

## CHAPTER 9

# Environmental Security

### 9.1 Emerging Environmental Security Issues

—Items identified between August 2002 and June 2010—

#### Monthly Environmental Scanning

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1. Executive Summary

2. Summarizing Environmental Security Monthly Scanning

Items Identified between August 2002-June 2010

Items Identified between July 2010-May 2011 (will open another file)

3. References

**Other Millennium Project studies related to environmental security included on this CD**  
(will open another file):

**9.2 Environmental Security: Emerging International Definitions, Perceptions,  
and Policy Considerations** (study conducted in 1997–1998)

**9.3 Environmental Security: United Nations Doctrine for Managing Environmental  
Issues in Military Actions** (study conducted in 1999–2000)

**9.4 Environmental Crimes in Military Actions and the International Criminal Court  
(ICC)—UN Perspectives** (study conducted in 2000–2001)

**9.5 Future International Environmental Security Issues and Potential Military  
Requirements over the period of 2010 to 2025** (study conducted in 2001–2002)

**6.2 Nanotechnology: Future Military Environmental Health Considerations**  
(study conducted in 2004–2005)

## FOREWORD

The purpose of the monthly environmental security scanning reports is to assess worldwide environment-related events in order to identify and analyze issues that might trigger future international environmental regulations and/or modifications to the existing ones with potential implications for the military.

The Millennium Project defines environmental security as environmental viability for life support, with three sub-elements:

- preventing or repairing military damage to the environment,
- preventing or responding to environmentally caused conflicts, and
- protecting the environment due to its inherent moral value.

This chapter presents a summary of the events and emerging environmental security-related issues organized around this definition.

Over the past several years, with support from the U.S. Army Environmental Policy Institute, the Millennium Project has been scanning a variety of sources to produce monthly reports on emerging environmental issues with potential security or treaty implications. About 2,500 items were identified since this work began in August 2002.

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*Key environmental and resource constraints, including health risks, climate change, water scarcity and increasing energy needs will further shape the future security environment in areas of concern to NATO and have the potential to significantly affect NATO planning and operations.*

*Active Engagement, Modern Defence.* Strategic Concept for the Defence and Security of the Members of the North Atlantic Treaty Organisation adopted by Heads of State and Government in Lisbon. 19 Nov. 2010

*While climate change alone does not cause conflict, it may act as an accelerant of instability or conflict, placing a burden to respond on civilian institutions and militaries around the world.*

2010 Quadrennial Defense Review  
United States Department of Defense

## 1. EXECUTIVE SUMMARY

Environmental security is increasingly dominating national and international agendas, shifting defense and geopolitical paradigms. Climate change and unconventional security issues—impervious to national sovereignty, ideology, and military power—are now recognized as top threats to peace, political stability, and prosperity. The role of environmental diplomacy is growing and environmental security–related concerns are becoming defining factors in international political and military negotiations.

The dynamics of security strategies are changed by the new circumstances and forecasts, demanding cooperation on non-traditional threats such as natural disasters; potential biological, nuclear, or chemical terror; water, food, and energy security; and increasing environmental and social problems, as well as the deepening gap between those who could cope with the effects of climate change and those who could not. These challenges are so complex and changing so fast that it is increasingly difficult to design realistic longterm strategies and impossible for any single nation to address them alone.

International law systems and organizations are adjusting to better support environmental security, from the protection and management of natural resources to liability for environmental damages. The ability to identify environmental threats and crimes has been strengthened by increasingly powerful detection and monitoring technologies and by environmental jurisprudence supported by improved enforcement mechanisms. Environmental damages that people and organizations got away with in the past are less likely to escape exposure and punishment in the future.

### **Preventing or Repairing Military Damage to the Environment**

Since conflict and environmental degradation exacerbate each other, their spectrum and severity could expand unless they are addressed together. Defense experts increasingly argue that environmental security should be on a par with and an integral part of conventional security. Including environmental factors in military actions gives strategic advantages in combat and postconflict operations, protects the health, safety, and security of the troops, and develops diplomatic relations and the confidence of local populations and neighboring countries, thus increasing any mission's success.

NATO's Strategic Concept for the next decade stipulates that the world's security environment and the organization's planning and operations will be increasingly shaped by key environmental and resource challenges such as climate change, water and food scarcity, and growing energy needs. The roadmap has been also updated to consider modern threats such as energy security, cyber attacks, and the security impacts of emerging technologies, along with and in the context of the spread of terrorism and extremist groups.

The U.S. Army's Strategy for the Environment and new special projects show military leadership in protecting the environment, increasing energy efficiency through procurement and operations, R&D centers of excellence, and the transfer of knowledge. The *National Security*

*Implications of Climate Change for U.S. Naval Forces* report by the National Research Council argues that climate change raises challenges to America's current naval capabilities, requiring serious changes to the design of their fleets, training, and ships' deployment.

Environmental factors are affecting both resource-scarce and resource-abundant countries. The most critical situation is in 40 or so fragile and conflict-affected states, where a growing young population compounded with scarce resources and unstable political systems deteriorate environmental security, further aggravating the vulnerability to violence.

The Global Peace Index 2011 shows that the world's peacefulness decreased for the third year in a row, mostly due to internal unrests rather than warfare between countries; the likelihood of terrorist attacks increased in 29 of 153 countries, while violent demonstrations increased in 33 countries. The cost of violence to the global economy was estimated to be over \$8.12 trillion in 2010. USAID notes that over the past 60 years, at least 40% of all interstate conflicts had a link to natural resources. UNEP reports that since the mid-twentieth century more than 90% of major armed conflicts took place in countries that contained biodiversity hotspots and over 80% occurred directly within a hotspot area, further threatening biodiversity. The Pacific Institute's Water Conflict Chronology Map identifies more than 100 conflicts over the past 20 years that were water-related. While conflicts involving natural resources are twice as likely to relapse in the five years following a peace agreement, UNEP notes that fewer than 25% of relevant peace agreements address environmental or resource aspects. The 2010 Environmental Performance Index reveals that most lower-ranked nations are also vulnerable states.

The UN Security Council's focus on the environment-security-development nexus is increasing, as several countries are urging that climate change be addressed as a global security threat, with issues ranging from loss of livelihoods and illegal exploitation of minerals to the impacts of climate change on national sovereignty.

The UN Convention to Combat Desertification suggests adopting the concept "securitize the ground" in order to create a wider global political awareness of the social, environmental, and economic consequences of desertification, land degradation, and drought.

Lawyers and human rights activists are assessing legal instruments for prosecuting the pillage of natural resources as a war crime. While from the trade of "conflict minerals" and to cases that use resulting revenue to fund armed conflict, concerns also include environmental degradation and social aspects. The most notorious situation is the Democratic Republic of the Congo, but other countries on the "watch list" include Brazil, China, India, Mexico, and Turkey. The U.S. Dodd-Frank Act (H.R. 4173) that became effective in April 2011 includes a clause requiring companies to report on their use of certain minerals from the DRC and neighboring countries, with noncompliance being fined.

In the eastern DRC, illegal timber logging and rare mineral extraction have historically fueled conflict. UN aid workers estimate that 890,000 people are internally displaced in the provinces, while security forces in the region have difficulty maintaining their peacekeeping mandate, which includes the protection of civilians and, by extension, control of natural resources through training and other military assistance to the government.

Defense officials in developing countries increasingly see security in terms of food and water security and natural disasters. Often, there might be a dilemma of allocation of forces and funds between traditional and environmental security. In 2010, Pakistan's defense budget rose by about 17%, to \$5.2 billion, while the July 2010 flooding that affected one-fifth of the country's land and about 20 million people, with a death toll of close to 2,000 and total economic loss of \$43 billion, arguably had a higher impact than anything the Taliban could accomplish.

Measuring Progress in Conflict Environments, a project developed by a consortium of organizations working in development, security, and policy, provides a framework for analyzing the peace progress during stabilization and reconstruction in order to identify the drivers that impede or facilitate the end of conflict. The system was tested in Afghanistan and Sudan and is currently being applied to crisis cases for further improvements.

Although Protocol 1 of the Geneva Conventions contains text protecting the natural environment, UNEP notes that there are no mechanisms in place to protect natural resources during armed conflict and no permanent international authority to monitor violations and to address liability and redress claims for environmental damage in those situations.

The Convention on Cluster Munitions entered into force in August 2010, two years after its adoption. It bans the use, production, and transfer of cluster munitions and sets deadlines for stockpile destruction and clearance of contaminated land, as well as prescribing responsibilities toward affected communities. As of mid-2011, a total of 57 countries had ratified and 108 had signed the convention. This sets a precedent on how a "coalition of the willing" can successfully lead to international regulations, and it might trigger similar negotiations and be emulated for other weapons.

The first Review Conference on the Rome Statute of the International Criminal Court added the criminalization of the use of certain weapons in non-international conflicts under Article 8 (paragraph 2, e) and includes poison, poisoned weapons, asphyxiating, poisonous or other gases and all analogous liquids, materials, or devices, as well as the use of bullets that expand or flatten in the body. It also reached agreement on the definition of the crime of aggression and the framework for the Court's jurisdiction over this type of crime.

UNEP recommends that the Permanent Court of Arbitration and its "Optional Rules for Conciliation of Disputes Relating to the Environment and/or Natural Resources" should be considered for addressing disputes related to environmental damage during armed conflict and that a summary report on the environmental impacts of armed conflicts should be presented annually to the UN General Assembly.

INTERPOL's 79<sup>th</sup> General Assembly resolution recommends that the world police organization form an Environmental Crime Committee. It underlines that since environmental crime is multidisciplinary in nature and not restricted by borders, it has to be addressed at the global level, with INTERPOL and the National Central Bureaus playing a leading role. INTERPOL also created a Radiological and Nuclear Terrorism Prevention Unit for expanding its current anti-terrorism activities to address chemical, biological, radiological, and nuclear threats.

Environmental degradation and hazardous ordnance leftovers in many post-conflict areas around the world threaten the livelihoods and health of current and future generations and may constitute an impediment for lasting peace. Leaking abandoned ordnance since World War II and dangerously high levels of heavy metals and other toxic chemicals related to military exercises are contaminating the oceans, endangering the marine ecosystem and human health.

The war in Libya makes it impossible for that country to meet the deadlines of May 2011 to destroy its cache of mustard gas and December 31 to eliminate its precursor agents, as requested by the Chemical Weapons Convention. Japan's nuclear and environmental disasters might further delay efforts to complete its obligations to dispose of the chemical munitions in China. The U.S. and Russia are also unlikely to meet the 2012 deadline for eliminating their respective stockpiles of chemical warfare materials. As of end of April 2011, the U.S. had destroyed about 86% of the warfare agents it held when the treaty entered into force in 1997, while Russia had destroyed about 49% of its stockpile as of February 2011, according to authoritative sources.

INTERPOL's Project Geiger database launched in 2005, developed in collaboration with the IAEA and other organizations, lists over 2,500 incidents linked to illegal radiological and nuclear trafficking. Meantime, with the entry into force of the Pelindaba Treaty for an African Nuclear-Weapon-Free Zone, nuclear weapons are being banned throughout the entire southern hemisphere. The new Strategic Arms Reduction Treaty was signed by the U.S. and Russia (together holding more than 90% of the world's nuclear weapons), requiring each to reduce their strategic nuclear arsenal, although critics note that the treaty does not address the disposal of the nuclear material contained in the weapons. The UN Security Council resolution aiming to advance global nuclear disarmament stipulates that noncompliance with the Nuclear Nonproliferation Treaty would be referred directly to the Security Council rather than to the IAEA.

While the chemical and nuclear weapons conventions have enforcement mechanisms, the Biological Weapons Convention does not, but negotiations continue. Meantime, the threats of bio-error and bio-terror increase. Developments in synthetic biology, cognitive science, nanotechnology, electromagnetic pulses, and other high-tech fields, combined with the availability of information and low-cost components needed to produce WMDs as well as the increase of terrorism and social unrest (often exacerbated by environmental factors), are increasing the threat of terrorism and single individuals who could use bioweapons to be massively destructive.

After land, sea, air, and space, cyberspace became the "fifth battlespace" on the agenda of security experts. Disruptions of critical infrastructure, such as water or electricity by cyberattacks in an IT-dependent world, call for new legal and policy frameworks. Cybersecurity challenges include cybercrime, cyberespionage and reconnaissance, and cyber-leveraged and information warfare. The EU will create a new cyber-defense unit that will pull together IT departments from the European Commission, Parliament, and Council to share intelligence and address attacks on all EU bodies. The U.S. has released its plan to protect the nation's cyber infrastructure, while the Pentagon's planned new strategy could qualify a cyber-attack from a foreign nation as an act of war that may result in military retaliation.

New technologies are offering unprecedented detection, cleanup, monitoring, and surveillance possibilities for environmental security. Intelligent battlefield robots will have elements of the rules of engagement and the Geneva Convention built into their programming. A NASA project tested the concept of “spiderbots” that can be placed into a hazardous environment to communicate among themselves and with the outside world, including satellites, to monitor an environmental situation. Ultra-sensitive portable chemical and biological devices offer increasing accuracy in detection, monitoring, and cleanup, with rapid response time.

### **Preventing or Responding to Environmentally Caused Conflicts**

The UN identifies five channels through which climate change can have security implications: impacts on livelihoods and vulnerable people, economic development, population migration and/or conflict over scarce resources, displacement of whole communities due to sea level rise and consequent statelessness, and access to internationally shared resources.

The WMO notes that 2001–10 was the warmest decade on record, with the global average temperature 0.46°C above the 1961–90 average. Meteorological organizations forecast that the intensity and frequency of extreme weather events will grow worldwide, and climate patterns are changing. By mid-2011, there were over 1,000 confirmed tornadoes in the U.S., causing an estimated 523 deaths (almost as much as the total for the previous 10 years).

According to the Centre for Research on the Epidemiology of Disasters, in 2010 there were 373 disasters registered, affecting 207 million people—89% out of whom were in Asia. In 2011, disasters had already caused more than \$300 billion in losses by May, almost the same as in all of 2010. The UN estimates that the amount of global wealth exposed to natural disasters risk has nearly tripled from \$525.7 billion 40 years ago to \$1.58 trillion today. The risk of economic losses in OECD countries due to floods has increased by 160% and for tropical cyclones by 262% over the past 30 years. Calling for improved adaptation policies and funding, officials forecast that for every \$1 invested in resilience and prevention, \$4–7 are saved in response.

A Humanitarian Emergency Response Review estimates that around 375 million people will be affected by climate-related disasters every year by 2015 and many more by other “rapid onset” emergencies and the impact of conflicts. Climate Risk Index 2011 by Germanwatch shows that developing countries are among the nations most affected by extreme weather.

The Social Conflict in Africa Database includes over 6,300 social conflict events for the period 1990–2009. The pattern reveals more social conflicts in years that were extremely wet or dry than in years of normal rainfall. The Food Security Risk Index 2010 reveals that the countries most at risk from shocks to food supplies are also among the countries with serious security problems. Rated at most “extreme risk” are Afghanistan, DRC, Burundi, Eritrea, Sudan, Ethiopia, Angola, Liberia, Chad, and Zimbabwe.

Turning around the increases in world food prices will become increasingly important for stability. World food prices have more than doubled since 1990. Oxfam predicts that the average cost of key crops could further increase by 120–180% by 2030. This may understate the severity,

since 16 factors that directly or indirectly increase food prices all look like they will be rising: population growth, rising affluence especially in India and China, diversion of corn for biofuels, soil erosion, aquifer depletion, the loss of cropland, falling water tables and water pollution, increasing fertilizer costs (rising prices for oil, phosphorus, and nitrogen), market speculation, diversion of water from rural to urban, increasing meat consumption, global food reserves at 25-year lows, climate change that increases droughts and desertification (in dry areas), flooding (in wet areas), melting mountain glaciers that reduce water flows, and eventually saltwater invading croplands.

While genetically engineered seeds adapted to a harsher climate could help increase yields, researchers warn that increasing corporate control over seeds is reducing the diversity of traditional seed varieties and traits that help farmers adapt to the effects of climate change, jeopardizing poor farmers' livelihoods and strongly influencing food prices.

The World Bank estimates that up to 30 million hectares (74 million acres) of farmland are lost each year due to severe degradation, conversion to industrial use, and urbanization. Additionally, large-scale land acquisitions in regions that are already food- and water-scarce, as well as the allocation of land to produce agrofuels rather than food, risk increasing poverty and social unrest. Within Africa's Sahel, a region of approximately 60 million inhabitants, extreme drought and unpredictable weather patterns continue to worsen food and water security and interregional migration.

If current trends continue, most glaciers in the mountains of tropical Africa will disappear by 2030, and those in the Pyrenees will be gone by 2050. Since 70% of fresh water is trapped in glaciers, once they are gone the situation for human survival will become critical. The *2011 Water Stress Index* reinforces that Africa and the Middle East, especially countries on the Persian-Arabian Gulf, are most vulnerable to serious water shortages, increasing the likelihood of resourcebased conflicts in these areas. The UN estimates that 18 of the 30 water-scarce nations will be in the Middle East and North Africa by 2025. The capital of Yemen is expected to run out of water much sooner.

Food and water issues are also considered to be exacerbating factors in the 2011 Arab Spring uprisings. The political turmoil could further affect living standards in the region, fueling tension in an already conflict-prone region. As the scope and spectrum of the protests expanded, energy security concerns around the world increased. Fear of extended interruptions in oil supplies from these countries rapidly drove up prices. Unreliable production and exports of oil from the region would cause greater demand on oil supplies from the North Sea and Africa.

The scale of the Japanese disasters (in a relatively well-prepared country) and the potential increase in the number and intensity of natural disasters around the world due to climate change trigger important reexaminations regarding preparedness and resilience, as well as the management of nuclear and other hazardous material. Political leaders are calling for a review of the IAEA's nuclear safety convention and for efforts to make the standards mandatory and enforceable, while restricting reactor construction in earthquake-prone areas. Many nations are changing their nuclear policies, with Germany and Switzerland now planning to completely phase out nuclear power.



Russia is building “ecological barriers” on its borders to reduce the impacts of future international disasters such as the oil spill in the Gulf of Mexico and the Fukushima nuclear disaster. A sensor network will monitor air and water pollution on the Russian borders, thus giving early warning of danger.

The annual demand for rare earth elements has skyrocketed over the last decade from 40,000 tons to 120,000 tons, and by 2014 this might increase to 200,000 tons, assuming green and IT technologies continue to increase. China, which controls over 90% of known rare earth supplies, has been gradually reducing export quotas since 2005 and might completely stop exports by 2012.

Disputes over deep-water oil territorial claims in the South China Sea and the Arctic are potential areas for conflict. The Arctic is warming faster than forecast, and human activities—from navigation to exploitation of natural resources—are increasing. The Seventh Ministerial Meeting of the Arctic Council, in May 2011, adopted the Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic, the first legally binding agreement negotiated by the Council.

A report by the Arctic Monitoring and Assessment Programme predicts that by 2100 sea level could rise 0.9–1.6 meters, depending on the rate of melting of the Arctic and Greenland’s ice sheets, while new research found that ice loss from Antarctica and Greenland has accelerated over the last 20 years and is occurring faster than models predicted. This puts in danger the very existence of small island states such as Kiribati, the Marshall Islands, and Tuvalu in the Pacific and the Maldives and Seychelles in the Indian Ocean. The President of Kiribati says that in the country’s outer islands the situation is already critical, as an increasing number of coastal villagers need to be relocated because of rising sea levels.

Experts are assessing existing formal and informal rules that would apply to shifting maritime baselines due to climate change. Such situations range from delimitation of maritime economic exploitation zones to the continued existence of some nations as legal and sovereign entities even if their entire population was forced to relocate elsewhere. Some potential options are updating UNCLOS with a concept of moving maritime baselines or making today’s baselines and boundaries of maritime zones permanent.

WMO is developing the concept of hydrometeorological security with a global framework for climate services for better integration of global observing, information systems, and disaster risk reduction.

### **Protecting the Environment Due to Its Inherent Moral Value**

UNEP asserts that an investment of 2% of global GDP per year in 10 key sectors could trigger “greener, smarter growth,” removing the inherent risks and crises associated with the current “brown economy” model, while investing about 1.25% of global GDP per year in energy efficiency and renewable energies could cut global primary energy demand by 9% in 2020 and close to 40% by 2050.

While there is general agreement that there are gaps in the current environmental governance system, views differ about potential solutions. Some countries favor creating a global policy organization with universal membership to manage the global environmental agenda, while others advocate a new specialized UN agency on the environment or argue for an umbrella organization on sustainability. However, there is general support for other broad reforms, such as setting up an all-encompassing global information network, establishing a tracking system on environmental finance, and enhancing UNEP presence within existing UN country offices.

There are more than 700 multilateral environmental agreements, and the focus of international negotiations is switching from designing new treaties to reinforcing existing ones and strengthening international environmental governance. Following the successful synergies developed among the three conventions on chemicals and waste—the Basel, Rotterdam, and Stockholm Conventions—a framework for coordination of all biodiversity-related MEAs and UN bodies is being created. Considering impediments, six conventions form a potentially manageable and coherent cluster: CBD, CITES, CMS, Ramsar, WHC, and ITPGRFA, while the CBD, UNFCCC, and UNCCD cluster would assure a better integration of biodiversity with climate change issues.

These synchronizations would improve global environmental governance by increasing coherence in decisionmaking and monitoring at international, regional, and national levels. Integration is also being initiated among regional regulations. For example, China, Japan, and South Korea have set a broad framework for adapting their chemical regulatory systems to the EU Registration, Evaluation, Authorization and Restriction of Chemicals (or REACH) system, and in May 2011 they decided to foster cooperation on non-traditional threats such as nuclear safety, disaster prevention, and food, energy, and environmental security.

Evaluation mechanisms of the effectiveness of agreements are improving, and increasingly powerful analytical tools are being created to compare national environmental status. New international watchdog bodies have emerged, and others are being proposed to assist legal action against environmental crimes. And indexes are being created to measure progress and assess policy efficiency or to set priorities.

There is a growing trend for an ecological democracy, with people demanding active participation in decisions that have ecological impact. The Protocol on Strategic Environmental Assessment to the UNECE Espoo Convention sets the legal framework for better integration of environmental and health assessments, as well as public participation in decisionmaking at the earliest stage of projects and programs. The Lima Declaration on mining calls on governments to enact measures limiting (or revoking) transnational companies' rights to mine on indigenous land without previous consultation with the indigenous people. It calls on the UN to declare indigenous peoples “the rightful owners since the ancient times of the soil, subsoil and natural resources” of their territories, and also attests indigenous people are “committed to instrumentalize the International Court of Justice Climate” and the “construction of a national and regional agenda for climate justice.”

Bolivia is preparing a draft UN treaty on the Rights of Mother Earth, similar to that on human

rights. The treaty aims to institute 11 rights protecting nature from human intervention, ranging from the right to clean water and air to unaltered vital cycles and equilibrium and the right to not be genetically modified. It builds on President Evo Morales's proposal in January 2010 for an international court for environmental crimes and the "Rights of Mother Earth," as well as a Bolivia-led UN resolution in 2009 that proclaimed April 22nd International Mother Earth Day.

An International Consortium on Combating Wildlife Crime was formed by INTERPOL, CITES, UNODC, the World Bank, and the World Customs Organization. It will improve coordination of the five organizations' work to curb wildlife crime, which is generally transnational and involves several types of criminal organizations.

The 2011–20 Strategic Plan for Biodiversity identifies 20 targets, including expanding the world's protected areas to include 17% of terrestrial surface and 10% of the marine surface; the restoring of a minimum 15% of ecosystems already degraded; and halving, or bringing as close as possible to zero, the rate of loss of the world's natural habitats. Supplementary new protocols to the CBD provide international rules and procedures for liability and redress related to living modified organisms, geoengineering, and use of genetic resources.

Although global agreement for a post-Kyoto treaty has not been achieved, more local progress is being made. China is drafting a national law dedicated to climate change and its latest Five-Year Plan (2011–15) is switching its focus from GDP quantity to sustainable quality. After the EC plan to increase energy efficiency by 20%, increase renewable energies to 20%, and reduce greenhouse gas emissions by 20% (20/20/20 plan), the Community put forward a "roadmap" for achieving a low-carbon economy by 2050 in the EU. The EU is also considering creating a "coalition of the willing" to continue the fight to reduce GHG emissions in the absence of an international treaty.

The emergence of nanotechnology and synthetic biology and the proliferation of personal electronics bring new international environmental security requirements. The International Organization for Standardization publishes a globally harmonized methodology for classifying nanomaterials. The EU is exploring how to include nanomaterials within the REACH context. Many research activities around the world are evaluating health and environmental implications of nanotechnology as well as mechanisms to reduce their negative impacts.

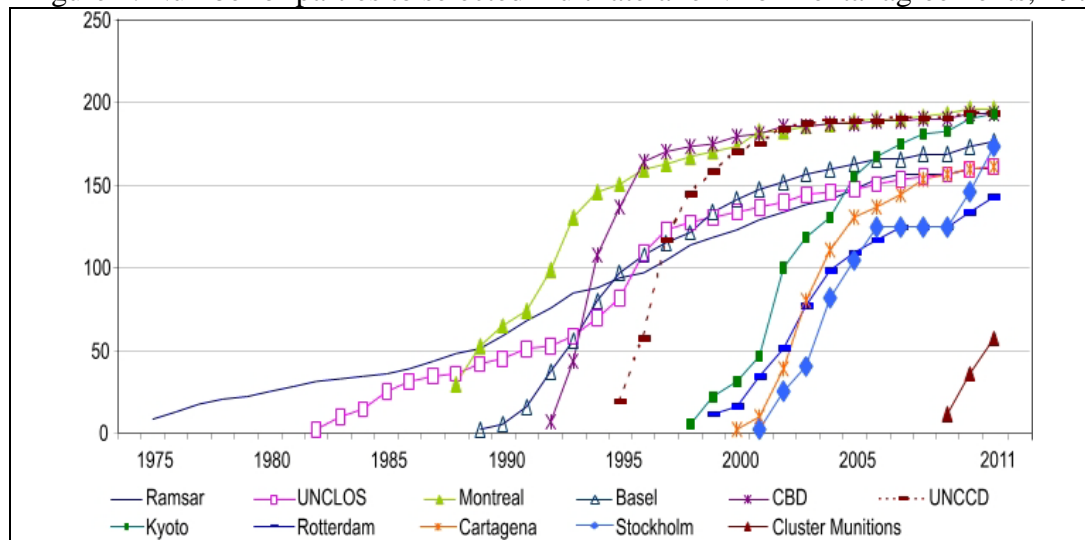
Since synthetic biology could one day be misused to create bioweapons and potentially even WMDs, international agreements to regulate this new technology seem both likely and warranted. The scale and scope of the expected future biological revolutions may one day require an international regulatory agency similar to the International Atomic Energy Agency.

Electronic waste is an extremely serious problem that is not getting adequate attention. It grows by 40 million tons a year around the world, and it is expected to rise dramatically in developing countries, which are vulnerable to illegal trafficking of hazardous waste unless regulations are strengthened and enforced. Computer waste in India alone is projected to grow by 500% by 2020 compared with 2007 levels. China, Brazil, and Mexico are also among the countries highly vulnerable to rising environmental damage and health problems from hazardous waste. Groundwater could be seriously polluted over many years from slow-motion seepage of toxic e-

waste. An exercise coordinated by the International Network for Environmental Compliance and Enforcement and the Seaport Environmental Security Network revealed that 54% of the 72 total targeted inspections showed infringements, mostly related to e-waste. The European Parliament has adopted amendments for strengthening the WEEE Directive on waste electrical and electronic equipment, further encouraging recovering and recycling.

In view of increased threats of conflicts triggered by environmental factors, enforcement of international multilateral agreements should be strengthened. Figure 1 reveals significant efforts on ratifications, but more is needed in the area of implementation of the regulations, as well as in developing a global environmental consciousness.

Figure 1. Number of parties to selected multilateral environmental agreements, 1975–2011



Source: MEAs' websites with compilation by The Millennium Project

Environmental security analysis should include the impacts of new kinds of weapons; asymmetrical conflicts and warfare; increasing demands on natural resources; urbanization (which makes more people dependent on vulnerable public utilities); environmental degradation and climate change; continued advances in environmental law, with escalating environmental litigations; and the globalization that is increasing interdependencies.

## 2. Summarizing Environmental Security Monthly Scanning

—August 2002–June 2010—

The purpose of this study is to assess worldwide environmental-related issues in order to identify and analyze events that might trigger future international environmental treaties, conventions, or protocols and/or modifications to the existing ones. About 1,200 items have been identified since August 2002 when the Millennium Project began this monthly scanning. The items are organized in this section by the three sub-elements of the environmental security definition:

- A. Preventing or repairing military damage to the environment
- B. Preventing or responding to environmentally caused conflicts
- C. Protecting the environment due to the moral value of the environment itself

### A. Preventing or repairing military damage to the environment

#### **ENVIRONMENTAL SECURITY RISES ON THE INTERNATIONAL POLITICAL AGENDA**

- UN to Shift Attention from Reaction to Prevention of Conflicts
- UN Secretary General Reiterates the Link between Environment and Security
- UN General Assembly Focuses Government Leaders on Climate Change
- UN General Assembly 61st Session Pinpoints Global Warming as a Central Issue for Security
- UN Conflict Prevention Strategy Includes Environmental Dimension
- Additional Environmental Security Role for the UN Security Council
- UK Initiates UN Security Council Debate on Climate Change and Security
- UN Security Council Adds Natural Resources Management and Environmental Issues to Future Peacekeeping Missions
- UN Panel Meeting on World Water Day to Discuss How to Avoid Water Wars
- UN Reform Report Stresses Environmental Issues
- UN Reforms in Development, Humanitarian Assistance, and Environment to be Proposed by High-Level Panel
- Human Security Proposed as Reorganizing Principle for the UN
- Environment and Security – The Role of the United Nations*
- Human and Environmental Security - An Agenda for Change
- UN Creates Peacebuilding Commission for Post-Conflict Situations
- UN Report Recommends Basis for Global Security Consensus
- UNU Institute for Environment and Human Security Founded (Bonn, Germany)
- UN Legal Counsel, Under-Secretary-General Hans Corell, Calls for more Focus on State of the Environment
- NATO Report on New Security Threats and Trends
- Briefings on Environmental Security at NATO Conference
- Pentagon's Quadrennial Defense Review Addresses Climate Change
- International Guidance on the Treatment of Individuals in War May Eventually Guild International Standards on the Treatment of the Environment in War

Environmental Courts and Tribunals Are Rapidly Increasing Around the World  
International Lawsuits for Environmental Crime Proliferate  
UNEP Year Book 2010 Addresses ‘warfare ecology’  
New Approach to Environmental Crime  
G8 and G20 Integrate Security and Environmental Issues in Development  
UNEP Conference Furthers Environmental Governance  
New UN Secretary-General Announced Climate Change a Top Priority  
UN Appoints Special Envoys for Climate Change  
UN Establishes the International Panel for Sustainable Resource Management  
Proposal for a UN Environmental Mediation Program  
Environmental Considerations Should be Included in Planning Military Operations  
Environmental Ministers Advance Global Consensus at UNEP Forum  
OSCE Adopts Ministerial Declaration on Environment and Security  
OSCE is Enhancing Environmental Security in Central Asia  
France Supports Brazil’s Permanent UN Security Council Seat to Promote  
Environmental Issues  
Environmental Security Issues Discussed at the G8 in Japan, July 2008  
OSCE-NATO Workshop on Environmental Security in the Mediterranean  
International Meetings Bring Environment and Security Closer Together  
Environmental Security Listed First in UNDP’s 2009 Arab Human Development Report  
First EU-Central Asia Security Forum Included Environmental Security  
UK Defence Ministry Highlights the Link between Environment and Security  
Conference on Future of the Dutch Military Includes Environmental Security as an Emerging  
Military Role  
Civil Society Regional Consultations Worldwide Prior to the Global Ministerial Environment Forum  
World Leaders Discuss Environmental Security Policies at Davos  
UK Scientists List 100 Most Vital Ecological Policy Questions  
Environment a Key Element in the First European 18-month Work Program  
The Institute for Environmental Security in The Hague to Hold Annual Peace and  
Sustainability Sessions  
French President Jacques Chirac issues Paris Call for Action for Global Ecological Governance  
Climate Change a Serious Threat to Security, Conclude Eminent Military Officers  
Report on Environment, Security, and Sustainable Development (by the Institute for  
Environmental Security)  
New Environmental Security Blog (Environmental Change and Security Program, WWC)  
Meeting of OECD Environment Ministers Calls for More Ambitious Policies to Meet the  
Environmental Targets  
UN Annual Treaty Event Produced 93 Actions from 32 Countries  
Conference on Environment, Security and Sustainable Development in The Hague  
World’s largest Environmental Forum to set priorities  
International Conference on Environment, Peace and the Dialogue among  
Civilizations and Cultures  
OSCE-UN Launches Environmental Security Initiative in Southern Caucasus  
ENVSEC to Expand Environmental Co-operation in South Caucasus  
Environmental Security stressed by World Islamic Forum for Dialogue for inclusion to  
proposed International Charter on Values for the United Nations

East Africa to Increase Environmental Security  
 Libya Initiates International Conference on Environmental Security for Seas and Oceans  
 Pacific Islands Forum Summit in October 2005  
 Environmental Role for Army Increasing  
 Former U.S. EPA Administrator Calls for US Leadership in Environmental Protection  
 U.S. Congressman Leach Calls for New Actions to Address Asian Environmental Security Problems  
 Somali Piracy is also an Eco-terrorism Threat  
 Environmental Security Focus of the Nobel Peace Prize for 2007  
 Gimcheon, South Korea to Create a Global Climate Change Situation Room  
 Branson calls for War Room on Climate Change at the United Nations  
 The Center for a New American Security Launched National Security Program  
 Reports Stressing the Link between Environment and Security

### **INTERNATIONAL TREATIES RELATED TO ENVIRONMENTAL SECURITY AND MILITARY ACTIONS**

Protocol V on Explosive Remnants of War (ERW) of the Convention on Certain  
 Conventional Weapons came into force on 12 November 2006  
 The Convention on Cluster Munitions Enters into Force on August 1, 2010  
 United States Bans Cluster Munitions Export  
 Assessment and Potential Revision of Resolution 1540 on Preventing WMD Terrorism  
 OSCE document on Stockpiles of Conventional Ammunition is a politically binding  
 international instrument that addresses risks arising from ammunition stockpiles  
 Changes to War Crimes Proposed for the International Criminal Court  
 Increased Calls for Banning Nonlethal Riot-control Agents  
 Ocean Dumping of Chemical Weapons might be addressed by international agreements  
 UN Nuclear Terrorism Convention Entered into Force on July 7, 2007  
 UN Security Council Resolution on the Comprehensive Nuclear Test Ban Treaty  
 Global Zero, a New Initiative for Promoting Global Nuclear Disarmament  
 Entire Southern Hemisphere Covered by Nuclear-Free Zone Treaties  
 Belgian Senate to Consider Nuclear-Weapon Ban  
 European Parliament Passed Resolution Calling for Global Ban of DU Weapons  
 Chemical Weapons Convention Gets New Boost  
 Meeting of Experts to Strengthen a Global Ban on Biological Weapons  
 NATO Creating a special chemical, biological, radiological, and nuclear (CBRN) unit  
 U.N. Monitoring, Inspection and Verification Commission (UNMOVIC) might become a  
 permanent agency to investigate biological and missile programs worldwide  
 Agent Orange study may spur chemical bans and new claims  
 EU Chemical Policy Reforms' Supporters Ask US Government not to undermine their Efforts  
 Nuclear-Free Zones

### **CONFLICT AND POST-CONFLICT ENVIRONMENTAL SECURITY ISSUES**

UN Secretary-General on the International Day for Preventing the Exploitation of the  
 Environment in War and Armed Conflict  
 Environmental Destruction during War Aggravates Instability  
 UN Designates November 6th as International Day for Conflict and the Environment  
 Geneva Convention for Environment  
 UNEP may establish a new Secretariat on Environment and Conflict

UNEP's Post-conflict Environmental Assessment may one day get extended to ongoing  
 Environmental Assessments  
 Collateral Damages Caused by Attacks Need to be Redefined  
 New Resolution on Victims' International Human Rights  
 New UN Peacebuilding Commission to Improve Post-Conflict Planning  
 UN Secretary-General, Kofi Annan, Calls for Updated Laws against Environmental  
 Damage in War  
 UN Mission Assessment of Gaza Conflict Included Environmental Impacts  
 New Legal Proceeding over Allegations of Use of Illegal Weapons in Iraq  
 UNEP Post-Conflict Assessment Chairman's input to UN's High-Level Panel on Threats,  
 Challenges, and Change, the Environmental Change and a New Environmental Security  
 Project at the Woodrow Wilson Center  
*Protecting the environment during armed conflict. An inventory and analysis of international law*  
 Conference on Disarmament unable to agree on work program  
 Sunk Weapons Represent a Growing Health and Environmental Hazard  
 OSCE Security Forum Urges Destruction of Thousands of Tons of Dangerous  
 Ammunition and Weapons  
 OECD and the Republic of Georgia signed an agreement to eliminate or recycle leftover  
 munitions dumps on former military bases.  
 OSCE-UN launches Environmental Security Initiative in Southern Caucasus  
 International Crisis Group to Debate Considering Climate Change Variable in Conflicts  
 Australia Claims First Complete Cleanup of an Atomic Bomb Test Site  
 Controversy over the impacts of depleted uranium  
 Health Threats from Open Waste Pits in Conflict Zones Trigger Regulation  
 Sustainable Development and Conflict  
 Governance is Key to Post-conflict Environmental Future Says UNEP Report on Afghanistan  
 Environment and Security Initiative Progress Report 2006 (Central Asia and Caucasus)  
 Pressure mounts for increased funds and better techniques for de-mining  
 Liability for World War II land mines in Egypt  
 Environmental Change and Security 12th Annual Report—Focus on Africa  
 Environmental Aspects of the Darfur Conflict  
 Environment to Get Crucial Role in Sudan's Future Peace and Prosperity Strategy  
 Disputes over Oil Might Reignite Congo-Uganda Conflict  
 UN to Demand Israel Pay Lebanon Compensations for War Damages  
 UN to Conduct Post-Conflict Environmental Assessment in Gaza  
 Hezbollah-Israeli War Threatens an Already Precarious Environment  
 Report on Lebanon After-war Environmental Assessment  
 Israeli Trench Raises Environmental Concerns  
 UNEP Desk Study on the Environment in Iraq  
 UN to Help Tackle Iraq Pollution  
 Gulf Environmental Group Planned  
 Conclusions on Health and Environmental Impact of 1990-1991 Gulf War  
 Iraq Marshlands to be Restored  
 Iraqi Environmental Harm in Kuwait Invasion Greater than Thought  
 Danger of Unexploded Ordnance in Basra Area  
 Crimes Against the Environment considered on the list of War Crimes against Saddam



Hussein

Environmental Viability for Life Support is Increasingly Critical in the Palestinian Occupied Territories

Liability for World War II warships in the Pacific

Effects of Poison Gas Used in WWII by Japan

Japanese Chemical Weapons Cleaning in China Yet to be Completed

Discussions over World War II Japanese Warfare Program in China not Settled Yet

Military Introduction of Tree Pathogen in Italy

## **NATIONAL AND REGIONAL INITIATIVES AFFECTING MILITARY ACTIVITIES**

Sustainable Development Strategies

North American Environmental Security Action Plan

The Disputes over the Northern Territories Set to Continue

U.S. Created Committee to Address Climate Change and Energy Security Issues

U.S. Policy Shift May Improve International Environmental Security

First U.S. National Health Security Plan Released

U.K.'s Military Technology Plan Includes Alternative Energy

NASA-Like Agency to Achieve a 10-Year Environmental Goal Proposed

New Canadian Strategies for Monitoring the Northwest Passage

Canada, Mexico, and the USA Met to Strengthen Regional Environmental Regulations

Russian Focus on Environmental Security

Russian Military Exercise to Include Environmental Issues

President Putin Cites Environmental Security as Key Criterion for Caspian Energy Projects

Russia to Boost Its Space Security Program

EU and US to Cooperate on Environmental Research

EU Energy and Climate Change Policy

European Energy Security Strategies

European Commission's New Low-carbon 20/20/20 by 2020 Energy Plan

Norway Proposal to Ban Gasoline-only New Cars by 2015

European Temporary Committee on Climate Change to Begin Operations in May 2007

To Join the EU, Balkan Countries Should Increase Environmental Efforts

New Construction on Mediterranean Coastlines to be Banned

UK Defense Ministry released its first Sustainable Development Report

UK to Establish an Independent Climate Committee

France Could Add Teeth to the Kyoto Protocol

EU, Latin American and Caribbean Countries Environment Cooperation

Argentina Redeploys Military to Defend Water and Oil

Ecuador Gets an Environmentalist Foreign Minister

Uganda to Create an Environmental Police Unit

East African Environmental Projects to Fight Crime and Link Journalists

Iran and Iraq Sign Environment Protection Agreement

Iran and Qatar Sign Environmental MOU

Morocco Adopts First National Earth Charter in the Arab World and Africa

Jordan Armed Forces Upgrade, Part of Global Warming Debate

Israel to Participate in UNEP and UN HABITAT

Waste Disposal a Matter of Discord or Cooperation between Palestine and Israel

Gulf Cooperation Council Elevates Priority of Environmental Protection  
Pan-African Parliament Upgrades Environmental Policy  
Nigerian Government Resolves to Push Effective Environmental Enforcement  
Indian Military Upgrades its Counter-WMD Strategies  
New Norwegian Emergency Force Set Up  
The Environmental Dimension of Asian Security  
Asia-Pacific Should Intensify Green Growth Efforts  
Korean Environmental Groups Request Release of U.S. Base Data  
UNEP and South Korea to Help North Korea's Environmental Management  
Asian New Strategy to Improve Health and Environment  
Thailand, Other Asian Countries, May Tighten Environmental Regulations  
Japan Sets up e-Waste Collection Locations to Recycle Rare Metals  
South Korea Adopts a Green Growth Policy and Influences Next G-20 Meeting  
Climate Change Issues May Have Determined Australian Election  
Environment and Security Program in the East-Caspian Region  
Environmental security among top three priorities in Australia-China talks  
China May Restructure Environmental Effort  
China's Five-Year Plan Increases Attention to Environmental Protection  
China to Create an Emergency Environmental Management System  
China's Energy Conditions and Policies—White Paper  
China's New Ministry of Environmental Protection  
China Calls for Enhanced Cooperation on Environmental Protection in Northeast Asia  
China's Climate Change and S&T Action Plan  
China to Invest \$175 Billion in Environmental Protection over Five Years  
China Creates 11 Independent Environmental "Watchdog" Centers  
China's President Hu Ordered Environmental Regulations for Military Activities  
Chinese Research Priorities for the Next Fifteen Years  
Asia and Pacific Countries Adopt Declarations on the Environment  
UK Cooperation with India and Others on the Environment and Sustainable Development  
India Drafting New National Environment Policy  
Environmental Courts Established in the Philippines  
Maldives to Become World's First Carbon Neutral Country in 10 Years  
Tuvalu to use only renewable energy by 2020  
US-Uruguay Treaty on S&T Cooperation

#### **TECHNOLOGICAL BREAKTHROUGHS WITH ENVIRONMENTAL SECURITY IMPLICATIONS**

Computer Technology and Robotics  
New Detection and Cleanup Techniques  
Counter Bioterrorism or Pandemic Technologies  
Promising Environmental-friendly Technologies  
Early warning systems  
Space Technology  
Technologies that Could Trigger New Forms of Arms Race

## **B. Preventing or Responding to Environmentally Caused Conflicts**

### **SECURITY IMPLICATIONS OF ENVIRONMENTAL ASPECTS**

Global Security linked to Climate Change  
 Seven Tipping Elements That Could Transform the Planetary Systems  
 National Security Implications of Global Climate Change Through 2030  
*Global Trends 2025: A Transformed World*  
 International Conference on Military's Role in Climate Change  
 Economic and Security Implications of Climate Change  
 International Conferences Put Climate Change among Top Security Issues  
 Increased Role of the Military in Environment-related Crises  
 Climate Change Triggers Redrawing Swiss-Italian Borders  
 Climate Change Impacts Assessment on U.S. National Security  
 Security Implication of Climate Change to the EU  
 Monopoly over Rare Earth Elements Raises Security and Environmental Concerns  
 Improved Governance Needed for Reducing Risks of Environmental Disaster  
 Developing Countries Most Affected by Global Warming  
 Indigenous Peoples Highly Vulnerable to Climate Change  
 Human Ecological Footprint Increasing Each Year  
 Earth's Biodiversity Decline Increasing  
 Threats and Strategies for Addressing Climate Change in the Middle-East  
 Arab Mediterranean Governments' Environmental Security Cooperation  
 Yemen's Internal Conflicts Are Water-Induced  
 Water and Environmental Research Center to Be Established in UAE  
 Kyrgyzstan's Deforestation Threatens Central Asia's Security  
 Indian and Chinese Assessments of Climate Change Consequences  
 The Haiti Earthquake Disaster Could Stimulate Improved Resilience Planning  
 The Arctic Debate  
 Greenland Moving Towards Independence  
 Greenland Conference on Global Warming  
 Disputes over Polar Regions Expands  
 Environmental Performance Index 2010 Score Worse for Vulnerable States  
 Global Climate Risk Index 2008  
 Tools for Addressing Humanity's Growing Ecological Footprint  
 miniAtlas of Human Security  
 Reports addressing the Link between Climate Change and Conflict  
 Twenty Years of Environmental Security  
 Global Environment Outlook (GEO-4)  
 UNEP Year Books  
*State of the World Reports*  
*Living Planet Report 2006*  
*Global Risk 2007, the World Economic Forum*  
*World in Transition –Climate Change as a Security Risk*  
*Six places in the world where climate change could cause political turmoil*  
*An Uncertain Future: Law Enforcement, National Security and Climate Change*

*World Resources 2005--The Wealth of the Poor: Managing Ecosystems to Fight Poverty*  
Environmental Change and Security Program 11th Report  
New Report Summarizes Pacific Environmental Threats and Solutions  
*Climate Change: A New Threat to Middle East Security*

### **NATURAL DISASTERS**

New 2009 Terminology on Disaster Risk Reduction  
Scientific evidences and potential consequences  
Natural Disasters as an Environmental Security Issue  
Worldwatch Institute: Assessing the Relation between Disasters and Conflict  
Fourth Assessment Report Climate Change 2007  
Adaptation and Vulnerability Report by the IPCC  
Human Footprint on Earth Ecosystem at Critical Stage  
Joint Science Academies' Statement on Climate Change  
*Millennium Ecosystem Assessment Reports*  
Dust and Climate Change  
New Developments for Addressing Natural Disasters  
ICSU Launched Global Disaster Research Program  
New UN Office Using Space Technology to Assist Mitigation of Disasters  
Google to Support Development of Early Warning System in Vulnerable Regions

### **MIGRATION TRIGGERED BY ENVIRONMENTAL CAUSES**

Progress on Defining Environmental Refugees  
New Strategies Needed to Deal with Global Displacement and Migration  
Climate Change Refugees Trends  
Environmental Degradation Causes More Refugees than War and Politics  
UNU Calls for International Framework for Environmental Refugees  
UN Establishes New Agency for Internally Displaced People  
Implications of Environmental Migration to National Security  
Environmental Refugees Cyberseminar Revealed the Difficulty of Defining  
Environmental Refugees  
Desertification Triggering Migration  
Population and Resources Affecting the Risk of Conflict  
South Asian environmental migration  
Rising Sea Level Triggers Rising Refugee Move

### **SEA LEVEL RISE**

Scientific evidences and possible consequences  
Rising Concerns over Rising Seas  
Void in High Seas and Coastal Governance  
Coastline Erosion due to Rising Sea Waters Signaled Around the World  
Small Low-laying Island States in Jeopardy  
First People Displaced Due to Rising Sea Levels  
Small Island States Adopt Position on Addressing Climate Change  
UN Conference on Small Island States and Climate Change

## **MELTING SEA ICE AND GLACCIERS**

- Scientific evidences and possible consequences
- Arctic Debate
- Arctic Observing Integrated Network
- International assessment of Arctic pollution triggers Action Plan
- Mission to Study Arctic Environmental Changes
- Disputes over Polar Regions Expands
- International Polar Year 2007-2008
- Stricter Measures to Protect Polar Regions Expected
- First Species declared Endangered Due to Global Warming

## **FOOD AND FRESHWATER**

- Climate Change and Access to Water Addressed as Human Rights
- Food Scarcity Issues
  - Trends and Regional Aspects
  - Population Trends and Environmental Impact
  - Grain Harvest Shortfalls may drive conflicts in areas already unstable
  - Sustainable Development and Conflict
  - Joint Afro-Arab Strategy for Addressing Agricultural Development and Food Security
  - Food Crisis in Southern Africa and Horn of Africa
  - Food Security Observatory Proposed for Sahel-Saharan Region
  - Food Security Summit Usefulness Debatable
  - FAO Launched New Crisis Management Centre
  - OSCE Environmental Security Conference Focuses on Land and Water
  - Dossier about Drylands and Desertification Launched by Scidev.Net
  - Asia's Progress Jeopardized by Environmental Degradation
  - Biodiversity for Food Security was the Theme of 2004 World Food Day

### **Freshwater**

- Freshwater Scarcity Issues and Regional Aspects
- Water to be Considered Integral Part to Copenhagen Negotiations
- Unless Water Management Improves, Conflicts over Water Are Inevitable
- Prospects for Conflict over Water Rise in Several Regions
- International Agreements Are Needed for 158 International Freshwater Basins
- Global Plan to Address Freshwater Supplies Negotiated
- Water Poverty Index
- Tools for Improving Water, Sanitation and Hygiene
- Improved Database for Stormwater Best Management Practices
- Central Asian Water Security Tensions Continue
- Project to Address the Aral Sea Disaster
- EC Proposal for Water Pricing
- Addressing Potential Business-related Water Scarcity Issues
- Consultative Group on International Agricultural Research (CGIAR) initiates
  - Program to Fight Water Shortages
- Singapore's New Institute of Water Policy
- European Water Pollutants List Delayed One Year

Decade *Water for Life* Launched  
International Year of Freshwater, 2003  
Reports on Water-related Issues  
Water Forums

## HEALTH

Climate Change Consequences, Trends, and Actions  
UNEP Report Warns of Increasing Changes in Infectious Disease Patterns due to Environmental Encroachments  
World Health Organization: Stress Environmental Impact on Human Health  
WHO Launched Website on Environmental Health in Emergencies  
WHO Report 2007 Addresses Global Health Security Threats  
Environment and Human Health Integration  
World Network of Regional CDC-like Organizations Proposed  
CDC launches the National Environmental Public Health Tracking Network  
Global Health Security Initiative Upgrades Its Strategic Policy Process  
Proposed Global Early Warning System for Monitoring Pandemics  
A Community Guide to Environmental Health Available for Liaison Activities  
WHO-sponsored pandemic flu task force holds first meeting in Geneva  
International Response to Contain Influenza A(H1N1) Outbreak  
Global Influenza Pandemic Declared  
Avian Influenza  
Two Viral Diseases Lie in Wait  
The Threat of Pandemic Influenza: Are We Ready?--Workshop Summary (2005)  
Europe Embarks on Environment and Health Action Plan  
New UN Office Using Space Technology to Assist Mitigation of Disasters  
Antigenic Maps Help Trace Development of Diseases  
Google to Support Development of Early Warning System in Vulnerable Regions  
Nationwide Health Information Network Could Help in Environmental Emergencies  
Climate Change Impact on Human Health  
Study Shows Deforestation Brings Malaria Epidemics

## ENERGY SECURITY

New International Renewable Energy Agency Opens in January  
An International Energy and Environmental Security Foresight Network  
Energy and Environmental Security Increasingly Addressed Together  
Suggestions for Addressing Energy and National Security  
Trends of Energy Use in IEA Countries  
*World Energy Outlook 2008*  
EU Energy and Climate Change Policy  
Energy Security Challenges for the 21<sup>st</sup> Century  
*World Energy Outlook 2006* Warns on Energy Security and Environmental Implications of Increasing Energy Demands  
*World Energy Outlook 2005* -- Middle East and North Africa Insights  
Energy and Security: Toward a New Foreign Policy Strategy

North American Trilateral Agreement for Energy Security and the Environment  
Increasing Oil Demand in China and India Raise Security Concerns  
China's Climate Change and S&T Action Plan  
Energy Security Central to China's Energy Plan  
European Action Plan on Energy Efficiency

**PREVENTION AND ADAPTATION**

Adaptation Needs and Actions  
Better Disaster Planning to Avoid Environmental Catastrophes  
New Flood Center to Develop Warning Systems  
OSCE Workshop on Environmental Risks and Security in Earthquake Areas  
Indigenous Peoples Demand More Involvement in Environmental Policies  
UN and Governments of Latin America and the Caribbean Met to Improve Disaster Anticipation and Response System  
UK Calls for Worldwide Action for Addressing Global Warming  
UN Framework Convention on Climate Change Conference  
A Sample of Counter Global Warming Activists around the World  
Nordic Countries Suggest Actions to Cope with Global Warming  
EU Climate Change Policy  
European Adaptability to Climate Change is Questioned  
Asia-Pacific to Increase Responses to Climate Change  
East Asia and Climate Change  
International Early Warning Programme to Begin Operations  
Indian Ocean Tsunami Warning System  
UN Tsunami Early Warning Systems Extended to Mediterranean, Northeast Atlantic  
China to Launch Climate Adaptation Program  
U.S. Climate Change Science Program Progress Assessment  
Calls for recommitment on ten-year anniversary of U.N. Framework Convention on Climate Change  
Conference on Resilience Concepts for Large-Scale Disasters

**OTHER POTENTIAL NATURAL DISASTERS**

NASA Scientist Warns of Possible Severe Solar EMPs in 2013  
Solar Storm Could Wipe Out Power Grid  
Experts Call For Global Network to Prevent Asteroid Disasters

**CLIMATE CHANGE COMPUTER MODELING AND SCENARIOS**

## **C. Protecting the Environment Due to Its Inherent Moral Value**

### **ENVIRONMENTAL SECURITY-RELATED INTERNATIONAL REGULATIONS THAT HAVE BEEN OR ARE CLOSE TO COMING INTO FORCE SINCE AUGUST 2002**

#### **Access to Information and Liability**

Rotterdam Convention on the Prior Informed Consent (PIC)  
Protocol on Strategic Environmental Assessment (SEA)  
Aarhus Convention  
Kiev Protocol to Aarhus Convention Enters into Force in October 2009  
European Environmental Liability Directive Came Into Force in April 2007  
EU Polluter Pays Bill

#### **Air Pollution**

Geneva Convention on Long-range Transboundary Air Pollution (sixth protocol)—  
Persistent Organic Pollutants (POPs)  
Gothenburg Protocol on Air Pollution  
EU New Directive on Air Pollution  
EPA Proposes Tougher Air-Quality Rules  
UN Economic Commission for Europe Adopts Electric and Hybrid Vehicle Regulations  
Spain Promotes European Common Strategy on Electric Cars  
EU Airline Carbon Trading to Start in 2011—a Year Earlier than Planned  
ASEAN Agreement on Transboundary Haze Pollution  
Europe to Reduce Fluorinated Gas Emissions  
European Parliament Passed the Fine Particles Air Quality Directive

#### **Aquatic Environment**

##### Freshwater

EU to Introduce New Regulations to Combat Surface Waters Pollution  
European Parliament Approves New Water Quality Standards Directive  
Protocol on Shared Watercourse Systems  
European Transboundary Guidance on Water and Adaptation to Climate Change  
EPA Issues New Regulations on Water Pollution from Construction

##### Marine Environment

UN General Assembly Adopts Resolutions on Marine Protection  
“Roving” Marine Protected Areas as Climate Change Affects Migration  
IMO Sets New Limits on Ship Fuel Pollution  
Tougher Global Limits Imposed on Air Pollution from Large Ships  
UN Treaty on Maritime Goods Transportation Opened for Signature  
IMO Adopts New Convention on Ships' Ballast Water  
Protocol to the Convention on the Prevention of Marine Pollution by Dumping of  
Wastes and Other Matter entered into force on March 24, 2006  
New International Agreement on Recycling of Ships  
EU Integrated Maritime Policy  
European Directive on Ship-Source Pollution Became Effective on April 1, 2007



European Parliament Passed the Marine Strategy Directive  
 EU Waste Shipment Legislation Came into Force in July 2007  
 Anti-Fouling Systems on Ships Convention to Enter into Force in September 2008  
 Single-hull Oil Tanker Phase-out  
 Proposals to the EU to Cut Sulfur Emissions from Ships  
 Oil Spill Fines Increase  
 Political Agreement Reached on the European Marine Strategy Directive  
 European Parliament Resolution to Protect Whales from Sonar  
 Commercial Whaling Ban Strengthened by International Whaling Commission (IWC)  
 Shipwrecks Removal Treaty Received First Signature  
 South-west Pacific Islands Might “Localize” Environment-protection Legislation  
 Marine Protection to Increase  
 Marine Protected Areas  
 IMO Establishes First “Mandatory Area to be Avoided” in New Zealand  
 World Database on Marine Protected Areas  
 French create 90-mile Mediterranean Ecological Zone  
 Micronesian Nations Sign Coral Reef Protection Document  
 Coral Triangle May Get Regional Protection

### **Biological Diversity and Safety**

Cartagena Protocol on Biosafety  
 UN Convention on Biodiversity  
 International Body to Monitor Biodiversity Destruction  
 Plant Genetic Resources for Food and Agriculture—FAO International Treaty  
 Intensified Efforts Needed to Save Biodiversity  
 Protected Sites and Species  
 World Parks Congress Adopts Conservation Accord  
 International Year of Deserts and Desertification—2006

### **Chemicals and other Hazardous Compounds**

Montreal Protocol (on chemicals that damage the ozone layer)  
 Stockholm Convention on Persistent Organic Pollutants  
 Rotterdam Convention on PIC for Certain Hazardous Chemicals and Pesticides in  
     International Trade to be expanded  
 Global Classification and Labeling System for Chemicals  
 Intergovernmental Forum on Chemical Safety becomes part of the International  
     Conference on Chemicals Management  
 REACH Program, Europe’s Chemical Regulations Entered into Force on June 1, 2007  
 EU Updates the REACH System, and WEEE and RoHS Directives  
 EU Restrictions on Nanofoods Expected to Pass in July 2010  
 Canada Increases Chemicals Control  
 Agreement on International Carriage of Dangerous Goods by Inland Waterways (ADN)  
     Closer to Entry into Force  
 Protocol on Heavy Metals  
 Ban on Mercury  
 EU to Ban the use of Cadmium in Batteries  
 France Bans 30 Pesticide Components  
 Increasing BPA Restrictions

Restrictions on Plastic Bags Expanding

**Forests Management**

Agreement to Protect the World's Forests Adopted  
Sixth UN Forum on Forests Agrees to Multi-Year Work Plan  
International Alliance of Forest Peoples  
Rights of Forest Peoples Need to Be Observed in Anti-deforestation Efforts  
African Rain Forest Protection—International Treaty signed in February 2005

**Greenhouse Gas Emissions**

Kyoto Protocol  
Carbon Trading Scheme  
EU Greenhouse Gas Emission Trading Scheme (EU ETS)  
World's Mayors Sign Municipal Version of the Kyoto Protocol  
Australia Cuts Sulfur Content in Transport Fuels

**Energy**

International Renewable Energy Agency Statute Enters into Force on 8 July 2010

**Health (pandemics)**

World Health Assembly adopts new International Health Regulations  
UN Upgrades Early Warning System for Health and Terror Alerts  
EU New Law to Control Bird Flu Epidemics

**Mountains**

Carpathian Convention Comes Into Force, January 2006  
Prospective International Agreements for Mountain Regions

**Waste Management**

Waste Reduction and Recycling Regulations and Laws Spreading Around the World  
Waste Export Regulations Revised and Tightened  
E-waste Management Directive Came into Effect on August 13, 2005  
EC's WEEE Directive Goes into Effect in UK in July 2007  
EU New Strategy on Waste Recycling  
EU Batteries Directive Entered into Force  
China Issues Electronic Waste Rules  
India Further Loosens Already Lax Rules on Waste Importing

**Weapons-related**

UN Convention against Nuclear Terrorism  
Chemical Weapon Disposal Continues to Pose Threat  
Preventing Terrorist Access to Weapons of Mass Destruction—UN resolution  
Sweden Initiates New Commission to Cooperate with the UN to Reduce Proliferation of Weapons of Mass Destruction  
New European Union Law Controls Radioactive Sources  
OSCE Document on Stockpiles of Conventional Ammunition  
Protocol on Prohibitions or Restrictions on the Use and Transfer of Mines Other Than Anti-Personnel Mines (MOTAPM)

Protocol V on Explosive Remnants of War (ERW) of the Convention on Certain Conventional Weapons came into force on 12 November 2006

## **PROPOSED TREATIES AND/OR CHANGES TO EXISTING ONES**

### **Air Pollution**

Vienna Convention for the Protection of the Ozone Layer and the Montreal Protocol on Substances that Deplete the Ozone Layer  
Call for Expanding Montreal Protocol on Ozone-Depleting Substances  
EU Thematic Strategy on Air Pollution for the CAFE Programme  
Vehicle Emissions in Europe  
Trans-boundary Pollution Regulations Need Better Enforcement  
Clean Air for Europe Initiative to Limit Air Pollution  
2007—The International Year of the Ozone Layer

### **Aquatic Environment**

#### Freshwater

A New Step Toward Preventing Water Wars  
Draft Agreement for Management of International Aquifers

#### Marine Environment

Could large-scale ocean zoning prevent conflicts?  
Increased Protection Needed for the Marine Environment  
Proliferation of Sensors in and on Oceans Requires an International Legal Framework, but Might Affect Freedom to Conduct Ocean Research  
Better Planning Needed for Maritime, Especially Coastal, Areas  
Factors to Consider in Establishing and Operating Marine Protected Areas  
International Conference and Assessments Find Rising Ocean Pollution  
Marine Biodiversity Protection Regulations Need Improvement  
Tougher Law of the Sea Regulations Suggested for Marine Genetic Resources  
Shipping to Face New Regulations to Reduce Air Pollution  
U.S. and Canada to Control Air Emissions from Ships  
London Convention Might be Expanded to Include Ocean-based Geoengineering  
Deep Seas and Open Oceans Need Urgent Conservation Actions  
Ocean/Sea 'Dead Zones' was Focus of UNEP Governing Council/Global Ministerial Environment Forum with 158 Nations  
Improved Cooperation among International Organizations to Fight Marine Pollution  
Could large-scale ocean zoning prevent conflicts?  
Maritime Workers Security  
U.S. Commission on Ocean Policy Emphasizes Ecosystem-Based Management  
Europe to Harmonize Marine Pollution Legislation  
Europe looks to maritime rules after tanker spill  
International Maritime Organization (IMO) and EU collaborate on oil spill prevention  
Transport Canada Proposes New Vessel Operation Regulations  
EPA Plan for Reducing Ship Emissions  
The U.S. Might Ratify the Law of the Sea  
Malacca Straits Need Increased Protection from Various Security Threats

Network of Marine Educators Formed to Protect Pacific  
Website for Marine Protected Areas and Cetaceans' Sanctuaries  
Network of Marine Protection Areas to be adopted by 2012  
New Baltic Sea Action Plan Based on Ecosystem Approach  
Whales' Protection Efforts Increasing  
Scientists Say Dolphins Should Be Treated As 'Non-Human Persons'  
Coalition Urges UN to Consider Legislation to Curb Harmful Ocean Sounds  
Measures Needed to Quiet Underwater Noise  
UNU Report Urges the Need for a New Treaty on Deep-Sea Research  
Greenpeace Calls for Oceans Natural Reserves  
Plastic Threats to the Marine Environment  
Growing Marine Litter Increasingly Threatens Marine Ecosystems

## **Biological Diversity and Safety**

### Biodiversity

New Measures to Continue the Fight against Biodiversity Loss  
International Year of Biodiversity is 2010 and Convention on Biological Diversity  
COP10 to Meet in Japan This Year

### Biosecurity

Cartagena Protocol on Biosafety—Second Working Group on Liability and Redress  
Biological Weapons Convention (BWC) Meeting Improves International Resilience  
Systems to Address Infectious Disease and BioWeapons  
No Enforcement Mechanism Proposed for Strengthening the Bioweapons Treaty Due  
to “rapidly changing nature” of the Threat  
Genetic Patenting and GMO Face New Challenges  
Synthetic Biology and Calls for Global Regulations

## **Chemical Safety**

Call for Reinforcements to Chemical Safety  
Chemicals Management to Address Emerging Technologies-related Issues  
New International Strategy for Chemicals Management and 9th Special Session of the  
UNEP Governing Council  
Micro-reactors Challenge Chemical Weapons Convention Effectiveness  
International agreement needed to insure laboratory bio-safety and uniformity in  
biosafety standards and application or compliance requirements  
New Strategic Approach to International Chemicals Management (SAICM) launched to  
address the widening gap among countries in following chemical safety policies  
Stockholm Convention on POPs to be expanded  
Asian Countries to Adapt their Chemicals Regulatory Systems to EU REACH System  
New Chemicals Considered for Toxic Lists  
New Substances Identified as Harmful to Human Health and the Environment  
U.S. to Revise the Toxic Substances Control Act  
U.S. New Measures on Chemicals Safety  
California Proposes Reducing the Level of Chromium 6 in Water  
Canada Extends Toxic Substances Lists

Toxic Compound Detected in Chlorinated Tap Water  
Environmental Effects from Flame Retardant Manufacturing Impurities  
Ultrathin Solar Panels Could End Up On the EU list of Hazardous Materials, Due to Cadmium Content  
Building Contaminants Linked to Parking Lots with Coal Tar Sealant  
Organophosphate Flame Retardants May Pose Health Risk  
New Evidence on Silver Toxicity  
EU to Ban the use of Cadmium in Batteries  
Call for Global Ban on Lead-based Paints  
WHO Project to Minimize Risks of Radon  
Reactive Nitrogen Beginning To Be Recognized As Environmental Hazard  
Methyl Bromide a Continuing International Concern  
Possible Risk with Bisphenol A Receiving Increased Attention  
Vanishing Supply of World's Helium Calls for Conservation  
Canadian Chemical Plan May Go beyond REACH as Environmentalists Get New Political Support  
Bottled Water Becomes Target of Environmentalists  
Insecticide Ingredient Deet May Be a Neurotoxin

### **Greenhouse Gas Emissions**

Post-Kyoto Protocol and Post-Copenhagen Negotiations  
Regulations Might be Needed for New Greenhouse Gases  
Reducing GHG Emissions Using the Montreal Protocol and other Regulatory Systems  
Aviation and Shipping should be Subject to Emissions Cuts  
Aviation to be included in the EU Emissions Trading System from 2012  
Airline Group Supports Including Aviation in Global Emissions Trading Scheme  
Draft International Standards for Measuring Greenhouse Gas Emissions for Cities National and Regional Initiatives  
New Zealand Adopts Carbon Trading Scheme in 2009  
EU Potential New Measures For Reducing CO<sub>2</sub> Emissions  
France Proposes Carbon Tax Across EU and on Imports  
British Group Outlines Plan for Zero Emissions by 2030  
China and U.S. Announce Climate Change Goals  
China Adopting Pollution Tax Systems  
New Jersey Ports Pushing for Toxic Diesels Ban

### **Energy Saving**

Ban on Incandescent Light Bulbs Expands  
Compact Fluorescent Light Bulbs (CFLs) May Surge to Fore  
European Lamp Companies Push Compact Fluorescents, as Does the EU  
EU to Set Higher Targets for Cuts in Energy Consumption  
European Commission's New Low-carbon 20/20/20 by 2020 Energy Plan

### **New Technologies**

New Regulations Needed for Emerging Technologies  
Geo-engineering Promises/Threatens  
Nanotechnology

Biotechnology  
Computer Technology and Cyberspace  
Space Technology

### **Nuclear Safety**

Nuclear Nonproliferation Treaty Review Conference Adopted Document for  
Reducing Nuclear Threat  
Progress on the Nuclear-Test-Ban Treaty  
Support for Total Ban on Nuclear Weapons Increases  
Advancements on Non-proliferation and Nuclear Disarmament  
IAEA Director's Recommendations to Improve Nuclear Safety  
IAEA Database Recorded 1,562 Nuclear Trafficking Incidents for the Period 1993–2008  
International Norms Led by IAEA Are Needed to Stop Smuggling of Nuclear Materials  
and Nuclear Proliferation  
Advancements in Setting the Agenda for the 2010 NPT Review  
Importance of Nuclear Weapon Disarmament Reiterated by UN

### **Waste Management**

Toxic Waste Disposal of Global Growing Concern  
Organized Crime Targets Electronic Waste Recycling  
Renewed Calls for Strengthening E-Waste Management Regulations  
Global Environmentally Sound E-waste Disposal System is Needed  
European Parliament Proposes Tougher Waste Management Strategy  
European Union Regulations for Curbing Biowaste  
Basel Convention Needs Revision and Update  
Basel Convention on Hazardous Wastes to be Made More Effective  
Central Asian Nations to Create Regulatory Frameworks for Reducing Nuclear and  
Toxic Waste Threat  
UN E-Waste Forum and Basel Convention's Conference of Parties  
EU Vote on Revision of Waste Directive  
EU Pollution Prevention Strategy to Focus on Recycling of Waste  
Higher Targets for Packaging Recycling and Recovery  
Firm regulations for perchlorates, a component in rocket fuel, are needed  
Medications Disposal

### **Weapons-related**

Increased Efforts Needed to Counter the Proliferation of Weapons of Mass Destruction  
Chemical Weapons Convention Gets New Boost  
Strengthening Biological Weapons Convention  
International Convention on Cluster Munitions Adopted by 111 Countries

### **IMPROVED ENFORCEMENT OF ENVIRONMENTAL REGULATIONS**

Likelihood of Climate Lawsuits Increasing  
First Simultaneous ExCOPs for Improving MEAs' Synergies and Coordination  
New UN-linked Body Proposed to Protect Biodiversity and Ecosystem Services  
UK Could Seize Planes to Enforce European Emissions Trading Scheme  
Central Asian Nations to Create Regulatory Frameworks for Reducing Nuclear and  
Toxic Waste Threat

Environmental Testing  
 EU to Introduce New Environmental Index  
 European Commission Creates New Directorate-General for Climate Action  
 Calendar with Environmental Deadlines Compliance  
 UNU Inter-linkages initiative  
 UNU to discuss global integration of environmental assessments  
 Improving Environmental Governance, UNU Reports  
 International Conference on Environmental Compliance and Enforcement  
 Improving Effectiveness of Multilateral Environmental Agreements  
 Environmental Performance Index to Help Improve Policymaking  
 First International Research Center for “Creeping” Environmental Issues  
 East African Projects to Fight Environmental Crime and Link Journalists  
 Conviction in Transborder Electromagnetic Pollution Case  
 Developing countries’ compliance with environmental regulations is expected  
 to improve via new modes of international assistance  
 IAEA to Improve Nuclear Security in 35 Countries  
 IAEA Nuclear Terror Prevention Guide  
 Comprehensive Test Ban Treaty Organization to be Restructured  
 The UN Security Council Increased its Role in Preventing Terrorist Access to  
 Weapons of Mass Destruction  
 Problems with Destruction of Chemical Weapons and Potential Proliferation  
 Progress in the Elimination of Chemical Weapons Stockpiles  
 Biological Weapons Convention Enforcement  
 Overview of Explosive Remnants of War Protocol  
 Improved Cooperation Among International Organizations to Fight Marine Pollution  
 Global Map of Human Impacts to Marine Ecosystems  
 New Measure to Enforce Maritime Environmental Protection  
 Observation and Information System for the World's Oceans to be Created  
 Water Footprint Measuring System  
 New Air Quality Evaluation Tool  
 World Bank Development Indicators Database Available Free  
 Kyoto/Climate Change Enforcement  
 OECD Environment Ministers Call for more Ambitious Policies  
 New Mechanisms for Enforcing Biosafety and Biological Diversity Treaties  
 European Environmental Liability Directive Came Into Force  
 Environmental Damage to Be Criminalized in the EU  
 EC Enforces Compliance with EU Environmental Regulations  
 EC Legislation Reform First Targets Environment-related Rules  
 European Commission Enforces Environmental Pollution Legislation  
 EU Starts Legal Action Against Member States on Breaches of Environmental Law  
 EU to Increase Environmental Regulations Enforcement  
 EC Enforces Compliance of National Legislation with EU Environmental Regulations  
 EC Reports EU Environmental Law Enforcement by EU Members is Poor  
 EU Parliamentary Committee Moves to Strengthen Air Pollution Laws  
 Aarhus Convention Implementation Strategies  
 European Network for the Implementation and Enforcement of Environmental Law

(IMPEL) increases its role and plans to develop enforcement indicators  
 UK Suggests Environmental Court similar to Australia and New Zealand  
 E-waste Directives to be Enforced in the UK  
 New UK Chemical Data Base for Regulatory Compliance (for REACH)  
 Denmark to Sue EU Over Annuling Flame Retardant Ban  
 North America's Commission for Environmental Cooperation to Increase Enforcement  
 of Environmental Regulations and Public Participation  
 North America's CEC Ministerial Statement  
 States to Sue the Energy Producers Over Global Warming  
 North American Environmental Atlas Online  
 CEC: Future Directions under the Commission for Environmental Cooperation Sound  
 Management of Chemicals Initiative  
 A new Biodefense Agency within the Office of the Secretary of the U.S. Department of  
 Defense suggested by the Institute of Medicine and the National Research Council  
 ASEAN Seeks East Asia's Cooperation on Environmental Issues  
 Asian Regional Forum on Combating Environmental Crime Formed  
 Southwest Pacific Islands Might "Localize" Environment-protection Legislation  
 International environmental law—one of the topics on the agenda of the 2003  
 International Bar Association Meeting  
 China's Emergency Response Law to Punish Falsifying Environmental Information  
 Indonesian Navy to Tighten Security in Sea Border Areas  
 United Arab Emirates Establish Nuclear Agency  
 Taiwan Cracking Down on Environmental Violators  
 Vietnam Cracking Down on Environmental Violators  
 Preparatory Process Started for the EfE 6th Ministerial Conference  
 Consumer's Handbook for Reducing Solid Waste  
 Summary of European Battery Regulations Released  
 Space Technology for Environmental Regulations Enforcement

#### **INTERNATIONAL STANDARDS WITH ENVIRONMENTAL SECURITY IMPLICATIONS**

New Standard-setting Instruments Adopted at UNESCO's General Conference  
 More than 30 New International Food Safety Standards Adopted  
 Software Standards to Connect Data Globally  
 Emerging International Packaging Standards to Reduce Environmental Footprints  
 International S&T Information System Proposed  
 New Standards for Handling Robotic Environmental Equipment  
 Chemical Emission Certification Extended to Electronic Devices  
 UNESCO Draft Declaration on Bioethics and Human Rights  
 New ISO Standard on Sustainable Building  
 OECD Strengthens Environmental Standards for Companies Bidding on Contracts to  
 Build Civil Infrastructure Projects around the World  
 Only Very Low-Energy Buildings to Be Built in EU after 2020  
 NAFTA is reviewing its Environmental Side Accord  
 Green Standards to Counter E-waste  
 More than 30 New International Food Safety Standards Adopted  
 ASTM Issues Standard Terminology for Nanotechnology



ANSI to Carry Out Survey on Needs for Nanotech Standards  
ISO to Establish Standardization in the Field of Nanotechnologies  
China Creates World's First National Standards for Nanotechnology

## **SAFETY ISSUES**

### Chemical and Biological safety issues

Some Chemical and Biosecurity Issues  
Half of Transported European Hazardous Waste Could Be Illegal—How Much More Elsewhere?  
Toxicogenomics Risk Assessment  
Organized Crime Targets Electronic Waste Recycling  
*Human Biomonitoring for Environmental Chemicals*  
Scientific Community's Questions Concerning Biodefense Standards  
Proceedings of the Workshop 'Risk, Uncertainty and Decision Analysis for Environmental Security and Non-chemical Stressors'  
World network of regional CDC-like organizations proposed for combating the effects of bioterrorism  
Soviet-Era Anti-plague Institutes Still Pose Environmental Threat  
Russia to Destroy All Chemical Weapons Arsenal by 2012  
Japanese Chemical Weapons Cleaning in China Yet to be Completed  
EU and Japan Respond to Risks from Low Dose Chemicals  
Citation Statistics May Reveal Covert Weapons Work  
Chemical Munitions on San José Island, Panama

### Bioterrorism and Epidemics Threats

Terrorists Could Tap Pharmaceutical Toxins  
African Countries are Vulnerable to Bioterrorism  
UN Report Recommends New Powers to Combat Bioterrorism and Epidemics  
Interpol Warns World Unprepared for an Eventual Bio-terrorist Attack  
New NAS Website on Biosecurity  
Bioterrorism Via Smuggled Ebola-contaminated Bushmeat from Africa  
Russia No Longer Funding Bioterrorism Countermeasures Research  
Bioterrorism, Preparedness, Attack and Response Report

### Nuclear Safety

IAEA Director Warns on Continuous Nuclear Safety Issues  
New Recommendations for Reducing Nuclear Risk  
Nuclear Security Addressable only Internationally  
International Nuclear Safety Regime Review  
Nuclear Theft, Smuggling, and Sabotage Countermeasures  
UN Agency to Intensify Tracking of Illicit Nuclear Trafficking  
SIPRI Year Book 2007 Points out Environmental, Nuclear, and Energy Threats  
Reports Addressing Nuclear Safety  
Multilateral Approach Needed To Keep Nuclear Arms from Terrorists  
Increasing Calls for Improved Management of Nuclear Materials and Nonproliferation  
Increasing Nuclear Safety and Security  
IAEA Annual Report for 2004

Non-Proliferation Treaty Deadlock Continues  
 Australia to Propose Panel to Advance Work for the NPT Review in 2010  
 Nuclear-Free Zones  
 U.S. and Allies Should Change Priorities, Says New Book on Terrorism  
 Russia Accepts London Convention on Dumping of Radioactive Wastes  
 A Single set of International Standards is proposed for Nuclear Power Plants from  
 Design to Decommissioning  
 Reducing Proliferation Risks by Converting 60 High- to Low-Enriched Uranium  
 Research Reactors Could Take 10 Years  
 Safeguarding radioactive materials is inadequate  
 Nuclear safety during conflicts  
 Nuclear Safety—groundbreaking resolutions adopted by the IAEA General Conference  
 ranging from establishing nuclear-weapon-free-zones to nuclear material storage  
 and transportation  
 Tightened nuclear security needed to overcome ‘Dirty Bombs’  
 Commercial radioactive components recognized as “dirty bomb” hazard  
 FDA Approves Dirty Bomb Antidotes  
 Increased funds for study of Long-term effects of atomic radiation  
 New European Union law controls radioactive sources  
 Proposed EU legal nuclear safety standards was blocked by five countries asking that  
 the two draft laws be downgraded into non-binding instruments  
 UN Conference on Disarmament 2003 Session  
 Russia signs treaty to track nuclear waste  
 Russian Submarines Dismantlement an International Concern  
 Russia’s Floating Nuclear Plants Pose International Security Risk  
 Revival of Nuclear Power in Asia Poses Security Concerns  
 China to Control NBC and Missile Exports, Possibly Join MTCR  
 International Cooperation to Address Radioactive Waste Emergent Disaster in  
 Central Asia  
 UN Investigators Warn of Illegal Uranium Mining in DRC  
 Israeli Dimona Nuclear Reactor  
 Small Disposable Nuclear Power Plants Raise Environmental Concerns

#### Potential Health Threats of Some New Technologies

Nanotechnology  
 Electromagnetic Fields  
 Underwater Sounds from Human Sources Endangering Marine Life  
 International Convention for the Evaluation of New Technologies needed  
 Publication of Data Dangerous to the Environment  
 Toxicogenomic Technologies and Risk Assessment of Environmental Carcinogens: A  
 Workshop Summary  
 Leading cancer specialists call for REACH Strengthening  
 Genetically Modified Organisms (GMO) Issues  
 Chemicals could be the Cause of ‘Gulf Syndrome’  
 China’s ASAT Test Created Serious Long-Range Low-Earth Orbital Pollution  
 Geo-engineering Promises/Threatens Major Consequences  
 Japanese Asbestos Claims

Phthalates May Trigger Lupus  
Personal Computer Dust Health Implications

## **POLLUTION**

Greenhouse Gas on the Rise  
China to Pass U.S. in CO<sub>2</sub> Emissions this Year Making U.S. and China Target for  
Changing Climate Change Policies  
Polluted Skies and Global Warming Puzzle Decoded  
Ozone Hole Worst Ever Recorded  
New Predictions for the Atmosphere by 2030  
Burning Fossil Fuels Acidifies Oceans, Erodes Coral Reefs  
The Oil Spill Likely to Initiate International Regulations Discussions and Accelerate  
Alternative Energy Developments  
New Research Finds Human Energy Usage is a Long-Term Heating Problem  
Independent of Greenhouse Gases and Solar Radiation  
Pollutants Travel Globally  
Health Impacts of Fuels  
Safe Toxin Levels Unknown  
Drug Metabolites Identified in Wastewater—Removal Possible  
Microplastics Recognized as Environmental Threat to Oceans  
Dechlorane Plus® Detected in Atmosphere  
Accelerating Environmental Health Crises in China  
Repeated Spills in China Threaten Human Health and the Environment  
North American Report on Children's Health and Environment Indicators  
EPA Warnings on Various Potential Health Hazards  
Studies Show Increased Hazards from Some Types of Airborne Particles  
Health Hazards from “Environment-friendly” Reusable Bags  
Possibly Tainted Imported Drywall Raises Health Fears  
Low-fume Paint Requirements Spread  
Study Reveals Extensive Danger from Lead in Foreign Paints  
European Environment Agency Draws First Map of Europe’s Noise Exposure  
Greenhouse Gas Emissions Increase Ocean Noise Pollution

## **OTHER ENVIRONMENT-RELATED PROTECTION MEASURES**

Desertification Synthesis (Millennium Ecosystem Assessment 3)  
Ecosystems & Human Well-being: Wetlands & Water Synthesis  
Ecosystems and Human Well-being: Health Synthesis  
New International Financial Alliance to Support Biodiversity  
GMO Debate Continues  
FAO calls for an international framework for GM trees  
GM Crops Created Superweed  
European environment - State and outlooks 2005  
Europe 2005: The Ecological Footprint  
Mediterranean Threatened by Development Pressures, Says *Blue Plan Report*  
Europe to Redouble Efforts to Stabilize Biodiversity by 2010

World's Largest Environmental Forum to Set Priorities  
The Little Green Data Book, 2005  
New Zealand's Largest Environmental Management Forum  
Brazil launches Project Drake to counter biopiracy  
Experts Call For Global Network to Prevent Asteroid Disasters  
Solar Storm Could Wipe Out Power Grid

#### **NEW ORGANIZATIONS WITH MANDATES WITH EVENTUAL ES IMPLICATIONS**

Global Facility for Disaster Reduction and Recovery to Mitigate Impact of Natural Disasters  
FAO Launched New Crisis Management Centre  
WHO-sponsored pandemic flu task force holds first meeting in Geneva  
UN Creates Secretariat of the Global Bioenergy Partnership at FAO  
'3R'—Reduce, Reuse and Recycle New Environmental Think Tank for Asia  
Asian Consortium on Non-traditional Security Issues  
UN StEP Initiative for Reducing E-Waste  
World's First Academy of Environmental Law  
UN to Enhance Eco-Development Procedures  
Interpol Creates Global Information Center to Combat Bioterror Threat  
Carpathian Mountain office of the United Nations Environment Programme  
Russian Green Party Formally Organized  
China Climate Change Organization Formed  
Liberia's First Environment Center Opened  
European Green Diplomacy Network  
European Chemicals Agency created under the REACH program  
European Space Policy Institute founded  
New Regional Environmental Offices in Asia to Strengthen Environmental Protection  
Network of Environment Centres in Central Asia  
Regional Environmental Center for Central and Eastern Europe

#### **NEW INITIATIVES AIMING TO INCREASE ECO-EFFICIENCY**

Global Investment Road Map for a Transition to a Greener Economy Launched by UNEP  
Green Economy a Solution for Addressing the Global Economic Crises  
Global Fuel Economy Initiative Aims to Increase Cars' Fuel Efficiency 50% by 2050  
Corporate CEOs Pledge Actions on Climate Change at UN Global Compact Summit  
Global Trends in Sustainable Energy Investment 2007  
Renewable Energy Projects May Face New Scrutiny  
US EPA recommendations for Green Infrastructure  
Green Un-building Becomes Major Environmental Goal  
EU-US Joint Energy-Efficiency Standards for Office Equipment  
Green Information Technology is forecasted as 2008 Top IT Strategy  
State of Green Business 2008  
New "Green IT" Software under Development  
Energy/Performance Benchmark for Workstations under Development  
New Environmentally Friendly City in UAE Offers Cooperation Opportunity  
Switching to Green: A renewable energy guide for office and retail companies  
*Cleantech Report*<sup>TM</sup> by Lux Research

Idle Nighttime Computers Cited as Energy Wasters  
Efforts for Increasing Corporate Eco-responsibility  
UN Envisaging a Treaty for Multinational Corporations  
Climate Change Dialogue Initiative Launched  
Second Australia-New Zealand Climate Change and Business Conference  
Two Global Alliances for “Greener” Buildings Around the World  
UNEP and 150 Labor Unions Agree on Environmental Objectives  
Prospects for Hydrogen and Fuel Cells  
The Future of Technology Assessment  
UK Analysis of Current Green Energy Options  
Renewables 2005: Global Status Report  
Target 2020: Policies and Measures to Reduce Greenhouse Gas Emissions in the EU  
New REN21 Report Links Renewable Energy to Climate Change Solutions  
China and India Sign Precedent-Setting Energy Agreement  
Chinese Popular and Government Support for Environmental Concerns  
Chinese Automobile Industry’s Potential Environmental Emphases  
New Israeli Venture Capital Fund for "Clean Tech" Enterprises  
Green Buildings in North America Project Started  
Global Greenhouse Gas Register  
UNCTAD Manual for the Preparers and Users of Eco-efficiency Indicators  
European Pollutant Emission Register (EPER)  
UNECE Catalogue of Environmental Networks and Data Sources for EECCA  
Online Database of Sustainable Consumption Initiatives in North America Launched

## **A. Preventing or repairing military damage to the environment**

### **ENVIRONMENTAL SECURITY RISES ON THE INTERNATIONAL POLITICAL AGENDA**

#### **UN to Shift Attention from Reaction to Prevention of Conflicts**

The UN Security Council agreed that the UN should improve its capacity to prevent conflicts rather than just react after the conflicts have occurred. To move from a culture of ‘reaction’ to one of effective ‘prevention,’ more UN resources should be focused to identify possible causes of conflict and set up potential conflict detection systems, to promote preventive action in response to threats to international peace and security. Thus, efforts should increase to address the root causes of conflicts, develop early warning systems, mediate disputes, and coordinate efforts of UN bodies, regional organizations and others trying to prevent wars. Along the same lines, in fragile post-conflict countries, peacebuilding should be focused on issues that are potential causes for relapsing into conflict. Over the past five years, the UN has spent \$18 billion on peacekeeping operations but has not devoted similar resources to conflict prevention. [See also *UN Conflict Prevention Strategy Includes Environmental Dimension* in August 2006 and *UN Security Council Adds Natural Resources Management and Environmental Issues to Future Peacekeeping Missions* in June 2007 environmental security reports]

Meantime, the International Policing Advisory Council (IPAC), which held a 2-day meeting in Canberra, Australia, highlighted the unprecedented global demand for UN peacekeepers and police officers, and stressed the importance of better cooperation with the UN to prevent and face conflict-related challenges. (August 2007, Ref. 1)

#### **UN Secretary General Reiterates the Link between Environment and Security**

On the International Day for Preventing the Exploitation of the Environment in War and Armed Conflict, celebrated on November 6, UN Secretary General Ban Ki-moon renewed the call for “protecting the environment as a pillar of our work for peace.” Reiterating that “The environment and natural resources are crucial in consolidating peace within and between war-torn societies,” he gave the example of the transboundary cooperation in the Great Lakes Region of Africa to manage their shared natural resources, and underlined that lasting peace in war-torn regions like Darfur and Afghanistan is not possible without restoration of the ecosystem to support livelihoods. He noted that although “The natural environment enjoys protection under Protocol 1 of the Geneva Conventions... this protection is often violated during war and armed conflict.” [See also *UN Secretary-General on the International Day for Preventing the Exploitation of the Environment in War and Armed Conflict* in October 2007 environmental security reports] (November 2008) Ref. 2

#### **UN General Assembly Focuses Government Leaders on Climate Change**

The theme of the 62nd session of the UN General Assembly was “Responding to Climate Change.” Speeches by heads of state and governments talked about climate change, rising sea levels, droughts and floods—as issues in themselves, but also as related to poverty and social problems, and ultimately to global security. There was again mention of strengthening the UNEP by transforming it into a UN Environmental Organization. This annual General Assembly was

preceded by a high-level meeting convened by the UN Secretary General focusing specifically on climate change and actions to address it. Prior to this meeting was the annual UN-NGO conference that also focused on climate change. These meetings demonstrated a near consensus that urgent action is necessary, and that the UN Framework for Climate Change is the appropriate forum for discussions. The President of the UN General Assembly is preparing to create a Global Compact on Climate Change tentatively planned for release in early 2008 from which many agreements could flow. All of this focuses on the next high-level meeting on climate change to be held in December, in Bali, Indonesia. (September 2007, Ref3)

### **UN General Assembly 61st Session Pinpoints Global Warming as a Central Issue for Security**

Tackling climate change and environmental degradation were mentioned at par with terrorism, fair trade, HIV/AIDS, and human rights as essential issues to be addressed by global action by world leaders at the UN General Assembly, September 2006 Session 19-29. Since the small island developing states are particularly vulnerable to the impacts of global warming and sea level rise, they reiterated the call for renewable energy, a global fund to support these efforts, recognition of the “polluter pays” principle, and the placement of climate change in the center of development considerations. Some declared that the impacts of climate change are the most serious threat to global security. (September 2006) Ref. 4

### **UN Conflict Prevention Strategy Includes Environmental Dimension**

UN Secretary-General Kofi Annan’s Progress report on the prevention of armed conflict is an in-depth review of UN capacities to help prevent crises from escalating into armed conflicts; it outlines a wide range of recommendations to strengthen the UN’s conflict-prevention capacity around the world. Environmental factors are mentioned several times in this 54-page document; e.g., “Environmental degradation has the potential to destabilize already conflict-prone regions, especially when compounded by inequitable access or politicization of access to scarce resources.” (par. 22) The report will be submitted for discussion to the General Assembly on September 7, 2006. (August 2006) Ref. 5

### **Additional Environmental Security Role for the UN Security Council**

Klaus Toepfer, Executive Director of UNEP, said that the restructuring of the UN Security Council might be necessary to address the environment-conflict nexus more efficiently. He stated, “One of the options being discussed is to create a subdivision under the Security Council that focuses on environment-related security concerns.” (October 2004) Ref. 6

### **UK Initiates UN Security Council Debate on Climate Change and Security**

Britain’s foreign secretary argued that future climate change might cause wars: “An unstable climate will exacerbate some of the core drivers of conflict, such as migratory pressures and competition for resources,” and hence it is a matter for the UN Security Council to address. About 50 nations urged the UK to take the issue to the Council. During the debate on April 17, 2007, China argued against this position along with Russia, Qatar, Indonesia, and South Africa, saying that the Security Council is the wrong forum to discuss this and act on climate change-related issues. On behalf of 130 developing nations, Pakistan argued that the issue should be a matter for the UN General Assembly since it was a more democratic institution than the Council. [Yet it is the Council not the Assembly that can authorize peacekeeping forces.] Secretary-

General Ban Ki-moon, acknowledging, “issues of energy and climate change can have implications for peace and security,” called for a “long-term global response” and noted, “this Council has a role to play in working with other competent intergovernmental bodies to address the possible root causes of conflict discussed.” The US supported the development of alternative fuels, energy efficiency, and other voluntary approaches that did not affect economic growth. The EU, Peru, Panama, and Papua New Guinea (head of the Pacific small island states), were among the supporters of the initiative. “The dangers that the small island states and their populations face are no less serious than those nations threatened by guns and bombs,” stated Ambassador Robert Guba Aisi of Papua New Guinea. (April 2007) Ref. 7

#### Britain to Push on Adding Climate Change to Security Council Agenda

Britain intends to put climate change on the UN Security Council agenda in April—when it assumes the presidency. The intention is to stress that climate change is a matter of international security—from disputes over diminishing natural resources to mass migrations that could exacerbate conflicts. AIDS was similarly put on the Security Council agenda in 2001 and had positive results. Britain began lobbying the other 14 Security Council member states but seems to meet resistance from countries such as the U.S., China, and South Africa. (March 2007) Ref. 8

#### **UN Security Council Adds Natural Resources Management and Environmental Issues to Future Peacekeeping Missions**

A Security Council session dedicated to assessing the link between natural resources and conflict concluded that efforts should increase to improve natural resources management—mainly in failed or vulnerable states—so that their use contributes to post-conflict recovery, rather than fueling conflict. Monitoring and certification systems similar to the Kimberley Process Certification Scheme—concerning “conflict diamonds”—should be developed or emulated to stop illegal exploitation of resources, which triggers, exacerbates, or maintains conflict. The Council report added: In the case of peacekeeping and peacebuilding, the Council should ensure that the root causes of conflicts and the role of resources as a contributing factor were addressed in peace agreements as a way of ensuring that countries did not relapse into the vicious cycle of conflict. Therefore, in order to be more successful, peacekeeping operations should include an environmental and natural resources management dimension. (June 2007) Ref. 9

#### UN Report on the Role of Natural Resources in Conflict and Peacebuilding

The report “From Conflict to Peacebuilding – The Role of Natural Resources and the Environment”, co-authored by IISD and UNEP, assesses the linkages among environment, conflict, and peacebuilding. It notes that since 1990 at least 18 violent conflicts have been driven by factors related to natural resources and/or environmental degradation. Over 40% of intra-state wars are linked to the exploitation of natural resources. These situations are twice as likely to return to conflicts or become “re-wars” within the first five years. Unfortunately, fewer than 25% of relevant peace agreements address the environmental or resource aspects. The report analyzes 13 case studies including Afghanistan, Darfur, Sierra Leone, Kosovo, and Gaza. (February 2009) Ref. 10

#### **UN Panel Meeting on World Water Day to Discuss How to Avoid Water Wars**

The UN General Assembly held a high-level dialogue on World Water Day with three panels on: water related to the Millennium Development Goals; water, climate change and disasters;



and water and peace and security. Since potential water wars could be triggered by combinations of climate change, population growth, rapid urbanization, and increasing inequalities between those who could and could not cope with water scarcity, several participants suggested that greater efforts by the international community to promote dialogues for equitable and sustainable use and management of transboundary rivers, lakes and aquifers are needed. It was also suggested that water issues be included on the agenda of the next session of the Conference of Parties (COP16) of the UNFCCC, to be held in Mexico at the end of the year, and that 2012 be declared the International Year of Water Diplomacy.

More people now die from contaminated and polluted water than from all forms of violence, including wars, notes the UNEP report, *Sick Water?* Some two million tons of waste, estimated to equal two or more billion tons of wastewater, is being discharged daily into rivers and seas, harming key ecosystems and human health. The report underlines the need for global and comprehensive water-related regulations and enforcement mechanisms, including international standards and guidelines for water and ecosystem quality management. (March 2010) Ref. 11

### **UN Reform Report Stresses Environmental Issues**

The UN Secretary General has issued an extensive report on UN reform, entitled "In Larger Freedom: towards development, security and human rights for all", with environmental issues cited in all sections. It states "threats to peace and security in the twenty-first century include not just international war and conflict but [...] also include poverty, deadly infectious disease and environmental degradation since these can have equally catastrophic consequences." [para.78] It proposes that the Secretariat include better responses to "humanitarian emergencies and its handling of environmental issues", that "National investment and policy priorities" improve environmental management and policy reforms, and calls on countries to adopt time-bound environmental targets. "Ensuring environmental sustainability" should be one of the global actions priorities. It specifically requires [para.212] a more coherent framework of global environmental governance, for effective implementation, coordination and monitoring of the over 400 international environmental treaties already in force. This is reiterated in the Annex— For decision by Heads of State and Government calling for a "more integrated structure for environmental standard-setting, scientific discussion and monitoring, and treaty compliance." The Reform Report will be discussed and adopted at the summit of world leaders in September 2005 at the UN. (March 2005) Ref. 12

### **UN Reforms in Development, Humanitarian Assistance, and Environment to be Proposed by High-Level Panel**

The UN Secretary-General has appointed a 15-member international high-level panel to explore how to improve the work and efficiency of the UN system in the areas of development, humanitarian assistance, and environment. The study's outcomes will be used for the comprehensive UN management reform, complementing such other major reform initiatives as the new Peacebuilding Commission and the new Human Rights Council. The study is expected to be completed by the summer and its recommendations formally presented to the UN General Assembly in September 2006, with possible implementation in 2007. (February 2006) Ref. 13

### **Human Security Proposed as Reorganizing Principle for the UN**

The UN was organized 60 years ago around the principle of preventing national wars. Today it should be reorganized around the principle of addressing human security, which would reinvent

global governance, proposes former Canadian foreign minister, Lloyd Axworthy. A UN cohesive response system able to rapidly deploy aid when and where necessary is needed now to efficiently respond to current civil conflicts and disasters. (November 2005) Ref. 14

### **Environment and Security-The Role of the United Nations**

*Environment and Security-The Role of the United Nations* is a comprehensive report summarizing the outcomes of a Roundtable Conference conducted by the UN Foundation and the Woodrow Wilson Center's Environmental Change and Security Project. It assesses security by its links to population, water, resources, and climate change and makes recommendations to the UN for a better integration of environment with security issues. It recommends that "The UN Security Council should take a leadership role by making environmental security a priority and moving environmental issues from the technical to the security domain", and that the UN coordinate international efforts on environmental security in all fields, from trade to water, climate change, and integrated environmental perspective in all its projects. "By protecting the earth, the UN Security Council can help preserve the peace," concludes the report. [See also *New Reports Stress the Link between Environment and Security* in the January 2005 environmental security report.] (September 2005) Ref. 15

### **Human and Environmental Security - An Agenda for Change**

*Human and Environmental Security - An Agenda for Change*, by Stakeholder Forum for a Sustainable Future, is a "ground-breaking book, authored by prominent international decision-makers, tackles the global human security problem across the range of core issues. The authors identify the causes of insecurity, articulate the linkages between the different elements of human security, and outline an agenda for engaging stakeholders from across the globe in building the foundations of genuine and lasting human security for all nations and all people." (September 2005) Ref. 16

### **UN Creates Peacebuilding Commission for Post-Conflict Situations**

The UN established a Peacebuilding Commission to prevent countries emerging from conflict from falling back into conflict. The 31-member new Commission will be an intergovernmental advisory organization with membership composed of seven Security Council members (including the five permanent members), seven members of ECOSOC, five top financial contributors to the UN, five top providers of military personnel and civilian police to UN missions, and an additional seven members elected by the General Assembly, with special consideration for States that have experienced post-conflict recovery. The Commission will act by consensus, proposing integrated strategies for improving the UN actions of stabilization and recovery in post-conflict situations. The UN reports that about half of all conflicts over the past 20 years were "re-conflicts" – conflicts that recurred within five years after peace accords. (December 2005) Ref. 17

### **UN Report Recommends Basis for Global Security Consensus**

It is not likely that all UN Member States will agree with all 101 recommendations in the UN report: *A more secure world: Our shared responsibility*. Report of the High-level Panel on Threats, Challenges and Change; however, it goes further than any UN report thus far to address the security challenges of the 21st century. Since no State can protect itself wholly by its own actions, the report provides an agenda to establish collective security. Both national security and

human security are addressed. Environmental degradation, social equity, health, and transnational organized crime are raised to a par with threats from weapons of mass destruction and terrorism. The report also addresses UN reform, guidelines for the use of force, and defines terrorism (which reduces an impediment to creating better international agreements to address it). (December 2004) Ref.18

### **UNU Institute for Environment and Human Security Founded**

The United Nations University has established an Institute for Environment and Human Security in Bonn, Germany (UNU/EHS) which aims to provide research-based, policy-relevant advice and training to enhance the capacity of societies to cope with catastrophic events. As its priority, UNU/EHS will focus on human and environmental security and vulnerability assessment in flood plains and deltas with particular emphasis on urban settlements. Its interdisciplinary and multicultural core team will engage in the development and implementation of research and training programs. (June 2004) Ref. 19

### **UN Legal Counsel, Under-Secretary-General Hans Corell, calls for more focus on state of the environment**

United Nations Legal Counsel, Under-Secretary-General Hans Corell, as he reflected on conventions that passed during his 10 years of UN service, called for more attention to be paid to the condition of the world's environment: "There is a tendency, of course, because of the way some behave, that we are focusing on armed conflicts and the use of arms and issues related to that. What I am actually more concerned about now, since part of my responsibility is the environment, is the status of the globe on which we live," he told at a pre-retirement news conference at UN Headquarters in New York. As an example of achievement, he pointed out the Law of the Sea, which existence prevented many conflicts. (March 2004) Ref.20

### **NATO Report on New Security Threats and Trends**

NATO's report "New Horizons," released ahead of the organization's 60th anniversary summit, addresses the challenges that the organization faces in view of the new threats and trends triggered by current geopolitical developments. Most of the threats and trends have an environment-related root, ranging from structural energy and resource problems that, "may lead to energy/raw material nationalism by anti-Western states," and resource conflicts, to the various direct and indirect consequences of climate change that will lead to "acceleration in the breakdown of ecosystems and more severe 'natural' disasters and food shortages, in turn leading to much higher levels of migration, increased human suffering and greater social unrest". The report quotes a NATO official: "[Climate change] is a global problem requiring the involvement of the UN, NATO, EU and other regional organizations. NATO forces must develop the resiliency to adjust to changing climate and react to its consequences." However, the report emphasizes, "The only aspect of climate change that was considered to be truly affecting the Alliance was resource competition." (March 2009) Ref. 21

### **Briefings on Environmental Security at NATO Conference**

Prior to the NATO Summit in April, the NATO Security Science Forum on Environmental Security held in Brussels on March 12<sup>th</sup> addressed security implications of environmental issues such as climate change, water, energy security, and natural catastrophes. It also looked at environmental security forecasting and cooperation with other international organizations to

increase environmental security. Webcasts of the presentations are available on the first website listed below. After the NATO Summit in April in Romania, Russian President Vladimir Putin and NATO leaders agreed to cooperate in several areas, including environmental security. (April 2008, Ref.22)

### **Pentagon's Quadrennial Defense Review Addresses Climate Change**

The Pentagon's Quadrennial Defense Review (QDR) is specifying for the first time climate change as a key issue "that will play a significant role in shaping the future security environment." It addresses both ways that climate change would affect DoD: as a potential source of conflict, therefore shaping its "operating environment, roles, and missions," and the impacts it would have on facilities and military capabilities. It notes, "While climate change alone does not cause conflict, it may act as an accelerant of instability or conflict, placing a burden to respond on civilian institutions and militaries around the world." Therefore it suggests proactive engagement for capacity building mainly. "...with countries where the military is the only institution with the capacity to respond to a large-scale natural disaster." As for facilities and military capabilities, it recommends, "a comprehensive assessment of all installations to assess the potential impacts of climate change on its missions and adapt as required." Future challenges, "...include managing uncertainty about the future environment and science and technology (S&T) trends." (February 2010) Ref. 23

### **International Guidance on the Treatment of Individuals in War May Eventually Guild International Standards on the Treatment of the Environment in War**

Making distinctions between civilians and combatants, as well as making distinctions between military targets and civilian areas, is becoming increasingly difficult and may become even more difficult in the future. As a result, the International Committee of the Red Cross has issued an "Interpretive Guidance" concerning "the distinction between legitimate military targets and persons protected against direct attacks." The Guidance is not intended to replace existing rules, but clarify criteria in answering key questions. "Who is considered a civilian for the purposes of the principle of distinction? What conduct amounts to direct participation in hostilities? What modalities govern the loss of protection against direct attack?" With the increasing attention to environmental security, these kinds of questions may eventually be applied to the environment. Although the guidance applies only to IHL affecting human factors, considering the reference that triggered the guidelines, "transformation and modernization of warfare", as well as previous discussions relative to including environmental factors under IHL, it is fair to speculate that the scope and spectrum might be expanded to also cover environmental aspects; e.g., when is the use of environment considered a weapon and when should it be off limits? (June 2009) Ref. 24

### **Environmental Courts and Tribunals Are Rapidly Increasing Around the World**

According to an international study by the World Resources Institute (WRI), there are about 350 environmental courts in 41 countries. About half of them were created over the last five years, increasing public access to environment-specialized legal systems. The increasing number of courts dedicated to environmental issues should lead to accelerated changes in environmental lawsuits, creating precedents around the world. It reinforces the trends toward improved enforcement and applications of the "polluter pays" principle. (April 2010) Ref. 25]

### **International Lawsuits for Environmental Crime Proliferate**

International lawsuits for environmental crimes are increasing, including those based on damages due to climate change, which is a new phase in the international environmental legal system. For example, Micronesia filed a case with the Czech Environment Ministry against the extension of the Prunerov, CEZ's largest coal-powered generator, on grounds of potential increase of CO<sub>2</sub> emissions with subsequent consequences to global warming and rising sea levels. Consequently, the Czech government ordered an international assessment of the project. Another example is Kivalina, an Inupiat Eskimo village on a barrier island north of the Arctic Circle. It has created a case against a group of fuel and utility companies (including ExxonMobil and Shell Oil) for their contribution to climate change that is accelerating the island's erosion. A third example is four Nigerian farmers and Friends of the Earth Netherlands who filed a pollution lawsuit in the Netherlands against Royal Dutch Shell for environmental degradation caused in Nigeria. In a related activity, Bolivia's President Evo Morales is organizing an international conference April 20-22, 2010 in Cochabamba to explore creation of an international court on environmental crimes and a "universal proposal for the rights of mother earth." Government officials, indigenous people, other social movement representatives, environmentalists, and scientists will be invited. (January 2010) Ref. 26

### **UNEP Year Book 2010 Addresses 'warfare ecology'**

UNEP Year Book 2010 presents the latest developments and scientific insights in UNEP's six thematic priorities: environmental governance; the state of ecosystems and related management challenges; harmful substances and hazardous waste management; effects of climate change; disasters and conflicts; and use of resources. The report underlines, "In 2009, progress was made towards understanding how climate change, environmental degradation, and mismanagement of natural resources increase vulnerability to both disasters and conflicts—and how sustainable natural resource management may reduce vulnerability to disasters and conflict while supporting peacebuilding." A subchapter is dedicated to 'warfare ecology', assessing ways to reduce the effects of conflicts on the environment. It suggests the need "...to incorporate ecosystem protection measures into weapons manufacturing," and all phases of tactical planning, noting, "In the second half of the 20th century, more than 90 per cent of major armed conflicts took place in countries that contained biodiversity hotspots and more than 80 per cent occurred directly within a hotspot area", therefore threatening biodiversity. Highlighting the role of preparedness and adaptation to reduce the risk of conflict as an effect of natural disasters, it mentions the IPCC report to come out in 2011 that will look specifically at synergies between disaster risk reduction and climate change adaptation: *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation*. (February 2010) Ref. 27

### **New Approach to Environmental Crime**

Eco-Crime and Justice: Essays on Environmental Crime is a collection of four essays detailing the multidisciplinary application of criminology to environmental harm. The papers examine how environmental crimes, including illegal wildlife trade, timber trafficking, and hazardous waste dumping, represent some of the fastest growing, most profitable, and poorly enforced illegal activities perpetrated by both international corporations and organized crime. Claiming that states and territories' very existence is threatened by climate change and that environmental harm disproportionately afflicts developing nations, the poor, and minorities, the essays demand a new perspective. The approach proposed, called eco-global criminology, proposes integrating

local wisdom with expert solutions to these borderless ailments, using tailored policing based on multilateral treaties and law enforcement. (May 2010) Ref. 28]

### **G8 and G20 Integrate Security and Environmental Issues in Development**

The G8 meeting held in Muskoka, Canada, declared that: “We must also ensure that the proliferation of weapons of mass destruction, terrorism and organized crime, as well as many other challenges faced by states to address their security vulnerabilities, including climate change, remain at the forefront of public policy.” The G8 reiterated the goal of reducing global greenhouse gas emissions at least 50% by 2050, with developed countries reducing in aggregate by at least 80% compared to 1990 or more recent years.

The G8 was followed by the first Summit of the G20 in its capacity as the premier forum for international economic cooperation. The G20 addressed cooperation strategies for finding global solutions to transnational problems, such as the effects of climate change, food and energy security. A Working Group on Development was established to suggest a development strategy to be adopted at the Seoul Summit to be held November 11-12, 2010. However, critics say that the Toronto Declaration was watered down, not containing specific commitments to clean energy and phase-out subsidies of fossil fuels. (June 2010) Ref. 29

### **UNEP Conference Furthers Environmental Governance**

The 25<sup>th</sup> session of the United Nations Environment Programme (UNEP) Governing Council/Global Ministerial Environment Forum (GC-25/GMEF) took place February 16-20, 2009, at the UN Office in Nairobi, Kenya, with over 1000 participants from 147 countries. The meeting adopted 17 decisions on issues such as hazardous substances, biodiversity, support to Africa, environmental management, and the environmental situation in Gaza.

#### *Strengthening International Environmental Governance*

A ministerial consultative process on international environmental governance and global environmental assessment was proposed, and it was decided that UNEP will support governments and stakeholders to improve the scientific basis of their own environmental assessment, management, and effective policy implementation. An “assessment of the assessments” will be submitted to the UNGA 64th session later this year, when universal membership of the Governing Council and a resolution for a more efficient international environmental governance framework will be discussed. UNEP should provide early warning, assessment, and monitoring, provide environmental information supporting policy and decision making, improve implementation and enforcement of MEAs, and address synergies, and support the implementation of the Bali Strategic Plan. The Fourth Programme for Development and Periodic Review of Environmental Law was adopted as a broad strategy for activities related to environmental law for the decade beginning in 2010, with a mid-term review of the implementation and effectiveness of the Programme no later than GC-28 in 2015 and report to GC-30 in 2019. The Secretariat should support the work of drafting guidelines for the development of national legislation regarding, inter alia, access to information and public participation, and liability and redress concerning activities dangerous to the environment. It was also agreed to strengthen the policy relevance of the Global Environment Outlook reports.

#### *Legally Binding Regulation on Mercury to be Drafted by 2013*

Agreement was reached for the elaboration of a legally binding instrument on mercury, which could include both binding and voluntary approaches and actions to reduce risks to human health and the environment. It would cover demand, supply, trade, waste, and emissions, as well as

finding alternatives. An intergovernmental negotiating committee should be convened in 2010 with the goal of completing its work by 2013, for the GC-27. [EU legislation banning mercury exports will come into effect in 2011.]

*Assessment for Cadmium and Lead, and Waste Management*

The Governing Council agreed on further assessment of potential health and environmental hazards of lead and cadmium, and that the mandate of the intergovernmental negotiating committee could be supplemented regarding these and/or potential hazardous chemicals. As for waste management, it was decided that UNEP is to provide further assistance to developing countries for implementing an integrated waste management approach, with a progress report to be presented at the GC-26.

*Assessment of the environmental situation in the Gaza strip*

Expressing concern about the environmental impacts and implications of the conflict in the Gaza Strip, it was decided that a mission of environmental experts be deployed to Gaza to assess the natural and environmental situation, allocate adequate resources and assistance, request UNEP to participate in the Cairo Conference on the Reconstruction of Gaza, and submit a follow-up report on the findings to the GC/GMEF 11th Special Session in 2010. (February 2009) Ref. 30

**New UN Secretary-General Announced Climate Change a Top Priority**

UN Secretary-General Ban Ki-Moon took office on January 1, 2007 and listed addressing global climate change as a top priority during all of his major meetings, including his first press conference at the UN, his meeting with President George Bush, and public talks in Washington and with the EU leaders in Brussels. Climate change also topped the agenda of the World Economic Forum Annual Meeting at Davos, where Tony Blair said that addressing climate change was the “supreme expression of interdependence.” President Bush for the first time included the issue in his State of the Union address, the new Democratic leadership in the US Congress has it among its top priorities, and corporations are forming relationships with environmental groups. Hence, it is clear that the international politics of climate change could have dramatic changes over the next several years. (January 2007) Ref. 31

**UN Appoints Special Envoys for Climate Change**

As part of his commitment to enhance the UN's action in addressing climate change, Secretary-General Ban Ki-moon appointed three Special Envoys, former Norwegian Prime Minister Gro Harlem Brundtland, the President of the 56th Session of the UN General Assembly Han Seung-soo, and former President of Chile Ricardo Lagos. The Special Envoys will work with the Secretary-General, government leaders, and key stakeholders from around the world to advance negotiations and develop mitigation strategies to address climate change and its impacts. (May 2007) Ref. 32

**UN Establishes the International Panel for Sustainable Resource Management**

The International Panel for Sustainable Resource Management (IPSRM) is a new international think tank established by UNEP to provide expert global assessments on the use, security, and environmental impact of global resources. Just as the Intergovernmental Panel on Climate Change (IPCC) founded in 1988 has evolved with the participation of 2,500 scientists from 60 countries to produce the state of knowledge of global climate change, so too could IPSRM do one day for the global knowledge of resource management. It will begin by providing a systemic and holistic framework for understanding resources from all phases of the resources' life cycles

to help identify interlinkages, gaps, and opportunities for policy makers to take action. The Panel is supported by a Secretariat, hosted by the Sustainable Consumption and Production Branch of UNEP's Division of Technology, Industry and Economics, based in Paris. National participation in the panel has been expressed so far from Canada, China, Egypt, Finland, Germany, Hungary, Italy, Japan, Netherlands, Norway, Russia, South Africa, and Tanzania. NGOs such as the World Business Council on Sustainable Development and the International Council for Science (ICSU) have also asked to participate. (November 2007, Ref.33)

### **Proposal for a UN Environmental Mediation Program**

Former and present Executive Directors of UNEP and NGO leaders met June 28-July 2, 2009 in Glion, Switzerland to make recommendations to improve international environmental governance. A UN Environmental Mediation Program (UNEMP) was proposed by U.S. Ambassador John McDonald, Executive Director of the Institute for Multi-Track Diplomacy. The proposed UNEP unit would provide mediation services as requested by governments to help resolve environmental issues between nations and within nations, including training of environmental mediators, establishing national environmental mediation centers, assisting national research programs, and creating an international panel of environmental mediators to be on call to help resolve transboundary disputes. The idea will be considered by UNEP later in 2009. [For an earlier version of the proposal see: "Environmental Security: United Nations Doctrine for Managing Environmental Issues in Military Actions; Appendix C: United Nations Environmental Mediation Program (UNEMP)" at <http://www.millennium-project.org/millennium/es-un-app3.html>] (June 2009) Ref. 34

### **Environmental Considerations Should be Included in Planning Military Operations**

"Green Warriors. Army Environmental Considerations for Contingency Operations from Planning Through Post-Conflict" by RAND Corporation Arroyo Center, is a comprehensive analysis of the environmental aspects in military operations. It shows that considering environmental factors in military actions gives strategic advantages in combat and post-conflict operations, increasing the overall missions' success. Environmental conditions impact troops' health, safety and security and affect diplomatic relations and local populations' and neighboring countries' confidence in the operation. However, the study finds that the Army doesn't have a comprehensive approach to environmental considerations at any phase, or in contracting. The recommendations are: "1. Improve the policy and guidance for environmental considerations in contingency operations. 2. Encourage an environmental ethic throughout the Army that extends to contingency operations. 3. Better incorporate environmental considerations into planning. 4. Improve pre-deployment and field environmental training. 5. Invest more in environmental resources and good environmental practices for field operations. 6. Use a 'sustainability' model for contingency operations." Although specifically analyzing the Army, the results apply to any actors involved in contingency operations. (September 2008) Ref.35

### **Environmental Ministers Advance Global Consensus at UNEP Forum**

More than 100 environment ministers met in Monaco for the 10<sup>th</sup> Special Session of the Governing Council/Global Ministerial Environment Forum of the United Nations Environment Programme (UNEP) on February 20-22. The UNEP Medium-term Strategy 2010-2013 was adopted, which upgrades UNEP's ability to be more effective in addressing climate change, disasters and conflicts, ecosystem management, environmental governance, harmful substances



and hazardous waste, and resource efficiency – sustainable consumption and production. The theme of the Special Session was “Globalization and the Environment—Mobilizing Finance for the Climate Challenge”. Issues discussed included long-term predictable carbon prices, building public-private partnerships, regionally balanced distribution of funds, UNEP management to implement the Bali Strategic Plan, and better implementation of multi-lateral environmental agreements.

The discussions and ministerial consultations focused on:

- policy issues and strategies for mobilizing finances to address climate challenges, with the main issues being related to: a coherent international framework for addressing climate change; long-term predictable carbon prices; building public-private partnerships; and a balanced distribution of funds by region and scope;
- strengthening international environmental governance and UN reform, mainly related to UNEP organizational aspects, and to improving the environmental international regulations system, by addressing synergies between existing multilateral environmental agreements in order to simplify understanding of the MEAs’ implementation, and compliance monitoring. Although there is consensus on the need to strengthen international environmental governance (IEG), there is no agreement on how to do it. Views range from supporting a more powerful and coherent IEG (including an eventual UNEO) with reform negotiations starting at the General Assembly’s 63<sup>rd</sup> session, to favoring the status quo with slight improvements. An interesting suggestion was made by Botswana, who noted that for an effective transboundary ecosystem management, neighboring countries should be parties to the same conventions. The US asked that the final report include language requesting that cooperation among MEAs should be subject to the approval of their governing bodies.

The Forum adopted decisions in five areas:

- the UNEP Medium-term Strategy 2010-2013—formulating the strategic frameworks and programs of work and budgets
- chemicals management, mainly concerning the implementation of the decisions related to reducing hazards from mercury, and improving waste management;
- improving the Global Environment Outlook (GEO), including the development of a global assessment of environmental change and its implications;
- inviting ECOSOC to declare 2010-2020 the International Decade for Addressing Climate Change;
- sustainable development of the Arctic region, mainly continuous environmental assessment (including increased international scientific collaboration) and addressing legal aspects.

At the Forum, UNEP also launched the Climate Neutral Network (CN Net) to assist nations and interested actors with reducing greenhouse gas emissions (<http://www.climateneutral.unep.org>) (February 2008, Ref.36)

### UNEP Governing Council/Global Ministerial Forum Makes Progress on Global Environmental Governance

The 24th session of the United Nations Environment Programme (UNEP) Governing Council/Global Ministerial Environment Forum (GC-24/GMEF) took place 5-9 February 2007, in Nairobi, Kenya. Delegates from 141 countries discussed issues related to globalization and environment (including developing a range of clear and specific policy options for improving environmental governance at national, regional, and global levels), the state of the world environment, and cooperation at different international levels. The GC/GMEF adopted 15

decisions, including issues related to waste management (adequacy of the Basel Convention and eventual further developments), strengthening international environmental governance (including the draft Environment Watch Strategy Vision 2020, and coordination and synergies among multilateral environmental agreements), chemicals management (heavy metals and hazardous chemicals), the world environmental situation (improved assessment and mitigation actions), water policy and strategy, recommending that the UN General Assembly declare the decade 2010-2020 as the UN Decade for Deserts and the Fight Against Desertification, and Africa's environmental management and protection. Egypt offered to host an international center to build judicial capacity in environmental law. The next GC/GMEF will be held in February 2009. (February 2007) Ref. 37

#### Controversy over a United Nations Environmental Organization Continues

Last February France along with 46 other countries proposed the establishment of a UN Environmental Organization to encourage and coordinate research and government actions to address climate change. During the Security Council's debate over security implications of climate change, Italy's deputy foreign minister, Vittorio Craxi, renewed support for creating a UN environmental organization. The U.S. affirmed support for strengthening the United Nations Environment Programme, but saw no need to create a new UN agency, arguing that the existing UNEP is sufficient for helping countries honor environmental treaty obligations. [See also *French President Jacques Chirac issues Paris Call for Action for Global Ecological Governance*, and *New International Strategy for Chemicals Management and 9th Special Session of the UNEP Governing Council*] (April 2007) Ref. 38

#### **OSCE Adopts Ministerial Declaration on Environment and Security**

On November 30, the Organization for Security and Cooperation in Europe (OSCE) agreed on a Ministerial Declaration on Environment and Security. However, the OSCE failed to reach consensus on a detailed environmental security strategy. Nevertheless, Ambassador Bernard Snoy, Coordinator of OSCE Economic and Environmental Activities, is confident that the level of OSCE's commitment in the field of environmental security will increase, especially since countries east of Vienna stress their specific needs regarding these issues. (November 2007, Ref.39)

#### OSCE Parliamentary Assembly Agrees to Advance Work on Environmental Security Strategy

The OSCE Parliamentary Assembly passed the resolution to support efforts of OSCE's 56 participating States and 11 Partners "to tackle environmental security threats and thus to promote stability;" to continue work, "to develop an Environmental Security Strategy for the Organization to be debated at the OSCE Ministerial Council in November in Madrid;" to recommend that "the OSCE works closely together with OSCE participating states as well as national and other international organizations experienced in the field of environmental security; and "Calls upon OSCE participating countries to develop their own environmental security strategies." (July 2007, Ref.40)

#### OSCE to Develop an Environmental Security Strategy

The Economic and Environmental Forum of the Organization for Security and Co-operation in Europe (OSCE), held in May 2007 in Prague focused on constructive actions that would help its 56 participating States and 11 Partners tackle environmental security threats and promote stability. OSCE Chairman-in-Office, Spanish Foreign Minister Miguel Angel Moratinos said: "Environmental co-operation can be an effective catalyst for reducing tensions, broadening co-

operation and promotion of peace.” There was consensus that environmental security should top the Organization’s agenda and the parties agreed to study the implications of climate change on security, the role of environmental sustainability, and how OSCE’s actions could complement other organizations’ efforts. An Environmental Security Strategy for the Organization will be developed over the coming year and debated at the OSCE Ministerial Council to be held in November in Madrid. Several follow-up events to the environmental forum are planned. A resolution may be introduced in the OSCE Parliamentary Assembly to further support this governmental initiative to help insure its implementation under the next Chairman-in-Chief of the OSCE. (May 2007) Ref.41

### **OSCE is Enhancing Environmental Security in Central Asia**

The OSCE continued its commitment to further environmental security in Central Asia during a meeting held June 23, 2010, among the OSCE Chairperson-in-Office, Kazakhstan’s Secretary of State and Foreign Minister Kanat Saudabayev, President of Turkmenistan Gurbanguly Berdymukhammedov, and other senior officials. In addition to exploring ways to improve environmental security in the region, they also discussed the related security issues in Kyrgyzstan and Afghanistan. Following the meetings Saudabayev said: “The Kazakh OSCE Chairmanship is committed to preventing escalation of tensions in Kyrgyzstan, and is ready to help the country with post-conflict rehabilitation. The OSCE is working together with the international community to help Kyrgyzstan.” The next day’s high-level international conference on disarmament in Central Asia and the Caspian region, held also under the auspices of the OSCE, expanded the discussions to potential strategies for making Central Asia a zone free of weapons of mass destruction (including nuclear), strengthening nuclear security in Central Asian states (counter transit of nuclear materials by terrorists), safe transportation of energy resources, and the Caspian Sea border delimitation disputes. These issues will be further discussed at an informal meeting of OSCE Foreign Ministers in Almaty, July 16-17, 2010. [Related items: *First EU-Central Asia Security Forum Included Environmental Security* in September 2008, *ENVSEC to Expand Environmental Co-operation in South Caucasus*, in March 2009 environmental security reports.] (June 2010) Ref. 42

### **France Supports Brazil’s Permanent UN Security Council Seat to Promote Environmental Issues**

Increasing Brazil’s role in international affairs, including a permanent seat on the UN Security Council to provide leadership on environment-related issues, was strongly supported at the second Brazil-EU summit, held in December 2008, by Nicolas Sarkozy, French President and holder of the EU rotating presidency. During the visit, the French and Brazilian leaders also addressed, inter alia, security and military affairs. Meantime, Brazil announced that its new strategic defense plan increases the focus on environmental protection and energy security. (December 2008) Ref. 43

### **Environmental Security Issues Discussed at the G8 in Japan**

Environmental security issues such as climate change, food crises, energy security and disaster reduction were the focus of the 34th G8 Summit held in Toyako, Hokkaido, July 7–9, 2008. Although the Summit ended without an agreement on firm targets for reducing greenhouse gases, the final declaration stipulates a goal of at least 50% by 2050, with mid-term goals to be adopted by individual countries. This does not meet the suggestion made by the G5 countries (Mexico,

Brazil, China, India and South Africa), which also attended the Summit, that developed countries' greenhouse gas reduction targets should be more than 80% by 2050 with an interim target of a 25-40% reduction by 2020. G8 leaders also agreed to implementing ambitious economy-wide mid-term GHG emission reduction goals, using sectoral approaches for achieving national emission objectives, conducting an energy forum to focus on efficiency and new technologies to be held in 2009 in Japan, and establishing the Climate Investment Funds to be administered by the World Bank to support the efforts of developing countries. (July-August 2008) Ref. 44

### **OSCE-NATO Workshop on Environmental Security in the Mediterranean**

The "Water Scarcity, Land Degradation and Desertification in the Mediterranean region—Environment and Security Aspects" workshop held in Valencia, December 10-11, was organized jointly by the NATO Public Diplomacy Division and the Organization for Security and Co-operation in Europe (OSCE) Office of the Coordinator for Economic and Environmental Activities. Policymakers, scientists and experts assessed implications that water scarcity, land degradation, and desertification might have on population movements and security in the Mediterranean region. Since water management also offers opportunities for cooperation and conflict prevention, specific roles for the OSCE, NATO and other organizations were explored with OSCE Mediterranean Partners for Co-operation and the NATO Mediterranean Dialogue, which include Algeria, Egypt, Israel, Jordan, Mauritania, Morocco and Tunisia. [See also *OSCE Adopts Ministerial Declaration on Environment and Security* in November 2007 and other previous environmental security reports on similar issues.] (December 2007, Ref.45)

### **International Meetings Bring Environment and Security Closer Together**

The Roundtable on Environment and Security, organized alongside the IUCN Congress, was attended by selected representatives from the security community and major environmental leaders who discussed present and future environmental security issues, explored possibilities for cooperation, examined common strategies, and agreed that the impacts of environmental issues on security are increasingly requiring more attention from governments. Physical conflict and military environmental issues were central to the discussions. The Institute for Environmental Security program "Climate Change and International Security" is organizing several meetings to foster environment-security dialogue and set the agenda for some global environmental agreement(s) to reduce the probability of climate change-related conflicts.

Participants in the IUCN World Conservation Congress pointed out that biodiversity losses are not only more serious than the current financial crises, but are also often irreparable. The IUCN Programme 2009–2012 creates a framework for addressing environmental crises from planning to implementing, monitoring, and evaluating conservation work. Issues that got special attention include: high seas, of which less than 1% are under any kind of protection, nearly all located close to shore; forests—summary of the outcomes of the Forests Dialogue's Initiative on Forests and Climate Change and agreement on five guiding principles for climate change negotiators and tackling deforestation; the role of the environment in avoiding conflict and for post-conflict stability; and better integration of biodiversity concerns into policymaking in all sectors. The new Red List of Threatened Species, unveiled at the Congress, now covers nearly 45,000 species, specifying those that are particularly susceptible to climate change. Over 8,000 people working in conservation or related areas participated in the 10-day IUCN Congress held in Barcelona, Spain, October 5-15, 2008. (October 2008) Ref.46

**Environmental Security Listed First in UNDP's 2009 Arab Human Development Report**

The “Arab Human Development Report 2009” by UNDP underlines that the region’s security faces growing challenges from environmental stresses. It argues that human security will be adequately addressed only if all the seven interdependent threats identified are dealt with simultaneously and equally. Out of seven dimensions of threat, “People and their insecure environment” is listed first, as “The Arab region faces growing challenges to the security of its population from environmental stresses. [...] challenges will result from population and demographic pressures, the overexploitation of land, water shortages, desertification, pollution, and climate change.” Amat Al Alim Alsoswa, Director of the UNDP Regional Bureau for Arab States and UN Assistant Secretary-General pointed out, “The human security of people in the Arab region depends, first and foremost, on the health of the environment that sustains all of us.” (July 2009) Ref. 47

**First EU-Central Asia Security Forum Included Environmental Security**

The aim of the first EU-Central Asia Security Forum was to consolidate relations between the EU and the Central Asian governments of Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan, as envisioned in the EU Strategy for Central Asia. This EU strategy focuses on terrorism, non-proliferation, human and drug trafficking, and energy and environmental security. The EU will help with financing and expertise for curbing illegal traffic of people, arms and drugs, while common energy security issues would be addressed by building infrastructure, including the Nabucco pipeline. The meeting was held in Paris, September 18, and attended by foreign ministers from the Central Asian countries and the EU member states and candidate countries, EU dignitaries, and experts from other organizations. Afghanistan observed. Participants agreed to have “regular exchanges” on these security risks. (September 2008) Ref.48

**UK Defence Ministry Highlights the Link between Environment and Security**

UK Ministry of Defence published its second annual Sustainable Development Report. The 2005 report identified potential risks from nanotechnology, chemical weapons from the WWII, risks from military sonar, and tungsten and its alloys as emerging sustainability issues related to military activities; and most importantly, acknowledged the link between conflict, security and sustainable development. ‘We must also be ready to act, anywhere in the world, where environmental, social or economic stresses may contribute to the destabilization of society... we have a significant role to play in helping to address these concerns and exploring links between security, conflict and SD with Foreign and Commonwealth Office and Department for International Development,’ the report said (DFID). [For the first Annual report, 2004, See the item *UK Defense Ministry released its first Sustainable Development Report* in the August 2005 environmental security monthly report] (September 2006) Ref. 49

**Conference on Future of the Dutch Military Includes Environmental Security as an Emerging Military Role**

The Netherlands Ministry of Defence and the Netherlands Institute of International Relations (Clingendael) held a conference December 15–17, 2008 in The Hague on future roles for the Dutch armed forces. The conference was part of the Future Policy Survey, a comprehensive interdepartmental look at future developments and scenarios to the year 2030 to update the Netherland’s defense policies and roles with NATO and the EU. There was some discussion of

re-nationalization of defense policy due to ineffectiveness of the EU and NATO. Among the presentations was an overview of future environmental security roles for the military and why these roles will be increasing. (December 2008) Ref. 50

### **Civil Society Regional Consultations Worldwide Prior to the Global Ministerial Environment Forum**

In preparation for the 8th Global Civil Society Forum (GCSF) and the 24th session of the Governing Council/Global Ministerial Environment Forum (GC-24/GMEF) to be held in Nairobi, Kenya, in February 2007, representatives of major groups of civil society held regional consultations around the world. The European Regional Consultation took place in Geneva, October 23–25, and the African Civil Society meeting was held in Nairobi, October 26-27. The discussions were structured around the February GCSF's central themes—globalization and environment, and UN Reform—with focus on such regional aspects as water, chemicals management, sustainable procurement policies and practices, and international and regional processes. (October 2006) Ref. 51

### **World Leaders Discuss Environmental Security Policies at Davos**

Business and political leaders exchanged ideas for addressing climate change, water shortages, conflict, terrorism, UN Millennium Development Goals, globalization, and new technologies at the World Economic Forum held in Davos, Switzerland, January 23-27, 2008. Japan's Prime Minister Yasuo Fukuda advocated new climate-change initiatives, including national CO<sub>2</sub> reductions for major emitters, increasing global energy efficiency 30% by 2020, and a new multilateral fund to mitigate climate change and to support developing countries to cope with global warming. He also announced that Japan—holding this year's G8 presidency—will place climate change at top of the July G8 summit agenda. U.N. Secretary-General Ban Ki-moon asked business and political leaders to make water issues and scarce supplies top priorities, citing environmental factors increasing and/or maintaining conflicts. Business leaders pledged millions of dollars for helping development and agriculture in poor countries by also improving the environment and water use and access. It was suggested that a certain amount of clean water for drinking should be seen as a human right, but water used for economic reasons should be priced to assure its efficient use. (January 2008, Ref.52)

### **UK Scientists List 100 Most Vital Ecological Policy Questions**

UK scientists have prepared a list of the 100 biggest questions facing the country's environment. According to Guardian Unlimited, "the list ... of Britain's most pressing ecological problems is based on the suggestions of more than 650 experts in universities, conservation groups and government institutes. It is intended to inform policy-makers and steer research over the next decade to answer key questions in areas such as farming, climate change, pollution and urban development." (August 2006) Ref. 53

### **Environment a Key Element in the First European 18-month Work Program**

For the first time, the European Council adopted an 18-month work program for the following three European Presidencies to be held from January 2007 to June 2008 by Germany, Portugal, and Slovenia. Along with economic and security matters, it covers environment and sustainable development issues, a reassurance that the EU Strategy for Sustainable Development remains in the focus of policymaking. The Environment chapter includes climate change, biodiversity,

environmental technologies, and international environmental governance. The 18-month Programme confirms the EU's strong commitment to environmental matters. (January 2007) Ref. 54

### **The Institute for Environmental Security in The Hague to Hold Annual Peace and Sustainability Sessions**

The Institute for Environmental Security will convene annual Peace and Sustainability sessions to address the challenges related to conflict prevention and post-conflict issues. The first session, entitled Forces for Sustainability, will be held on 14-15 March 2007 at the Peace Palace in The Hague. It intends to promote cooperation between different actors (such as the security and development sectors) involved in conflict prevention and/or transition to sustainable development in post-conflict situations. “Challenges to be addressed include—how to: formulate scenarios for change towards transparent governance structures; give priority to supervision of the phasing out of illegal economic activities; retrain and employ militias in professions for the restoration and management of ecosystems and natural resources; create new models of empowerment for local communities” says the announcement. (February 2007) Ref. 55

### **French President Jacques Chirac issues Paris Call for Action for Global Ecological Governance**

An international conference on global ecological governance, “Citizens of the Earth,” was held in Paris at the instigation of President Jacques Chirac, who issued the Paris Call for Action for Global Ecological Governance and invited all nations to come to Paris to make progress on the call to action. The resulting conference, held in February, addressed new approaches to climate change, biodiversity, pollution, environmental health, water, environmental governance, and changing patterns of production and consumption. Within the nine points of the Paris Call for Action that inspired the meeting was the proposal for a Universal Declaration of Environmental Rights and Duties (the right to a sound environment) and the transformation of UNEP into a WHO-like organization to be called the United Nations Environment Organization. Green Cross International renewed its call for the adoption of an international legal instrument that would assure the right to water. Environmental degradation “could even come to jeopardize international peace and security” said UN Secretary-General Ban Ki-moon's message to the conference, and the UN General Assembly President Sheikha Haya Rashed Al Khalifa, addressing the Conference, called for “clear objectives and strong ecological governance at the global level, a concept that continues to elude us.” (February 2007) Ref. 56

### **Climate Change a Serious Threat to Security, Conclude Eminent Military Officers**

*National Security and the Threat of Climate Change*, a report by the CNA Corporation, presents the conclusions of an eminent Military Advisory Board (consisting of retired senior military officers and national security experts) on the security implications of climate change. The report looks at the geo-strategic implications of climate change in general and its effects on international security. It explores specific regional security challenges in Africa, Asia, the Middle East, Europe, and the Americas; discusses the direct impact of some climate change aspects on military systems and operations; and presents a set of findings and recommendations related to mitigation, adaptation, and preparation, as well as policies in response to climate change. It warns that climate change could seriously exacerbate already marginal living standards... causing widespread political instability and the likelihood of failed states.... The

chaos that results can be an incubator of civil strife, genocide, and the growth of terrorism... The U.S. may be drawn more frequently into these situations, either alone or with allies, to help provide stability before conditions worsen and are exploited by extremists. The U.S. may also be called upon to undertake stability and reconstruction efforts once a conflict has begun, to avert further disaster and reconstitute a stable environment." Therefore, "The consequences of climate change can affect the organization, training, equipping, and planning of the military services." (April 2007) Ref. 57

### **Report on Environment, Security, and Sustainable Development**

The *Inventory of Environment and Security Policies and Practices* report by the Institute for Environmental Security (IES) in the Netherlands "provides an easy to use comparative overview of existing governmental and inter-governmental positions and actions dealing with the relationship between environment, security and sustainable development." The report describes the environmental security activities of 13 (largely OECD) countries and 7 international NGOs. It also furnishes background information on IES's program, Greening European Security, which focuses on mainstreaming environmental and sustainable development factors into European foreign and security policy. (March 2007) Ref. 58

### **New Environmental Security Blog**

The Environmental Change and Security Program of the Woodrow Wilson International Center for Scholars has launched a blog on new security threats. The blog provides frequent updates and commentary on the latest news stories and reports pertaining to environmental security, such as global water scarcity, climate change and terrorism. (February 2007) Ref. 59

### **Meeting of OECD Environment Ministers calls for more ambitious policies to meet the environmental targets**

At the 20-21 April 2004 meeting, the OECD environment ministers agreed that more ambitious policies supported by stronger political will are needed to meet the environmental targets that they set for 2010 in the OECD Environmental Strategy. A new Environmental Outlook will also be produced. (April 2004) Ref.60

### **UN Annual Treaty Event Produced 93 Actions from 32 Countries**

A special event was held this month [September 2004] at the UN to get countries to speed up the process of their acceptance of international agreements. The focus this year was on treaties that protect civilians, especially during times of armed conflicts. Some 32 countries participated by completing 93 actions--accessions, ratifications or signatures to treaties that protect the rights of civilians, covering subjects from armed conflicts to transnational crime, pesticides and chemicals. (September 2004) Ref. 61

### **Conference on Environment, Security and Sustainable Development in The Hague**

*Environmental Security in the 21st Century* was the title of the Conference on Environment, Security and Sustainable Development organized by the Institute for Environmental Security in The Hague, May 9-12, 2004. Attended by senior decision makers and representatives from governments, NGOs, development institutions, the private sector, and academia, the Conference discussed the role of environmental security in making the world a safer and more sustainable place. The conference aimed to find integrated, science-based, diplomatic and legal solutions for



increasing environmental security. The Conference's concluding document, *Pathways to Environmental Security* [not available yet], will include recommendations related to the conference's objectives. (May 2004) Ref. 62

### **World's Largest Environmental Forum to Set Priorities**

About 3000 environmental leaders in government, business, NGOs, universities, and international organizations are expected at the 3rd IUCN World Conservation Congress scheduled to convene in November 2004 in Thailand. It will address the issue of natural resource conservation relative to economic and population growth. The Congress will have three elements: IUCN Commission Meetings, the World Conservation Forum, and the Members Business Assembly. The Commission meetings will set the priorities for conservation work for the coming four years, addressing species extinction, management of protected areas, laws to conserve nature, ensuring that fair benefits flow to rural people from natural resources, building understanding of how ecosystems function, and improving public understanding of conservation. The World Conservation Forum will discuss and define solutions for problems such as the loss of species and ecosystems, globalization and related health concerns, poverty alleviation, and economic and legal steps to ensure the sustainable use of natural resources. (May 2004) Ref. 63

### **International Conference on Environment, Peace and the Dialogue among Civilizations and Cultures**

The International Conference on Environment, Peace and the Dialogue among Civilizations and Cultures, held May 9—10 in Tehran, Iran, was organized by UNEP, Iranian Department of Environment, the United Nations University (UNU), and UNESCO. It discussed and reaffirmed the interaction between environment and conflict, environment and human security, and the role of dialogue in reducing international conflict and protecting the environment. Other issues discussed were: the efficiency of the current international regulations relating to environmental protection during armed conflict; the status of environmental treaties after parties go to war; the applicability of international law to non-international armed conflicts; and UNEP's possible role in assessing liability for damages. UNEP representative noted the potential of a future UN Peacebuilding Commission to address these issues. The delegates adopted the Tehran Communiqué that provides nine recommendations and conclusions arising from the Conference: to create a culture of universal peace and solidarity; to deepen and broaden the process of dialogue among civilizations and cultures; UNEP should continue its initiative on environment, peace and dialogue and consider holding annual international meetings; improve understanding and correlation between security and environment; enlarge the dialogue to include all segments of society; the proposed UN Peacebuilding Commission should contribute to the objectives of the Conference; development of fora for preventive dialogue and post-conflict restitution; and cultural, ethical and spiritual values must be fully integrated into strategies of dialogue for peace, security and development. The Communiqué will be formally submitted to the UN Secretary-General as a message to the September UN General Assembly. (May 2005) Ref. 64

### **OSCE-UN Launches Environmental Security Initiative in Southern Caucasus**

The Organization for Security and Cooperation in Europe (OSCE), the UN Environmental Programme (UNEP), and the UN Development Program (UNDP) launched the Environmental Security Initiative through a series of consultations in Armenia, Georgia, and Azerbaijan May 10<sup>th</sup>-18<sup>th</sup>. The initiative began with consultations among government officials, non-governmental

organizations and local and international experts, discussing environmental risk factors that have the potential to hamper security in Armenia. Other workshops focused on the role of environmental security in economic growth and poverty reduction in Georgia and on environmental concerns with security implications in Azerbaijan, including trans-boundary water pollution and freshwater quality as well as contamination of the Caspian Sea and deforestation. The purpose of the Environment and Security Initiative is to eliminate environmental problems that might cause political tensions. (May 2004) Ref.65

### **ENVSEC to Expand Environmental Co-operation in South Caucasus**

The Environment and Security Initiative (ENVSEC) held a meeting bringing together officials from Armenia, Azerbaijan, and Georgia with representatives from the OSCE, other international organizations, and environmental experts to discuss ways for expanding environment and security cooperation in the South Caucasus region. The ENVSEC helps capacity building to assess and address environmental threats to security in Southeastern Europe, Eastern Europe, Central Asia, and the South Caucasus. [See also *Environment and Security Program in the East-Caspian Region* in September 2007 environmental security report.] (March 2009) Ref. 66

### **Environmental Security Stressed by World Islamic Forum for Dialogue for Inclusion to Proposed International Charter on Values for the United Nations**

At a recent conference on religions and cultures, Dr. Hamid ibn Ahmed Al-Rifae, president of the World Islamic Forum for Dialogue (WIFD) presented WIFD's proposals for inclusion in a new charter on values. Three fundamental points were stressed: Unity of human family; human dignity and justice; and environmental security. This paper was presented in preparation for the development of an international charter on values to be submitted to the United Nations. (May 2004) Ref.67

### **East Africa to Increase Environmental Security**

The East African Community (EAC) conference, 'Peace and Security for Stability and Development,' held in Kampala, Uganda, October 5–7, 2009 explored the issues and impacts of globalization and climatic change on the region. It recommended the creation of a regional standby force that would provide collective protection of EAC's natural resources (land and marine), as well as the unified airspace. It would have active and reserve contingents, and would be different from the Brigades established by the African Union. The Implementation Plan for the EAC Regional Strategy for Peace and Security addresses broad human security concerns, including population growth, socio-political and economic security issues, and global warming. Along the same lines, the Annual Regional Parliamentary Forum on Environmental Security in Eastern Africa, held October 13–14, also in Uganda, discussed security implications of environmental challenges facing Africa, as well as environmental crime and its trans-boundary manageability. The recommendations to parliamentarians include initiating policy reforms and legislation, as well as establishing monitoring systems for environmental security related issues. (October 2009) Ref. 68]

### **Libya Initiates International Conference on Environmental Security for Seas and Oceans**

Building on the "Ocean Security Conference" held in the US Congress in May 1997 and the "Towards Enhancement of Ocean Security in the Third Millennium" conference held in the Swedish Parliament in January 1998, the *International Conference for the Initiative of*

*Environmental Security of Seas and Oceans* was held in Tripoli, Libya, 23-25 July 2005 as the first of three international conferences on the Ocean Security Initiative. It was organized by the Advisory Committee on Protection of Seas and Oceans (ACOPS) under the patronage of the Gadhafi International Foundation for Charities Associations and the Environmental General Authority of Great Jamahiriya. Ocean environment and security experts from 26 countries representing governments, international organizations, NGOs, and the private sector participated. The conference addressed the environmental security issues relating to the seas and oceans from a broad perspective ranging from illegal immigration to transnational organized crime. Participants stressed that international and trans-institutional collective action was required to assure compliance with international terms and standards for improved ocean environmental security. (July 2005) Ref. 69

### **Pacific Islands Forum Summit in October 2005**

The Pacific Islands Forum Summit will be held on October 27, in Papua New Guinea. It will be preceded by the Small Island States Summit and the Pacific ACP (African Caribbean Pacific) Leaders Summit, and the Pacific leaders' retreat on October 25-26, and followed by a post-forum dialogue meeting on the 28th and 29th. The Forum's topics will include Pacific regional security, aid, policing, peacekeeping, money laundering, arms trading, HIV-AIDS, resource management of commodities and fish stocks, and regionalized governance. It will be attended by the prime ministers of Australia, New Zealand, Fiji, Samoa, Tonga, Cook Islands, PNG, Tuvalu, Vanuatu, Nauru, French Caledonia, and other islands states, as well as representatives of the EU, the UN, United States of America, China and Japan. Parallel with the official forum will be meetings of NGOs representing stakeholder groups and lobbyists. [See also *Asia and Pacific Countries Adopt Declarations on the Environment* of March 2005 environmental security report] (August 2005) Ref. 70

### **Environmental Role for Army Increasing**

The growing trend of governments to use the military in peacetime for enforcing environmental legislation indicates an increased recognition that environmental conditions are an essential part of national security.

#### Chinese Army Environmental Role Increases

A recent statement by a senior military official has identified environmental protection as a security role of the Chinese military. (April 2004) Ref.71

#### Environmental Role for Army in Brazil

Brazil has established an agreement between its environmental and defense ministries to provide military support to environmental enforcement efforts. Although Brazil has used its army in such a role since the late 1990s, this marks the first time that a formal agreement has been signed outlining the responsibilities of the two agencies in directly addressing deforestation. (July 2004)

On 6 August 2004, the Brazilian Institute of the Environment and Renewable Natural Resources and the Army Command of Land Operations signed an agreement for the Army to provide logistic support and guarantee the security of operations to monitor, control, and combat deforestation in the Amazon. In addition, approximately 0.5% of Brazil's total defense budget has been allocated for this effort. (August 2004) Ref. 72

Note: A report by Conservation International reveals that Brazil's tropical savanna is

disappearing at a faster rate than Brazil's Amazon and Atlantic rain forests and might disappear by 2030 if current clearing practices continue. This environmental group will meet with Brazil's government at the end of July to further discuss the situation.

#### Environmental Role for Army in Lebanon

A recent editorial in a Lebanese newspaper called for the Lebanese Army to take on an environmental role in the country in the absence of a wartime mission. (July 2004) Ref. 73

#### **Former EPA Administrator Calls for U.S. Leadership in Environmental Protection**

At the conference on the Making of Environmental Law at the Woodrow Wilson International Center for Scholars, Russell E. Train, former Administrator of the Environmental Protection Agency, presented his recent book, *Politics, Pollution, and Pandas*, and called for US leadership in this field. Although the U.S. was the world leader in environmental protection in the 1970s, he said, it is now widely viewed as a laggard or even as an impediment to progress. With other panelists at the conference, he urged the need for new US leadership in environmental protection. (September 2004) Ref. 74

#### **U.S. Congressman Leach Calls for New Actions to Address Asian Environmental Security Problems**

Representative James A. Leach, chairman of the Subcommittee on Asia and the Pacific of the House International Relations Committee, said before the committee September 22, 2004 that, "By almost any objective measure, it would appear the scale of the environmental challenges in Asia demands a more robust response from countries within the region as well as the international community," and he invited policy input. (September 2004) Ref. 75

#### **Somali Piracy is also an Eco-terrorism Threat**

The rise of piracy in Somalia's waters raised serious environmental and potential eco-terrorism concerns after the hijacking on November 15, 2008 of the large Saudi oil tanker, *Sirius Star*, reported to contain 2 million barrels of crude oil. While piracy may not present a direct threat to countries' national security, its consequences could have widespread effects. Nevertheless, the integrity of the international efforts to tackle piracy in the region (the UN Security Council resolution, the EU one-year "Atalanta" anti-piracy mission, and international coalition forces patrolling the region) is seriously undermined by allegations that the EU and Asian countries are unwilling or unable to stop companies that have been dumping toxic waste off the Somali coast for many years. The UN special envoy for Somalia, Ahmedou Ould Abdallah, has in the past few months repeatedly warned about illegal fishing and toxic dumping by European firms off Somalia's coast. [See also *Toxic Waste Disposal of Global Growing Concern* in September 2006 and other related items in previous environmental security reports.] (December 2008) Ref. 76]

#### **Environmental Security Focus of the Nobel Peace Prize for 2007**

The Nobel Committee said it wanted to bring into sharper focus the "increased danger of violent conflicts and wars, within and between states", posed by climate change. As a result, the Intergovernmental Panel on Climate Change (IPCC) and Al Gore were awarded the Nobel Peace Prize 2007 "for their efforts to build up and disseminate greater knowledge about man-made climate change, and to lay the foundations for the measures that are needed to counteract such change." Awarding this year's Nobel Peace Prize for climate change work and the 2004 Prize to

Wangari Maathai “for her contribution to sustainable development, democracy and peace” compellingly acknowledges the importance of the environmental issue to international security. (October 2007) Ref.77

### **Gimcheon, South Korea to Create a Global Climate Change Situation Room**

On August 19, 2009, the City of Gimcheon, South Korea, announced that it will establish a global climate change situation room. The Millennium Project has agreed to provide the collective intelligence system based on the GENIS model (Global Energy Network and Information System) with additions for climate science, adaptation, and mitigation.

Collaboration will be sought with related efforts such the War Room on Climate Change proposed by Richard Branson (see *Branson calls for War Room on Climate Change at the United Nations* in February 2008 environmental security report.) (August 2009) Ref. 78

### **Branson calls for War Room on Climate Change at the United Nations**

During the special UN General Assembly session “Addressing Climate Change: The United Nations and the World at Work,” Sir Richard Branson, chairman of the Virgin Group, offered a \$25 million prize for technology to clean CO<sub>2</sub> from the atmosphere and challenged the world to help him create a war room to manage the attack on climate change. Although it would be independent of the UN, it would include the participation of the UN, corporations, governments, NGOs, and universities in its design, information systems, and management. Key themes of the General Assembly speeches were: 1) partnerships among UN, government, business, NGOs, and universities; 2) global alliances for action; 3) better UN coordination to address Climate Change; 4) rich nations pay for poorer nations’ adaptations to meet climate change challenges (since the poorer countries contribute the least to greenhouse gases, but will suffer the most from global warming; hence, the richer nations should pay for the poorer nations adaptation measures); 5) need for a global long-term strategy; 6) shared but differential responsibilities among nations to address climate change; 7) technology transfer and issues of intellectual property rights; 8) early warning systems for adaptation; and 9) “it is too late to say later.” (February 2008) Ref.79

### **The Center for a New American Security Launched National Security Program**

The Center for a New American Security launched the National Security Program, based on its work on the national security and foreign policy implications of energy and climate change. (June 2009) Ref. 80

### **Reports Stressing the Link between Environment and Security (Ref.81)**

*Human Development Report 2007-08. Fighting climate change: Human solidarity in a divided world.* The 2007-08 edition of UNDP’s Human Development Report focuses on the threat of climate change. Climate change, according to the report, is the ‘defining human development challenge of the 21st Century’ and the world must take actions today to avoid catastrophic consequences. For example, by 2080 an additional 600 million people in sub-Saharan Africa could suffer from malnutrition due to climate change, and a 3–4°C increase in global temperature could result in 330 million people being permanently or temporarily displaced through flooding. Pointing to the fact that the poorest are most vulnerable and suffer the earliest and most damaging setbacks, the report warns that actions taken—or not taken—in the years ahead will

have a profound bearing on the future course of human development. (November 2007). Ref.82

*A Climate of Conflict* by the London-based International Alert conflict resolution group analyzes the possible link between climate change and conflict. The report warns that unless adequate and timely adaptation policies are implemented, more than half of the world's nations are at risk. It identifies 46 countries—home to 2.7 billion people—at high risk of armed conflict, while another 56 states—with a total population of 1.2 billion—are at risk of political instability. Fragile states have particular vulnerability; therefore, reconstruction policies should include environmental and climate change adaptability strategies, underlines Dan Smith, Secretary General of International Alert. (November 2007) Ref.83

*The Age of Consequences: The Foreign Policy and National Security Implications of Global Climate Change*, by the Center for Strategic and International Studies and the Center for a New American Security presents the possible security implications of climate change by three plausible scenarios:

- scenario 1: Expected Climate Change to 2040 (based on the medium IPCC projections, temperature rise 1.3°C above 1990 levels and sea level rise 0.23m);
- scenario 2: Severe Climate Change to 2040 (more severe warming at 2.6°C and 0.52m sea level rise has exponentially more devastating effects on agriculture, ecosystem and population, and water scarcity is affecting 2 billion people);
- scenario 3: Catastrophic Climate Change to 2100 (an expansion of Scenario 2 from 2040 to 2100, assuming average global temperature rises of 5.6°C above 1990 levels, mountain glaciers virtually gone, and sea level rise by 2 m relative to 1990, rendering low-lying coastal regions uninhabitable, and severely affecting all areas of life and ecosystems).

The report includes a Summary of key environmental and national security implications of the three scenarios, which “makes clear, climate change has the potential to be one of the greatest national security challenges that this or any other generation of policymakers is likely to confront.” (November 2007) Ref.84

The *10th anniversary report* of the Woodrow Wilson Center Environmental Change & Security Project highlights the fundamental role of the environment for global peace building. Top thinkers identified and analyzed key themes with crucial impact on conflict prevention over the next ten years: population, environment, and health. UNEP executive director, Klaus Toepfer, said that “Environmental security is the disarmament policy of the future.” (January 2005) Ref.85

*World Watch Institute State of the World 2005: Redefining Global Security* calls for new approaches to global security by addressing poverty, disease, and environmental decline, “the true axis of evil” as stated by the Institute’s president, Christopher Flavin. (January 2005) Ref.86

*The Optimist*, Green Cross International's magazine (now available online), is highlighting current problems and opportunities for achieving sustainable and equitable development as the true path towards global peace and security. With articles ranging from the environmental legacy of the Cold War to cultural and poverty issues, it covers the wide landscape of security components. (January 2005) Ref.87

*Outgrowing the Earth: The Food Security Challenge in an Age of Falling Water Tables and Rising Temperatures*, the new book by Lester R. Brown, Founder and President of the Earth Policy Institute, investigates the impact of water shortage and climate change on food security

and implicitly security in general. The book also suggests some practical steps to overcome food shortage and its implications. (January 2005) Ref.88

World Wildlife Fund's *The Living Planet Report 2004* examines humanity's ecological footprint, and the state of nature and resource use in 149 countries. It reveals that humanity is running an "ecological debt," consuming over 20 percent more natural resources than the Earth can produce, destroying ecological balance, depleting groundwater, and damaging biodiversity. The report urges us to live within the means of our planet, and adopt and implement policies to reverse the ecological debt trend: increase biocapacity; reduce world population; diminish per person consumption; and improve resource efficiency. The WWF is urging governments to reduce the rate of biodiversity loss by 2010 and create national and regional targets for creating networks of protected areas to safeguard biodiversity, as agreed at several UN Summits. (October 2004) Ref.89

*Environment and Security: Transforming Risks into Cooperation – The Case of the Southern Caucasus*, highlights the link between environment and security in the Southern Caucasus, arguing that environmental degradation and competition for natural resources could worsen the situation in this area already vulnerable to conflicts. The report gives an overview of human security in the regional context and then looks at specifics for the three countries, Armenia, Azerbaijan, and Georgia. It examines both the negative effects of conflict in the region and the opportunities environmental issues present for cooperation and confidence building. The report is part of the Environment and Security Initiative (ENVSEC). (October 2004) Ref.90

*Blood and Soil: Land, Politics and Conflict Prevention in Zimbabwe and South Africa* by the International Crisis Group (ICG) analyses the link between land reform in the region and instability and violence, offering practical policy suggestions. (October 2004) 91

*A more secure world: Our shared responsibility. Report of the High-level Panel on Threats, Challenges and Change*

It is not likely that all UN Member States will agree with all 101 recommendations in the UN report: *A more secure world: Our shared responsibility. Report of the High-level Panel on Threats, Challenges and Change*; however, it goes further than any UN report thus far to address the security challenges of the 21st century. Since no State can protect itself wholly by its own actions, the report provides an agenda to establish collective security. Both national security and human security are addressed. Environmental degradation, social equity, health, and transnational organized crime are raised to a par with threats from weapons of mass destruction and terrorism. The report also addresses UN reform, guidelines for the use of force, and defines terrorism (which reduces an impediment to creating better international agreements to address it). (December 2004) Ref.92

*Environment and Security—The Role of the United Nations* is the summary report of a panel of experts in the fields of water, climate change, and natural resources who assessed the link between environment and security and how the UN could prevent environment-related conflict, and even use the environment to build peace between nations. The report suggests that the UN more efficiently integrate the environment into its security agenda and recommends that the "Security Council mainstream environmental issues into its security operations, add

environmental conflict experts to its staff, and facilitate sharing conflict-related environmental data and analysis across UN agencies.” The report is part of the UN Foundation's United Nations and Global Security Initiative. (September 2004) Ref.93

UNEP's latest report, *Understanding Environment, Conflict, and Cooperation* was launched by Klaus Toepfer at the conference, Environment, Development, and Sustainable Peace: Finding Paths to Environmental Peacemaking, held at Britain's Wilton Park, September 16-19. The report features papers by several environmental security experts, analyzing different aspects of the link between environment and conflict, institutional implications, early warning, and opportunities raised by environment and security initiatives. (September 2004) Ref.94

*Emerging Forces in Environmental Governance*. A recent book published by the United Nations University presents arguments for overhauling international environmental governance. It argues that a new environmental coordinating body is needed to solve problems associated with the proliferation of multiple organizations that administer various treaties, conduct research, and maintain the information required to ensure consistent enforcement of existing international environmental agreements. Enforcement options presented include creation of a World Environment Court, a UN Environmental Security Council with binding enforcement powers, and expansion of the UN Security Council mandate to include environmental security. (June 2004) Ref.95

*South Asia in the World: Problem Solving Perspectives on Security, Sustainable Development, and Good Governance*, UNU Publication. This 460-page book analyses South Asian regional economic, social, security, and environmental issues. Several chapters are dedicated to security issues, and two chapters specifically address environment and security related issues: “Environment: Critical links between environment and development in South Asia” and “The environmental challenge to human security in South Asia” (June 2004) Ref.96

World Health Organization (WHO) updated *Guidelines for Drinking-water Quality* recommends a completely new approach to water management, shifting from reactive action (responses to outbreaks), to preventive action, by managing drinking water quality in a holistic, systematic way: from source to tap. (September 2004) Ref.97

## INTERNATIONAL TREATIES RELATED TO ENVIRONMENTAL SECURITY AND MILITARY ACTIONS

### **Protocol V on Explosive Remnants of War (ERW) of the Convention on Certain Conventional Weapons came into force on 12 November 2006**

Protocol V on Explosive Remnants of War (ERW) of the Convention on Certain Conventional Weapons came into force on 12 November 2006, almost three years after it was adopted. The Protocol stipulates that Parties should take “remedial measures to mark and clear, remove or destroy unexploded ordnance or abandoned explosive ordnance” as early as possible after hostilities have ended, whether they control the territory or not, by cooperating directly or indirectly with all parties involved through quick and accurate information exchange. The Protocol is not retroactive, covering only wars occurring after its entry into force. As of the end of November, there were 27 States Parties to the Protocol.



The Portfolio of Mine Action Projects 2007 found that 26 out of 29 war-ravaged countries or territories surveyed are beleaguered with the lurking remnants of cluster bombs and other explosives. In 2007, the focus of the Projects will be on unexploded ordnance, aiming to deal with the aftermath of conflicts that took place before Protocol V entered into force. (November 2006) Ref. 98

#### Protocol on Explosive Remnants of War to the Convention on Certain Conventional Weapons

A new Protocol on Explosive Remnants of War (ERW) recommended by the Group of Governmental Experts on ERW and Mines Other Than Anti-Personnel Mines (MOTAPM) was adopted at the 28 November Meeting of the States Parties to the Convention. It became Protocol V on Explosive Remnants of War, annexed to the Convention on Certain Conventional Weapons (CCWC). The text of the new Protocol is contained in Annex II of the Report—CCW/GGE/VI/2. The Group will continue its work in 2004 on the issue of ERW focusing on the implementation of existing legislation and studying possibilities of improving the design of certain specific types of munitions, including sub-munitions to minimize the humanitarian risks if/when they become ERW. (November 2003) Ref.99

#### Protocol on Prohibitions or Restrictions on the Use and Transfer of MOTAPM

Another protocol under negotiation being considered for submission to the next Meeting of the States Parties to the Convention is the Protocol on Prohibitions or Restrictions on the Use and Transfer of MOTAPM. (November 2003) 100

#### **The Convention on Cluster Munitions Enters into Force on August 1, 2010**

The Convention on Cluster Munitions received the 30th ratification and thus will enter into force on August 1, 2010, two years after its adoption in May 2008. The Convention bans the use, production, and transfer of cluster munitions, and sets deadlines for stockpile destruction and clearance of contaminated land, as well as prescribing responsibilities towards affected communities. The Oslo process, based on close collaboration among governments, civil society (led by the Cluster Munitions Coalition), the International Committee of the Red Cross, as well as UN agencies, set a precedent on how a “coalition of the willing” can successfully lead to international regulations. As of February 16, 2010, 30 countries ratified and 104 signed the convention. The first meeting of States Parties is scheduled for November, to be held in Lao People’s Democratic Republic. [Related item: *The Cluster Munitions Treaty Signed by 94 Nations* in December 2008 environmental security report.] (February 2010) Ref. 101

#### The Convention on Cluster Munitions Opens for Signature on December 2<sup>nd</sup>

The Convention on Cluster Munitions (CCM) will be open for signing at a special conference in Oslo, December 2–4, 2008. The CCM prohibits the use, development, production, stockpiling, and transfer of cluster munitions. It was adopted at the Dublin Diplomatic Conference on Cluster Munitions in May 2008. [See also *International Convention on Cluster Munitions Adopted by 111 Countries* in May 2008 and other related items in previous environmental security reports.] (November 2008) Ref. 102

#### Convention on Cluster Munitions is Effective

The report *Banning Cluster Munitions: Government Policy and Practice* assesses the cluster munitions-related situation in 150 countries, including progress on the implementation of the

Convention on Cluster Munitions requirements in the signatory or party states. It documents that many countries already started to destroy their stockpiles of the weapon before the treaty formally came into force, and are expected to complete the destruction earlier than the eight-year deadline stipulated by the convention. Spain is the first country that completed the destruction of its cluster munitions stockpiles. Other countries that began the process include: Austria, Belgium, Canada, Colombia, France, Germany, Netherlands, Norway, Switzerland, and the United Kingdom. (June 2009) Ref. 103

#### The Cluster Munitions Treaty Signed by 94 Nations

94 nations signed the new international treaty banning cluster munitions at a special conference in Oslo December 3–4, 2008. The agreement will become binding international law six months after 30 signatories have ratified it. Four countries have already ratified it: the Holy See; Ireland; Norway, and Sierra Leone. The treaty forbids states parties to produce, trade, and use cluster munitions, as well as requiring them to discourage other nations from using cluster munitions in joint military operations. Dozens of countries that signed are stockpilers, former producers, and users of the weapon, including 18 of 26 NATO nations, such as the UK, France, and Germany. The number of signatories is expected to increase rapidly. (December 2008) Ref. 104

#### International Convention on Cluster Munitions Adopted by 111 Countries

The Convention on Cluster Munitions was formally adopted by 111 countries in Dublin, Ireland, on May 30, 2008. The Convention is a legally binding instrument that outlaws the use, production, transfer, and stockpiling of cluster munitions, and commits countries to clear areas contaminated by cluster munitions and assist victims and affected communities. The President of the International Committee of the Red Cross, Jakob Kellenberger, urged all countries to adhere to the Convention and noted “these weapons are not only morally unacceptable but also now illegal under international humanitarian law.” The Cluster Munitions Convention will be opened for signature in Oslo, December 2-3, 2008, and will enter into force after 30 ratifications. The U.S., China, and Russia did not participate in the meeting. [See also *Negotiations Continue for an International Instrument to Ban Cluster Munitions* in November 2007 and other related items in previous environmental security reports.] (May 2008) Ref.105

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#### Negotiations Continue for an International Instrument to Ban Cluster Munitions

Cluster munitions were the focus of the Convention on Certain Conventional Weapons (CCW)

meeting held in Geneva this month that resulted in a weak mandate with no legally binding document or language referring to cluster bomb prohibition or timeline. The EU's proposal to negotiate a treaty in 2008 banning cluster munitions was rejected. UN Secretary-General Ban Ki-moon underlined in his message to the delegates the necessity of a legally binding international instrument that would prohibit the use, development, stockpiling and transfer of cluster munitions; while promoting the destruction of current stockpiles, battlefield clearance and risk mitigation activities. This is consistent with the aim of the Oslo Process to negotiate a ban on cluster munitions. On November 5, the Global Day of Action to Ban Cluster Bombs, public actions took place in 40 countries, calling on governments to take actions for banning cluster munitions. Supporters hope that momentum was created to advance the negotiations next month, when more than 100 countries will gather in Vienna to discuss a draft treaty. [See also *Progress Made on Banning Cluster Bombs* in March 2007 and other items on this theme in previous environmental security reports.] (November 2007) Ref. 107

#### Progress Made on Banning Cluster Bombs

At the Conference on Cluster Munitions held in February 2007 in Oslo, 46 states and several international organizations decided to develop, by 2008, a legally binding international instrument to ban the use, production, transfer, and stockpiling of cluster munitions, as well as to create a framework for dealing with the consequence of cluster munitions' use in the affected areas. Environmental damage and civil casualties are the highest concern for banning cluster bombs. Next meetings are planned for May/June in Lima, November/December in Vienna and early 2008 in Dublin. Last year Belgium has become the first country to ban cluster bombs, and this month [March 2007] the Belgian Senate passed legislation that criminalizes investment in companies that make cluster munitions. The Belgian Parliament plans to publish a list of companies that manufacture such munitions. Austria announced a moratorium on the use, production, or trade of cluster munitions. Canada promised to destroy its stockpile of cluster munitions. The U.S. Democrats recently introduced a bill in the U.S. Senate proposing to "restrict federal funds for the use, sale or transfer of cluster bombs." Presently there are 34 countries producing cluster munitions and about 75 countries that stockpile them. [See also related items *CCW Protocol V on Explosive Remnants of War Entered into Force in November 2006*, *NGOs Launch Campaign to Ban Cluster Bombs*, and *Draft Protocol on Cluster Bombs Cleanup Liability*] (March 2007) Ref. 108

#### African Countries Call for International Ban on Cluster Bombs

The first meeting of African countries on cluster bombs adopted the "Livingstone Declaration," endorsed by 38 out of 39 countries (South Africa, one of the continent's two producer states was the exception.) The strong political declaration is formally committing the African countries to the negotiations for a global cluster munitions ban treaty to be held in Dublin, Ireland, May 19-30, 2008. There was widespread support for a broad definition of cluster munitions to avoid exceptions based on so-called 'technical fixes,' and on the need for comprehensive liability provisions for the affected communities. The Dublin meeting should conclude the Oslo process and agree on the final terms and language of a cluster bombs ban treaty, which would then be opened for signature before the end of 2008. [See also *Negotiations Continue for an International Instrument to Ban Cluster Munitions* in November 2007 and other items on this issue in previous environmental security reports.] (April 2008) Ref 109

### NGOs launch campaign to ban cluster bombs

The Cluster Munition Coalition, involving NGOs from around the world, launched a campaign aiming to ban, under international law, the use of cluster bombs. The campaign also calls for help for victims and an overall cleanup of explosive remnants. Several governments - including the Netherlands, Canada, New Zealand and Mexico support the campaign. The campaign has two aims: embedding in international law the responsibilities of parties with regard to ERW, and binding the use of cluster munitions (CM) by universal humanitarian standards. Regarding CM, the campaign aims to restrict use and production, as well as trade in cluster munitions. (November 2003) Ref.110

### **United States Bans Cluster Munitions Export**

The US adopted legislation banning export from the United States of cluster munitions that leave behind more than 1% of their submunitions as duds, and conditions export on agreement of the receiving country that “cluster munitions will not be used where civilians are known to be present.” The law is seen by many as a move of the US closer to the Convention on Cluster Munitions that completely bans these weapons’ use, production, and trade. So far, 96 nations have signed and 5 ratified the Convention; thirty ratifications are required for its entry into force. (March 2009) Ref. 111

### **Assessment and Potential Revision of Resolution 1540 on Preventing WMD Terrorism**

The UN Security Council’s 1540 Committee conducted a three-day review meeting of Resolution 1540 (that requires states to take steps to prevent terrorists from acquiring chemical, biological, radiological and nuclear weapons) to assess the evolution of risks and threats, and to address implementation aspects. Issues identified include: lack of capacity-building tools and criteria for evaluation, geographical gaps, and compatibility differences of national systems, as well as potential weaknesses at the international level. Some delegates argued that the resolution did not have the same power and impact as a convention, therefore legislations are not 1540-specific, and cannot be used for prosecutions. The Committee hopes to prepare a report on collaborative anti-WMD strategies by the end of 2009, said panel head, Jorge Urbina, Costa Rican ambassador to the UN. [Related item: *Increased Efforts Needed to Counter the Proliferation of Weapons of Mass Destruction* in July-August 2008 environmental security report.] (October 2009) Ref. 112

### **OSCE document on *Stockpiles of Conventional Ammunition* is a politically binding international instrument that addresses risks arising from ammunition stockpiles**

Foreign Ministers of 55 countries endorsed the OSCE Document on *Stockpiles of Conventional Ammunition*. It is a politically binding international instrument that addresses risks arising from surplus stockpiles of all categories of conventional ammunition, explosive material and detonating devices, stock surpluses that can cause environmental problems and hazards to populations. The document could serve as a valuable reference and tool for other organizations, including the United Nations and will be disseminated to the OSCE's Partners for Co-operation, which include Afghanistan, Japan, The Republic of Korea and Thailand, as well as to the Mediterranean Partners for Co-operation, Algeria, Egypt, Israel, Jordan, Morocco and Tunisia. (December 2003) Ref.113

**Changes to War Crimes Proposed for the International Criminal Court**

The 8th session of the Assembly of States Parties to the International Criminal Court discussed proposals to amend the Rome Statute. Belgium proposed modifying Article 8 to cover use of certain weapons (chemicals, gases, and certain bullets) for international and non-international conflict situations and expanding the list of war crimes to include use of chemical, biological, and some conventional weapons, and anti-personnel mines. These proposals are considered relatively non-controversial so as not to deter non-parties from ratifying the Rome Statute and to be consistent with other multilateral agreements in force and with international customary law. Mexico proposed adding the employment or the threat to employ nuclear weapons to article 8. The Netherlands proposed inclusion of Crime of Terrorism under Article 5: Crimes within the jurisdiction of the Court. The first Review Conference on the Rome Statute will be held May 31-June 11, 2010, in Kampala, Uganda. (November 2010) Ref. 114

**Increased Calls for Banning Nonlethal Riot-control Agents**

Should advances in non-lethal riot control agents be considered in the Chemical Weapons Convention (CWC)? Currently, the Chemical Weapons Convention and its enforcement mechanisms do not apply to non-lethal riot control agents, incapacitants, and certain munitions containing chemical agents. The nature of the global chemical industry and chemical warfare materials are evolving outside international regulations. A report, *Dangerous Ambiguities: Regulation of Riot Control Agents and Incapacitants under the Chemical Weapons Convention* by Michael Crowley of the University of Bradford Non-Lethal Weapons Research Project documents these problems. It notes that the danger of “misuse of riot control agents by law enforcement officials, military personnel and private military company employees” grows exponentially as research on these agents proliferates around the world. The report recommends that the next (third) CWC review conference, scheduled for 2013, considers clarifying ambiguities that undermine effective enforcement of the Convention with regard to such weapons and, in the meantime, adopt a moratorium on weaponization of incapacitants. Some states, led by Switzerland, show an increased interest in discussing a legal framework for incapacitants. (November 2009) Ref. 115

**Ocean Dumping of Chemical Weapons might be addressed by international agreements**

Since WWII, several nations, including the US, have disposed of chemical munitions by disposing of them at sea. Each year, several stories appear in the media about these munitions being caught in fishermen’s nets. Recognizing the potential threat of contamination of fish supplies, several countries have been monitoring known dumping sites and attempting to map suspected dumping sites. Recently, environmental interest groups have begun to take interest in the issue, calling for the recovery of these abandoned munitions. Although no treaty currently requires the recovery of these munitions, interest on the part of governments is increasing with respect to how to minimize the hazard and mitigate any significant release of chemical agents into the waters surrounding dumping areas. Since the UN has been consistent in recent years in its interest in long-term and widespread contamination issues, it is reasonable to expect international agreements to address this issue. (January 2004) Ref. 116

**UN Nuclear Terrorism Convention Entered into Force on July 7, 2007**

The International Convention for the Suppression of Acts of Nuclear Terrorism enters into force on July 7, 2007; about two years after Member States adopted it, in April 2005. It is one of the

measures to reduce risks posed by nuclear, biological, and chemical weapons, and is the 13th international instrument on terrorism. The Nuclear Terrorism Convention creates an international legal framework that will help countries enhance their nuclear security and collaborate to prevent terrorist groups from gaining access to nuclear material. It should also add strength to the Global Counter-Terrorism Strategy. As of the end of June, the Convention has 115 signatories and 23 Parties. [June 2007) Ref. 117

#### UN Convention against Nuclear Terrorism

The International Convention for the Suppression of Acts of Nuclear Terrorism was adopted by the General Assembly on April 13, 2005 and will be open for signature on 14 September at the high-level plenary meeting scheduled for the 60th session of the UN General Assembly. The Convention creates an enforced legal framework to counter nuclear terrorism. It will provide for a definition of acts of nuclear terrorism, and covers nuclear safety, crisis and post-crisis situations in accordance with the International Atomic Energy Agency (IAEA) standards. Under its provisions, States are supposed to cooperate by sharing information and assisting each other in preventing terrorist attacks, and the alleged offenders must be prosecuted or extradited. (April 2005) Ref. 118

#### Nuclear Nonproliferation Treaty Stalemate Continues

No progress was achieved by the two-week annual session for preparing the 2010 NPT Review Conference. After having its work delayed for six days due to Iran's disagreement with the agenda, the conference ended with disputes over the session's final statement. Iran and other Nonaligned Movement nations criticized the statement as being too focused on compliance and not enough on the need for nuclear-weapon states to move toward disarmament. [See also *Review Conference of the Non-Proliferation Treaty*, and *Increasing Calls for Improved Management of Nuclear Materials and Nonproliferation*] Meanwhile, eight more nations joined the Global Initiative to Combat Nuclear Terrorism. Led by Russia and the U.S., this global effort was initiated in 2006, to improve security over nuclear materials and to deter nuclear smuggling. The group now includes 31 nations. The next meeting is scheduled to be held in June, in Kazakhstan. (May 2007) Ref. 119

#### **UN Security Council Resolution on the Comprehensive Nuclear Test Ban Treaty**

The UN Security Council endorsed a resolution aiming to advance global nuclear disarmament. Measures include: discouraging withdrawal from the Nuclear Nonproliferation Treaty, increasing membership in the Comprehensive Nuclear Test Ban Treaty, and creating additional nuclear weapon-free zones. Non-compliance with the Nuclear Nonproliferation Treaty would be referred directly to the Security Council for possible punitive action, rather than to the International Atomic Energy Agency. (September 2009) Ref. 120

#### **Global Zero, a New Initiative for Promoting Global Nuclear Disarmament**

Global Zero is a new effort launched by international leaders—including former heads of state and top diplomatic and defense officials—to eliminate all nuclear weapons worldwide within 25 years. It wants to encourage the international community to establish safeguards and audits for disarmament, using dialogs and strategies different from past approaches. The group plans to organize a global meeting in January 2010, prior to the Nuclear Non-Proliferation Treaty Conference to be held in May 2010. Meantime, the EU also aims to be a leader in nuclear

disarmament, suggesting new measures, including a worldwide prohibition on nuclear tests. [See also *Nuclear Safety* in September 2007 and other related items in previous environmental security reports.] (December 2008) Ref. 121]

### **Entire Southern Hemisphere Covered by Nuclear-Free Zone Treaties**

With the entry into force of the Pelindaba Treaty for an African Nuclear-Weapon-Free Zone, nuclear weapons will be banned throughout the entire Southern Hemisphere. The Treaty requires the establishment of an African Commission on Nuclear Energy to implement the agreement and to promote cooperation for the peaceful uses of nuclear science, and stipulates procedures by which the African Union could refer non-compliance cases to the UN Security Council. The other regional agreements banning nuclear weapons in their area are: the 1959 Antarctic Treaty, the 1967 Treaty of Tlatelolco (for Latin America and the Caribbean), the 1985 Treaty of Rarotonga (for the South Pacific), the 1995 Treaty of Bangkok (for Southeast Asia), and the 2006 Treaty of Semipalatinsk (for Central Asia). (August 2009) Ref. 122

### **Belgian Senate to Consider Nuclear-Weapon Ban**

A bill submitted to the Belgian Senate on October 15, 2009, is proposing a ban in Belgium on the manufacturing, fixing, sale, shipping, and possession of nuclear arms. Deliberations will take at least until May 2010. Belgium has already banned cluster and depleted uranium munitions. (October 2009) Ref. 123

### **European Parliament Passed Resolution Calling for Global Ban of DU Weapons**

The European Parliament agreed, with 491 out of 521 votes, to accept a resolution calling on the EU to lead negotiations “through the UN or through a ‘coalition of the willing’” for a global treaty to ban depleted uranium weapons. The resolution “Strongly reiterates its call on all Member States and NATO countries to impose a moratorium on the use of depleted uranium weapons and to redouble efforts towards a global ban, as well as systematically to halt production and procurement of this type of weaponry.” It also recommends inclusion of this wording in the European Security Strategy, “the need to give serious thought to the future utility of unguided munitions, as well as cluster bombs, mines and other weapons of indiscriminate effect, such as depleted uranium weapons;” and “not to deploy military and civilian personnel in regions where no guarantee can be given to the effect that depleted uranium has not been, or will not be, used.” [See also *Depleted Uranium Environmental Concerns Resurfacing* in November 2007 and other items on this issue in previous environmental security reports.] (May 2008) Ref. 124

### **Chemical Weapons Convention Gets New Boost**

The Second Review Conference for the Chemical Weapons Convention was held in The Hague, April 7-18, 2008, attended by delegates from 114 of the 183 treaty states. The main issues brought up by participants were: threats posed by the use of chemical weapons by nonstate actors; deadlines for chemical weapons destruction (specifically named were Russia and the U.S., which have to destroy their chemical warfare agents by April 29, 2012, and Japan for destruction of its chemical weapons stockpiles in China); and universal adherence to the treaty. Delegates produced a report that reviews the treaty procedures and implementation issues, and urges the 12 countries that are not yet Party (Angola, the Bahamas, Dominican Republic, Egypt, Guinea-Bissau, Iraq, Israel, Lebanon, Myanmar, North Korea, Somalia and Syria) to join the international disarmament and nonproliferation treaty “as a matter of urgency and without

preconditions.” The report does not address the convention’s relation to some new science and technology developments that could produce new threats—such as development of new incapacitating agents, advances in biology and nanotechnology, and industry verification mechanisms. It was proposed that, from now on, the Scientific Advisory Board of the Organization for the Prohibition of Chemical Weapons meet twice a year, not just once as it has previously. [See also *New Concerns Rising over Chemical Weapons* in April 2007 and other related items in previous environmental security reports.]

In the meantime, Pacific Consultants International warns that Japan is not on schedule for meeting its obligations towards China in the recovery and destruction of hundreds of thousands of chemical weapons abandoned at the end of World War II and will most probably not meet the April 2012 deadline, due to management problems. [See also *Japanese Chemical Weapons Cleaning in China Yet to be Completed* in June 2007, and other previous environmental security reports on this issue.] (April 2008) Ref 125

### **The Meeting of Experts to Strengthen a Global Ban on Biological Weapons focused on addressing the legal framework necessary for implementation and enforcement of the Convention’s requirements**

The Meeting of Experts was held in preamble to the annual meetings of the States Parties to the Biological and Toxin Weapons Convention (BTWC) as set by the Fifth Review Conference of the treaty [see *Strengthen a global ban on Biological Weapons* issue in AC/UNU Millennium Project November report]. The experts from 150 States Parties and UN World Health Organization (WHO) and Food and Agriculture Organization (FAO), focused on addressing the legal framework necessary for implementation and enforcement of the Convention’s requirements, and security mechanisms concerning pathogenic microorganisms and toxins. The outcomes of the meeting constituted the input to the annual meeting of States Parties to BTWC held in November 10-14, 2003.

Note: Referring to "genetic bombs", a recent article<sup>1</sup>, is warning that "advanced forms of biological warfare that can 'target' specific genotypes may transform biological warfare from the realm of terror to a politically useful tool." <sup>2</sup> (August-September 2003) Ref. 126

### **NATO Creating a special chemical, biological, radiological, and nuclear (CBRN) unit**

NATO is creating a special chemical, biological, radiological, and nuclear (CBRN) defense unit with assets from 13 member nations, including the United States. The Czech army, renowned for its expertise in weapons of mass destruction defense, will be responsible for training the unit. The unit will operate both independently and as part of the new NATO Response Force. Once a nation's CBRN troops have gone through the training, they will be on call from their home country, on a rotational basis, by NATO command for quick deployment abroad. (February 2004) Ref. 127

### **U.N. Monitoring, Inspection and Verification Commission (UNMOVIC) might become a permanent agency to investigate biological and missile programs worldwide**

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<sup>1</sup> *The Genetically Modified Bomb*, Thom Hartmann (<http://www.commondreams.org/views03/0910-15.htm>)

<sup>2</sup> *Rebuilding America's Defenses: Strategy, Forces and Resources For a New Century*. The Project for the New American Century, Washington, DC, September 2000



Former chief U.N. weapons inspector, Hans Blix, recently suggested that the U.N. Monitoring, Verification and Inspection Commission (that searched for weapons of mass destruction in Iraq prior to the war), could become a permanent U.N. inspections body with a "more active role that the UN Security Council envisages for itself in the sphere of weapons of mass destruction". In another address, Blix urged the U.S. to better share data and information with the U.N. teams. (June 2004)

The U.N. Monitoring, Inspection and Verification Commission (that searched for weapons of mass of destruction in Iraq prior to the war) was suggested to become a permanent agency to investigate biological and missile programs worldwide. The project is supported by Britain, France, Canada, the European Union and Russia. As funding is the biggest impediment, there are suggestions to make it a permanent section of the U.N. Secretariat, or an organ of the Security Council. (November 2003) Ref.128

### **Agent Orange Study May Spur Chemical Bans and New Claims**

A conceptual framework and geographic information system (GIS) software package was developed to assign exposure opportunity indexes to troops, locations, or individuals to herbicides (such as Agent Orange in Vietnam) by Columbia University for the US National Academy of Sciences. The model takes into account factors such as herbicide type, locations and amounts of application, and troop movements to generate a quantitative estimate of exposure and likely health effects. The model helps individuals determine their proximity to spraying and corresponding health risks. The researchers also found that about seven million liters, or ten percent more than previously thought of the dioxin-containing Agent Orange defoliant was used. The finding prompted Vietnam to call on the US to provide aid to help victims stating, "the U.S. has a moral responsibility for this." The US does not provide compensation to Vietnamese victims, but funds multi-million dollar health programs in general. (April 2003) Ref.: 129

### **EU Chemical Policy Reforms' supporters ask US government not to undermine their efforts**

Over 70 health and environmental organizations have written to the US government, accusing it of "intervening in the regulatory process of sovereign nations at the behest of the industry", and urging it to cease efforts to undermine EU chemicals policy reforms. Key elements of the proposed changes include: introduction of the REACH system to Register, Evaluate and Authorize new Chemicals; the obligation for the chemical industry to provide safety data and risk assessments of new chemicals; and provisions to reduce animal testing. The US chemical industry and the Bush administration are opposed to these changes.

Note: The REACH system proposals have been revised in response to criticism from the chemical industry and from the leaders of France, Germany and the United Kingdom. The recently released new draft lightens the burden on industry and clarifies previously vague provisions concerning manufacturers and importers and the "duty of care" to avoid open-ended liability claims. Also, industry concerns over stricter protection of confidential business information is better addressed. (August-September 2003) Ref.130

### **Nuclear-Free Zones**

Nuclear-Free Zones are multiplying all over the world showing humanity's commitment to ban

nuclear weapons. The treaty bans all production, testing, and admittance of nuclear weapons in the region, as well as helping any other country to do so. The regional agreements banning nuclear weapons in their area are: the 1959 Antarctic Treaty, the 1967 Treaty of Tlatelolco (for Latin America and the Caribbean), the 1985 Treaty of Rarotonga (for the South Pacific), the 1995 Treaty of Bangkok (for Southeast Asia), the 1996 Pelindaba Treaty for an African Nuclear-Weapon-Free Zone, and the 2006 Treaty of Semipalatinsk (for Central Asia).

*Entire Southern Hemisphere Covered by Nuclear-Free Zone Treaties*

With the entry into force of the Pelindaba Treaty for an African Nuclear-Weapon-Free Zone, nuclear weapons will be banned throughout the entire Southern Hemisphere. The Treaty requires the establishment of an African Commission on Nuclear Energy to implement the agreement and to promote cooperation for the peaceful uses of nuclear science, and stipulates procedures by which the African Union could refer non-compliance cases to the UN Security Council. The other regional agreements banning nuclear weapons in their area are: the 1959 Antarctic Treaty, the 1967 Treaty of Tlatelolco (for Latin America and the Caribbean), the 1985 Treaty of Rarotonga (for the South Pacific), the 1995 Treaty of Bangkok (for Southeast Asia), and the 2006 Treaty of Semipalatinsk (for Central Asia). (August 2009) Ref. 131

The Agency for the Prohibition of Nuclear Weapons in Latin America and the Caribbean (OPANAL) has presented a paper: *What means Nuclear-Weapon-Free Zones?* which specifies some principles to be considered in the existent and future NWFZ treaties such as: applications during wartime as well as peacetime; prohibition of peaceful nuclear tests; prohibition of military attacks on nuclear facilities of Member States; extension of denuclearization to the maritime areas adjacent to Member States; and new international enforcement mechanisms for possible cases of violating the treaties (such as the Bangkok Treaty mentions).Ref.132

The Nuclear Nonproliferation Treaty (NPT) has 188 states parties; only India, Pakistan, Israel and North Korea are not parties to the NPT. There is international consensus that the gravity of the increasingly serious threat to the treaty and international security posed by the proliferation of weapons of mass destruction –nuclear, biological and chemical – reinforces the need to strengthen the treaty.

*Central Asia agrees to become a Nuclear Free Zone*

Uzbekistan, Kazakhstan, Tajikistan, Kyrgyzstan and Turkmenistan agreed to become the world's next nuclear weapons-free zone after five years of negotiations. The treaty bans all production, testing, and admittance of nuclear weapons in the region, as well as helping any other country to do so. This is the first such agreement to be negotiated under the UN. It is expected to be signed by the end of this year. Other nuclear free zones include the Antarctic, Africa, Latin America, South Pacific, South Asia, and Mongolia. Currently Central Europe, South Asia and the Peninsula of Korea, and the Middle East are in negotiations for their own free zones. (October 2002) Ref.133

*Cuba's ratification of the Treaty of Tlatelolco completes Latin American and the Caribbean Nuclear Weapons Free Zone*

Cuba was the last of 33 eligible states to ratify the Treaty of Tlatelolco October 26,2002, which establishes a nuclear weapon-free zone in Latin America and the Caribbean. (October 2002)

Ref. 134

*Central Asia Becomes Nuclear Weapon-Free Zone*

With the Kazakh Senate approving the Central Asian Nuclear Weapon-Free Zone treaty, and Kazakhstan President Nursultan Nazarbayev expected to ratify it shortly, Central Asia—including Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan — becomes a nuclear weapons-free zone, with the parties banning the possession as well as stationing of other nations’ nuclear weapons on their territories. (December 2008) Ref. 135]

## CONFLICT AND POST-CONFLICT ENVIRONMENTAL SECURITY ISSUES

The cost of military operations to comply with environmental regulations may become so high that the nature of conflict and military operations could change.

“We emphasize the importance of the peaceful resolution of conflicts to avoid situations in which weapons of war degrade the environment and cause irreparable harm directly through toxic agents, radiation, landmines and physical destruction and indirectly destroy agriculture and create vast displacement of people” reads one of the statements adopted at the Global Judges Symposium on Sustainable Development and the Role of Law.<sup>3</sup>

Long-term environmental degradation caused, in part, by the complete collapse of local and national forms of governance is one of the most serious issues in post-conflict situations.

The UN reports that about half of all conflicts over the past 20 years were “re-conflicts”—those that recurred within five years of peace accords. Many had environmental backgrounds. There is consensus that failed states are the most vulnerable to climate change and possible conflicts due to environment-related issues.

Environmental degradation and hazardous ordnance leftovers in post-conflict areas threaten the livelihoods and health of current and future generations and may constitute an impediment for lasting peace. There should be a “green chapter” in the Geneva Conventions for safeguarding the rights of the environment.

*National Security and the Threat of Climate Change*, a report by a group of high-ranking U.S. military officers and national security experts, warns that “climate change could seriously exacerbate already marginal living standards... causing widespread political instability and the likelihood of failed states.... The chaos that results can be an incubator of civil strife, genocide, and the growth of terrorism.”

The military is increasingly called to take part in post-conflict reconstruction efforts and environmental restoration to build stability, as well as in mitigation of environmental effects to avoid conflict. The report entitled *A Climate of Conflict* by Dan Smith and Janani Vivekananda

<sup>3</sup> Global Judges Symposium on Sustainable Development and the Role of Law, convened by UNEP in Johannesburg, 18 to 20 August 2002.

published by International Alert in London warns that unless adequate and timely adaptation policies are implemented, more than half of the world's nations are at risk. It identifies 46 countries—home to 2.7 billion people—at high risk of armed conflict, while another 56 states—with a total population of 1.2 billion—are at risk of political instability.

Conflict and environmental degradation exacerbate each other. Middle East countries are among the least environmentally sustainable, and conflict has caused massive damages to ecosystems from Iraq to Lebanon and North Africa. Refugees, human rights groups, and legal experts have urged the International Criminal Court to consider human-made environmental crimes along with terror and mass killings in the prosecution of Sudanese officials and Arab Janjaweed. They argue that the crisis was aggravated by the ecological destruction used by the government as a weapon to force people to move. The number of refugees in camps reached 2.2 million and the risk of unrest is increasing as resources are getting exhausted. The deployment and work of the joint UN-African Union force of 26,000 peacekeepers is jeopardized by lack of water. In 2007, an estimated 26 million people were internally displaced by armed conflicts and violence worldwide.

Many post-conflict health and environmental impact assessments are ongoing, as are liability disputes. The Portfolio of Mine Action Projects 2007 found that 26 out of 29 war-ravaged countries or territories surveyed are beleaguered with the lurking remnants of cluster bombs and other explosives. Protocol V on Explosive Remnants of War of the Convention on Certain Conventional Weapons came into force in November 2006. The Convention on Cluster Munitions was formally adopted in May 2008, legally binding the use, production, transfer, and stockpiling of cluster munitions and committing countries to clear areas contaminated by cluster munitions and to assist victims and affected communities.

Concerns over the environmental and health effects of the use of depleted uranium munitions are resurfacing and increasing worldwide. The European Parliament adopted a resolution calling on the EU to lead negotiations “through the UN or through a ‘coalition of the willing’” for a global treaty to ban depleted uranium weapons.

Over the past 10 years, only 30% of known chemical weapons stocks have been destroyed. The remaining 70% are supposed to be totally destroyed by 2012 to meet the Chemical Weapons Convention stipulations. Japan is not on schedule to meet its obligations toward China in the recovery and destruction of hundreds of thousands of chemical weapons abandoned at the end of World War II and will most probably not meet the April 2012 deadline. Some experts argue that “nonlethal” materials such as “incapacitating agents” are toxic chemicals that would violate the CWC if used on the battlefield. Clarification of what chemicals will be allowed under the treaty's exceptions is needed.

There is an international consensus that the “polluter has to pay” with no exemption for the military. A Geneva Convention for the environment would safeguard the rights of the environment in conflict situation. Numerous studies are being conducted to assess the effect of different chemicals or other potential polluting materials with long-lasting effects on the environment and human health. The most “investigated” are the effect of several chemicals (an increasing number of chemicals are being banned), some metals (i.e. mercury and lead), poison gas, and nuclear material (mostly depleted uranium used in armor-piercing ammunition).

Many post-conflict health and environmental impact assessments are ongoing, as are liability disputes. Protocol V on Explosive Remnants of War (ERW) of the Convention on Certain Conventional Weapons came into force in November 2006, almost three years after it was adopted. The Protocol stipulates that Parties should take “remedial measures to mark and clear, remove or destroy unexploded ordnance or abandoned explosive ordnance” as early as possible after hostilities have ended, whether they control the territory or not, by cooperating directly or indirectly with all parties involved through quick and accurate information exchange. The Protocol is not retroactive. The Portfolio of Mine Action Projects 2007 found that 26 out of 29 war-ravaged countries or territories surveyed are beleaguered with the lurking remnants of cluster bombs and other explosives.

### **UN Secretary-General on the International Day for Preventing the Exploitation of the Environment in War and Armed Conflict**

In advance of the November 6th International Day for Preventing the Exploitation of the Environment in War and Armed Conflict, UN Secretary-General Ban Ki-moon urged all nations to renew their commitments preventing environmental exploitation in war and armed conflict. “Taking ecological considerations into account is crucial if we are to avoid longer-term environmental problems that can undermine security and development, and lead to further cycles of conflict and displacement,” he said in a message and added that massive migrations caused by conflicts also severely damage the environment. UNEP found that more than 2 million displaced people since 2003 had caused severe deforestation, land degradation, and overexploitation of groundwater resources around the larger camps for displaced persons. (October 2007) Ref. 136

### **Environmental Destruction During War Aggravates Instability**

On the occasion of the International Day for Preventing the Exploitation of the Environment in War and Armed Conflict, observed on November 6, UN officials highlighted again that environmental degradation, mostly destroying natural resources in wartime, worsens conflicts inside and between nations and re-launched the call for cleanup of the remnants of war. Although legal protection for the environment during wartime is covered by several existing international laws, there might be a “need to go further than this piecemeal coverage, and develop clear standards, appropriate sanctions and credible enforcement mechanisms to ensure that environmental damage is avoided, deterred or punished. We may well need to add a 'green' chapter to the long established rules of war set out in the Geneva Conventions” said Kofi Annan, UN Secretary-General. Klaus Toepfer, Director of the United Nations Environment Programme, stressed that “Joint projects to clean up sites, agreements and treaties to better share resources such as rivers and forests, and strengthening cooperation between the different countries' ministries and institutions may hold the key to building trust, understanding and more stable relations.” (November 2004) Ref. 137

### **UN Designates November 6th as International Day for Conflict and the Environment**

The United Nations has designated November 6 as the “International Day for Preventing the Exploitation of the Environment in Wars and Armed Conflicts.” This designation is the result of UN member states requesting UNEP and the UN Human Settlements Program to monitor the issue. This provides a new avenue for increasing public awareness of environmental impacts of

conflict. (November 2002) Ref.: 138

### **Geneva Convention for Environment**

Klaus Toepfer, UNEP's Executive Secretary, called for the equivalent of a Geneva Convention for the Environment at the Agency's Governing Council meeting in February: "We have the Geneva Conventions, aimed at safeguarding the rights of prisoners and civilians. We need similar safeguards for the environment. Using the environment as a weapon must be universally condemned, and denounced as an international crime against humankind, against Nature." He stressed that environmental security had to be a fundamental part of a long-lasting peace policy. In an article written to mark the meeting held from 3-7 February 2003 in Nairobi, Kenya, Toepfer said that the environment is often neglected as "the long-term casualty of war," and went further to recommend that the international community, "...outlaw those who deliberately put the environment at risk in war." (February 2003) Ref. 139

### **UNEP may establish a new Secretariat on Environment and Conflict**

UNEP held an international meeting to address and assess the impact and link between environmental degradation and political instability, human conflict, and health. A UNEP survey conducted prior to the meeting found that the links between the environment and poverty, trade and conflict were the main "knowledge gaps" in understanding environmental-related issues. This gap will be the focus of the UNEP Governing Council/Global Ministerial Forum to be held in March. As a result, the "UNEP might set up a new secretariat on environmental peace and conflict," said Dr. Steve Lonergan, Director of UNEP's Division of Early Warning and Assessment. (January 2004) Ref. 140

### **UNEP's Post-conflict Environmental Assessment may one day get extended to ongoing Environmental Assessments**

During the UNEP Governing Council's Drafting Committee meeting (February 3-7, 2003), the role of UNEP in post-conflict environmental assessment was discussed, including the possibility of environmental assessments of ongoing armed conflicts such as in Israeli-Palestinian conflicts. Although it was agreed to strengthen UNEP's ability to conduct post-conflict assessments and report to the relevant UN bodies and commissions for further follow-up, it is clear that the potential for assessments in longer-term ongoing conflicts is an emerging issue that could lead one day to international agreements. (February 2003) Ref.: 141

### **Collateral Damages Caused by Attacks Need to be Redefined**

Although precision weapons are seen as reducing collateral damage and reducing conflicts' duration, a study of precision bombing in Yugoslavia that targeted chemical plants brings into question the definition of "collateral damage." The Institute for Energy and Environmental Research report of this study argues that, "there is need for a sharp redefinition of how target sets and collateral damage are evaluated.... Currently collateral damage is measured in terms such as the number of civilian casualties or the cost of replacing property. Long-term environmental harms can be much more difficult to quantify and evaluate, despite their very significant costs." (November 2002) Ref.: 142, 143

### **New Resolution on Victims' International Human Rights**

The latest Session of the UN Human Rights Commission approved the "Basic Principles and

Guidelines on the Right to a Remedy and Reparation for Victims of Gross Violations of International Human Rights Law and Serious Violations of International Humanitarian Law.” This comprehensive Resolution doesn’t introduce new international obligations, but identifies “mechanisms, modalities, procedures and methods for the implementation of existing legal obligations under international human rights law and international humanitarian law” and reinforces the obligation of all States to respect the international legal obligations and adapt their respective national legal systems to the international laws and regulations on human rights. The Resolution will come into effect after adoption by the Economic and Social Council and the General Assembly, which could occur at the next meeting this September. (May 2005) Ref. 144

### **New UN Peacebuilding Commission to Improve Post-Conflict Planning**

The UN Peacebuilding Commission for post-conflict situations held its inaugural meeting on June 23, 2006. The new UN peacebuilding body was created to help prevent countries from falling back into violence, by adopting reconstruction, institution building, and other stabilization and development strategies specific to each country/region emerging from conflict. Since environmental issues are recognized as often being a contributing cause in conflict re-emergence, environment is expected to occupy an important position in the strategies set forward by the Commission. Proposed in 2004 by the Secretary General’s High-Level Panel on Threats Challenges and Change, detailed by the *In Larger Freedom* report, the Commission was endorsed by the 2005 World Summit, and became operational in December 2005. The Commission is an intergovernmental advisory body requiring members to act only by consensus. The Peacebuilding Commission’s membership includes seven members of the Security Council (including its five permanent members); seven States from the Economic and Social Council; five top contributors to the UN budget; five top providers of military personnel and civilian police to UN missions; and seven additional members (that have experienced post-conflict recovery) elected by the General Assembly. (June 2006) Ref. 145

### **UN Secretary-General, Kofi Annan, calls for updated laws against environmental damage in war**

November 6<sup>th</sup> is the International Day for Preventing Exploitation of the Environment in War and Armed Conflict. At its second annual observance this year [2003], Kofi Annan, UN Secretary-General, and Klaus Toepfer, Executive Director of the United Nations Environment Program (UNEP) urged the international community to assess how they could protect the environment in time of war through legal and other mechanisms. "While humankind's ability to wage war continues apace with new and even more potentially devastating weapons," said Toepfer, "international rules and laws designed to minimize the impact on the Earth's life support system have lagged far behind." He also mentioned a recent report commissioned by the German Environment Ministry, which asserts that the Geneva Protocol's requirement of proving "widespread, long-term and severe damage" has rendered it ineffective for environmental protection, as it applies only to "expected damages rather than possible ones" and remains unenforceable due to a lack of a common definition of these three terms and lack of any assessment envisioned to be carried out after a conflict. (November 2003) Ref. 146

### **UN Mission Assessment of Gaza Conflict Included Environmental Impacts**

The UN Mission assessment of the December 2008–January 2009 Gaza conflict found evidence that both Israeli forces and Palestinian militants committed actions that could be violations of

international law. The 575-page report, “Human Rights in Palestine and Other Occupied Arab Territories; Report of the United Nations Fact Finding Mission on the Gaza Conflict,” includes impacts on the environment and public health. The Mission assessed particularly the use of white phosphorous, fléchette missiles, DIME (dense inert metal explosive) munitions, and depleted uranium. The Mission “...believes that serious consideration should be given to banning the use of white phosphorous in built-up areas” (par. 897). Similarly, it notes that DIME weapons injuries might raise the risk of cancer (par. 904). The report recommended further environmental monitoring under UN auspices and underlined that a detailed environmental impact assessment is being conducted by UNEP (September 2009) Ref. 147

### **New Legal Proceeding over Allegations of Use of Illegal Weapons in Iraq**

The UK Ministry of Defence began investigations over allegations that Britain was complicit in the use of chemical weapons in the 2004 attack against Fallujah, Iraq. The increased number of child deformities, miscarriages, and cancers might be linked to the alleged use of weapons including white phosphorus, a modern equivalent of napalm, and depleted uranium by the coalition forces. Affected Iraqi families initiated legal actions against the UK Government for breaching international law, war crimes, and failing to intervene to prevent a war crime. (May 2010) Ref. 148

### **UNEP Post-Conflict Assessment Chairman’s input to UN’s High-Level Panel on Threats, Challenges, and Change, the Environmental Change and a New Environmental Security Project at the Woodrow Wilson Center**

As a contribution to the United Nations’ High-Level Panel on Threats, Challenges, and Change, the Environmental Change and Security Project of the Woodrow Wilson International Center for Scholars (WWICS) launched the project *Protecting the Earth, Preserving Peace: Preventing Environmental Threats to Security*. This new WWICS project will invite panels to address three issues: “What is the link between environment and security? What can be done about it? What contributions can be made by collective action mechanisms such as the United Nations?”

As part of this process Pekka Haavisto, Chairman, UNEP Post-Conflict Assessment Unit made a well structured presentation May 25 at the WWICS highlighting the UNEP’s work on post-conflict assessment, links between environmental conditions and conflict, and NATO countries’ work on techniques and equipment for minimizing environmental damage during conflicts. (May 2004) Ref. 149

### ***Protecting the environment during armed conflict. An inventory and analysis of international law***

*Protecting the environment during armed conflict. An inventory and analysis of international law* report by UNEP is a comprehensive overview of existing legislation protecting the environment in case of conflict and gaps and areas that should, but are not yet, covered by regulations. The report notes that there are no mechanisms to protect natural resources during armed conflict, and no permanent international authority to monitor violations and address liability and redress claims for environmental damage caused during armed conflicts. There are also terminology issues, such as lack of clear definition for “widespread,” “longlasting,” and “severe”, as well as a standard definition of what constitutes a “conflict resource” or their illegal exploitation and trade. While the majority of international legal provisions protecting the environment during armed conflict—including the ICRC Guidelines on the Protection of the



Environment during Armed Conflict (1994)—were designed for international armed conflicts, the majority of today’s conflicts are internal; hence the legal instruments do not apply. The report recommends, inter alia, that the Permanent Court of Arbitration and its “Optional Rules for Conciliation of Disputes Relating to the Environment and/or Natural Resources” should be considered to address disputes related to environmental damage during armed conflict. It concludes that “A summary report on the environmental impacts of armed conflicts should be presented on an annual basis to the UN General Assembly, in conjunction with the International Day for Preventing the Exploitation of the Environment in War and Armed Conflict.” (January 2010) Ref. 150

### **Conference on Disarmament unable to agree on work program**

The U.N. Conference on Disarmament, the sole multilateral forum for disarmament negotiations, failed again in reaching consensus on a program of work. The adopted annual report requests that future presidents conduct consultations among member countries during the inter-sessional period and, if possible, make recommendations considering all relevant proposals and the outcomes so far. The 2004 sessions are scheduled for Jan. 19 to March 26, May 10 to June 25, and June 26 to Sept. 10. (August-September 2003) Ref. 151

### **Progress Made on Banning Cluster Bombs**

#### Negotiations Continue for an International Instrument to Ban Cluster Munitions

Cluster munitions were the focus of the Convention on Certain Conventional Weapons (CCW) meeting held in Geneva this month that resulted in a weak mandate with no legally binding document or language referring to cluster bomb prohibition or timeline. The EU’s proposal to negotiate a treaty in 2008 banning cluster munitions was rejected. UN Secretary-General Ban Ki-moon underlined in his message to the delegates the necessity of a legally binding international instrument that would prohibit the use, development, stockpiling and transfer of cluster munitions; while promoting the destruction of current stockpiles, battlefield clearance and risk mitigation activities. This is consistent with the aim of the Oslo Process to negotiate a ban on cluster munitions. On November 5, the Global Day of Action to Ban Cluster Bombs, public actions took place in 40 countries, calling on governments to take actions for banning cluster munitions. Supporters hope that momentum was created to advance the negotiations next month, when more than 100 countries will gather in Vienna to discuss a draft treaty. [See also *Progress Made on Banning Cluster Bombs* in March 2007 and other items on this theme in previous environmental security reports.] (November 2007) Ref. 152

#### Progress Made on Banning Cluster Bombs

At the Conference on Cluster Munitions held in February 2007 in Oslo, 46 states and several international organizations decided to develop, by 2008, a legally binding international instrument to ban the use, production, transfer, and stockpiling of cluster munitions, as well as to create a framework for dealing with the consequence of cluster munitions’ use in the affected areas. Environmental damage and civil casualties are the highest concern for banning cluster bombs. Next meetings are planned for May/June in Lima, November/December in Vienna and early 2008 in Dublin. Last year Belgium has become the first country to ban cluster bombs, and this month [March 2007] the Belgian Senate passed legislation that criminalizes investment in companies that make cluster munitions. The Belgian Parliament plans to publish a list of

companies that manufacture such munitions. Austria announced a moratorium on the use, production, or trade of cluster munitions. Canada promised to destroy its stockpile of cluster munitions. The U.S. Democrats recently introduced a bill in the U.S. Senate proposing to “restrict federal funds for the use, sale or transfer of cluster bombs.” Presently there are 34 countries producing cluster munitions and about 75 countries that stockpile them. [See also related items *CCW Protocol V on Explosive Remnants of War Entered into Force in November 2006*, *NGOs Launch Campaign to Ban Cluster Bombs*, and *Draft Protocol on Cluster Bombs Cleanup Liability*] (March 2007) Ref. 153

#### African Countries Call for International Ban on Cluster Bombs

The first meeting of African countries on cluster bombs adopted the “Livingstone Declaration,” endorsed by 38 out of 39 countries (South Africa, one of the continent’s two producer states was the exception.) The strong political declaration is formally committing the African countries to the negotiations for a global cluster munitions ban treaty to be held in Dublin, Ireland, May 19-30, 2008. There was widespread support for a broad definition of cluster munitions to avoid exceptions based on so-called ‘technical fixes,’ and on the need for comprehensive liability provisions for the affected communities. The Dublin meeting should conclude the Oslo process and agree on the final terms and language of a cluster bombs ban treaty, which would then be opened for signature before the end of 2008. [See also *Negotiations Continue for an International Instrument to Ban Cluster Munitions* in November 2007 and other items on this issue in previous environmental security reports.] (April 2008) Ref 154

#### NGOs launch campaign to ban cluster bombs

The Cluster Munition Coalition, involving NGOs from around the world, launched a campaign aiming to ban, under international law, the use of cluster bombs. The campaign also calls for help for victims and an overall cleanup of explosive remnants. Several governments - including the Netherlands, Canada, New Zealand and Mexico support the campaign. The campaign has two aims: embedding in international law the responsibilities of parties with regard to ERW, and binding the use of cluster munitions (CM) by universal humanitarian standards. Regarding CM, the campaign aims to restrict use and production, as well as trade in cluster munitions. (November 2003) Ref. 155

#### **Sunk Weapons Represent a Growing Health and Environmental Hazard**

Tons of chemical weapons and ordnance abandoned at the end of World War II continue to litter the world’s oceans, representing serious hazards to the environment and human health. There is no compulsory international legislation requiring full disclosure of dumping sites and long-term monitoring of those areas (the London Convention of 1972 is not retroactive and cannot affect acts that had already been executed). However, one would expect that the countries responsible would have moral obligations and common international customary law should demand action for cleanup and protection of humans and environment against the imminent hazards that those sites represent. [See also *Chemical Munitions on San José Island, Panama* in August 2004, and *Ocean Dumping of Chemical Weapons a Continuous Threat* in January 2004 environmental security reports.] (November 2005) Ref. 156

#### Undersea Abandoned Ordnance Presents Increasing Environmental and Health Hazards

Leaking abandoned ordnance since WWII or from military exercises is contaminating the

waters around Puerto Rico's Vieques Island with carcinogenic materials, endangering the marine ecosystem and the health of inhabitants who eat local seafood, noted University of Georgia ecologist James Porter at the Second International Dialogue on Underwater Munitions held February 25-27 in Honolulu, Hawaii. Other previous findings also show dangerously high levels of heavy metals and other toxic chemicals related to military activities in the area. In 2001, Vieques's residents filed a \$100 million damage claim against the US Navy for increased cancer incidence due to military exercises. U.S. Navy efforts to clean up areas of Vieques were so far limited to land and shoreline. Experts note that Vieques Island is one of many marine sites around the world increasingly affected by abandoned ordnance. [See also *CCW Protocol V on Explosive Remnants of War Entered into Force* in November 2006, and other items on this issue in previous environmental security reports.] (February 2009) Ref. 157

### **OSCE Security Forum Urges Destruction of Thousands of Tons of Dangerous Ammunition and Weapons**

In a special meeting held on September 29 in Vienna, the OSCE's Forum for Security Cooperation (FSC) discussed the best strategies to secure and/or destroy the vast stocks of deteriorating weapons and munitions left over from the Cold War across Eastern and South-Eastern Europe, the Caucasus, and Central Asia. The life-threatening stocks represent a huge problem because of their quantity (very large—Ukraine alone identified 120,000 tons on its territory overdue for destruction), placement (in populated areas and next to important infrastructure), composition (some are nuclear), and costs (their destruction or secure storage exceeds the countries' financial capabilities). Representing an imminent human and environmental hazard, and terrorism risk, it is critical to urgently deal with the situation. (September 2004) Ref. 158

### **OECD and the Republic of Georgia Signed an Agreement to Eliminate or Recycle Leftover Munitions Dumps on Former Military Bases**

Recognizing that old weapons on former military bases have become a threat to safety, ecology, and security, the Georgian Government and the Organization for Security and Co-operation in Europe (OSCE) signed an agreement on 30 January 2003 establishing a project to eliminate or recycle these stockpiles of ammunition and bombs. The governments of Finland, Germany, the United Kingdom, the Netherlands, Sweden, and Turkey have assured financial support for the project. With similar closing of many post-Cold War bases around the world, it is reasonable to assume that other countries will also seek such international agreements. (January 2003) Ref.: 159

### **OSCE-UN Launches Environmental Security Initiative in Southern Caucasus**

The Organization for Security and Cooperation in Europe (OSCE), the UN Environmental Programme (UNEP), and the UN Development Program (UNDP) launched the Environmental Security Initiative through a series of consultations in Armenia, Georgia, and Azerbaijan May 10th-18th. The purpose of the Initiative is to eliminate environmental problems that might cause political tensions. (May 2004) Ref.160

### **International Crisis Group to Debate Considering Climate Change Variable in Conflicts**

The International Crisis Group, which tries to prevent conflicts by monitoring vulnerable regions based on indicators such as political instability, began in June to debate whether to include

climate change as a new variable in its analysis. (June 2007) Ref. 161

### **Australia Claims First Complete Cleanup of an Atomic Bomb Test Site**

Australia announced that it is the first country to successfully clean up a former (British) atomic bomb test site. The US\$108 million rehabilitation buried 360,000 cubic meters (12.71 million cubic feet) of contaminated soil in 10-15 meter (33 ft-50 ft) deep trenches and treated radioactive debris pits. The success of this claim is disputed by Greenpeace and senior U.S. and Australian advisers who worked with the project. (March 2003) Ref.: 162

### **Controversy over the impacts of depleted uranium**

[Controversy over the impacts of depleted uranium](#)

[Study by Sandia on Depleted Uranium \(DU\)](#)

[NGOs Call for Action concerning the Use of DU in Iraq](#)

[Unexplained high levels of uranium found in Afghan urine samples](#)

[Kosovo Cleanup](#)

[UN confirms that contamination by depleted uranium Persists in Bosnia and Herzegovina](#)

[Environmental cleanup of depleted uranium continues in Montenegro with calls for assistance, reimbursement, and, in some NATO countries, a ban on such ammunition](#)

[Depleted Uranium Environmental Concerns Resurfacing](#)

[Updated Studies on Potential Health Implications of Depleted Uranium](#)

### Controversy over the impacts of depleted uranium

The health impact of armor-piercing bullets with depleted uranium (DU) is subject of continuing complaints and subsequent research in several former conflicts. Although one UNEP study in Kosovo found no significant impact of DU, Bosnia and Herzegovina has requested that UNEP conduct a study in their country. After examining 14 sites, a team of UNEP experts has identified three radioactive "hot spots" in Bosnia and advised the government of Bosnia to begin decontamination of the sites and to educate local people about the hazards. A full report will be published in March 2003. The World Health Organization has warned that depleted uranium has significant chemical toxicity and UNEP is calling for "precautionary action" at locations where the public has access to depleted uranium sites. According to an article in the *Seattle Post Intelligencer*, Iraqi medical doctors say DU has caused cancer and birth defects. Others outside Iraq say DU has a role in the Gulf War Syndrome. Iraq offered a resolution banning weapons that used DU to the U.N. General Assembly's Disarmament and International Security Committee in November that got 35 votes in favor, 59 against, and 56 abstentions. (October 2002) Ref.: 163

### Study by Sandia on Depleted Uranium (DU)

Sandia National Laboratories has completed a study assessing health risks associated with accidental exposure to depleted uranium (DU), using as a case study the 1991 Gulf War. The two-year study, *An Analysis of Uranium Dispersal and Health Effects Using a Gulf War Case Study*, used mathematical modeling to estimate eventual health risks both on troops and civilians. The study's findings are consistent with other U.S. studies on the same issue: there are no proofs

of serious health risks implied from use of DU in combat. Closer exposure might enhance some risks, but at low level of probability. The report recommends monitoring of those exposed in close proximity or by handling DU, as well as considering conservative guidelines for uranium workers. [See also *Claims of Radioactive Battlefields in Iraq need more scientific ground* in August 2003, *Depleted Uranium Controversy Continues* in July 2003, and *Health Research Updates on Depleted Uranium Inconclusive* in June 2003 environmental security reports.] (July 2005) Ref. 164

#### NGOs call for action concerning the use of DU in Iraq

NGOs call upon the occupying powers in Iraq to take action concerning the DU left over from the Iraq war this year. The Nuclear Policy Research Institute (NPRI) is calling on the occupying forces to begin the cleaning up and establish long-term monitoring of "migration of DU into the environment" and allow independent research "to address the health problems" in Iraq. An NPRI forum on June 14, 2003 at the New York Academy of Medicine will more fully debated the "Health Effects of Depleted Uranium Munitions."

The U.K.-based Campaign Against Depleted Uranium organized international demonstrations and events to protest against the use of DU weapons by several countries including the UK and the USA.

Several studies conducted by international organizations demonstrate that DU does cause contamination of the environment and might have serious health effects. (May 2003) Ref.: 165

#### Unexplained high levels of uranium found in Afghan urine samples

Even though both US and UK defense officials have said no depleted uranium shells were used in Afghanistan and an independent team also found no evidence of depleted uranium shells in Afghanistan, high uranium levels were found in urine samples of Afghan civilians and identified several hundred people suffering from illnesses and conditions similar to those of Gulf veterans. The team from the Uranium Medical Research Center (UMRC), based in Canada, which used an independent UK laboratory, cannot explain the uranium contamination. (May 2003) 166

#### Kosovo Cleanup

Two environmental "hot spots" identified by the UN in the wake of the Kosovo Conflict have been cleaned up and the condition of two others has been declared to be improved, bringing to an end a four-year remediation project run by the United Nations Environment Programme.

Remaining remediation activities have been handed over to the Government of the Republic of Serbia. The precedent set by the UN's involvement in post-conflict remediation of a battlespace suggests that the development of a post-conflict battlefield remediation treaty is possible.

(November 2003) Ref. 167

#### UN Confirms that Contamination by Depleted Uranium Persists in Bosnia and Herzegovina

For the first time, a UN report released in March 2003 confirms contamination of drinking water and air caused by the use of DU weapons in Bosnia and Herzegovina in 1994 and 1995. Even though the contamination is at a low level, monitoring is required. "The findings of this study stress again the importance of appropriate cleanup and civil protection measures in a post-conflict situation," said Pekka Haavisto, chairman of the UNEP DU projects. "We hope that this work will play a role in protecting human health and the environment in the unfortunate event of future conflicts." (March 2003) Ref.: 168, 169

Environmental cleanup of depleted uranium continues in Montenegro with calls for assistance, reimbursement, and, in some NATO countries, a ban on such ammunition

The controversy over depleted uranium continues in Europe. According to the New York Times, depleted uranium particles have been detected in the air and ground two years after the NATO attack in the Cape Arza area of Montenegro in 1999. Some research in the United States, Canada and Britain has shown that uranium particles from depleted uranium-coated bullets can have potentially dangerous health effects, though there is no agreement on what a harmful dose would be. As a result, cleanup and storage is warranted by UNEP guidelines, leading the director of the Montenegro Toxicological Institute to call for NATO to "come and take back your radioactive waste and pay for decontamination."

If such calls proliferate, they could lead to new agreements requiring the military that used the bullets to remove them from the battlefield after the conflict or could lead to an outright ban of such ammunition. (September 2002) Ref. 170

Depleted Uranium Environmental Concerns Resurfacing

Concerns over the environmental and health effects of the use of depleted uranium munitions are resurfacing and increasing worldwide. The debate ranges from extensive articles in the news to testimonials by scientists and health tests of military veterans and active duty personnel who may have been exposed to depleted uranium. A British study by the University of Leicester—using MC-ICP mass spectrometry for detecting an individual's exposure to depleted uranium—reveals that, depending on the rate of exposure, depleted uranium can be traced in urine 20 years after inhalation, even when the concentration was at the low end of the normal range. [See also *Conclusions on Health and Environmental Impact of 1990-1991 Gulf War* in July 2005 and other previous items on this theme, as well as *Sensitive Uranium Detector Using DNA* in February 2007 environmental security reports.] (November 2007) Ref. 171

Updated Studies on Potential Health Implications of Depleted Uranium

Two recent studies by the Institute of Medicine address the possibility of assessing the potential health implications of exposure to depleted uranium: *Gulf War and Health: Updated Literature Review of Depleted Uranium*, and *Epidemiologic Studies of Veterans Exposed to Depleted Uranium: Feasibility and Design Issues*. Both studies conclude that health impacts of depleted uranium exposure in military and veteran populations are difficult to determine with the available data and procedures and an assessment plan would not be easy to design. However, the study on feasibility and design issues makes some recommendations for improving assessment of depleted uranium-related health outcomes, including "a prospective cohort study if future military operations involve exposure to depleted uranium" and better integration and linkages of DOD databases for identifying health issues of current active-duty military personnel and veterans with potential DU exposure. Both studies are pre-publications by the National Academies Press. (July-August 2008) Ref. 172

**Health Threats from Open Waste Pits in Conflict Zones Trigger Regulation**

Over 400 Iraq and Afghanistan veterans complain of health problems after being exposed in conflict areas to burning toxic waste in open pits. A bill introduced to Congress, 'Military Personnel War Zone Toxic Exposure Prevention Act,' requires health assessment of those who were exposed, as well as further prohibition of use of open pits to burn toxic waste. Meantime,

several lawsuits have been filed against KBR Inc., a former subsidiary of Halliburton, for liability over soldiers' toxic exposure. (June 2009) Ref. 173

### **Sustainable Development and Conflict**

The UN Commission on Sustainable Development's Twelfth Session (CSD-12) was held in New York from 14 to 30 April. This meeting was the first substantive review of progress on targets set by world leaders at the 2002 World Summit on Sustainable Development in Johannesburg, which include many of the eight UN Millennium Development Goals (MDGs). CSD-12 discussions centered on halving by 2015 the number of people without access to safe drinking water and basic sanitation, and significantly improving the lives of at least 100 million slum dwellers by 2020. A number of the thematic issues reviewed included the intersection of conflict and natural disaster subjects with environmental and natural resource topics. (May 2004) Ref. 174

### **Governance is key to post-conflict environmental future says UNEP Report on Afghanistan**

The United Nations Environment Program (UNEP) released the report, *Post-Conflict Environment Assessment*, on the environmental damage of two decades of warfare in Afghanistan. The report found that the most serious issue is the long-term environmental degradation caused, in part, by the complete collapse of local and national forms of governance. The report includes 163 recommendations to be implemented by the Government of Afghanistan with technical and financial assistance from the international community. If the linkage of governance and environmental management becomes better understood, then future international treaties on post-conflict environmental cleanup may include training and development (capacity building) for local governments' environmental management. (January 2003) Ref.: 175, 176

### **Environment and Security Initiative Progress Report 2006**

*The Environment and Security Initiative—An international partnership for managing conflict and risk*, progress report 2006, highlights advancement of ENVSEC sub-regional projects' implementation in the Southern Caucasus, Central Asia and South Eastern and Eastern Europe, as well as the initiation of an environment and security risk assessment in the Belarus, Moldova and Ukraine sub-region. The issues identified for urgent attention by ENVSEC include: wastes, stocks of rocket fuel and obsolete pesticides from Soviet times, shared waters, and the continuing environmental consequences of the Chernobyl disaster. "Activities conducted under the ENVSEC Initiative show that environment can act as a bridge for crossboundary cooperation" says the report. The 2007–2009 work program includes over 70 projects based on region-specific priorities "related to need of further assessments, policy development, institution and capacity building as well as technical cooperation." (April 2007) Ref. 177

### **Pressure mounts for increased funds and better techniques for demining**

Minefields in **Angola** impede food aid delivery to tens of thousands of starving people and previously prevented farmers from harvesting crops. The World Food Program (WFP) calls for funds for demining activities. (May 2003) Ref. 178, 179

**Afghanistan** destroyed a first stock of more than 500 landmines to demonstrate its commitment to the Global Mine Ban Treaty and said that it was ready to speed up the mine destruction process if the UN and donor countries provided assistance.

Following attacks and threats to demining teams, in May the UN Mine Action Centre for Afghanistan had to suspend its demining work several times, until measures are in place to guarantee the security of its workers. (May 2003) Ref.: 180, 181

In June 2003 **Tajikistan** will start the first international mine clearance project supported by OSCE, the Canadian Government, and the Canton of Geneva in Switzerland. The project will consider the priorities set up by the Government's recently published State De-mining Programme. According to the Tajik authorities, around 16,000 land mines laid during the '92-'97 civil war by both sides, as well as by the peacekeeping forces, and later along the borders with Afghanistan and Uzbekistan, are dispersed over an area of 2,500 square kilometers. The demining action has been delayed due to lack of resources. (May 2003) Ref.: 182

### **Liability for World War II land mines in Egypt**

Egyptian authorities estimate that there are 18 million landmines and unexploded bombs in the el-Alamein desert, which threaten human life and retard the region's development. Egypt does not have the resources to solve this problem and wants the landmines and ordnance removed. (November 2002) Ref.: 183

### **Environmental Change and Security 12th Annual Report—Focus on Africa**

The 12th annual report of the Woodrow Wilson Center's Environmental Change and Security Program explores the link between environment, conflict, and cooperation in Africa, focusing on fragile states. It calls attention to other smaller—local—conflicts triggered by increasingly shrinking resources due to population growth, climate change, and accelerated environmental degradation. It warns that unless timely measures are taken, those small conflicts might escalate into wars and humanitarian disasters, such as in Sudan's Darfur region. However, "efforts to promote sustainability—and use natural resources as peacebuilding tools—could help turn deadly environments into safe, sustainable neighborhoods" say the authors. The report includes the contributions of eight African leaders and scholars. (June 2007) Ref. 184

The **Democratic Republic of the Congo** (DRC) and neighboring **Republic of Congo** (ROC), at the end of a two-day conference attended by representatives of several African countries from the region, sought support of the international community to eradicate antipersonnel landmines. Canada offered both financial and material support in an effort to encourage countries in the region to ratify the Ottawa Landmine Treaty. (May 2003) Ref.: 185

### **Environmental Aspects of the Darfur Conflict**

#### ICC Urged to Consider Environmental Crimes in Darfur Cases

The International Criminal Court (ICC) has begun the prosecution process related to the Darfur conflict, but so far there is no mention of environmental crime, although environmental degradation is recognized as one of the underlying causes of the region's devastating war. Refugees, human rights groups and legal experts have urged the ICC to consider man-made environmental crimes along with terror and mass killings in the prosecution of Sudanese officials and Arab Janjaweed. They argue that the ecological crisis—recognized as partly caused by climate change—was aggravated by the destruction of vegetation, land, and food and water sources that was ordered by government officials to force people to move. (August 2007) Ref. 186



### Water Shortage for 2.2 Million in Refugee Camps Could Increase Darfur Conflict

Water shortage might impede the peace process in Darfur. The number of refugees in camps reached 2.2 million in July 2007 and the risk of unrest is increasing as the water wells are running dry. As stipulated by the UN Security Council's resolution adopted in July, a joint UN-African Union force of 26,000 multinational peacekeepers should be deployed in the area. However, their deployment and work are jeopardized by lack of resources, mainly water. (August 2007) Ref.187

### **Environment to Get Crucial Role in Sudan's Future Peace and Prosperity Strategy**

UNEP is conducting detailed environmental assessments in order to identify environmental impacts, pressures, risks, and priorities for Sudan's post-conflict reconstruction plans. Since December 2005, four field missions were conducted in each of the main geographic areas. These findings will be presented in the UNEP report Sudan – Post-Conflict Environmental Assessment scheduled for release in October 2006 and then incorporated into national policies, plans, and laws for resource management in Sudan. UNEP is also currently preparing a program entitled Capacity Building for Environmental Governance in Sudan, which will cover the period 2007-2009. The UNEP study and recommendations are another example of the importance being accorded to the environmental dimension in post-conflict reconstruction. (July 2006) Ref. 188

### UNEP Warns No Peace in Sudan without Environmental Management Plan

The UNEP report Sudan Post-Conflict Environmental Assessment underscores that the conflict-torn region is unlikely to achieve a lasting peace unless it switches to sound natural resources management. Desertification and deforestation, spread of deserts southwards, increased pressure by unsustainable agriculture, and environmental degradation exacerbated by oil exploitation all contribute to increasing scarcity of resources, the main cause of the Sudan conflict. The report emphasizes that if these problems are not quickly and appropriately addressed the conflict might spread. (June 2007) Ref.189

### **Disputes over Oil Might Reignite Congo-Uganda Conflict**

Since the discovery of oil at Lake Albert in the border region of Uganda and Congo, tension between the two counties has escalated. Uganda responded to a series of violent incidents with several casualties by increasing troops along the border, and the media were talking of a "possible invasion of Congo". "This is about oil. The stakes are enormous," says Congo's petroleum minister, Lambert Mende. Both Uganda—a poor country, and Congo—seeking to rebuild after a ruinous war, have high hopes in a better, oil-fueled, future. Negotiations on the future joint management of reserves began, although the reserves are not yet assessed. (August 2007) Ref.190

### **UN to Demand Israel Pay Lebanon Compensations for War Damages**

The Lebanese newspaper Al-Akhbar reported that UN Secretary-General Ban Ki-moon will submit a motion to the Security Council requesting Israel to pay Lebanon nearly \$1 billion for environmental damages caused during the 2006 Second Lebanon War. The amount is based on a World Bank damage assessment including, inter alia, the cost of UN clean-up of the oil spill after Israel bombed a large refinery, but not related environmental damages. [See also *Report on Lebanon After-war Environmental Assessment* in February 2007, *Environmental Legacy of*

*Hezbollah-Israeli War* in January 2007, and other related items in previous environmental security reports.] (September 2008) Ref. 191

### **UN to Conduct Post-Conflict Environmental Assessment in Gaza**

UNEP's Post Conflict and Disaster Management Branch will deploy a team of up to eight experts to the Gaza Strip to assess the environmental impact of the December 2008–January 2009 invasion by Israel. The focus will be infrastructure and contamination risks assessment, wastewater and hazardous wastes management, state of coastal and marine environment examination, and institutional and economic evaluation. The ten-day mission is scheduled for mid-May, with results expected by early June, followed by a report and recommendations in July. (April 2009) Ref. 192

### **Hezbollah-Israeli War Threatens an Already Precarious Environment**

Arab countries are among the least environmentally sustainable in the world. The current wars are making this situation worse. The impact of the oil slick caused by Israeli bombing of the Jiyeh power station is an “environmental tragedy which is rapidly taking on a national but also a regional dimension,” warned UNEP Executive Director Achim Steiner. Long-term implications also include the loss to fishing for the Lebanese people, and decline in tourism. Presently the ecological damage spreads along 50 miles of the Lebanese coast; 10,000 tons of crude oil have been released into the Mediterranean, with another 15,000 tons expected to spill very soon. According to the Environmental Sustainability Index of Yale University, Iraq, Sudan, and Kuwait fall within the bottom 5% of the world for sustainability and half of the remaining Arab States scored in the lowest 25%. Without major changes, environmentally induced migrations and more conflicts in the region seem inevitable. (July 2006) Ref. 193

### Addressing Post-Conflict Environmental Security Issues

Further on last month's item on the environmental consequences of the Hezbollah-Israeli war, UNEP announced the beginning of the cleanup operation of the massive oil spill caused by Israeli bombing of a fuel depot, which affected some 150 kilometers of Lebanese and Syrian coastline. It is estimated that the cleanup could take up to one year and might cost over \$64 million. The massive damages to the ecosystem are already noticeable. [See also *Hezbollah-Israeli War Threatens an Already Precarious Environment* in July 2006 environmental security report.]

At the end of July 2006, the UN Compensation Commission announced the last disbursement to individuals who suffered because of Iraq's 1990 invasion of Kuwait. The total paid out to date is nearly \$21 billion, while 49 other claims, including environmental ones are still pending. (August 2006) Ref. 194

### Environmental Legacy of Hezbollah-Israeli War

Lebanon—Post-Conflict Environmental Assessment, UNEP's Post Conflict Branch report, is a comprehensive assessment of the legacy of last summer's Hezbollah-Israeli war in Lebanon and its impact on the environment and human health. The report details serious environmental challenges confronting the Lebanese authorities and threatening the population's health, and calls for urgent remediation actions. The highest risks are posed by leaked toxic and health hazardous substances, disposal of significant quantities of war-related debris, unexploded cluster bombs, and damaged water supply and sewage networks. (January 2007) Ref. 195

**Report on Lebanon After-war Environmental Assessment**

Lebanon Rapid Environmental Assessment for Greening Recovery, Reconstruction & Reform–2006 report is a comprehensive review of the major environmental impacts caused by the July–August 2006 war, proposes some action plans to mitigate them, and explores opportunities for green reconstruction and recovery. It also looks at such environment-related legal aspects as improving national legislation and the options available to the Government of Lebanon to seek compensation for environmental damage. (February 2007) Ref. 196

**Israeli Trench Raises Environmental Concerns**

An Israeli concept for digging a 2.5-mile long trench along the Gaza Strip – Egypt border to reduce weapons smuggling has generated some environmental concerns. Specifically, flooding the trench with seawater could cause contamination of groundwater in the area. (June 2004) Ref. 197

**UNEP Desk Study on the Environment in Iraq**

The United Nations Environment Program's (UNEP) Post-Conflict Unit has completed and released the *Desk Study on the Environment in Iraq*. The report provides a preliminary assessment of the main environmental threats in Iraq and recommendations for immediate and long-term cleanup. Critical long-term environmental vulnerabilities and risks are associated with water resource management, waste management, the oil industry, and ecosystem degradation. Two decades of war and misrule have left Iraq with extreme pollution and other environmental hazards that need urgent cleanup. The most urgent priorities are those needed to address humanitarian issues including restoration of water supply and sanitation systems, and cleanup of accumulated municipal and medical wastes. A scientific assessment of areas where weapons containing depleted uranium (DU) have been used is also a priority. Long-term projects indicated include cleanup of hazardous wastes and emissions, better water and sanitation management, and restoration of the country's ecosystem, especially the Mesopotamian marshlands that were drained in 1991. The study also recommends that steps be taken to build strong national institutions and capacities for long-term environmental management. (April 2003) Ref.: 198, 199

**UN to Help Tackle Iraq Pollution**

UNEP in collaboration with the Iraqi Ministry of the Environment will start a long-term, large-scale environmental clean-up process. The project will begin with an assessment across the country to determine the areas with highest threats, and prioritize areas for cleaning. For the pilot project, five high priority sites are likely to be chosen out of more than 300 environmental 'hot spots'. (September 2004) Ref. 200

**Gulf Environmental Group Planned**

Kuwait hosted a meeting on December 17-18 to establish a regional body to assess environmental damage and coordinate cleanup projects in the Gulf, including in Iraq. The meeting followed previous talks between officials from five countries: Kuwait, Iraq, Iran, Saudi Arabia and Jordan. The chairman of Kuwait's authority for assessing compensation for damages from Iraq's 1990 invasion and occupation has announced that among the goals of the meeting is the establishment of a regional environmental rehabilitation advisory group, its objectives and scope, and to establish a program for regional cooperation. [Note: at the time of this writing, the results of the closed-door, three-day meeting were not yet available.] (December 2005) Ref. 201

**Conclusions on Health and Environmental Impact of 1990-1991 Gulf War**

Researchers from the Harvard School of Public Health (HSPH) revealed the findings of Phase I of their study on the implications on the health of Kuwaiti civilians who remained in Kuwait during Iraq's 1990 invasion and occupation. The investigations followed for 14 years the health condition of 5,000 Kuwaitis over the age of 50 to assess likely mortality impacts of exposure to smoke from the oil fires and also reviewed trends in morbidity and mortality data from Kuwait's Ministry of Health. The conclusions show that an average individual risk on the order of 2/10,000 may be attributable to exposure to smoke from the oil fires. Screening assessing risks connected to other contaminants -- such as volatile organic compounds, polycyclic aromatic hydrocarbons and metals from the oil lakes and marine oil spills; and depleted uranium -- also indicated low risks to public health. [See also item 8.2 *Study by Sandia on Depleted Uranium* further in this report]

The fifty-sixth session of the Governing Council of the United Nations Compensation Commission (UNCC) concluded the assessment of compensations related to Iraqi 1990 invasion. Some argue that the denial of billions of dollars in compensation to some countries for adverse health and environmental effects of the 1990-1991 Gulf War sets a dangerous precedent to discourage future targeting of natural resources and the environment in future wars. Nevertheless, it is worthwhile to note that the fifth (and last) installment under category "F4"—environmental claims—involved 19 claims filed by six Governments, out of which eight claims filed by four Governments were approved by the Council for compensation, with a total award value of over \$252 million. (July 2005) Ref. 202

**Iraq Marshlands to be Restored**

UNEP announced an \$11 million program, funded by the government of Japan, to restore the damaged marshlands of Iraq. The project will use environmentally sound technologies to restore drinking water and sanitation systems to the Marsh Arabs. (July 2004) Ref. 203

Iraq's Marshes Recovering

Iraq's Mesopotamian marshes, which almost vanished during Saddam Hussein's rule, are rapidly recovering to their former 1970s state, according to the findings of the Iraqi Marshlands Observation System. The system is the latest component of the UNEP marshlands project based on the use of a variety of environmentally sound technologies and technical training. However, the funding of the project might be in jeopardy for the moment, since Japan has postponed the donors' conference due to the ongoing controversies over Iraq's constitution. The marshes, reputed to be the biblical Garden of Eden, are a major source of fish and freshwater for local people, as well as an important habitat for wildlife. [See also *UN to Help Tackle Iraq Pollution* in September 2004 and *Iraq Marshlands Restorations Could be Dangerous if not Preceded by Cleanup* in October 2003 environmental security reports] (August 2005) Ref. 204

**Iraqi environmental Harm in Kuwait Invasion Greater than Thought**

Kuwait's Public Authority for Assessment of Compensation for Damages Resulting from the Iraqi Aggression presented the first results from U.N.-financed studies into environmental damage to the Governing Council of the UN Compensation Commission in October 2002. The study found greater Iraqi environmental damages than first estimated. Diplomats and U.N. sources said the commission was expected to approve a payment of almost \$700 million to

Kuwait for damage due to Iraqi mines and ordnance left behind as Iraq's troops fled. The Commission is scheduled to end its work at the end of 2004. (October 2002) Ref.:205, 206

### **Danger of Unexploded Ordnance in Basra Area**

Abandoned munitions and unexploded ordnance (UXO) are injuring people every day in Iraq. There are about thirty abandoned munitions sites around Basra that British forces admit that they do not have sufficient troops to guard. Future international agreements may not only assign legal responsibility to the owners of the ammunition for its cleanup, but also extend the responsibility to occupying powers, independent of the reason for occupation. (May 2003) Ref.: 207, 208, 209

### ***Crimes Against the Environment* considered on the list of War Crimes against Saddam Hussein**

The Kuwaiti parliament is currently considering specific war crimes actions against Saddam Hussein. Included in the war crimes list are “crimes against the environment”. These are separate from financial reparations actions previously taken. (February 2004) Ref.210

### **Environmental viability for life support is increasingly critical in the Palestinian Occupied Territories**

The UNEP Desk Study on the Environment in the Occupied Palestinian Territories reports that water pollution, loss of natural vegetation, climate change, desertification, waste-dumping, and land degradation are escalating particularly in the Palestinian Occupied Territories due to military conflicts, protracted refugee situations, and rapid population growth. This study will be “one of the top items” for the UNEP Governing Council meeting of environmental ministers to be held in Nairobi 3-7 February 2003. The potential human disaster in Somalia’s food supply, environment, and governance set the precedence for UN-authorized invasion. Although circumstances are different, the UNEP report increases attention to environmental deterioration as both a result and contributing cause of conflict. Such increased attention could eventually translate into international agreements for not only post-conflict environmental repair, but also for environmental security monitoring systems and criteria for environmental threats to life support sufficient to warrant international intervention. (January 2003) Ref.:211, 212

### **Liability for World War II warships in the Pacific**

Some of the 2000 World War II warships loaded with oil, chemicals and ordnance in the South Pacific are beginning to leak. There are similar problems in the Mediterranean and on the California coast. Unlike commercial vessels, where salvagers can claim rights to sunken cargo, warships forever belong to their flag state. Assignment of liabilities for old conflicts may become a larger issue. Since many countries in the affected areas do not have the financial or scientific resources for cleanup operations, UN or other international resolution could one day require the responsible countries to provide financial and technical assistance to address these issues. (November 2002) Ref.: 213

### **Effects of Poison Gas Used in WWII by Japan**

The Japanese government has decided to help citizens believed to be suffering from illnesses induced by contamination assumed to be related to chemicals produced by the military for use as weapons in WWII. According to a 1973 government survey made public in April 2003, Japan disposed of 3,875 tons of poison gas after WWII; the military will conduct an investigation on

domestic post-war disposal of poison gas.

Japan has long been beleaguered and faced lawsuits over an estimated 700,000 chemical weapons it abandoned in China after the war. However, at the beginning of May a Tokyo court rejected a compensation claim from five Chinese over health damage they suffered, although it admitted that the chemical weapons were responsible for their health problems. (May 2003) Ref.:214, 215

### **Japanese Chemical Weapons Cleaning in China Yet to be Completed**

June 2007 was the deadline agreed to by Chinese and Japanese authorities for cleaning up the Japanese chemical weapons littering China since the Japanese war against China. Yet, this month, a number of Chinese construction workers suffered health problems after being exposed to a ruptured mustard agent bomb believed to have been dropped by a Japanese warplane many years ago. The unexploded bomb was hit by the construction team while excavating for a residential building in Bayannaor City in Inner Mongolia. The Japanese government is expected to receive a request to destroy the weapon, sources said. In May 2007, Japan's Supreme Court ruled that Chinese victims of Japanese biological warfare and other atrocities that occurred before and during World War II are not eligible for compensation. (June 2007) Ref. 216

### Japanese Supreme Court Denies Chinese Wartime Claims

Japan's Supreme Court ruled that Chinese victims of Japanese biological warfare and other atrocities occurred before and during World War II are not eligible for compensation. Two cases involving about 200 Chinese required compensation and Japanese government apologies for biological weapons experiments, the firebombing of a Chinese city and other atrocities happened in the 1930s and 1940s. The majority of the plaintiffs were relatives of the victims. "These are unjust rulings that ignore the human rights and personal suffering of the defendants. [...] The Supreme Court has completely neglected its responsibility to uphold justice." Historians estimate that up to 250,000 people might have died in Japan's Unit 731 experiments that involved germ testing and vivisection. No unit personnel ever faced prosecution and Japan argues that the cases brought up happened before Japan's ratification of relevant treaties. [See also *Discussions over World War II Japanese Warfare Program in China not Settled Yet, China: Japan to Pay \$2.7 Million for War Gas Leak, and Effects of Poison Gas Used in WWII by Japan.*] (May 2007) Ref. 62

### **Discussions over World War II Japanese Warfare Program in China not Settled Yet**

The chemical weapons left over by the Japanese invading army during World War II are still realistic threats to the Chinese people and environmental security, say Chinese officials urging Japan to take more measures to accelerate the process of destroying them. Chinese Foreign Ministry spokesman Liu Jianchao demands that the Japanese government follow the Convention on the Banning of Chemical Weapons and the memorandum on the destruction of chemical weapons reached between the two governments.

Recently, Japan rejected China's demands for apology and compensation for damages caused by the Japanese germ warfare program during World War II. Chinese Foreign Ministry said, "Germ warfare was one of the serious crimes of the Japanese militarist period during World War II... The Japanese government should properly deal with this problem by using an honest attitude, undertaking its full responsibilities and handling conscientiously the reasonable demands of the injured people." The lawsuit has uncovered information about Japan's biological warfare

program kept secret by Japan's government and the United States following World War II, says the Associated Press. For instance, the Unit 731 base near the Chinese city of Harbin may be responsible for as many as 250,000 deaths in the 1930s and '40s during the Japanese occupation of China. [See also *China: Japan to Pay \$2.7 Million for War Gas Leak* in October 2003 and *Effects of Poison Gas Used in WWII by Japan* in May 2003 environmental scanning reports] (July 2005) Ref. 217

### **Military Introduction of Tree Pathogen in Italy**

Researchers at the University of California, Berkeley, and in Italy, have shown the origin of a tree pathogen threatening Italian pine trees to be the US Army units that occupied the area 60 years ago. "This study suggests that when planning military operations abroad, there is a need, and a responsibility, to check for potential micro-organisms that could be introduced to foreign lands, and to take measures to prevent them from spreading." The research in Italy supports a common suspicion among plant pathologists in Europe that certain diseases in that region are linked to US Army bases. Although there does appear to be a correlation, there is no proof yet that other US bases are the cause of similar tree die-offs elsewhere in Europe. (April 2004) Ref. 218

## **NATIONAL AND REGIONAL INITIATIVES AFFECTING MILITARY ACTIVITIES**

New national initiatives increasingly include the military for environmental protection, mitigation (after natural disasters), prevention, and preparedness, as well as assistance in compliance with international agreements.

### **Sustainable Development Strategies**

The Intergovernmental Preparatory Meeting for the 15th session of the Commission on Sustainable Development (CSD-15) took place February 26-March 2, 2007 and discussed policy options and possible actions related to four thematic areas: energy, industrial development, air pollution/atmosphere, and climate change in the context of sustainable development, as well as the situation of small island developing states (SIDS), and inter-linkages and cross-cutting issues in the framework of the thematic areas. The draft Chair's "negotiating document" that will be transmitted directly to CSD-15 has six sections, covering the four thematic areas, inter-linkages and crosscutting issues, and review and follow up. The 15th session of the CSD will be held April 30-May 11, 2007, in New York. Climate change also topped the agenda of the G-8 meeting held in Potsdam, Germany, March 16-17. The meeting, attended by environmental ministers of the G-8 countries plus China, India, Brazil, Mexico and South Africa, aimed to prepare for the G8 summit to be held in June, in Heiligendamm and the discussions for the December Climate Change Conference. Although consensus was reached on the need to protect the world's environment, consensus was not yet achieved on either post-Kyoto strategies nor on a global carbon emissions trading scheme like the one used in the EU. (March 2007) Ref.219

### **North American Environmental Security Action Plan**

The 15<sup>th</sup> Regular Session of the Council of the Commission for Environmental Cooperation (CEC) was held June 25-26, in Ottawa, Canada. Key issues discussed included, *inter alia*: raising and harmonizing environmental standards across North America and effective enforcement of

environmental law; reducing the risks of toxic substances to human health and the environment by improving chemicals management—implementation of SMOC (Sound Management of Chemicals) Program and of the North American Regional Action Plans, and improving border security by increasing the Parties' cooperation on intelligence sharing and operational support to combat the importation, use, and production of such products (the list of hazardous chemicals is being revised); energy security and reducing greenhouse gas emissions (by encouraging green technologies in building and motor vehicles industries and the establishment of Green Suppliers Partnerships); continuing cooperation for marine and biodiversity protection; and climate change expected impacts for North America and mitigation and adaptation challenges.

As a preamble to the meeting, the CEC prepared *North America 2030: An Environmental Outlook*, a succinct overview of the region's environmental stress factors and their trends. It includes a subchapter on environmental security, focusing mainly on the Northwest Passage, and food and energy security. A more detailed report on factors likely to impact North America's environment to 2030 is expected to be published later in 2008. These papers are intended to assist the CEC in developing its 2010–2015 Strategic Plan. (June 2008) Ref.220

### **The Disputes over the Northern Territories Set to Continue**

As the North is warming up, opening access to its rich resources, the territorial claims over the Arctic region are set to increase. Reportedly, Russia is prepared to challenge the international community and claim sovereignty over large parts of the Arctic region that is now under the International Seabed Authority, on grounds of the region's geological continuity and similarity with continental Russia. (June 2007) Ref.221

### **U.S. Created Committee to Address Climate Change and Energy Security Issues**

The U.S. Congress created a 15-member Select Committee on Energy Independence and Global Warming to provide information and advice on the best policies to address America's energy security and climate-change issues. "Energy independence and climate change are issues of national security and national urgency," said House Speaker Nancy Pelosi (D-Calif.) announcing the creation of the committee. [Note: A nationwide poll conducted for the Yale Center for Environmental Law and Policy revealed that 63% of Americans agree that the U.S. "is in as much danger from environmental hazards, such as air pollution and global warming, as it is from terrorists" and 81% of Americans are ready to take action personally in response to climate change.] (March 2007) Ref.222

### **U.S. Policy Shift May Improve International Environmental Security**

Appointments of environmental scientists to the new U.S. administration, presidential memoranda, and speeches all signal that the new White House will give special attention to environmental matters from energy security to international cooperation for addressing climate change. Some bold actions considered by the new U.S. administration in its first week in office, include:

- implement the Energy Independence and Security Act that requires increasing car fuel efficiency standards starting with model year 2011 for reaching at least 35 miles per gallon by 2020 for cars and light trucks
- instruct the Environmental Protection Agency to allow California and other States willing to adopt stricter emissions standards for new motor vehicles (California's law requires reducing



vehicles' emissions by 30% by 2016; so far, 13 other states and the District of Columbia want to follow California's standards, representing about 40% of the U.S. car market)

- double capacity for alternative sources of energy like wind, solar, and biofuels over the next 3 years
- build a smart electricity super-grid to transport renewable energy from the West to the rest of the country
- allocate funds for weatherizing public and private buildings, and appoint a special envoy for climate change. There are also signals for tougher environmental standards, the adoption of a cap-and-trade system for CO<sub>2</sub> emissions, and America's participation in the international efforts to negotiate a post-Kyoto Protocol on climate change
- appoint a climate change special envoy (Todd Stern) for international negotiation of actions and accords to address climate change causes and effects

(January 2009) Ref. 223

### **First U.S. National Health Security Plan Released**

The U.S. Health and Human Services Department released the first National Health Security Strategy for the event of a bioterrorism incident or other large-scale health crisis. The strategy outlines objectives for different government areas and for nongovernmental groups to focus on over the next four years, and recommends a review of the national countermeasure system.

[Related item: *Global Influenza Pandemic Declared* in June 2009 environmental security report.] (January 2010) Ref. 224

### **U.K.'s Military Technology Plan Includes Alternative Energy**

The Defence Technology Plan of the British Ministry of Defence outlines the British military's long-term research objectives to help defence contractors set R&D priorities. It highlights five "capability visions," including reducing dependency on fossil fuels by introducing new alternatives. (March 2009) Ref. 225

### **NASA-Like Agency to Achieve a 10-Year Environmental Goal Proposed**

An international expert meeting on worst-case scenarios for global warming held at the Foundation for the Future near Seattle, Washington, proposed the creation of a NASA-like U.S. agency to achieve a 10-year environmental goal. A lobby, independent from the foundation, is being created, composed of environmental leaders, aerospace engineers, and business executives (working title is the American Climate Alliance) to get the US Congress to create the agency by 2010 that would reach the goal by 2020. (September 2008) Ref.226

### **New Canadian Strategies for Monitoring the Northwest Passage**

Further on the opening of the Northwest Passage, the Canadian government is undertaking serious military and strategic operations for increased monitoring of the area for actions that might affect its sovereignty over the territory, as well as ecological impacts. In spite of strong disagreement between the Canadian Department of National Defence and Environment Canada on projections concerning the timing of the Passage's accessibility for commercial and other navigation, new capabilities, funding and apparatus are being considered for increasing control. Those include: enforcing the Arctic Waters Pollution Prevention Act for avoiding ecological disasters; a highly mobile Rapid Reaction Battalions (based in B.C., northern Quebec, Newfoundland, and Ontario); armed icebreakers; and a deep-water port at the passage's eastern

entrance. [See also *Northwest Passage to Become “Canadian Internal Waters”* in April 2006, and *Arctic Northern Passage Opens New International Issues of Regulation* in February 2006 environmental security reports.] (August 2006) Ref.227

### **Canada, Mexico, and the USA Met to Strengthen Regional Environmental Regulations**

Environment ministers of Canada, Mexico, and the United States met as the Council of the Commission for Environmental Cooperation (CEC) and consulted with the Joint Public Advisory Committee in Denver this month to improve public participation and partnerships, enhance accountability and transparency, and set clear performance goals concerning environmental regulations across the continent. The environmental trilateral 2010–2015 Strategic Plan will consider strategies for reducing CO2 emissions (including a potential continental cap-and-trade system), climate change mitigation and adaptation issues, and enhancing protection of ecosystems. The participants from the public group asked specifically that reducing the North American ecological footprint also be included. Earlier this month, U.S. Secretary of State Hillary Clinton and Canada’s Minister of Foreign Affairs Lawrence Cannon met and announced their intention to modernize the 37-year-old Great Lakes Water Quality Agreement to reflect the new environmental threats and technologies to address them. (June 2009) Ref. 228

### **Russian Focus on Environmental Security**

Russia’s new President Dmitry Medvedev said: “Our country is in a threatened state. If we don’t deal with this [environmental matters], then in 10, 20, 30 years we could be in a situation where part of the country’s territory is unfit for habitation...Ecology is a question of national security.” (June 2008) Ref.229

### **Russian Military Exercise to Include Environmental Issues**

Russia is planning to conduct a military exercise in June 2004 that will include responding to an environmental disaster resulting from a terror attack. As Russia is scaling up its military exercises from the 1990s, environmental issues are being included in the exercise scenarios. (June 2004) Ref.230

### **President Putin Cites Environmental Security as Key Criterion for Caspian Energy Projects**

During the summit of five Caspian nations in Iran, Russian President Vladimir Putin said “Environmental security must become a yardstick for measuring the safety of all projects”, and “projects that may inflict serious environmental damage to the region cannot be implemented without prior discussion by all five Caspian nations,” suggesting that each country should have a virtual veto on energy projects in the region. Note: in September 2006, Russia threatened to revoke environmental authorization for the Sakhalin II project. However, in April 2007, when Gazprom (state owned company) gained 50%+1 share in the Sakhalin Energy Investment Company, the President announced that the alleged environmental problems were adequately addressed. (October 2007) Ref.231

### **Russia to Boost Its Space Security Program**

Reportedly, participants in the Russian State Duma hearings on planetary security stated that it was time for Russia to supplement its national space program with the study of the asteroid hazard and possible ways to protect the Earth. [In March 2009 an asteroid missed Earth by

77,000 kilometers, 80% closer to the planet than our moon is. If it had hit Earth, it would have wiped out all life on 800 square kilometers. No one knew it was coming.] Asteroid-comet hazard and international legal aspects of counteracting the impact hazard were also on the agenda of the 'Asteroid-Comet Hazard-2009' conference held September 21-25, 2009, in St. Petersburg (proceedings to be available on November 6). NASA already has a Near-Earth Object Program Office, and Italy and Spain cooperate on NEODYS (Near Earth Objects Dynamic Site). Meantime, Roscosmos (the Russian Federal Space Agency) announced plans to design by 2012 a nuclear-powered spacecraft, to be ready for a manned mission after 2021. [Related items: *Steps for an International Regime for Space Debris and Space Traffic Control System* in May 2009 environmental security report.] (October 2009) Ref. 232

### **EU and US to Cooperate on Environmental Research**

The US Environmental Protection Agency and the EU Commission's Directorate of Research have signed an agreement, *Implementing Arrangement on Environmental Research and Ecoinformatics*, setting up a bilateral research framework to more strategically address common environmental challenges. Among the collaborative research topics are: uses and impacts of nanotechnology; environmental information systems; development of environmental and sustainability indicators; environmental modeling; decision support tools; environment and health; sustainable chemistry and materials; environmental technologies; and air quality management. (February 2007) Ref.233

### **EU Energy and Climate Change Policy**

#### **EU Renewable Energy Policy becomes Legally Binding**

The targets set by the EU 20/20/20 energy policy become legally binding for all member States by 2020. They are to cut greenhouse gas emissions by 20%, establish a 20% share for renewable energy, and improve energy efficiency by 20%. EU member states have to present their national action plans by June 2010, and report on progress every two years. [See also *EU Leaders Support the 20/20/20 Energy Plan* in March 2008 and other related items in previous environmental security reports.] (October 2008) Ref. 234]

#### European Climate and Energy Package Formally Adopted

The European 20/20/20 energy and climate package was formally adopted, setting legally binding targets requiring that by 2020 greenhouse gas emissions be cut to 20% below 1990 levels, the share of renewable energy increase to 20%, and energy efficiency improve by 20%. The package consists of six legislative acts and will enter into force 20 days after publication in the Official Journal, expected in May 2009. (April 2009) Ref. 235

The European Council adopted its new Energy Policy to reduce CO<sub>2</sub> emissions by 20% of 1990 levels by 2020— a target that could rise to 30% if the U.S., China, and other economic powers agreed to comparable reductions; and by 2020 to have 20% of its energy from renewable sources and 10% of its transport fuel be biofuels. The EU Conference of Presidents decided on March 15 to set up a temporary committee on climate change to provide clear information and suggest strategies to address the issue.

On March 28, the Commission unveiled its “green taxes” strategy that suggests splitting the EU-wide minimum excise duties into an energy tax and an environmental tax to reflect products’

impact on the environment and encourage environmentally friendly goods. [See also *EU Plans Tougher CO2 Emissions Cuts* in February 2007, and *New European Energy Policy Developments* in March 2006 environmental security reports.]

Britain's draft Climate Change Bill is pushing for a drastic emissions' reduction policy and could make the country the first to limit greenhouse gases by law. The proposal—to become law next year if it passes public and parliamentary consultation—stipulates that an independent panel should set a "carbon budget" every five years, with the goal to cut CO2 emissions by 60% by 2050, from 1990 levels, and between 26% and 32% by 2020. Governments that miss the set target could be held liable. (March 2007) Ref. 236

### **European Energy Security Strategies**

The recent natural gas crises caused by the Russia/Ukraine clash prompted Europe to address energy security more aggressively. The European Commission proposed a €3.5 billion (approx. \$4.5 billion) program for new gas pipelines and electricity networks and offshore wind projects; earmarked €250 million (approx. \$320 million) for the politically controversial Nabucco project (the outstanding balance to the estimated €8 billion (approx. \$10.25 billion) to be covered by member states and private companies); and Germany is promoting the Nord Stream pipeline project. Europeans might also emulate the U.S. super-grid scheme to carry solar energy from the Sahara, geothermal energy from Iceland, hydropower from Scandinavia, and wind power from the North Sea. (January 2009) Ref. 237

### **European Commission's New Low-carbon 20/20/20 by 2020 Energy Plan**

The European Commission has proposed a package of measures to reach its "20/20/20 by 2020" targets — produce 20% of its energy from renewable sources and increase energy efficiency by 20%, cut greenhouse gas emissions by 20% of 1990 levels (or 30% in case of a global accord), and considerably reduce reliance on energy imports. The detailed roadmap includes specific renewable energy and CO<sub>2</sub> emission targets for each EU member state; new rules for carbon sequestration; and an updated Emissions Trading System for fair greenhouse gas emissions cuts for different emitters, with the aim of gradually including all industries in the emissions auction scheme. The Commission's proposals have to be endorsed by the European Council and Parliament, with the final package expected to come into force by the end of 2009. The European Commission hopes that the plan will trigger strong momentum towards a global agreement. Meantime, the European Commission is also considering introducing a climate tax on imports from states failing to tackle greenhouse gas emissions, and toughening EU's emission trading system. [See also *EU Energy and Climate Change Policy* in March 2007 environmental security report.] (January 2008) Ref.238

### EU Leaders Support the 20/20/20 Energy Plan

At the recent EU summit (March 13-14), member states' leaders indicated support for the EU's 20/20/20 energy plan. The package should receive full political backing by all governments by the end of 2008 in order to be discussed at the EU Parliament in the first week of 2009. In spite of the tight deadline, EU officials are confident that the plan will pass in time to give the EU a better negotiating position at the December 2009 UN climate change summit. At the same time, despite some countries' disagreements and complaints, the European Commission reaffirmed that it is not willing to change the timetables and national targets. However: 1) some concessions were agreed for energy intensive industries such as steel and cement factories, which could get

free pollution permits—instead of having to buy them by auction, and 2) foreign companies might also be made to take part in the emissions trading system (ETS). (March 2008) Ref.239

### **Norway Proposal to Ban Gasoline-only New Cars by 2015**

Norway Finance Minister Kristin Halvorsen wants to put forward a proposal to ban from 2015 the sale in Norway of new cars that run solely on fossil fuels. The proposal's intent is to force carmakers to shift to greener models, to help cut greenhouse gas emissions. [See also *European Commission Proposed Binding Legislation for Vehicle Emissions Cuts* in December 2007 and *All-Electric cars coming from Norway and China with More than Hundred Mile Ranges* in April 2008 environmental security reports.] (April 2009) Ref. 240

### **European Temporary Committee on Climate Change to Begin Operations in May 2007**

The European Parliament approved the establishment of a new temporary committee on climate change. The 60-member committee will start work on May 10, 2007. It will design and suggest strategies and policy options for the 27 EU states to address energy and climate change issues. It is also expected that the committee will strengthen EU's international role in intensifying action to tackle climate change, pushing it to the top of the international agenda and furthering post-Kyoto Protocol's negotiations. [See also *EU Energy and Climate Change Policy*.] (April 2007) Ref.241

### **To Join the EU, Balkan Countries Should Increase Environmental Efforts**

Balkan countries wanting to join the EU—Croatia, Bosnia, Serbia, FYR Macedonia, Montenegro and Albania—must pay as much attention to environmental protection as they do to economic development if they want to join the bloc, says the UNDP report *Balkan Vital Graphics: environment without borders*. Spending on environmental protection should increase from the present share of less than 0.1% to 0.7% of the GDP, to at least 1.5-2%. The six Balkan countries are working on a joint environmental strategy, but an agreement is yet to be reached. (October 2007) Ref.242

### **New Construction on Mediterranean Coastlines to be Banned**

The recent meeting of the Barcelona Convention [for the Protection of the Marine Environment and the Coastal Region of the Mediterranean] added a new protocol on Integrated Coastal Zone Management to strengthen regional co-operation for harmonious and sustainable use of the Mediterranean coastal zone, including banning any construction within 100 meters (about 328 feet) to the water all along the Mediterranean shore. The participants also issued the Almería Declaration that requires all member states to catalog threatened marine species by 2011 and establish a network of protected coastal areas by 2012. To ensure that the convention's provisions are enforced, the first compliance system was established, and the parties agreed to create an enforcement committee. [See also *OSCE-NATO Workshop on Environmental Security in the Mediterranean* and *European Parliament Passed the Marine Strategy Directive* in December 2007 and other related items in previous environmental security reports.] (January 2008) Ref.243

### **UK Defense Ministry released its first Sustainable Development Report**

Ministry of Defense of the UK released its first stand-alone report that aims to provide an overview of the Department's work on Sustainable Development issues. MoD's program for the

coming years includes improved data collection systems and the continued integration of sustainable development considerations into procurement. MoD intends to produce an interim report for 2004/2005 and a full report each financial year thereafter. (August 2005) Ref.244

### **UK to Establish an Independent Climate Committee**

The parliament of the UK plans to establish an independent climate committee that would report to the parliament on an annual basis, said MP Elliot Morley, member of the UK Parliament and the Government's Special Representative on the Gleneagles Dialogue on Climate Change, Clean Energy and Sustainability, addressing NATO's Advanced research Workshop on "Energy and Environmental Challenges to Security."

During his first speech as the UK's Prime Minister, Gordon Brown stressed the importance of addressing climate change in a global framework and said, "As we move to a post 2012 global climate change agreement, we need a strengthened UN role for environmental protection."

Scientists and policymakers attending the UK Environment Agency annual conference called for increased efforts to address climate change effects. The Agency's chief executive, Lady Young, said that climate change needs to be addressed like "World War Three", noting that current adaptation measures are "too little, too slowly." UK Environment Secretary Hilary Benn warned that climate change "is not just an environmental challenge. It's also a security challenge, a migration challenge, a political challenge and an economic challenge as well." (November 2007) Ref.245

### **France Could Add Teeth to the Kyoto Protocol**

France's President Nicolas Sarkozy is proposing a tax revision that would favor environmentally friendly practices and lower labor taxes, while increasing taxes on highly polluting vehicles and imports from countries that do not respect the Kyoto Protocol. Sarkozy's proposals are expected to be passed by parliament early next year. France also intends to expand its strategy to the EU, urging Brussels to consider EU tariffs for imports from non-Kyoto protocol countries. (October 2007) Ref.246

### **EU, Latin American and Caribbean Countries Environment Cooperation**

The first meeting of the EU, Latin American, and Caribbean countries' environment ministers took place in Brussels, March 4, 2008, in a pre-meeting to the high level summit to be held in Lima, in May. More than two dozen environment ministers attended the meeting aiming to identify common priorities in order to increase environmental efforts and better integrate them in the EU-LAC countries' areas of cooperation. The focus was on collaboration strategies between the two regions for addressing climate change, renewable energy, biodiversity loss, and deforestation. The EU has already pledged considerable funds to help the region in domains such as natural resource management, renewable energy and energy efficiency, forest management, climate change mitigation, greenhouse gas reduction, carbon sequestration, and governance. (March 2008) Ref.247

### **Argentina Redeploys Military to Defend Water and Oil**

The Argentine government is changing its military strategy based on the forecast that conflicts over water and oil are the most likely long-term national security threats. The most vulnerable area is the Guarani aquifer that neighbors Uruguay, Brazil, and Paraguay. The Army "Plan 2025" was launched last year and includes parceling the country into regions based on their resource

potential—mainly oil and fresh water. "Each division will be based in the geographical areas where the natural resources that we hypothetically must defend are located," Argentine Army Commander-in-Chief Roberto Bendini said in revealing the plan. (March 2007) Ref. 248

### **Ecuador Gets an Environmentalist Foreign Minister**

President Rafael Correa of Ecuador (to take office in January) has named a US-trained environmentalist, Maria Espinosa, as his foreign minister. The new cabinet member is head of the World Conservation Union in South America and an expert on nature reserves. The nomination comes at a time of growing tensions with neighboring Colombia over spraying of drug crops near the border, which damages Ecuadorian legal crops and the health of people living in the area. (December 2006) Ref. 249

### **Uganda to Create an Environmental Police Unit**

The Uganda National Environment Management Authority announced that it will form a police unit to "address environmental crimes, investigations and prosecution." The unit is expected to be operational in the next financial year. The Nature and Extent of Environmental Crime in Uganda report lists as leading environmental degradation causes: illegal waste disposal, pollution, and dumping and encroachment on protected areas. (October 2008) Ref.250

### **East African Environmental Projects to Fight Crime and Link Journalists**

The Environmental Crime Project launched jointly by the Institute for Security Studies and Eastern Africa Police Chiefs Cooperation Organization has the mandate to develop mechanisms to improve environmental law enforcement and policy making in the East African region. The project will operate in Uganda, Kenya, Tanzania, Burundi, Rwanda, Seychelles, Ethiopia and Sudan, increasing protection against all forms of environmental crimes.

The new Network of Climate Journalists in the Greater Horn of Africa (NECJOGHA, [www.necjogha.org](http://www.necjogha.org)) represents an interactive resource for environment-related information and communication in the region. The network is the result of collaboration among many international and national environment organizations, universities, and climate centers. (July-August 2008) Ref.251

### **Iran and Iraq Sign Environment Protection Agreement**

Iranian and Iraqi chief environment officials signed an agreement for increasing the two countries' cooperation in areas related to the environment. The eight-article document covers issues of natural resources, industrial and oil-exploitation pollution control, wildlife protection, and promoting ecotourism, as well as addressing environmental damage caused by wars. (January 2008) Ref.252

### **Iran and Qatar Sign Environmental MOU**

Qatar and Iran have signed a memorandum of understanding regarding preservation of the environment. The agreement covers managing green reserves and various flora and fauna aspects, as well as the environmental management of coastal areas, desertification control, and know-how exchange. Qatar has already undertaken several environmental projects, including a green convention center in Doha and an agreement between the Doha Bank and UNESCO to "Green the Middle East". (March 2010) Ref. 253

**Morocco Adopts First National Earth Charter in the Arab World and Africa**

The National Charter for Environment and Sustainable Development adopted by the Kingdom of Morocco represents the first such commitment in Africa and the Arab World. The Charter sets a framework for future regulations for natural resources, the environment, and sustainability policy. It was launched at the celebration of Earth Day's 40th anniversary, April 22, 2010. (April 2010) Ref. 254

**Jordan Armed Forces Upgrade, Part of Global Warming Debate**

Jordan is the only developing country that included upgrading military energy efficiency in its greenhouse emissions reduction plan submitted to the UN as per the Copenhagen agreement. The government in Amman stated that its armed forces would seek to upgrade equipment and use energy saving technologies by 2020. (February 2010) Ref. 255

**Israel to Participate in UNEP and UN HABITAT**

The Western European and Others Group regional bloc within the UN elected Israel to represent the regional group in consultations with the UN Environmental Programme and the UN Human Settlements Programme (UN-HABITAT). This could create unique opportunities to address environmental security issues in the Palestinian territories, which are among the most severe in the world. (January 2008) Ref.256

**Waste Disposal a Matter of Discord or Cooperation between Palestine and Israel**

Waste disposal might additionally fuel the increasingly tense relations between Israel and the Palestinian Authority as waste is transferred from Israel to areas of the West Bank. The main problem is that large quantities of building waste are deposited in pirate sites near Palestinian villages. Some contain toxic substances polluting the environment, leaking into the water system, and endangering the public health of both Palestinian and Israeli people. Scientists and environmentalists call on the two parties to leave aside diplomatic disagreements and develop collaborative relations on environmental issues generally and on solving the waste problem specifically. (March 2008) Ref.257

**Gulf Cooperation Council elevates priority of environmental protection**

The Secretary-General of the Gulf Cooperation Council (GCC) remarked in a recent environmental awards ceremony that the GCC leaders have an interest in joint environmental projects and efforts to increase environmental awareness. Sheik Jaber of Kuwait stated that commitment to environment protection was necessary from all countries in the region as an integral issue that could not be separated by borders. These statements define regional environmental policy, which in effect commit GCC member states to increase environmental protection efforts. (August-September 2003) Ref.258

**Pan-African Parliament Upgrades Environmental Policy**

Environmental issues were given increased emphasis during the Pan-African Parliament (PAP) Seventh Ordinary Session held in May 2007. Deputies and experts discussed the liability of Western countries relating to the continent's environmental degradation, and called for financial compensation and technological assistance to correct the situation. The recommendations of the committee on the environment included: request the PAP strengthen legislation for protection of the environment and fighting against pollution; establish synergy among African scientific



research institutions related to protecting the environment; create a network of environmental centers; create an African Environment Protection Observatory (AEPO); support regional initiatives; improve global cooperation and implementation of the Convention on Desertification; and strengthen international cooperation in scientific research and technology transfer. There were important debates about an African integration—a United States of Africa model—and the final document recommends that the African Union further consider such a union’s feasibility. It also recommends giving PAP, which started in 2004, the powers of a legislative organ. (May 2007) Ref. 259

### **Nigerian Government Resolves to Push Effective Environmental Enforcement**

On the occasion of a visit from a UK Environment Agency team, the director-general of the Nigerian National Environmental Standards and Regulations Enforcement Agency (NESREA) stated the government’s increased commitment to ensure a cleaner and healthier environment for Nigerians through effective enforcement of environmental laws. (February 2008) Ref.260

### **Indian Military Upgrades its Counter-WMD Strategies**

The Indian Union Home Ministry and the Health Ministry are to prepare “standard operational procedures to deal with terror attacks using biological weapons.” Indian military chiefs and senior military scientists held a week-long conference to examine their troops’ preparedness in the eventuality of conflicts involving nuclear, biological, or chemical (NBC) weapons. The meeting discussed progress in protective technologies (such as anti-radiation clothing and tanks, and armored carriers resistant to WMD attacks). Last month, an Indian paramilitary unit tasked with protecting key installations announced that it would organize two specially trained anti-WMD battalions by the end of 2006. (April 2006) Ref.261

### **New Norwegian Emergency Force Set Up**

Norway has set up a special emergency force of 1,000 soldiers from the Army prepared to handle national emergency situations mainly related to terrorism, and natural and environmental catastrophes. This is the first time since the Cold War that Norway has established such a unit. (January 2006) Ref.262

### **The Environmental Dimension of Asian Security**

*The Environmental Dimension of Asian Security. Conflict and Cooperation over Energy, Resources, and Pollution* “published by the U.S. Institute of Peace, analyzes the nexus between environmental and natural resources (ENR) problems and security in Northeast Asia” says a book review. The book argues that in the region “there is very little regional cooperation, despite the need to manage disputes over energy, natural resources, and pervasive pollution.” (November 2007) Ref.263

### **Asia-Pacific Should Intensify Green Growth Efforts**

The State of the Environment in Asia and the Pacific 2005 report, published by the United Nations Economic and Social Commission for Asia and the Pacific, notes that the region needs to shift towards ecologically efficient, ‘green growth’ patterns, if it wants to continue its growth. Acknowledging some efforts on new regulations, it documents that many areas are still in great need of improvement. High population density, low freshwater availability and biologically productive area per capita of all global regions, and the growth of highly energy-intensive and

polluting industries, along with increasing waste, are some of the most important concerns. The report offers a comprehensive picture of the region's trends both as problems, and as shortfalls that still have to be regulated. (December 2006) Ref.264

### **Korean Environmental Groups Request Release of U.S. Base Data**

Green Korea and the Chuncheon Civic Group filed a lawsuit against the South Korean Ministry of Environment demanding full release of environmental data and the state of former U.S. military sites that are being returned to South Korea. The request is motivated by preliminary research findings by the Ministry of Environment leaked to Seoul's Hankyoreh newspaper earlier this year. Both U.S. Forces Korea and the South Korean government refuse to comment, invoking the SOFA between the two countries. Some data, debated in the national assembly, reveals troubling high pollution of the sites by lead, BTEX (benzene, toluene, ethyl benzene and xylene aromatic solvents), petroleum hydrocarbons, and several chemicals. South Korean officials refuse to take over the sites and rejected a compromise offer, USFK commander Gen. B.B. Bell told *Stars and Stripes*. Ref.265

### **UNEP and South Korea to Help North Korea's Environmental Management**

UNEP and the Republic of Korea agreed to set up a Trust Fund for projects addressing key environmental issues in the Democratic People's Republic of Korea. This first collaboration of the two countries on environmental matters aims to address urgent problems in the DPRK related to forest, water quality, air pollution, land degradation and biodiversity, as well as support eco-housing initiatives, conservation management, environmental education, clean development mechanisms and renewable energy technology, and environmental monitoring. (November 2007) Ref.266

### **Asian New Strategy to Improve Health and Environment**

At the First Ministerial Regional Forum on Environment and Health, held in Bangkok, August 8-9, 2007, top environmental and health officials from Southeast and East Asian countries adopted the Bangkok Declaration on Environment and Health. The Declaration aims to set up strategies to reduce the estimated 6.6 million annual deaths—representing approximately 25% of all deaths in the region in a year—attributable to various environmental health risks such as air pollution, solid and hazardous wastes, and numerous man-made disasters. The Declaration provides a mechanism for improving collaboration in policy and regulatory frameworks at the national and regional level, and promotes the implementation of integrated environmental health strategies and regulations. It covers areas from air and water quality, to hazardous substances and climate change—including contingency planning, preparedness and response to environmental health emergencies. A second Ministerial Regional Forum is planned for 2010. (August 2007) Ref.267

### **Thailand, Other Asian Countries, May Tighten Environmental Regulations**

A Thai court has sided with the country's growing green movement and suspended \$12 billion in industrial investments until their environmental impacts can be properly assessed. The government hopes to set up a new environmental monitoring agency within five months to quickly assess and approve new projects. Environmental activists have similarly increased their pressures in Indonesia, Vietnam, and China over the past few years. (March 2010) Ref. 268

**Japan Sets up e-Waste Collection Locations to Recycle Rare Metals**

Odate city in northern Akita Prefecture, Japan has set up collection boxes for people to get rid of old cell phones, hair driers, and other electronic devices to recover rare metals. The demand for rare metals is increasing with the growth of high tech products. Hence, availability and future cost of indispensable rare metals is of increasing concern. This collection of e-waste and recycling is spreading throughout Japan with the help of subsidies from the Environment Ministry. (December 2008) Ref. 269]

**South Korea Adopts a Green Growth Policy and Influences Next G-20 Meeting**

President Lee Myung-bak stressed “Green Growth” at the Global Korea 2009 forum in Seoul as a way to address both the global financial crises and climate change at the same time. He will be a member of the G-20 management Troika for the April 2009 G-20 meeting in London along with leaders of Brazil and the U.K, and is expected to push the Green Growth strategy. (February 2009) Ref. 270

**Climate Change Issues May Have Determined Australian Election**

Environmental policy seems to have been one of the determining factors in Australia’s election and the success of the Labor Party, which has environmental issues such as climate change and signing the Kyoto Protocol as top priorities. It is therefore expected that Australia will adopt more environmentally protective policies. Given its status as a major regional power, Australia’s attitude could affect international and regional environmental deliberations. (November 2007) Ref.271

**Environment and Security Program in the East-Caspian Region**

The regional meeting of the Environment and Security (ENSVEC) Program in the East-Caspian region was held in Ashgabat, Turkmenistan, and was attended by leading specialists from Kazakhstan, Kyrgyzstan, Uzbekistan, Turkmenistan, Russia, Italy, Iran, and Afghanistan, as well as representatives of OSCE, NATO, UNEP and UNDP. In the framework of implementation of the ENSVEC program for environmental protection and cooperation in the region, the focus was on the East-Caspian Sea’s coastal area development, pollution reduction, and ecological preservation and restoration. The start of the ENSVEC program in the Atyrau and Mangistau oblasts of Kazakhstan and Turkmenistan was also announced. The Central Asia ENSVEC program priority regions include: the Fergana Valley, the Caspian Sea's Eastern Coast, the Semipalatinsk Nuclear Ground, the Amu-Darya river basin, and the Aral Sea. (September 2007) Ref.272

**Environmental security among top three priorities in Australia-China talks**

Among other things, China and Australia agreed during private talks during the September APEC meeting to cooperate on clean coal and nuclear energy to reduce greenhouse gas emissions. They plan to continue annual strategic security meetings including environmental security matters. (September 2007) Ref.273

**China May Restructure Environmental Effort**

Chinese President Hu Jintao, opening the ruling Communist Party’s five-yearly Congress, called the environment key to “the survival and development of the Chinese nation” and said that China should improve its economic/environment balance. There are speculations that China’s State

Environmental Protection Administration may be given more status and power as early as next year. “It is still under discussion how the new organization should be,” said Xia Guang, director of the Policy Research Center for Environment and Economy, a think tank within SEPA, during a recent talk at Brown University. [See also *China’s Climate Change and S&T Action Plan* in June 2007, *China’s President Hu Ordered Environmental Regulations for Military Activities* in April 2006, and other related items in previous environmental security reports.] (October 2007) Ref.274

### **China’s Five-Year Plan Increases Attention to Environmental Protection**

The third of six points of the Chinese 11th Five-Year Plan for Economic and Social Development (2006-2010) states: *Third, we will promote development by relying on resource conservation and environmental protection and focus on the fundamental change of the economic growth mode, transforming economic growth from being driven by large amount of resources consumption to being driven by the improvement of resources utilization efficiency.* A white paper issued by the Information Office of China's State Council entitled *Environmental Protection in China (1996-2005)* is a comprehensive overview of China’s enhanced attention to environmental protection, outlining efforts and achievements at the internal level, as well as its international cooperation in environmental matters, and future trends and policies. The paper stresses the need for more stringent regulations, policies, and enforcement. China’s monitoring and management capabilities are to be improved by an advanced environmental early-warning system, and a sound environmental law enforcement and supervision system. The paper also includes addressing nuclear and biological safety issues. This is China’s second white paper on environmental protection since 1996. (June 2006) Ref. 275

### **China to Create an Emergency Environmental Management System**

China’s Vice Minister of Environmental Protection, Zhang Lijun, announced that one of the ministry’s priorities for 2010 is the creation of an environmental management system for addressing pollution and its effects. Reportedly, “environmental protection authorities at all levels should focus on the handling of mass disturbances triggered by environmental pollution such as water and soil pollution, and reduce the harm that pollution bring to people as much as possible.” A two-year nationwide campaign will be conducted to investigate all pollution-related threats, “which will gradually form a dynamic environmental management system,” says Zhang. (December 2009) Ref. 276

### **China’s Energy Conditions and Policies—White Paper**

China’s Information Office of the State Council issued the country’s first-ever, white paper on its energy conditions and policies. The paper indicates a shift towards a more environment-centered energy policy, prioritizing sustainable development based on S&T, and strengthened international cooperation in the field of energy. It emphasizes, “China did not, does not and will not pose any threat to the world’s energy security.” [See also *China May Restructure Environmental Effort* in October 2007, and other related items in previous environmental security reports.] (December 2007) Ref.277

### **China’s New Ministry of Environmental Protection**

China announced the creation of five new “super ministries”: Ministry of Industry and Information, Ministry of Human Resources and Social Security, Ministry of Environmental

Protection, Ministry of Housing and Urban-Rural Construction, and Ministry of Transport, and a ministerial-level national energy body to oversee energy policy across all ministries. Establishing the new environment ministry is intended to help tackle China's growing pollution problems. Environmental monitoring and law enforcement will be high priorities, said future minister of environmental protection, Zhou Shengxian, at the 2008 National Environmental Law Enforcement Conference. (March 2008) Ref.278

### **China Calls for Enhanced Cooperation on Environmental Protection in Northeast Asia**

At the Opening of the 12th Senior Officials Meeting of the North-East Asia Sub-regional Program for Environmental Cooperation, Cui Tiankai, Assistant Foreign Minister of China, said environmental protection is an integral part of international and regional cooperation as nations face a number of traditional and non-traditional security threats. He urged six member countries (China, Japan, North Korea, Mongolia, Russia and South Korea) to enhance cooperation on environment and sustainable development. [See also *Asia-Pacific Should Intensify Green Growth Efforts*, *New Environmental Think Tank for Asia*, and *Meeting of Asia-Pacific Partnership on Clean Development and Climate*.] (March 2007) Ref.279

### **China's Climate Change and S&T Action Plan**

China launched its first national climate change program in June 2007. Although it does not include mandatory caps on emissions, it shows a strong commitment to reducing greenhouse gas emissions. The program highlights some major targets and actions to achieve them by 2010: reducing energy consumption by about 20% per GDP unit; increasing the share of renewable energy to 10% of the primary energy supply; keeping emissions of nitrous oxide from industrial processes at 2005 levels; increasing reforestation by 20%, and increasing international cooperation. The program notes that "China's energy efficiency is about 10% lower than that of the developed countries, and its per unit energy consumption of energy-intensive products is about 40% higher than the advanced international level. Science and technology are the ultimate resort for humankind to tackle climate change." In view of this, the Chinese Ministry of Science and Technology has released an action plan for the science and technology (S&T) aspects of China's new climate change initiative.

Note: The Chinese State Environmental Protection Administration report released in June reveals a continuous deterioration of air and water quality in Chinese cities despite national efforts to reduce pollution levels. Concomitantly, preliminary estimates by the Netherlands Environmental Assessment Agency reveal that in 2006 China surpassed the U.S., becoming the world's largest CO<sub>2</sub> emitter. (June 2007) Ref. 280

### **China to Invest \$175 Billion in Environmental Protection over Five Years**

China plans to invest \$175 billion (about 1.5% of GDP) in environmental protection in the next five years, to curb severe water and air pollution, which is causing riots and health problems. The money is to be spent on such measures as control of water pollution, improving air quality in cities, and halting soil erosion. China has 20 of the world's 30 most smog-affected cities, and 2.5% of its grain is estimated to be contaminated by heavy metals. [See also *China Creates 11 Independent Environmental "Watchdog" Centers* in the July 2006, *China's President Hu Ordered Environmental Regulations for Military Activities* in April 2006, *Chinese Research Priorities for the Next Fifteen Years* in March 2006, and other related items in previous environmental security reports.] (September 2006) Ref. 281

**China Creates 11 Independent Environmental “Watchdog” Centers**

China is establishing eleven watchdog centers to monitor and investigate environmental issues free from local government interference. The centers will operate under direct control of the State Environmental Protection Administration (SEPA) and will include five centers for environmental supervision, and six centers to monitor nuclear and radiation security. The main role of this nationwide network is to enforce environmental laws and regulations independent of local governments. The 11 centers will be included in SEPA's 24-hour emergency response system. [See also *China's President Hu Ordered Environmental Regulations for Military Activities* in April 2006, and *Chinese Research Priorities for the Next Fifteen Years* in March 2006, and other related environmental security reports] (July 2006) Ref. 282

**China's President Hu Ordered Environmental Regulations for Military Activities**

The People's Liberation Army of China has been directed by President Hu Jintao to submit its construction and training plans, as well as materiel transfer, weapon purchases, repair, and disposal to local authorities for approval regarding environmental impacts. The President also issued new regulations that specify assessment procedures and penalties for infractions. Construction of military bases, ports, logistics centers and exercise fields is to be approved only after the project passes environmental evaluation, including approval by local environment authorities. (April 2006) Ref. 283

**Chinese Research Priorities for the Next Fifteen Years**

The Chinese Academy of Sciences (CAS) announced its research priority for the next fifteen years. Areas of research are: drug and biofuel development; nanotechnology and new materials; genomics and proteomics; renewable energy and technologies for capturing carbon dioxide emissions; sustainable agriculture; and the next generation of information technology (IT). The academy investment is expected to grow by 70% in the next five years and then by about 12% annually until 2020 making it a major player in the future of science and technology.

Note: East Asian Strategic Review 2006, a recent report by the Japanese National Institute for Defense Studies, warns that increasing Chinese research on the development of technologies for mounting “China's military muscle can be seen as major destabilizing factors in East Asia.” (March 2006) Ref. 284

**Asia and Pacific Countries Adopt Declarations on the Environment**

At the Fifth Ministerial Conference On Environment And Development in Asia and the Pacific that took place in Seoul, Republic of Korea, 24-29 March 2005, ministers and senior officials from 52 Asian and Pacific countries pledged green-friendly approaches to development in the region. The delegates adopted the Ministerial Declaration on Environment and Development in Asia and the Pacific (2005), the Regional Implementation Plan for Sustainable Development in Asia and the Pacific (2006-2010) and the Seoul Initiative on Environmentally Sustainable Economic Growth. These instruments set clear implementation actions to promote environmentally friendly economic policies, including promoting partnerships and economic tools to improve ecological efficiency, reviewing national laws and identifying, assessing, monitoring, and capacity building to manage disaster risks.

The leaders' group from the Pacific Islands Forum held its first meeting on the Pacific Plan, a Forum initiative. One of the four areas of concern is sustainable development and environmental

security. The Pacific Islands Forum is the association of the 16 independent island states of the Pacific. Its objective is "to enhance the economic and social well-being of the people of the South Pacific". The Plan lays out how the region can improve cooperation in the four areas; it will be further developed during the coming months. (March 2005) Ref. 285

### **UK Cooperation with India and Others on the Environment and Sustainable Development**

As the result of a meeting between their ministers of environment, the UK and India have decided to enhance cooperation in dealing with issues related to sustainable development. These issues include emission of greenhouse gases, joint research on climate change, wildlife conservation, and reforestation. The UK Minister, Elliot Morley, also stated that this year, within the G8, the UK would focus on multifaceted and complex areas of climate change and Africa, and that these talks with India are the first in a series of dialogues that the UK will initiate with developing countries with rapidly growing economies, the next being China. (February 2005) Ref. 286

### **India Drafting New National Environment Policy**

Having received inputs from the constituent states and others, the Ministry of Environment and Forests in India is about to begin preparing the final draft of the new National Environment Policy. This comprehensive new document will replace a variety of single-issue statements and will incorporate the concepts of sustainable development. The policy addresses all levels of concern, from local to global, and is based on seven objectives and 15 guiding principles. (January 2005) Ref. 287

### **Environmental Courts Established in the Philippines**

The Philippine Supreme Court has designated 117 trial courts as 'environmental courts' to hear cases involving violations of laws protecting the country's natural resources and to speed up their resolution. (January 2008) Ref.288

### **Maldives to Become World's First Carbon Neutral Country in 10 Years**

The Maldives, one of the countries most affected by climate change, has become the seventh country of the UNEP-led Climate Neutral Network (CN Net), announcing that in 10 years it wants to become the world's first carbon neutral country by fully switching to renewable sources of energy. (May 2009) Ref. 289

### **Tuvalu to use only renewable energy by 2020**

Tuvalu, one of the small island states threatened by disappearance due to rising sea levels, has set a goal to use 100% renewable energy by 2020. It estimates that shifting exclusively to wind and solar power would cost a little over \$20 million. Following Maldives, Tuvalu is the second country intending to set an example to nations responsible for large greenhouse gas emissions ahead of the Copenhagen negotiations. "We look forward to the day when our nation offers an example to all — powered entirely by natural resources such as the sun and the wind," said Kausea Natano, Minister for Public Utilities and Industries. (July 2009) Ref. 290

### **US-Uruguay Treaty on S&T Cooperation**

On April 29th the US and Uruguay signed a treaty to increase government, academic, business, and NGO scientific cooperation between the two countries. The agreement gives special

attention to the study of biodiversity to improve agriculture, medicine, and understanding of the impact of climate change on the environment. (May 2008) Ref.291

## **TECHNOLOGICAL BREAKTHROUGHS WITH ENVIRONMENTAL SECURITY IMPLICATIONS**

New technologies are offering improved detection, cleanup, monitoring, and surveillance possibilities. WHO is developing a global epidemic simulator based on the model of climate monitoring systems. Small robotic helicopters operated by radio control could be used for reconnaissance and surveillance. High-sensitivity portable chemical and biological devices offer high accuracy detection, monitoring, and cleanup possibilities with rapid response time. However, future autonomous robotic weapon systems (without human decision-making control) are increasing vulnerability and concern over possible catastrophes.

Advances in biosciences not met by adequate security systems increase the risks of their potential misuse, the threat of biological weapons, and the likelihood of SIMAD, for Single Individuals Massively Destructive. The Biological Weapons Convention might need to be revised in view of the new synthetic biology developments, and verification and monitoring regimes would need to be developed to ensure compliance.

In order to prevent the misuse of science, it is important to strengthen the scientific expertise of security organizations and to create an independent science and technology advisory committee for intelligence agencies, as well as to promote within the international scientific community a common culture of awareness and responsibility.

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#### [New Detection and Cleanup Techniques](#)

#### [Counter Bioterrorism or Pandemic Technologies](#)

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Silicon Nanospheres rank among hardest known materials  
Environmentally Cleaner warfare: Energy on Targets vs. Metal and explosives on Targets needs environmental evaluation  
Use *off-switches* for bio weapons  
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New Web Site on Biomonitoring Technology

**Predictive Conflict Modeling to be used for determining conflict high risk areas and improving policy for enhancing stability in those countries**

Case studies suggest that the major sources of civil conflict that are associated with declines in available cropland and fresh water have been generated by the decreasing capacity of rural areas to maintain secure livelihoods and absorb growing labor forces. In the past, eruptions of civil tensions over cropland have been more common than over freshwater resources. While low per capita levels of land and water persist in several populous industrial countries, these countries –

with their robust urban economies and well-run services – are much less vulnerable to civil conflict involving these resources. Tensions between states over renewable natural resources have most often developed over rights to ocean fisheries and transboundary freshwater supplies. These tensions generally have led to interstate negotiations rather than warfare. Continued rapid population growth in the developing world, however, suggests a future unlike the past. The prospects for continued interstate cooperation, particularly over transboundary water rights, remain uncertain. Countries in high or extreme demographic stress categories for cropland or renewable fresh water were about 1.5 times as likely to experience civil conflict in the 1990s as countries that did not fall into these categories, suggesting a weak association between worsening scarcities of these critical resources, by themselves, and an increased likelihood of civil conflict. (February 2004) Ref.292

### **UNEP and Google Earth to Pinpoint Environmental Hotspots**

The United Nations Environment Programme has joined together with Google Earth to highlight environmentally plagued regions of the world and to compare them to previous maps of the same regions. This technology grants millions of people around the world access to accurate, easily comprehensible, and timely visuals of rapidly changing environments. This information could help increase public awareness, as well as alerting authorities to prevent eventual security issues due to environmental changes. Additionally, dissemination of this type of information will be beneficial for capacity building, teaching, and stimulating action against environmental degradation. Presently, the “UNEP: Atlas of our Changing Environment,” offers satellite images of 100 environmental hotspots from around the world. Google Earth images are not real-time images but have all been taken in the last three years. The continual improvement and widespread use of the “Atlas of our Changing Environment” could provide unique opportunities to help prevent environmentally related conflicts. (September 2006) Ref. 293

### **Enviromatics could contribute to Environmental Security**

MIT introduces and explains the emergence of a new field, enviromatics, born from the convergence of information technology and environmental research. Unlike environmental modeling based on statistical data, enviromatics uses real-time ecosystems-status database, Internet tools, and ubiquitous computers. Improved continuous sensing, simulation, and mapping tools make the predictions more reliable than previously. Instantaneous ecosystem analysis and short-term forecasting of ecosystems’ conditions is accessible to anybody interested. Possible applications of the new field range from farmers who could avoid eventual damages to their crops, to protection of endangered species that need special habitat conditions. Enviromatics could impact decisionmaking for improving forecasting implications of different action options, as well as increasing public awareness to foster more environmentally friendly practices. (May 2005) Ref. 294

### **Environmental Early Warning Systems with Web Crawlers**

Web crawlers (“software programs that browse the World Wide Web in a methodical, automated manner”) could serve as part of an early warning system for changes that may indicate impending ecological/environmental problems, points out an article by researchers from the Stockholm Resilience Centre at Stockholm University and the University of East Anglia. They suggest, “web crawlers can collect information on the drivers of ecosystem change, rather than the resultant ecological response,.... future early warning systems can make use of the recent

insight that shows that ecosystems sometimes ‘signal’ a pending collapse, ... [and the crawlers] may find information that describes ecological changes at small scales, which may warn of similar shifts in other locations” (March 2009) Ref. 295

### **Network of Autonomous Robots Monitors Difficult Environments**

A NASA project recently tested the concept of a network of rugged, autonomous, environment-sensing “spiderbots” that can be placed into a hazardous environment (in this trial, dropped into Mount St. Helens) to communicate among themselves and with the outside world, including satellites, to monitor an environmental situation. The network bypasses inoperative nodes and can command satellites to provide additional coverage. The principal investigator is Prof. WenZhan Song of the School of Engineering and Computer Science, Washington State University. (August 2009) Ref. 296

### **Autonomous Robots May Need Environmental Concerns**

Current work on intelligent battlefield robots by Ronald C. Arkin at Georgia Tech is focused on building into their programming regard for such elements as rules of engagement and the Geneva Convention. (November 2008) Ref. 297

### **Robot “Fish” Evaluate Underwater Pollution**

BMT Group, of Teddington, England, announced plans for initial testing of a new device for sensing underwater pollution. The device, developed by Prof. Huosheng Hu and associates at the School of Computer Science and Electronic Engineering, University of Essex, is physically modeled on a fish, is autonomous, requiring no external control, and communicates findings from its chemical sensors via a Wi-Fi connection at a charging point. (March 2009) Ref. 298

### **NASA-Developed Model to Help Reduce Famine**

Researchers from NASA's Goddard Space Flight Center have developed a computer model to anticipate food shortages brought on by drought, combining data from satellite remote sensing of crop growth, and food prices. (July 2007) Ref.299

### **Computer Simulation Planned to Predict Where Epidemics Will Strike Next**

World Health Organization researchers are developing a global epidemic simulator (GES) based on the model of climate monitoring systems. GES would record the location of disease outbreaks and their trajectory and then allow one to enter alternative mitigation measures to see the results. GES would integrate epidemiological and biological models of disease, to model the world’s disease status. The system would be connected to major elements of the built environments such as airlines, buildings, etc. to help spot outbreaks and the movements of people. WHO is seeking funding to complete the project. (April 2006) Ref. 300

### **Climate Change Computer Modeling**

Climate scientists and modelers warn that climate change forecasting abilities are still relatively weak and that some of those considered in policymaking—such as the IPCC assessments—are highly debatable, being too conservative and not taking into account the latest research.

Climate modelers from around the world met at the World Modelling Summit for Climate

Prediction, held in Reading (UK), May 6-9, 2008, to try to improve forecasting abilities, including measures that will allow a better understanding of how the climate will be affected locally as well as globally. At the end of the four-day summit, scientists made the case for a climate-prediction project on the scale of the Human Genome Project. A key component of this scheme would be a world climate research facility with computer power far beyond that currently used in the field. (May 2008) Ref.301

A group of climate scientists from NASA and Columbia University Earth Institute found that climate change is “close to critical tipping points, with potentially dangerous consequences for the planet.” In a related interview, Dr. James Hansen of NASA said that the point of no return might be reached as soon as in 10 years, if world governments fail to curb GHG emissions. He also noted that the IPCC report underestimated sea level rise, which, he warns, might reach 1-2 meters by the end of the century, if West Antarctic and Greenland melting are factored in. The *Dangerous human-made interference with climate: a GISS modelE Study* outlines two scenarios: ‘business-as-usual’, which shows disastrous consequences, and an ‘alternative scenario’ assuming controlled GHG emissions generating more moderate effects. (June 2007) Ref.302

Global warming will increase the risk of natural disasters over the next two centuries, even if harmful emissions were cut now, warn climate scientists from the University of Bristol's Department of Earth Sciences. Compiling data from more than 52 climate models looking at the impact of greenhouse gas emissions, the researchers calculated the risks induced by climate change to the world's key ecosystems based on levels of warming (less than 2°C (3.6°F) to over 3°C (5.4°F)) and for each group assessed the probability of changes in forest cover, the frequency of wildfires, and changes to freshwater supplies over the next 200 years. The findings are expected to be used to explore measures to reduce hazards as much as possible. (August 2006) Ref.303

A new study, Global temperature change, by a group of scientists, reveals that global surface temperature has increased approx.0.2°C per decade in the past 30 years, and the world is the warmest it has been in the last 12,000 years. Scientists estimate that pollution from human activity, combined with the loss of snow and ice cover, will accelerate future temperature increase. Also, since warming is not uniform around the globe, the likelihood of strong El Niños and other harsh weather phenomena increases. A global temperature rise of approx. 1°C might represent a threshold with “dangerous” consequences, as sea levels rise and species become extinct. (September 2006) Ref.304

Strong correlation between global warming and severe storms is also revealed by a study based on more than 80 simulations using 22 sophisticated computer models of the climate system. The simulations show with 84% probability that for the period 1906-2005, human activity—mainly greenhouse gas emissions—are responsible for about two-thirds of the temperature increases in hurricane formation regions of the Atlantic and Pacific Oceans. The research team that produced the study includes 19 hurricane and climate scientists from ten research centers. (September 2006) Ref.305

A new index developed by scientists of the Swiss Federal Institute of Technology in Zurich, allows mapping the different ways that climate change will affect different parts of the world.

This is the first map to show how global warming combined with natural variations in the climate would affect our planet, highlighting the frequency of extreme climate events—such as heat waves and floods—by 2100 compared with the late 20th century. It is intended to “help policy-makers gain a quick overview of the scientific facts without getting lost in the detail,” says Michèle Bättig, member of the team. (January 2007) Ref.306

New research and models by the National Center for Atmospheric Research and the University of Colorado's National Snow and Ice Data Center found that the Arctic could be seasonally free of sea ice by 2020, 30 years sooner than predicted by the IPCC report. In addition to all the consequences for the ecosystem and the Nordic inhabitants, this might accelerate even more global warming, as reflection of the sun's heat and light will be strongly diminished. (May 2007) Ref.307

New computer climate models reveal Earth's limits of CO<sub>2</sub> intake. The computer climate models developed by scientists from Berkeley Atmospheric Sciences Center, Woods Hole Oceanographic Institution, and the National Center for Atmospheric Research (NCAR) in Boulder, Colorado indicate that CO<sub>2</sub> absorption by land and oceans can not keep up with the current trends of increasing fossil fuel emissions, accelerating climate warming after the critical point is reached. The process is increased by drought and other phenomena already present. The paper explaining the findings, *Evolution of carbon sinks in a changing climate* was published in the Proceedings of the National Academy of Sciences (PNAS) of August 9, 2005.

Another computer model, also developed by scientists at the National Center for Atmospheric Research, simulates Earth's climate at the time of the greatest mass extinction in history, at the end of the Permian Era. It reveals that an abrupt and dramatic rise in atmospheric levels of CO<sub>2</sub> triggered the extinction of an estimated 90-95% of all marine species, and about 70% of all terrestrial species. "The results demonstrate how rapidly rising temperatures in the atmosphere can affect ocean circulation, cutting off oxygen to lower depths and extinguishing most life," says NCAR scientist and lead author, Jeffrey Kiehl. (August 2005) Ref. 308

Results of state-of-the-art climate models by Lawrence Livermore National Laboratory are consistent with new observational estimates of temperature data obtained from satellites and weather balloons, providing compelling evidence that the tropical troposphere is warming since 1979. Human activity is considered as one important cause of the warming. [See also *New Developments on Climate Change* of January 2005 environmental security report.] (August 2005) Ref.309

### **European New Web-based Air Pollution Monitoring System**

Users of the new Ozone Web released by the European Environment Agency can monitor and track ground level ozone across Europe. The Web site-based database is updated on an hourly basis with data from more than 500 air quality monitoring stations. Users can access the information on air quality in any part of Europe either by entering a place name or by clicking on a map of Europe. The Web site will also include information on the health implications of the respective ozone values. (July 2006) Ref. 310

### **Small Robotic Helicopters for Reconnaissance**

Scientists from the University of South Florida have been surveying hurricane damage with a

miniature battery-powered robot helicopter developed by iSENSYS, a spin-off from like90 LLC. This unit can operate by radio control at altitudes up to 300', over a quarter-mile radius. (December 2005) Ref. 311

### **Battle Simulators to Reduce Environmental Stresses from Military Exercises**

The Department of Defense has just acquired two massive new simulation-oriented computer complexes, which should substantially reduce environmental stresses from large-scale battlefield exercises. Each cluster consists of 256 dual 3-GHz Linux processors; they will be delivered to the USAF Maui HPCC (Maui High Performance Computing Center) and ASC (Aeronautical Systems Center) CMSRC (Center Major Source Resource Center) at Wright-Patterson AFB, and will be used by the Joint Forces Command's Joint Experimentation Directorate (J9). These systems will allow large-scale, high-resolution combat simulations that weren't possible with the previous hardware. [See also previous AC/UNU Millennium Project environmental scanning items: Software algorithms for ecoterrorism prediction and simulations to improve environmental policy efforts, by identifying plausible futures linked to key environmental issues, August-September 2003; and Virtual Earth Simulation might help reduce environmental impact of military operations, March 2004.]

Related news: Sandia National Labs announced that they are assembling the world's fastest yet smaller and most cost-effective supercomputer. Red Storm, the new supercomputer, is expected to become operational in January 2005. (August 2004) Ref. 312

### **Software algorithms for ecoterrorism prediction and simulations to improve environmental policy efforts, by identifying plausible futures linked to key environmental issues**

DARPA research into information technologies that enable collaboration among teams of intelligence analysts, policy-makers and covert operators could make it possible for humans and computers to "think together" in real time to "anticipate and preempt terrorist threats." The development of inference network applications is a major step towards such a goal, and is forecast as occurring within two years. (August-September 2003) Ref.313

### **Virtual Earth Simulation might help reduce environmental impact of military operations**

The U.S. Army has given a computer simulation company called "There" a contract to build a simulation of the Earth within four years to help it prepare for conflicts around the world. The simulation will use real-world terrain databases and include all aspects of a conflict situation, including surroundings and people (represented by avatars). A Baghdad section is to be ready in September of this year. The emphasis in the Baghdad simulation will be on human interaction rather than conflicts involving large quantities of military hardware. (March 2004) Ref.314

### **Scientific Models Could Help Navy Avoid Whales During Sonar Tests**

Duke University biologists are developing scientific models based on sets of environmental parameters that could predict different marine species' presence in proximity to sonar testing areas, helping to prevent eventual harm to the animals. The research was triggered when several whales of three species beached in January near Oregon Inlet just after a Navy training exercise used sonar at 240 nautical miles from Oregon Inlet. Although the incident might be a coincidence, the new model might help eliminate the possibility of such accidents. (February 2005) Ref. 315

**Future Computer-Human Interface Means Cyber Viruses Could Infect Humans**

As the human-computer interface continues to evolve into a continuum, it is reasonable to assume cyber viruses will one day be able to transfer into electronic components that will have been added into the human nervous system, and so have biological effects. Kevin Warwick, professor of cybernetics at Reading University, and a cyborg pioneer, warned that the emergence of computer-human connection and the production of synthetic viruses comes with great advantages, but also a huge risk: computer viruses will be able to infect augmented humans as they do PCs. (November 2004) Ref. 316

**Proceedings of the Conference on Wearable Electronics**

An insight into the current state of the field of wearable computing is available in the proceedings of the Fifth International Forum on Applied Wearable Computing, part of the ISWC 2008—12th IEEE International Symposium on Wearable Computing, held September 28–October 1, 2008 in Pittsburgh PA. (October 2008) Ref.317

**Wearable Computing Show Scheduled in Milan 20 May 2009**

The Road Show wearIT@work: The Present and the Future of Wearable Computing - Application in real-life work environments will take place on 20 May 2009 at the HP Milano site in Cernusco sul Naviglio, Milan, Italy. wearIT@work is an Integrated EU FP6 Project and is the largest project worldwide in Wearable Computing. Its major goal is the development and integration of wearable computing as a way of bringing computer support to workers without interfering with their normal activities. (April 2009) Ref. 318

**Robotics in the battlefield—"Well before the end of the century, there will be no people on the battlefield."**

Robotic elements are becoming a more and more significant part of the modern battlefield. By 2010 it is planned for the Stryker infantry vehicle to be equipped with an autonomous navigation system and other, application-oriented, "intelligent" facilities, and it will be only part of a complement of unmanned military vehicles and systems. One scientist in the field has predicted, "Well before the end of the century, there will be no people on the battlefield".

This trend will be enhanced by the increasing role of nanotechnology to produce tiny, intelligent pieces of equipment. These unmanned devices are involved with the battlefield environment in two ways: 1) as hazards to the environment, and 2) as environmental cleanup implements. They thus have two sets of connections with the body of environmental protection agreements and treaties. (March 2004) Ref.319

**Serpentine Self-Healing Robot significantly reduces logistics tail translated to lighter environmental footprints and reduces the amount of battlefield waste**

British researchers have developed a self-healing robot that uses a shape memory alloy for propulsion and a genetic algorithm to adapt its mobility routines when dealing with damage to itself. Using these two features allows the robot to operate without external operator input and adapt to damage rather than being rendered incapable of completing its mission. (August-September 2003) Ref.320

**Self-Assembling Robots**

The M-TRAN II robot, developed by the Japanese Distributed Systems Design Research Group,

represents a new generation of modular robots, with a flexible design able to rearrange itself into countless different shapes and create dramatically different patterns of movement. (March 2005) Ref. 321

### **Scorpion Robot for Complex Roving Missions**

The Scorpion robot, developed by Frank Kirchner from the University of Bremen, Germany, is able to access difficult terrains that are inaccessible to larger, wheeled vehicles. A prototype is currently being evaluated at NASA's Ames Research Center at Moffett Field, CA. Although developed mostly for other planets' exploration, the Scorpion robot could also be used on Earth, to investigate difficult or dangerous territories inaccessible to humans or larger vehicles. (February 2005) Ref. 322

### **Roach-like Robots for Better Post-conflict Clean-Up and Survivor Detection**

Researchers at Stanford, Berkeley, and Poly-PEDAL labs designed the Sprawl family of hexapedal robots, based on the cockroach model. These robots are fast, stable, independent, and lower cost. They could be deployed for landmine detection and for survivor location in natural or other disasters. (July 2004) Ref. 323

### **Robots that Can “Recharge” by Eating**

Researchers at the University of the West of England, Bristol, are working on creating robots with artificial digestive systems and corresponding metabolisms that would allow robots to ‘eat’ to recharge their electrical needs. The robots would collect bacteria from sewage sludge, break it down into sugars, and convert the biochemical energy into electricity that powers the robot. (January 2005) Ref. 324

### **Progress on Self-replicating Robots**

A team of engineers from Cornell University in Ithaca NY, has created robots that can self-replicate similarly to biological cloning. At this stage, they are just simple sets of 4 modular robot cubes, "molecubes", which are able to assemble copies of themselves, when provided a supply of pre-made cubes. Yet, they represent an important step forward compared to previous self-replicating robots, due to their flexibility, “memory”, and three-dimension movement possibility. (May 2005) Ref. 325

### **Robot Swarms**

Advances in robotics and artificial intelligence make possible the development of large “swarms” of cheap robots that range in size for a broad set of applications. Operating off simple individual instruction sets, swarms of robots can nevertheless potentially interact in a complex manner, performing a myriad of tasks, including a number of supporting environmental missions. The ability to produce large quantities of simple robots that interact with each other decreases the unit costs of robotics and potentially increases the number of tasks that such swarms can perform. (June 2004) Ref. 326

### **Nets of Agents Probe the Environment**

An important branch of Enviromatics is concerned with the acquisition of environmental data. Several current projects (Univ. of Wyoming, Univ. of Pennsylvania, UCLA) are developing variations of advanced data acquisition techniques. These are based on large networks of small



intercommunicating devices (agents), incorporating sensors, which can monitor wide areas for environmental data, process it, and transmit results back to a central point. These devices may be stationary—laid out in a grid pattern over the region of concern—or they can be a band of mobile robots swarming over a large area in an internally controlled search for sites and information of interest. Individual units might be specialized; e.g., for radiation, biological weapons, or chemical weapons. The key element here is the combination of individual autonomy, in which each device "runs itself", and intercommunication, which permits low-power wireless transmission of data and plans around the network. In this way the assemblage of units can behave in a seemingly intelligent manner, adjusting its behavior to changing conditions or surroundings. A flight of migratory birds, maintaining its V-shape, is the classic example of this kind of emergent behavior, demonstrating that, in fact, the whole can be greater than the sum of its parts. (May 2005) Ref. 327

#### **On-chip Antenna to Solve Communication Problems among Microscopic Sensors**

University of Florida electrical engineers have installed a radio antenna less than one-tenth of an inch long on a computer chip and demonstrated that it can send and receive signals across a span of several feet. By covering a large area with a number of such radio chips, each powerful enough to transmit information to the next radio, one can create a single large network that could be monitored from a distance. (May 2004) Ref. 328

#### **Silicon Nanospheres Rank Among Hardest Known Materials**

Measurements made at the University of Minnesota and confirmed at the Los Alamos National Laboratory have shown that silicon nanospheres (12 nm) have hardness falling between sapphire and diamond. This raises the possibility of producing superhard materials from this form of matter. It might eventually be considered an alternative to depleted uranium. (March 2003) Ref. 329

#### **Environmentally Cleaner warfare: Energy on Targets vs. Metal and Explosives on Targets Needs Environmental Evaluation**

Although new energy weapons are expected to come into use and such weapons do not appear to be an environmental problem compared with metal and explosives, their environmental impact has still to be assessed compared to previous weapons impacts. Variations of these energy weapons that cause short duration pain have also been suggested in crowd control. Since these kinds of weapons present a new category of arms, it is reasonable to anticipate that eventually new rules for their control will emerge. (February 2003) Ref.: 330

#### **Use *off-switches* for bio weapons**

Just like land mines now have "off-switches", there is a need to develop "off-switches" for bio-weapons. (August 2002) Ref.: 331

#### **Models for Photochemical Pollution Assessment in Urban Areas**

A new multimedia mass balance model might improve knowledge and therefore actions concerning volatile organic compounds (VOC) that may impact the ozone in urban environments. The model can estimate VOC's emission source, level and fate, thus helping to focus resources and regulation efforts on VOCs of major concern. The authors underline though that the model's outcome should be complemented by better quantification of certain parameters.

This work was funded by the American Chemistry Council, and the study was published in *Atmospheric Environment* (subscription required). Ref. 332

### **Software Package Monitors Buildings' Power**

The Sun Flow Monitor System software package marketed by Live Data Systems, Inc., Branchburg NJ, monitors a building's power sources, conventional or alternative, and its building management systems. This new software produces reports, which can aid in minimizing the structure's environmental demand. (July 2007) Ref.333

### **Google to Support Development of Early Warning System in Vulnerable Regions**

Google.org, the philanthropic arm of Google Inc., unveiling its charity plan over the next five to ten years, announced \$25 million in grants aimed at addressing global challenges. One of the five core initiatives, 'Predict and Prevent' aims to empower communities to predict and prevent ecological, health or social crises before they become local, regional, or global crises, by identifying 'hot spots' and enabling rapid response. InSTEDD (Innovative Support to Emergencies, Diseases and Disasters) is allocated \$5 million to improve early detection, preparedness, and response capabilities for global health threats and humanitarian crises. Other recipients in this category include the Global Health and Security Initiative (GHSI) and Clark University. (January 2008) Ref.334

### **New Web Site on Biomonitoring Technology**

The Environmental Health Research Foundation (EHRF) launched a new web site that is providing comprehensive information on Biomonitoring," the scientific technique for assessing human exposure to natural and synthetic chemicals <http://www.biomonitoringinfo.org>. (May 2005) Ref. 335

## **New Detection and Cleanup Techniques**

New and much more sensitive chemical and biological detection techniques will greatly assist in post-incident clean-up and will provide faster and more accurate monitoring of possible environmental violations. The *cleanup effort*, once a problem has been detected, may now be supported by new work that has produced both *plants and microbes* that selectively destroy or segregate hazardous or polluting elements.

- [Assessment of Fine Dust Composition Method](#)
- [Microcantilevers Provide Ultrasensitive Detection](#)
- [New Color Matrix Sensor Array Warns of Toxic Gases](#)
- [New Material Will Aid Radioactive Cleanup](#)
- [Silicon-on-insulator Microring Resonator Provides High Sensitivity Gas Detection](#)
- [Genetically Engineered Bacteria Might Provide Landmine Detection](#)
- [Chemical Vapor Deposition Creates Nano Filters, Catalyst Scaffolds](#)
- [Review and Map of Use of Nanomaterials for Environmental Cleanup](#)
- [Nanotechnology Applications for Clean Water](#)
- [Nanotube-impregnated Paper Provides Sensitive Biosensor for Aqueous Toxins](#)
- [New Catalyst Removes Nitrite and Nitrate from Drinking Water](#)

Water decontamination improved with gallium  
New Ultra-sensitive Detector for Water-borne Hazards  
New Water Purifying Filter Requires No Energy or Running Water  
Ozone Bubbles Provide New Cleansing Technique  
New Nature-based Filter Allows Utilization of Gray Water  
Inverse Fluidization of Aerogels Removes Oil from Water  
Genetically Engineered Tobacco Plant May Clear Polluted Water  
Water decontamination improved with gallium  
Water Treatment Technologies for the Removal of High-Toxicity Pollutants  
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Synthetic Biology to Combat Harmful 'Biofilms'  
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Tiny Cantilevers Detect Contaminants  
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Portable Sensor to Detect Exposure to Chemical or Nerve Agents  
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Model Helps Evaluate Performance of Biosensors  
Antibody-bearing Gel Can Disinfect Biologically Contaminated Areas  
New Studies of Bacterial Oil Degradation in Contaminated Soil  
New Bacterium Can Provide Arsenic Cleanup and Possibly Detection  
Soil Bacterium May Convert Toxic Metals to Harmless Form  
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Reusable Hydrogels Detect and Remove Heavy Metals from Contaminated Water  
New Deep Water Marine Sensors Being Developed  
Carbon Nanotube Adsorbents Remove Water Impurities  
New Treatment Improves Congo Red Decontamination  
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New Chemical Helps Protect Burned-over Soil from Erosion  
New Technique Promises Ultra-sensitive Biosensors  
EU Launches Mobile Carbon Tracking  
New Approach May Ease Uranium Decontamination  
New Material Strips out Radioactive Debris  
New Type Nanoscale Transistor Would Aid DNA Detectors  
DNA Spotted Microarrays Provide Faster Pathogen Identification  
Chemical Tests on Cells Rather than Animals  
Nanotech-based Explosives Detector  
Detector Materials for Cyanogen Halides from Chemical Weapons  
New Spectroscopy Technique Speeds Up Virus Detection  
Nanofibrils Film Improves Explosives Sensing Performance  
Bacterial Proteins Help Nanoparticle Cleanup  
Fluorescent Sensor Bacteria Offer Fast Pollutant Detection  
New Material Has High Absorbency for Organic Solvents  
New Production Technique for Nanofiber Filters for Chemical Warfare Protection  
Sugar-coated Nanotubes Stop Anthrax Inhalation  
New Spectroscopy Sensor for Environmental Monitoring  
Nanocantilevers for Ultra-small Sensors  
Digital Magnetofluidics Improves Biochemical Analysis  
Biosensors Sniff out TNT and Possibly Other Dangers  
Reliable Anthrax Antibodies Developed  
Bar-coded Nanowires May Yield Small, Fast Bio Detectors  
New Low-cost System for Bacteria Identification  
Quantum Dot Device Provides Fast Detector for DNA Sequences  
Sensicore's Lab on a Chip Water Profiler Automates Lab Functions  
Deep Cooling Improves Uranium Detection  
Biodetecting Wipes  
Fish Provide Early Warning of Toxic Chemicals

Ultrasound Soil Cleanup Technique  
New Surface Decontamination Method  
Virus Detection Technique—Fast, Convenient, and Sensitive  
New Technique for DNA Isolation  
Sensitive Uranium Detector Using DNA  
New and Improved Water Purification Method  
Microbes Can Help Build Nanodevices for Detection  
High Sensitive Portable Chemical Detection Device  
Piggybacking Environmental Sensors on Communications Gear  
Very Low Cost Chemical Sensors for Environmental Monitoring  
Nanobarcodes for Multiple Pathogen Detection  
Bacteria Used to Eliminate Perchlorate from Water  
New Oil Remediation and Recovery Technique  
New Efficient Energy-free Technique for Oil Removal from Water  
Nanotechnology Applications for Clean Water  
DNA-Wrapped Nanotube Sensors  
Sugar-Coated Gold Nanoparticles Detect Toxins  
Fast Bacteria Detection from Bacteriophage/Quantum Dot Complexes  
Chopped-up DNA Strands Speed Bacterial Identification  
New Spectroscopy Technique with Superior Results  
Laser-tracked Honeybee Detect Landmines  
Real-Time Antibody-based Bioterrorism Detection System  
Russian Discovery of New Bacterial Cleanup Technique  
A Radioactive Element's Rate of Decay Has Been Speeded Up  
Nanoshells Dramatically Improve Sensing Capability  
Iron Nanoparticles for Environmental Cleanup  
Dirty Bomb Clean-Up Technology for Porous Structures  
New and Improved Land Mine Destruction Technique  
Bionanotech Particles Can Detect Bacteria in 20 Minutes  
Chemical Probe Offers Fast Detection of Ricin  
Nanodevices for Biomolecules Detection  
Nanotubes that Detect and Kill Biological Agents  
Nano-engineered Powders Tackle Toxic Chemicals  
Smart Dust could be used to monitor and/or detect hazardous chemical or biological agents in the water and air  
Bacterial Integrated Circuits  
Military Applications of Silicon-Based Ultraviolet Sensors  
Technology for Perchlorates Cleanup  
Motion Detector Allows Naked Eye to See Motion of 10 Nanometers  
Designer Bacteria Could Help Cleanup Pollution and Produce Hydrogen  
New More Efficient Microbial Fuel Cell Cleans Wastewater and produces Hydrogen  
Sunlight-powered System for Cleaning Water and Produce Electricity  
Proposed T-Rays (TeraHertz) Devices Could Detect Almost Anything  
Automated Water Safety Sensor Units  
Arsenic-polluted Water Decontamination Using Sulphate  
Water Nanofilters

Sandia National Laboratories funded to develop improved Desalination and Arsenic Removal Technology  
Low-cost, Non-polluting Sewage Treatment System  
New diamond film connects electronics and biology for on-going bio-alert systems  
New chip speeds field detection of specific DNAs  
On-chip antenna to solve communication problems among microscopic sensors  
Miniature spectrometer can detect biological hazards  
Detecting chemical threats with "intelligent" networks  
Invention of a new multisensor system required to speed up landmine clearance  
Hand-Held Chemical Analysis and Detection System can identify the presence of some hazardous chemical or biological agents  
Muon Technology can help detect smuggled nuclear material  
Molecular Pattern Matcher for Chemical Detection  
New production process for gold nanoparticles make biosensors less costly  
Nanoscale Iron Particles as an environmental cleanup technology by reducing toxic chemical and heavy metals into less toxic compounds  
Nanoporous Ceramic uses for heavy metals cleanup  
Nano-engineered Gold Surface Mercury Vapor Sensor  
Nanotubes could be used to detect nerve gas and other chemical warfare agents  
Bacterial Conversion of soluble uranium to insoluble uraninite might eventually be used to clean heavily contaminated sites  
Artificial organisms and/or genetically engineered living bacteria used in cleanup operations  
Microbes as part of post-battle field clean up  
Pollution-eating microbe may help clean up  
Manure Aids in Removing Hydrogen Sulfide from Biogas  
Transgenic Plants to Help Decontaminate the Environment  
Aquatic Plant Removes POPs from Wetlands  
Bacteria-modified Yellow Lupine to Remove Toluene from Soil  
Implementation Steps for Landmine Control Convention: New Genetically Modified Plant to Detect Landmine Explosive  
Invasive species of genetically modified animals for reconnaissance and/or cleanup  
Flower-power could help clear landmines  
Polymer Nanofibers Provide Chemical Warfare Defense

### **Assessment of Fine Dust Composition Method**

A project managed by Dr. Cord Fricke-Begemann at the Fraunhofer Institute for Laser Technology in Aachen, Germany, has developed a new technique for analyzing by particle size the components of fine dust (< 100 nm) such as may be generated by industrial processes. According to a story in Nanowerk News, "a gas stream separates the particles into size classes before they are collected on filters. Their composition is then examined by means of laser emission spectroscopy." Results can be obtained in less than 20 minutes. (October 2009) Ref. 336

### **Microcantilevers Provide Ultrasensitive Detection**

A tuned-microcantilever-based chemical sensor that is far more sensitive than current devices

has been developed by a team led by Panos Datskos, of the Oak Ridge National Laboratory's Nanosystems & Structures Group. The researchers believe that the technology could be incorporated into a handheld instrument and therefore could be used for environmental assessment. (February 2010) Ref. 337

### **New Color Matrix Sensor Array Warns of Toxic Gases**

As part of the NIH Genes, Environment and Health Initiative, Prof. Kenneth S. Suslick and colleagues at the University of Illinois at Urbana-Champaign have developed what they characterize as an 'optoelectronic nose.' The system uses a postage stamp-sized 6x5 array of sensor dots, each of which signals the presence of one or more particular toxins by changing color. According to Prof. Suslick, "The pattern of the color change[s in the whole array] is a unique molecular fingerprint for any toxic gas and also tells us its concentration. By comparing that pattern to a library of color fingerprints, we can identify and quantify the TICs in a matter of seconds." Tests were run on a set of 19 toxic industrial chemicals. (September 2009) Ref. 338

### **New Material Will Aid Radioactive Cleanup**

Mercouri Kanatzidis, at the Argonne National Laboratory, and Nan Ding, a chemist at Northwestern University, report developing a new material, composed of metal sulfides, that binds radioactive cesium isotope ions to sulfur atoms inside its crystalline structure, giving it the ability to aid clean-up at radioactively contaminated sites. (March 2010) Ref. 339

### **Silicon-on-insulator Microring Resonator Provides High Sensitivity Gas Detection**

According to an article in Nanowerk News, INTEC, imec's associated laboratory at Ghent University in Belgium, has developed a technique using coated SOI microring resonators with films of 3.5 nm ZnO nanocrystals to achieve optical sensing of gaseous ethanol. Ethanol vapor concentrations as low as 100 ppm have been detected. The devices can be modified for the detection of other gases. (June 2010) Ref. 340

### **Genetically Engineered Bacteria Might Provide Landmine Detection**

Alistair Elfick, of the University of Edinburgh's Centre for Biomedical Engineering, and his team have genetically modified E. coli bacteria to produce a protein in the cell membrane that senses TNT, one of the explosives used in landmines. The group introduced the gene for the luciferase enzyme, which produces light in fireflies. According to scidev.net, "When proteins on the surface of E. coli detect TNT, this 'switches on' the gene responsible for light production." (January 2010) Ref. 341

### **Chemical Vapor Deposition Creates Nano Filters, Catalyst Scaffolds**

According to a story in Nanowerk News, an international group of researchers, led by Robert Vajtai at Rice Univ., has developed a technique that uses chemical vapor deposition to form carbon nanotube membranes that "could find wide application as extra-fine air filters", removing "up to 99 percent of particulates with diameters of less than [1000 nm]", and "as scaffolds for catalysts that speed chemical reactions." (May 2010) ) Ref. 342

### **Review and Map of Use of Nanomaterials for Environmental Cleanup**

According to the announcement, "A new review article ... co-authored by Dr. Todd Kuiken, a research associate for the Project on Emerging Nanotechnologies (PEN), focuses on the use of

nanomaterials for environmental cleanup. It provides an overview of current practices; research findings; societal issues; potential environment, health, and safety implications; and possible future directions for nanoremediation.” The Wilson Center/Pew Trust’s PEN also released a map that “shows which nanomaterials have been used where and includes detailed information on the contaminants treated and the nature of the treatment.” (July 2009) Ref. 343

### **Nanotechnology Applications for Clean Water**

Elsevier advertises, "Nanotechnology Applications for Clean Water highlights both the challenges and the opportunities for nanotechnology to positively influence ... [the] nanotechnology area of environmental protection. Here you will find detailed information on breakthroughs, cutting edge technologies, current research, and future trends that may affect acceptance of widespread applications. The first four parts of the book cover specific topics including using nanotechnology for clean drinking water in both large scale water treatment plants and in point-of-use systems [as well as] existing technologies and future potential for groundwater remediation, pollution prevention, and sensors. ... The final part discusses the inherent societal implications that may affect acceptance of widespread applications." The book was not read/reviewed for this report. (July 2009) Ref. 344

### **Nanotube-impregnated Paper Provides Sensitive Biosensor for Aqueous Toxins**

Prof. Nicholas Kotov, of the departments of Chemical Engineering, Materials Science and Engineering, and Biomedical Engineering at the University of Michigan, and associates from Jiangnan University, China, have developed a fast and inexpensive sensor for detecting toxins in water, using paper strips with several layers of single-walled carbon nanotube dispersion containing antibodies. The technique’s sensitivity is high—comparable with such current biochemical techniques as enzyme immunoassay and mass-spectrometry—and reportedly more than 25 times faster. Kotov explains that “The change of electrical response [conductivity] of the paper reflects the contents of the analyte”. (December 2009) Ref. 345

### **Genetically Engineered Tobacco Plant May Clear Polluted Water**

Dr. Pascal M.W. Drake from the Centre for Infection at St. George’s University of London and his team claim success in genetically engineering a strain of tobacco that produces an antibody to microcystin-LR (MC-LR), an environmental toxin pollutant produced by a species of cyanobacteria that makes water unsafe for human use. The authors claim that this plant could serve as a major tool for helping keep water sources safe to use, especially in developing nations. (March 2010) Ref. 346

### **New Catalyst Removes Nitrite and Nitrate from Drinking Water**

Jitendra Kumar Chinthajjala of the University of Twente, Netherlands, has developed a catalyst structure that can efficiently remove hazardous nitrite and nitrate, in combination with hydrogen, from drinking water, and turn it into harmless nitrogen. The system consists of nanoparticles of palladium or platinum attached to extremely fine threads of carbon, with the spaces between the threads allowing the nitrite and nitrate to come into good contact with the surface of the nanoparticles. (June 2010) Ref. 347

### **Water decontamination improved with gallium**

Researchers at Sandia National Laboratories have discovered that adding an atom of gallium to



the key molecules in a coagulant widely used for water decontamination greatly improves its effectiveness and shelf life. (July 2009) Ref. 348

#### **New Ultra-sensitive Detector for Water-borne Hazards**

A new semiconducting-nanotube-based chip that reliably detects very low concentrations (ppb) in water of TNT or a chemical relative of sarin has been developed by researchers from the Dept. of Chemical Engineering at Stanford University. According to the principal investigator, Prof. Zhenan Bao, the new device “offers a rare combination of low-cost materials, low power usage, robust and repeatable performance in water, instant response and physical flexibility,” and its technology is applicable to a wide variety of target compounds. (September 2009) Ref. 349

#### **New Water Purifying Filter Requires No Energy or Running Water**

Tata Chemicals, of Mumbai/Kolkata, India, has announced the release of ‘Tata Swach’, a water purifier unit that requires no energy or running water to operate. The unit uses a replaceable cartridge packed with a purification medium that kills bacteria and disease-causing organisms. The cartridge can purify up to 3000 liters of water, after which it stops water flow. (December 2009) Ref. 350

#### **Ozone Bubbles Provide New Cleansing Technique**

A new technique uses ozone bubbles to turn hydrocarbon [oil] content in water or soil into a form that can be retained by sand filtration, which is a conventional and economical process. This new method has been developed by Prof. Andy Hong of the University of Utah, and is expected to be commercialized by Miracotech, Inc. of Albany CA. (December 2009) Ref. 351

#### **New Nature-based Filter Allows Utilization of Gray Water**

Prof. Robert D. Berghage of the Pennsylvania State Univ. and associates have developed a filter that converts gray water (from sinks, showers, and other non-pathogenic sources) to a form suitable for irrigation and similar uses. According to an item in physorg.com, the filter "consists of two plastic pipes filled with layers of porous rocks, soil, crumbs from discarded tires, composted cow manure and peat moss. Vegetables and other plants are planted in holes along the sides of the pipes. The pipes stand in a basin with still more plants -- papyrus and horsetail reed - - whose roots support microbes that remove pollutants." (May 2010) Ref. 352

#### **Water Treatment Technologies for the Removal of High-Toxicity Pollutants**

“Water Treatment Technologies for the Removal of High-Toxicity Pollutants,” part of the NATO Science for Peace and Security Series C: Environmental Security, presents the proceedings of the NATO Advanced Research Workshop with the same name, held September 13–17, 2008 in Košice, Slovak Republic. It is an overview of problems related to high toxicity pollutants in the environment, especially in drinking waters, some technologies for water treatment, as well as policy aspects for increasing environmental security. (December 2009) Ref. 353

#### **New Technique Helps Reduce Nanoparticle Wastewater Pollution**

Scientists at the UK’s Centre for Ecology & Hydrology have discovered that coating nanoparticles with a surfactant causes them to clump together and form a removable solid sludge when they appear in wastewater as a result of their use (now widespread) in commercial products, enabling them to be cleared from treatment plant effluent streams. (November 2009)

Ref. 354

### **Project Developing Sensors for Engineered Nanoparticles**

According to Nanowerk News, Prof. Omowunmi Sadik, director of SUNY's Binghamton University Center for Advanced Sensors and Environmental Systems, is leading research on developing sensors that will detect and identify engineered nanoparticles. This should advance understanding of the risks associated with the environmental release and transformation of these particles, as well as naturally occurring cell particles. (March 2010) Ref. 355

### **Variable Heating Provides New Flexibility for Gas Sensors**

Researchers Barani Raman and associates at the US National Institute of Standards and Technology (NIST) have developed a new “sensitive detector technology capable of distinguishing hundreds of different chemical compounds with a pattern-recognition module that mimics the way animals recognize odors”, according to a NIST announcement. The current unit comprises eight types of sensors in the form of oxide films deposited on the surfaces of 16 microheaters that allow the sensors to be heated to 350 temperature points between 150°C and 500°C, and “relies on changes in electrical conductance in the sensing film to detect the presence of adsorbed gases. Temperature changes may be used to create response ‘fingerprints’ for different gases.” The new technology is better than previous devices at recognizing previously un-sensed compounds and at dealing with sensor wear over time. (November 2004) Ref. 356

### **Review and Map of Use of Nanomaterials for Environmental Cleanup**

According to the announcement, “A new review article ... co-authored by Dr. Todd Kuiken, a research associate for the Project on Emerging Nanotechnologies (PEN), focuses on the use of nanomaterials for environmental cleanup. It provides an overview of current practices; research findings; societal issues; potential environment, health, and safety implications; and possible future directions for nanoremediation.” The Wilson Center/Pew Trust’s PEN also released a map that “shows which nanomaterials have been used where and includes detailed information on the contaminants treated and the nature of the treatment.” (July 2009) Ref. 357

### **FAO/IAEA Meeting Discusses Portable Disease Detection Devices**

A five-day meeting in Verona, Italy discussed new mobile rapid disease detection technology that experts say could revolutionize the fight against bird flu and many other livestock disorders. One of the topics at the conference, sponsored by the Joint FAO/IAEA Programme, a Vienna-based partnership between FAO and the International Atomic Energy Agency, was a \$1,000 mobile test system and reader the size of a small portable television. Further work is in progress to reduce it to what researchers call a “laboratory in a pen”. (March 2007) Ref. 358

### **Portable Mass Spectrometer and Gas Chromatograph**

Researchers at Brigham Young University in Utah have developed a portable mass spectrometer and gas chromatograph for detecting biological and chemical agents. This easy to use and portable instrument can analyze a sample and—based on an internal library of known chemicals and biological agents—identify the material and the level of danger. The researchers intend to create a palm-sized version of the device. (March 2007) Ref. 359

**Single-electron Transistors (SETs) and NEMS Make for New High-performance Sensor**

A team at the School of Electronics and Computer Science at the University of Southampton, England, part of the EU FP-7 NEMSIC project, is developing an extremely small, high-performance, low-power sensor in silicon which will have applications in biosensing and environmental monitoring. The device co-integrates single-electron transistors (SETs) and nano-electro-mechanical systems (NEMS) on a common silicon technology platform to produce the smallest sensor offered so far. (July-August 2008) Ref.360

**New Substrate Preparations Make for Inexpensive “Labs on a Chip”**

Professor George Whitesides and colleagues of the Dept. of Chemistry at Harvard University have developed an inexpensive way of turning a sheet of paper into a microfluidic “lab on a chip” medium for bioassays. The technique is based on soaking the sheet with a hardenable photoresist, covering it with a transparency containing a drawing of the desired pattern of channels, and exposing it to light, rendering it impenetrable except in those areas shielded by the drawing. An analogous scheme is used by Aaron Wheeler of the University of Toronto to inexpensively make copper molds for plastic microfluidic chips. In his method, a pattern is inked directly onto a sheet of copper before a chemical is used to etch away a thin layer from exposed areas, leaving behind the mold pattern for the network of channels. (October 2008) Ref.361

**Miniature Radiation Sensors Could Implement Detection Network**

Scientists at Purdue University are working on developing a miniaturized radiation detection device that is small enough to fit into a mobile phone. Their suggestion is that a population carrying such embedded devices, together with software and communications subsystems, could serve as a networked system for the detection of radiological hazards such as “dirty bombs”. (October 2008) Ref.362

**New Air Quality Evaluation Tool**

According to a news story in Science Daily “The Grupo de Modelos y Software para el medio Ambiente of the Facultad de Informática at the Universidad Politécnica de Madrid has developed a very sophisticated tool (OPANA) that estimates the impact of air quality on the health of citizens using last generation models. ... [It produces] extremely precise measurements of the concentration of a certain atmospheric contaminant that a person breathes in a determined time and place, from a particular source (an industry, an incinerator, a motorway, etc.). It is possible to determine the consequent impact under almost any circumstances or distance from the source.” The results require the input of accurate data on local topography and land use, meteorology, and, most importantly, the estimated emissions in the area. (March 2009) Ref. 363

**New Techniques for Multi-nanowire Detection Arrays**

A team from the Electrical Engineering Department at Pennsylvania State University has developed an improved, potential mass production technique for assembling detector nanowires into an array on a silicon chip, using an electric field. Once in place, with electrodes on top of them, the set of treated wires yields a portable and very sensitive detector for multiple toxins or pathogens. A nanowire detectably changes its conductivity when a target substance (say, a toxin) binds to the specific complementary coating on the wire. Harvard chemist Charles Lieber earlier devised a competing technique to line up nanowires using polymer bubbles, and Prof. Mark Reed at Yale attacked the problem using an etching process. (January 2009) Ref. 364

**Nanotube-based Biosensor Sensitive to Trace Amounts**

Early Warning Inc. of Troy NY has licensed from NASA's Moffett Field Ames Research Center technology for a nanotube-based biosensor sensitive to trace amounts of specific bacteria, viruses and parasites. According to a company release, "The biosensor works when a single strand of nucleic acid comes into contact with a matching strand of nucleic acid attached to the end of an ultra-conductive nanotube. The matching strands form a double helix that generates an electrical signal, which is used to determine the presence of specific microorganisms in the sample. Because of their tiny size, millions of nanotubes can fit on a single biosensor chip allowing identification of very low levels." (May 2008) Ref.365

**Isotope Ratio Evaluates Decontamination Success**

A recent EPA report describes a new method for monitoring the success of biodegradation in decontaminating underground water. The technique, developed at the Univ. of Toronto's Stable Isotope Laboratory, depends on the active microbes' preference in the cleansing process for the carbon-12 isotope over carbon-13. The resulting change in the ratio of these isotopes in the contaminant indicates that the decontamination is proceeding satisfactorily. (February 2009) Ref. 366

**Fast Multi-hazard Water Analyzer**

A new automatic Biohazard Water Analyzer directly measures individual species of pathogenic bacteria, protozoa and viruses in the same test, and provides reports in two to three hours time. The technology is RNA-based, developed by Early Warning, Inc. of Troy NY and is licensed from NASA's Ames Research Center. (April 2009) Ref. 367

**New Biological Discovery Should Bring More Efficient Water Treatment**

Scientists at the Environmental Biotechnology Cooperative Research Centre (EBCRC), Eveleigh NSW, Australia, have discovered a cell signaling pathways that can control bacterial slime on membranes, which will lead to more efficient desalination and water recycling plants. According to the project leader, "Membrane fouling is one of the greatest contributors to increased energy usage and cost in the desalination and water recycling processes. Reducing fouling will significantly decrease operating costs through reduced energy consumption, a reduction in chemical usage and an overall reduction in a plant's environmental footprint". This signaling system initiates dispersal in established fouling biofilms and prevents the formation of new biofilms. EBCRC is developing a range of biofilm control formulations that will stimulate natural bacterial dispersal events. (October 2007) Ref.368

**New Membrane for Energy-efficient Water Filtration**

IBM Research (San Jose CA), Central Glass Co., Ltd. (Tokyo), the King Abdul Aziz City for Science and Technology (Riyadh), and the Univ. of Texas at Austin announced development of a new material for the energy-efficient membrane technology for water purification. The new formulation exhibits resistance to chlorine damage and performs well in mildly basic conditions, making it suitable for arsenic removal as well as water desalination. (March 2009) Ref. 369

**Improved Techniques for Water Treatment**

According to an NSF announcement, the Center of Advanced Materials for Purification of Water

with Systems at the University of Illinois Urbana-Champaign is developing “sensors with specially designed and synthesized DNA to detect trace amounts of lead, mercury, arsenic and other contaminants” and “chemically activated fibers and granules of carbon for removal of heavy metals and pesticides like atrazine in the presence of natural organic matter that interferes with many existing sensors”. (February 2009) Ref. 370

### **Inverse Fluidization of Aerogels Removes Oil from Water**

Scientists from the Otto H. York Department of Chemical Engineering at the New Jersey Institute of Technology, Newark, have reported a very efficient water decontamination technique in which a floating bed of surface-treated hydrophobic aerogel (Nanogel) granules are fluidized by a downward flow of oil-contaminated water in an inverse fluidization mode. According to an abstract, “Among the advantages of the process is the extremely low energy consumption (low pressure drop) during oil removal and the large absorption capacity. Oil concentrations of about 2000 mg/L in water could be reduced to less than 10 mg/L by the inverse fluidization process.” (February 2009) Ref. 371

### **Simple New Technique Supplies Chlorine for Water Purification**

John Hays, superintendent of Washington, Iowa’s water treatment plant, developed an electrolytic chlorination technique that offers an easy, inexpensive way of creating potable water in primitive circumstances. The method involves passing salt water through an electrolytic device (driven by, say, a 12 v. battery), to produce a combination of ozone, hydrogen peroxide, and chlorine, which can then be used for water purification. The method is being offered commercially by International Water Management Systems of Washington IA. (February 2009) Ref. 372

### **Water Filter Effective Against Parasites**

A new sand filter reportedly has the ability to clean water 30 to 50 times faster than similar existing devices, with the added advantage that it is effective in removing oocysts of the *Cryptosporidium* protozoan parasite from the flow. The filter, being developed by Prof. James Amburgey of the Department of Civil and Environmental Engineering at the University of North Carolina at Charlotte, uses a chemical pretreatment scheme based on ferric chloride and a pH buffer that is added to the water; a single formulation of the chemicals in the scheme seems to be effective regardless of water quality. (April 2009) Ref. 373

### **NanoRadio Offers Low Impact Environmental Monitoring and Communications**

Prof. Alex Zettl of the Univ. of California’s Berkeley Nanosciences & Nanoengineering Institute and his group have developed a nanoscale radio, in which the key circuit consists of a single carbon nanotube. This work derived from an effort to create inexpensive wireless environmental sensors. (April 2008) Ref. 374

### **New Technique Might Power Nano-based Environmental Devices**

Researchers at the Georgia Institute of Technology have developed a microfibre–nanowire hybrid structure for energy scavenging. According to the abstract, “Solar, thermal and mechanical (wind, friction, body movement) energies are common and may be scavenged from the environment”, and the Editor’s Summary describes their work as “a system that converts low-frequency vibration/friction energy into electricity using piezoelectric zinc oxide nanowires

grown radially around textile fibres. By entangling two fibres and brushing their associated nanowires together, mechanical energy is converted into electricity via a coupled piezoelectric-semiconductor process. This work shows a potential method for creating fabrics which scavenge energy from light winds and body movement.” (February 2008) Ref. 375

### **Ionic Liquids Provide Safe Alternative to Mercury**

Robin Rogers of Queen's University, Belfast, UK, and his colleagues have discovered that ionic liquids (IL)—salts in liquid form—are an environmentally safe substitute for mercury in thermometers. Gary Baker, of the Oak Ridge National Laboratory in the U.S., also points out that ILs are potentially green replacements for conventional solvents in other applications. (March 2008) Ref.376

### **Single-walled Carbon Nanotubes Give Support to Antimicrobial Enzyme**

A team of researchers from the Samuel Ginn College of Engineering at Auburn University produced antimicrobial coatings that have the potential to prevent diseases from spreading on contaminated surfaces. They mixed a lysozyme solution with physically strengthening single-walled carbon nanotubes, and used layer-by-layer deposition to produce an inherently antimicrobial surface. (July-August 2008) Ref. 377

### **Nanotube-based Coating Repels Water to Achieve Self-cleaning Surface**

A research team led by Ayyappanpillai Ajayaghosh at the National Institute for Interdisciplinary Science and Technology in Trivandrum, India, developed a coating that produces surfaces so hydrophobic that a 2° slope causes water droplets to run off them, taking dust and other contaminants with them. The treatment is a dispersion of carbon nanotubes that coated with para-ethylene vinylene, a highly hydrophobic molecule. (July-August 2008) Ref. 378

### **Emerging Contaminants: Most Effective Treatment Strategies**

Endocrine disruptor chemicals (EDCs) and pharmaceuticals and personal care products (PPCPs) have been discussed as emerging issues for water supply and wildlife protection for more than a decade. The American Water Works Association's (AWWA) May 2008 Opflow carries an article describing three processes for treating these substances in public water supplies. Additionally, AWWA has added a special session to its June 8-12, 2008 annual conference in Atlanta, Georgia. Taken together, these indicate that public and water industry interest in remedial action has run ahead of legislation and regulation – leaping over at least one of the common four steps through which an issue progresses in evolving from a scientific discovery to become a societal action item. The three processes discussed in the article are: additional processing of wastewater effluents, reverse osmosis treatment of potable water, and combined ultraviolet/reverse osmosis treatment of potable water. (May 2008) Ref. Ref.379

### **Synthetic Biology to Combat Harmful 'Biofilms'**

A team of researchers from MIT and Boston University has genetically engineered an E. coli bacteriophage to produce an enzyme that degrades the biofilm that the bacterium often produces and which interferes with the action of the phage. The researchers applied this technique to E. coli biofilms, (producing a hundred-fold phage performance improvement) but they believe that their approach can be used with many other bacteria. For example, it might be possible for a modified anthrax bacteriophage to be sprayed on an area affected by anthrax, and then wiped off.

(July 2007) Ref.380

### **Nanowire “Paper” Selectively Absorbs Oils in Water**

Prof. Francesco Stellacci, of MIT’s Department of Materials Science and Engineering, and colleagues have developed a paper-like membrane comprising a mat of potassium manganese oxide nanowires. The new (and inexpensive) material is completely impervious to water but can absorb up to 20 times its weight in oil or other hydrophobic substances, and can be recycled indefinitely often by heating it to evaporate the oil. (June 2008) Ref.381

### **Energy-saving Communications for Underwater Environmental Sensing Networks**

A low-cost, low-power modem subsystem for short-range, low data-rate underwater networking is being developed by a team of computer scientists from the University of California at San Diego’s Jacobs School of Engineering. The technology is based on reconfigurable hardware, and will enable the construction of low-cost, more efficient, underwater sensor networks that can capture and transmit environmental data back to land in real time. (May 2009) Ref. 382

### **Carbon-gold Nanoparticle Sacs Trap Oil Droplets**

Rice University’s Pulickel Ajayan, Professor of Mechanical Engineering and Materials Science, and his research team have developed carbon-gold segmented nanowires that assemble to form BB-sized sacs around droplets of oil in water. (June 2008) Ref.383

### **More New Improvements in Nanotube-based Environmental Sensors**

In a paper published in the online edition of *Angewandte Chemie*, Michael Strano, Associate Professor of Chemical Engineering at MIT, and his team describe a new highly sensitive technology for detecting gases in the environment. The system consists of carbon nanotubes, whose conductivity selectively changes when a gas binds to them, coupled with a miniature gas-chromatography column etched onto a silicon chip. The column separates the different gases in the environment before they reach the nanotubes, to achieve a sensitivity of 25 parts/trillion. A further improvement adds a coating to the tubes which causes the gas molecule to detach a few milliseconds after attaching, allowing the movement of the triggering component to be tracked as it moves. (June 2008) Ref.384

### **Tiny Cantilevers Detect Contaminants**

Prof. Anja Boisen and colleagues at the Department of Micro- and Nanotechnology, Technical University of Denmark, have created a detection device for contaminants, based on the change in resistance of a cantilever, 40×200 microns in size, when a contaminant molecule or bacterium binds to its antibody-coated surface and bends it. A variation works by using a similar element as the lid of a pigment-containing box, so when the strip bends, it releases a detectable color. (July 2007) Ref.385

### **Chemical Agent Cleanser Developed in Canada**

A new non-toxic method for rapidly and safely destroying toxic agents, such as chemical weapons and pesticides, has been developed by researchers from Queen’s University, Canada. The alcohol-based system is non-corrosive, acts within minutes, and proved to be more than 99% effective in eliminating organophosphorus agents, such as Tabun, Soman and VX. It might represent a safe and environmentally friendly option for destroying stockpiles of chemical

weapons, environmental spill cleanup, and rapid response to possible terrorist attacks using chemical weapons agents. It is safe in most conditions and has no special storage requirements. (April 2008) Ref.386

### **Animal-Robot Team Effective for UXO Clearance**

Animal-robot teams can be a safe and efficient alternative for post-conflict area scanning and clean-up. A remotely controlled robot leading a dwarf mongoose (*Helogale parvula*) trained to sniff out explosives is an approach demonstrated by Thrishantha Nanayakkara and colleagues at the University of Moratuwa in Sri Lanka. The group APOPO in Tanzania has been training Gambian giant pouched rats for similar manually-led operations, but the robot guidance eliminates the human risk factor. The two animals mentioned are more easily trained and perform better than dogs. (April 2008) Ref.387

### **Portable Sensor to Detect Exposure to Chemical or Nerve Agents**

The U.S. Pacific Northwest National Laboratory is developing a portable sensor able to identify exposure to chemical or nerve agents by testing blood or saliva samples. The device will be based on higher sensitivity test strips. Its development is funded by the National Institutes of Health and the project is estimated to take five years. (August 2007) Ref.388

### **Miniature Chemical Agent Sensor**

Gas chromatography and mass spectrometry devices for detection of various dangerous gases are being further reduced in size, while their sensitivity and rapidity of reaction is increasing. The prototype of a new tiny device produced results in about four seconds from minimal gas amounts and operates on limited amounts of power. The sensor, developed by researchers from MIT, Cambridge University, University of Texas at Dallas, Clean Earth Technology and Raytheon, is expected to be completed in the next two years. (January 2008) Ref.389

### **New Rapid Portable Chemical Sensor**

Guardion-7, a 28-pound, briefcase-sized unit is a portable chemical sensor that can identify nerve agents, explosives and other substances within five minutes, with high accuracy, even in extreme climates, apparently without false-positive readings found in current sensors. It was developed by Brigham Young University scientist Milton Lee and has been successfully tested at the Dugway Proving Ground in Utah. The U.S. Defense Threat Reduction Agency certified its accuracy in February. Research continues to make the device even smaller and lighter. (March 2008) Ref.390

### **Model Helps Evaluate Performance of Biosensors**

A new modeling technique allows the study of miniature biosensors used to identify pathogens, DNA or other substances. The technique, developed by scientists of the School of Electrical and Computer Engineering at Purdue University, comprises a new conceptual framework and corresponding computational model to relate the shape of a sensor to its performance and explain why certain designs perform better than others. (January 2008) Ref.391

### **Antibody-bearing Gel Can Disinfect Biologically Contaminated Areas**

The Ectoplasm Project is developing an environmental cleanup material consisting of a polymer solution that contains antibodies to a biological agent, like anthrax. It is being developed by



Anadis, of Melbourne, Australia, with funding from the Research Support for Counter Terrorism (RSCT) Programme. The antibody-based gel will allow decontamination teams to spray a possibly contaminated area with the substance, for biohazard detection, containment, and decontamination. The gel layer can be stripped off surfaces without damaging them, and discarded using safety precautions. The substance is expected to be ready for use in field operations worldwide within two years. (August 2007) Ref.392

### **New Studies of Bacterial Oil Degradation in Contaminated Soil**

Two papers in the recent issue of the African Journal of Biotechnology report on studies, one in Nigeria and one in Kwazulu-Natal, of bacterial degradation of oil in contaminated soil. The latter research found five indigenous bacteria that degraded diesel by more than 85% within two weeks. (July-August 2008) Ref.393

### **New Bacterium Can Provide Arsenic Cleanup and Possibly Detection**

Thomas Osborne and Joanne Santini from University College, London presented a paper at the Society for General Microbiology's autumn meeting announcing the discovery, at Yellowknife NWT, Canada, of a bacterium which converts arsenic in water from arsenite to much more easily removable arsenate, even at very low temperatures. The researchers also hope that an enzyme enabling the development of an arsenic biosensor can be isolated from these new strains of bacteria. [See also *Arsenic-polluted Water Decontamination Using Sulphate* in November 2004 and *Transgenic Plants to Decontaminate the Environment (removes arsenic from contaminated soil)* in the October 2002 environmental security monthly reports.] (September 2008) Ref.394

### **Soil Bacterium May Convert Toxic Metals to Harmless Form**

An international group of scientists at the Ohio State University, Columbus have published an on-line paper describing how the bacterium *Shewanella oneidensis*, found in soil, including nuclear waste dumps, breaks down metal oxides to chemically extract oxygen, leaving behind a non-soluble, and therefore harmless, residue. (March 2009) Ref. 395

### **Improved Technique for Removing Heavy Metals from Water**

Scientists of the Research Center for Eco-Environmental Sciences of the State Key Laboratory of Environmental Chemistry and Ecotoxicology, Chinese Academy of Sciences in Beijing, developed an improved technique for removing heavy metals from water. Fe<sub>3</sub>O<sub>4</sub> magnetic nanoparticles coated with humic acid are added to the water; they adsorb heavy metals, and are then removed with magnets. Their innovation is the use of the humic acid coating to prevent the particles from aggregating or oxidizing, while the acid itself combines with heavy metal ions. (July-August 2008) Ref. 396

### **Reusable Hydrogels Detect and Remove Heavy Metals from Contaminated Water**

Scientists at the Department of Chemistry, University of California at Berkeley developed a group of low cost protein-cross-linked hydrogels, incorporating pea metallothioneins, for the detection and sequestration of heavy metal ions, such as cadmium, in contaminated water. The compounds shrink upon absorbing metals, providing a detection capability, and can be reused after the bound metal ions are removed by chelation. The researchers are also working on applying the same technique to other types of pollutants. (December 2008) Ref. 397

**New Deep Water Marine Sensors Being Developed**

Prof. Hywel Morgan from the UK's University of Southampton's School of Electronics and Computer Science and Dr. Matt Mowlem at the National Oceanography Centre, Southampton, have performed initial testing of new technology marine sensors that are "capable of measuring harsh environments [and] can be deployed for months at a time", according to a University announcement. The four-year project's two goals are said to be "to develop lab-on-a-chip chemical and biochemical analyzers to detect nutrients and pollutants at the ultra-low concentrations found in the ocean, and to develop small chips to identify individual phytoplankton in the oceans". The researchers foresee applications wherever the condition of environmental water needs to be assessed. (January 2009) Ref. 398

**Carbon Nanotube Adsorbents Remove Water Impurities**

Prof. S. Ramaprabhu of the Alternative Energy and Nanotechnology Laboratory and Department of Physics at the Indian Institute of Technology, Madras, has led research resulting in the filing of a patent application for a nanocomposite adsorbent that could treat polluted wastewater from industrial plants and other sources, eliminating viruses, bacteria, toxic metal ions, and other organic molecules, although possibly requiring some modification for certain purposes. The news story reporting this also mentions water treatment research by Catalyx, Inc. of Anaheim CA, using reverse osmosis, and a project at the Center for Green Science at Carnegie Mellon Univ., based on tetra-amido macrocyclic ligand catalysts. (March 2009) Ref. 399

**New Treatment Improves Congo Red Decontamination**

K.P. Gopinath of the Dept. of Chemical Engineering, A.C. College of Technology, Anna University, Chennai, India, and colleagues reportedly have developed an improved technique for the degradation of the toxic pollutant Congo Red. The method uses sonolysis as pretreatment followed by biological treatment with *Bacillus* sp. Sonolysis is the breaking of chemical bonds with sound. (September 2008) Ref 400

**Reusable Carbon Aerogel Adsorbs Organic Solvent Pollutants**

A monolithic carbon aerogel that will adsorb organic solvent pollutants such as benzene, toluene and xylene, and that can be easily regenerated and used repeatedly has been produced by David Fairén Jiménez and other researchers at the Univ. of Granada in Spain. (March 2008) Ref.401

**Advance in Assessing Metabolites of Diesel Exhaust component 1-nitropyrene in Humans**

Researchers at Kanazawa University and the University of Washington reported developing a method for measuring metabolites of 1-nitropyrene (1-NT) in human urine. 1-NT is abundant in diesel exhaust particulates and a significant mutagenic agent. This appears to be a breakthrough in the quest for ways to evaluate human health effects of diesel engine emission inhalation. (August 2007) Ref.402

**Landmine Detection by Using Ground-penetrating Radar Technique**

A wide-band earth-penetrating radar offering promise of improved capability for landmine detection was developed by A. G. Yarovoy, P. van Genderen, and colleagues at the International Research Centre for Telecommunications-transmission and Radar of the Delft University of Technology, the Netherlands. (August 2007) Ref.403

**Porous Semiconducting Aerogels Purify Water and Hydrogen**

Scientists of the Argonne National Laboratory, together with colleagues at Northwestern and Michigan State Universities, have developed chalcogenide-based porous semiconducting aerogels which efficiently (99.99%) remove contaminants like heavy metals from water and also filter out catalyst-poisoning impurities from hydrogen intended for use in fuel cells. (August 2007) Ref.404

**Water Purification Techniques**

Researchers at the University of Nottingham have developed a technique that uses bacteria to consume contaminants that build up on the membranes used in some water purification systems. This allows the filters to be cleaned within the closed system, without removing the membranes. In another advance, researchers at the University of South Australia have developed a low cost, efficient technique for removing organic material from water. It involves the use of silica particles coated with a nanometer-thin layer of active material based on a hydrocarbon with a silicon-containing anchor. The coated particles are stirred in the contaminated water for up to an hour and the powder is then filtered out. (February 2008) Ref.405

**Millimeter-wave Spectroscopy Provides Environmental Sensing**

Scientists from the Argonne National Laboratory developed a new technology, passive millimeter-wave spectroscopy (PmmWS), which can detect specific molecules in concentrations as low as 100-1000 ppm at ranges of up to a few kilometers. The new system improves on earlier ones by being less susceptible to interference from clouds and other atmospheric phenomena, having a much longer range, and being less expensive. (September 2007) Ref.406

**New Chemical Helps Protect Burned-over Soil from Erosion**

ENCAP of Green Bay WI, a lawn care small business, introduced a new product, PAM-12, that claimed to be more effective and less costly in treating flame- and smoke-damaged soil than previous approaches so that it becomes more absorbent and less susceptible to erosion. It does this by causing the soil to form into tiny clumps around which water will flow instead of running off, aiding in the process of restoring the natural environment for vegetation re-growth. (September 2007) Ref.407

**New Technique Promises Ultra-sensitive Biosensors**

Scientists at MIT, led by Ned Thomas and Patrick Doyle, have developed a technique for producing millions of bar-coded 3D latticework microparticles in which DNA or other biotags can be attached. According to an announcement, "With conventional solid microarrays and particles, biotags only adorn the probe's surface. In contrast, biotags can attach inside the latticework particles, increasing the number of target molecules that bind to a particle, and therefore producing a more intense fluorescent signal". The developers believe this technique may increase the biosensing device's sensitivity by a factor of 10,000. Commercialization of this diagnostic tool is expected within two years. (December 2007) Ref.408

**EU Launches Mobile Carbon Tracking**

The mobGAS program is a personal mobile phone application that enables users to learn the amount of greenhouse gases produced by their daily activities. The software is available in 21 languages and is free to download to a mobile phone. Users can input daily activities and

calculate the daily, weekly, and yearly emissions via a secure website. The system compares the user's emissions with national and world averages. The system was developed by the Joint Research Center of the European Commission to help raise public awareness and motivation to reduce GHG emissions. (December 2007) Ref.409

### **New Approach May Ease Uranium Decontamination**

A new technique may lead to methods for removing dissolved uranium (e.g., from depleted uranium munitions) from liquids, such as groundwater. The method uses large organic molecules called macrocycles that essentially envelop a uranyl ion ( $(\text{UO}_2)^{2+}$ ), leaving one of its oxygen atoms exposed, showing that the normally strong bond between the uranium and oxygen has been weakened. The scientists, Polly Arnold and Jason Love of the University of Edinburgh, believe "that the uranyl ion's bonds can be loosened is a first step towards finding substances that can transform dissolved uranyl into an insoluble compound." The macrocycle is destroyed by water, so further work will be necessary to produce a practical decontamination technique. (January 2008) Ref.410

### **New Material Strips out Radioactive Debris**

Scientists at the U.S. Department of Energy's Argonne National Laboratory and Northwestern University developed a layered sulfide compound, which very efficiently strips out radioactive strontium-90 from nuclear waste. They are now experimenting with the compound's ability to isolate such other common radioactive elements as cesium and uranium. (March 2008) Ref.411

### **New Type Nanoscale Transistor Would Aid DNA Detectors**

A mathematical simulation developed by Samuel Afuwape of National University, in San Diego, helps to design a new type of nanoscale transistor for a portable DNA detector for testing contaminated sites. The new nanoscale ion-selective field-effect transistor (ISFET) could be integrated into a biosensor containing thousands of DNA sequences that would bind with DNA sequences in a sample, producing changes in conductivity detectable by the ISFET. The miniature DNA detector would have broad application, including bioweapons detection. (March 2008) Ref.412

### **DNA Spotted Microarrays Provide Faster Pathogen Identification**

Prof. Sanjeev Narayanan, of the Dept. of Diagnostic Medicine and Pathobiology, College of Veterinary Medicine at Kansas State Univ., and his colleague, Greg Peterson, reported having developed a DNA spotted microarray that finds the specific genetic markers that distinguish one pathogen from another and also determine antibiotic resistance. The new technique permits searches for multiple diseases and antibiotic resistance in about a day, compared to the several days required by earlier methods. According to an announcement, "they can detect as many as 557 genes, making it possible for them to screen for 40 different species of bacteria, 1,200 serotypes of Salmonella, five common serotypes of E. coli, and resistance to the 45 most common antibiotics used to treat human and animal illnesses caused by these pathogens." (September 2008) Ref.413

### **Chemical Tests on Cells Rather than Animals**

The U.S. Environmental Protection Agency, the NIH Chemical Genomics Center, and the National Institute of Environmental Health Sciences have announced collaboration to change

how chemicals are tested for risks they pose to humans. The agencies will research and implement a new approach that will move away from traditional animal testing and toward tests that use cells. The approach is explained in the National Research Council's 2007 report *Toxicity Testing in the 21st Century: A Vision and a Strategy*. (February 2008) Ref.414

### **Nanotech-based Explosives Detector**

Prof. Li Guang-tao of the Key Laboratory of Organic Optoelectronics & Molecular Engineering of the Ministry of Education at Tsinghua University, Beijing, and his group have developed nanocomposite silica films doped with porphyrins (nitrogen-containing macrocyclic molecules) which produce a very fast fluorescence response to trace vapors of explosives such as TNT, DNT and NB (nitrobenzene). These films can be used as the basis for small, cheap, and fast environmental detectors. (December 2006) Ref. 415

### **Detector Materials for Cyanogen Halides from Chemical Weapons**

Researchers at the Dept. of Chemistry at MIT, led by Samuel W. Thomas III, have developed new phosphorescent detecting compounds for cyanogen halides, used in chemical weapons. The new materials have greatly improved sensitivity to trace amounts of the toxins in the environment. (December 2006) Ref. 416

### **New Spectroscopy Technique Speeds Up Virus Detection**

A nanotech-based diagnostic test that can detect viruses as diverse as influenza, HIV, and respiratory syncytial virus in a minute or less was developed by a veterinary research team at the University of Georgia. The technique referred to as surface enhanced Raman spectroscopy (SERS) measures the Raman frequency shift of a near-infrared laser as it scatters off viral DNA or RNA. The test has the advantage of detecting the viral DNA or RNA itself rather than the indirectly produced antibodies that are the basis of other viral testing. This provides a much more rapid and reliable evaluation of the threat. The basic method was well known but the signals produced were unusably weak. The breakthrough here was placing silver nanorods at an 86° angle on the specimen slides, an addition that enormously increased the strength of the returns. (November 2006) Ref. 417

### **Nanofibrils Film Improves Explosives Sensing Performance**

A team of scientists from the University of Illinois and the Chinese Academy of Sciences developed a new fluorescent film, made from nanofibrils, which offers greatly improved performance in the detection of such explosive vapors as TNT. These sensors indicate the presence of explosives by losing their glow. They can be recycled repeatedly and also resist deterioration from exposure to sunlight. (June 2007) Ref. 418

### **Bacterial Proteins Help Nanoparticle Cleanup**

A new discovery indicated that bacteria could excrete proteins causing metal nanoparticles to aggregate, making them easier to remove from the environment. Apparently the bacteria produce the proteins to protect themselves from potentially toxic nanoparticles. The team of researchers from the Lawrence Livermore National Laboratory, UC Berkeley, and the Lawrence Berkeley National Laboratory found the bacteria at the abandoned Piquette Mine, in southwestern Wisconsin. Peter Weber from the LLNL notes that the discovery indicates that cysteine or cysteine-rich polypeptides or proteins could potentially be used for nanoparticle clean up. "With

the boom in nanoscience, people are naturally asking questions about the potential environmental impacts. Here, we see that naturally produced nanoparticles can be naturally controlled,” he commented. (June 2007) Ref. 419

### **Fluorescent Sensor Bacteria Offer Fast Pollutant Detection**

Jan Van der Meer, an environmental microbiologist at the University of Lausanne, Switzerland, and his team have announced successful results in their testing of sensor bacteria that release an enzyme in response to a given chemical and that have been genetically engineered so that that release also produces a protein that fluoresces in a particular color. Trials were conducted by testing ocean water for pollution from a simulated oil spill. Results could be obtained in a matter of minutes, as compared to the weeks needed for conventional chemical analysis. The bacteria’s self-reproduction eases the task of supplying test material. (September 2008) Ref.420

### **New Material Has High Absorbency for Organic Solvents**

Researchers at Kyushu University in Fukuoka have developed a new material, which can absorb large amounts of organic solvents such as chloroform. The material can absorb 300-480 times its weight of various agents. (June 2007) Ref. 421

### **New Production Technique for Nanofiber Filters for Chemical Warfare Protection**

A new 3D honeycomb structure of polymer nanofibers, which, when incorporated into protective gear, would be much more efficient in adsorbing and possibly destroying dangerous chemical warfare agents in the environment was developed by scientists led by Dr. Seshadri Ramkumar, Asst. Prof. at the Institute of Environmental and Human Health at Texas Technology University. (October 2006) Ref. 422

### **Sugar-coated Nanotubes Stop Anthrax Inhalation**

Clemson University chemist Ya-Ping Sun and his team have developed a technique that uses sugarcoated carbon nanotubes to render weaponized anthrax harmless. Finely divided anthrax spores in the environment bind to the sugar coating, forming clusters too large to be inhaled, rendering the weapon useless. [See also *Sugar-Coated Gold Nanoparticles Detect Toxins* in April 2006 environmental security report] (October 2006) Ref. 423

### **New Spectroscopy Sensor for Environmental Monitoring**

University of Wyoming researchers have developed and patented a sensor that can be used with surface plasmon resonance (SPR) spectroscopy to produce a low-cost system for rapid detection of biological signatures, explosives, and other volatile chemical targets in the environment. The sensor element comprises a specially designed surface optically coupled to an SPR spectrometer. Molecules such as antibodies are held close to the SPR surface, with no intervening liquid/hydrogel layer, maximizing sensitivity. (September 2006) Ref. 424

### **Nanocantilevers for Ultra-small Sensors**

Researchers at Purdue University are investigating the use of nanocantilevers in designing a new class of ultra-small sensors for quick detection of viruses, bacteria and other contaminants in air and fluids by coating the cantilevers with proteins, including antibodies that attract the contaminants. Nanocantilevers vibrate at different frequencies when contaminants stick to them, revealing the presence of dangerous substances. The work is funded by the National Institutes of

Health. (September 2006) Ref. 425

### **Digital Magnetofluidics Improves Biochemical Analysis**

A technique for more rapid, more accurate, and less costly analysis of biochemical fluids, such as is needed in biological warfare surveillance, was developed by the Department of Bioengineering of the University of Arizona in cooperation with other scientists. Based on magnetic forces, this form of "lab on a chip" minimizes contamination of the sample by the substrate, and saves both time and expensive chemicals. (August 2006) Ref. 426

### **Biosensors Sniff out TNT and Possibly Other Dangers**

Temple University School of Medicine Fels Institute researcher Prof. Danny Dhanasekaran and colleagues have developed a new biosensor that uses a yeast strain genetically engineered with mammalian (rat) olfactory signaling machinery, linked to the expression of green fluorescent protein, to detect a chemical signature of TNT. The technique should be extendable to spot other chemical agents, such as sarin.

Biosensor 2200R, developed by Mine Safety Appliances Inc. of Pittsburgh, is a new biosensor able to determine the presence of a suspicious biological agent such as anthrax or ricin. The response time is less than 5 minutes (compared to about 45 minutes for the devices presently in use) and the unit has a very high accuracy, with only a one in a million chance of producing a false reading. (May 2007) Ref. 427

### **Reliable Anthrax Antibodies Developed**

Swiss scientists have developed reliable anthrax-specific antibodies. This is an important achievement, since the similarity of the anthrax spore surface to that of spores of other bacteria, which commonly occur in humans, has previously prevented development of an antibody that would be reliably anthrax-specific for identification. (August 2006) Ref. 428

### **Bar-coded Nanowires May Yield Small, Fast Bio Detectors**

A "nanowire bar-code" system developed by researchers at Lawrence Livermore National Laboratory in cooperation with several other institutions may facilitate creating portable sensors capable of identifying multiple airborne pathogens within minutes. The technique consists of coating a nanowire with a distinctive pattern of gold and silver stripes—analogue to a barcode—and then with an antibody for the target threat. The applications of such a system range from detection of biowarfare agents to use during an outbreak of an infectious disease. (August 2006) Ref.429

### **New Low-cost System for Bacteria Identification**

Researchers at Purdue University's Bindley Science Center have developed a new low-cost high-speed system that analyzes scattered laser light to quickly identify bacteria. The technique uses computer analysis of 120 factors in laser light scattered by bacterial colonies growing in a petri dish, costs a tenth as much as conventional methods, and can be completed in five minutes after the culture has grown. (August 2006) Ref.430

### **Quantum Dot Device Provides Fast Detector for DNA Sequences**

Researchers at Quantum Logic Devices, of Austin TX, have constructed a DNA sequence detector that can detect a piece of DNA in less than 30 minutes, compared to 24 hours for a

fluorescence technique. (August 2006) Ref. 431

### **Sensicore's Lab on a Chip Water Profiler Automates Lab Functions**

This system applies chip technologies in a WaterPOINT device that dramatically shrinks the space and time required to perform sixteen standard water quality and treatment tests. Memory and software permit rapid comparisons and mapping of results for entire systems. The 0.4-millimeter pH electrode illustrates the degree of miniaturization achieved. Several wet chemistry procedures are reduced from hours to minutes in duration without the need for reagents. Additional testing capabilities are in development for promised availability in the near future. (August 2006) Ref.432

### **Deep Cooling Improves Uranium Detection**

Zheming Wang, at the Department of Energy's Pacific Northwest National Laboratory in Richland, Wash., has applied cryogenic fluorescence spectroscopy to detect uranium in contaminated soil at a former nuclear fuel manufacturing site. Use of an ultraviolet laser on the sample cooled to  $-267^{\circ}\text{C}$  produced fluorescence intensity of more than five times that at room temperature, and brought out additional spectral features enabling different forms of uranium, including uranium carbonate, to be distinguished. (September 2006) Ref. 433

### **Biodetecting Wipes**

Scientists at Cornell University have started development of an inexpensive and easy-to-use biodegradable absorbent wipe containing polymer nanofibers attached to antibodies for biohazards and chemicals. By changing color, or through another effect, the wipes signal when the antibodies bond to their targets. The 100 nm fibers provide very large surface areas for sensing, and increased absorbency compared to conventional fibers. (September 2006) Ref. 434

### **Fish Provide Early Warning of Toxic Chemicals**

Bluegills, a small, hardy fish species, are highly sensitive to chemical disturbances in their environment, and react to toxins by convulsively flexing their gills to expel contaminating material. They can be used to monitor the chemical purity of a water supply by keeping them in a continuously re-supplied tank equipped with sensors to watch for changes in their breathing, heartbeat, and swimming patterns. The fish have successfully detected 30 alien chemicals, and have the advantage of requiring no "programming" for specific hazards. Their sensitivity was demonstrated on one occasion when they detected a diesel spill two hours before other sensors. The fish have been incorporated into an operational system by Intelligent Automation Corp. of Poway, CA. (September 2006) Ref. 435

### **Ultrasound Soil Cleanup Technique**

Researchers at CSIRO Industrial Physics near Sydney, Australia have shown that high-intensity ultrasound can destroy toxic or carcinogenic persistent organic pollutants (POPs) that commonly contaminate land. According to New Scientist, "Cleaning them up is difficult. Incineration can produce toxic breakdown products, while chemical treatment methods can require huge amounts of energy or involve substances almost as toxic as those being cleaned up – risking dangerous leakages." The new technique, which avoids those problems, mixes the soil with water and then passes it through a chamber where the ultrasound produces localized temperatures of  $4000^{\circ}\text{C}$  and pressures of 1000 atmospheres, destroying up to 97% of the contaminants in a few minutes.



(October 2006) Ref. 436

### **New Surface Decontamination Method**

Bradley D. Veatch of Westminster, CO and associates have filed a patent application for a novel means of removing contamination, including radioactive material, from surfaces. An abrasive foam pad soaked in a mix of latex gel and conductive iodine solution is rubbed over the contaminated area, loosening any surface material and applying a layer of latex, while a high current is passed through it. An electrolytic reaction transfers the contaminant from the surface into the latex gel, and also polymerizes the gel, producing a strong rubbery skin, which can be peeled off and safely discarded. (January 2007) Ref. 437

### **Virus Detection Technique—Fast, Convenient, and Sensitive**

Aurel Ymeti and associated researchers at the Univ. of Twente, Enschede, the Netherlands, and elsewhere, have developed an improved new technique for virus detection and identification. As is the case with a number of other methods, it depends on the adhesion of the virus to an antibody-coated surface, but here the adhesion is detected optically, greatly improving the device's characteristics. A monochromatic laser beam is sent down a path which branches into two parallel channels and then rejoins. One of the channels is coated with the antibody; the beam in that channel undergoes a phase shift if the sample has attached to the antibody. When the beams from the channels are recombined, the phase shift produces a pattern of interference fringes if the virus was present. This detector is able to detect the herpes virus at just 850 particles per milliliter under physiological conditions (e.g. in human serum). (January 2007) Ref. 438

### **New Technique for DNA Isolation**

TNO, in Delft, Netherlands, has developed a new tool, SamPrep, for the rapid automatic pre-treatment of biological material to separate out pure DNA for further analysis. The new automated system can produce results from a sample in 20 minutes instead of the hours required for manual manipulation. (January 2007) Ref. 439

### **Sensitive Uranium Detector Using DNA**

Researchers at the University of Illinois and elsewhere, led by chemistry Professor Yi Lu, have developed a uranium sensor which they say "combines the high metal ion selectivity of catalytic DNA with the high sensitivity of fluorescence detection [and] provides a fast, on-site test for assessing uranium contamination in the environment and the effectiveness of remediation strategies". The sensor has a sensitivity of 11 parts per trillion. (February 2007) Ref. 440

### **New and Improved Water Purification Method**

Delft University of Technology (Netherlands), with Merle de Kreuk as principal researcher, and the DHV engineering consultancy, has developed a compact and environmentally friendly water purification method, in which aerobic bacteria form granules that sink quickly. In this new aerobic granular sludge technology (Nereda™), aerobic bacterial granules are formed in the water that is to be purified. These granules not only sink quickly but their use also has the advantage that only one vessel is needed for the process. The new technique requires 25% of the space and 70% of the energy needed for earlier methods. (July 2006) Ref. 441

**Microbes Can Help Build Nanodevices for Detection**

University of Wisconsin scientists have electrically stimulated bacteria to self-assemble into nano-bio-electrical circuits that could detect toxins like anthrax in near real-time. These circuits have the potential to make building atomic-scale machines far easier than current methods, and create a new class of biological sensors. This ability to a) manipulate individual bacteria by electrical means, b) form them into nanostructures, and c) use their biochemical properties for useful applications, such as the detection of toxins, provides an alternative to the painstaking manufacture and assembly of nano systems by larger more costly systems. Nanotechnology self-assembly to create larger devices (bottom up construction) has been seen as a more distant future possibility. This breakthrough brings low-cost, precision mass production a step closer to reality. (March 2005) Ref. 442

**High Sensitivity Portable Chemical Detection Device**

A research team led by R. Graham Cooks at Purdue University has developed a mass spectrometer for chemical detection and identification that has the twin advantages of high sensitivity ( $10^{-12}$  g) and portability/speed (no pre-treatment needed). The equipment uses desorption electrospray ionization (DESI), a technique that separates traces of material from a substrate so that they can be passed into the analytical instrument. The device has analyzed pharmaceuticals at three samples per second. (October 2005) Ref. 443

**Piggybacking Environmental Sensors on Communications Gear**

Computer science graduate student R.J. Honicky and Prof. Richard Newton of the Univ. of California at Berkeley are working on inexpensive environmental sensors that can be incorporated into communications devices like cell phones, using the power, location (e.g. GPS), and communications facilities already present in those devices. This technique would greatly reduce the space and cost burden of providing environmental data coverage over a wide area. (August 2005) Ref. 444

**Very Low Cost Chemical Sensors for Environmental Monitoring**

Electrical engineering Prof. Vivek Subramanian at the University of California, Berkeley, has developed a technique for inexpensively producing arrays of chemical sensors, using organic semiconductors and ink-jet printing. Based on organic transistors, the array of sensors mimics the behavior of the human nose, differentiating among toxins in air or water. This approach would cut the cost of such sensors from several hundred dollars per unit to about 30¢. As a result, more nearly ubiquitous toxin monitoring will be possible. (December 2005) Ref. 445

**Nanobarcodes for Multiple Pathogen Detection**

Scientists in the Department of Biological and Environmental Engineering at Cornell University have developed a rapid, low cost, multiplexed, sensitive and specific molecular detection technique for pathogen DNA that uses fluorescence nanobarcodes to identify the individual potential reactants. A single element in the system comprises a section sensitive to the DNA of a particular target and one containing a bar code identifying it. Multiple elements can be placed on a single test probe. Results can be obtained in 30 minutes. (July 2005) Ref. 446

**Bacteria Used to Eliminate Perchlorate from Water**

Perchlorate, an ingredient of rocket fuel and fireworks, and known to be dangerous to human health, has become present in drinking water in many parts of the world. Bruce Rittmann of the Center for Environmental Biotechnology at Arizona State University, Tempe, has discovered an efficient way to remove the chemical, by using a system of bacteria that feeds on hydrogen gas and perchlorate to produce water and chloride—a compound commonly found in salts and swimming pools. The advantage of this system over others for the same purpose is that it's very cost-effective and it doesn't appear to generate harmful waste by-products. The bacteria are grown on membranes that are wrapped into spaghetti-like strands that can be filled with hydrogen and bundled into cylinders through which flows the contaminated water. A 1.5-meter-tall system with 7,000 fibers can clean 4-8 liters a minute, says the researcher. The system was already tested on ground water from California's central valley, and in about 2 years its efficiency could be boosted enough to clean the waste water of a small city. [See also *Firm Regulations for Perchlorates are Needed* in October 2004, and *Technology for Perchlorates Cleanup* of August 2004 environmental security reports.] (September 2005) Ref. 447

**New Oil Remediation and Recovery Technique**

A proprietary oil remediation and recovery application, using patented Self-Assembled Monolayer (SAMs) technology, has been announced by Interface Science Corp. Its treated material, produced using nanoscale techniques, absorbs about 40 times its weight in oil, and has the added advantage of allowing the absorbed oil to be recovered. (September 2005) Ref. 448

**New Efficient Energy-free Technique for Oil Removal from Water**

The Extended Gravity Oil Water Separation (EGOWS) concept developed by an engineering team from the University of New South Wales is an improvement on the industry-standard American Petroleum Institute (API) gravity separator that has been widely used for the last 60 years. The device is a simple tank-and-siphon system, entirely mechanical, that operates unattended and purifies water to oil content less than 10 ppm, the level often set by environmental regulations. A simple, innovative application of hydraulic principles results in residence times of days instead of minutes, as is common with API designs. Utility seems be limited to sources with episodic discharges, rather than steady flows. (August 2005) Ref. 449

**Nanotechnology Applications for Clean Water**

Elsevier advertises, "Nanotechnology Applications for Clean Water highlights both the challenges and the opportunities for nanotechnology to positively influence ... [the] nanotechnology area of environmental protection. Here you will find detailed information on breakthroughs, cutting edge technologies, current research, and future trends that may affect acceptance of widespread applications. The first four parts of the book cover specific topics including using nanotechnology for clean drinking water in both large scale water treatment plants and in point-of-use systems [as well as] existing technologies and future potential for groundwater remediation, pollution prevention, and sensors. ... The final part discusses the inherent societal implications that may affect acceptance of widespread applications." The book was not read/reviewed for this report. (July 2009) Ref. 450

**DNA-Wrapped Nanotube Sensors**

Trace amounts of harmful contaminants can be found inside the body via single-walled carbon

nanotubes wrapped with DNA and placed inside living cells. Ions of atoms such as calcium, mercury and sodium in contact with DNA neutralize its negative charges, changing its shape. This reduces the frequency of the nanotube's fluorescence indicating how many ions have bound to the DNA. "We found that the thermodynamics that drive the switching back and forth between these two forms of DNA structure would modulate the electronic structure and optical emission of the carbon nanotube," said Michael Strano, a professor of chemical and biomolecular engineering at the University of Illinois at Urbana-Champaign. (January 2006) Ref. 451

### **Sugar-Coated Gold Nanoparticles Detect Toxins**

Researchers at the UK's University of East Anglia have developed a new method for detecting toxins based on the use of 16-nm-sized sugar-coated particles of gold. The sugars used are tailored to be sensitive to specific substances; a solution containing the particles will change color in the presence of the target material. The scientists speculate that a portable detector using this scheme could be ready in five years. (April 2006) Ref. 452

### **Fast Bacteria Detection from Bacteriophage/Quantum Dot Complexes**

Scientists from the National Cancer Institute (NCI) and National Institute of Standards and Technology (NIST) have developed a technique for the fast and sensitive identification of bacteria. A selected type of bacteriophage attacks a specific bacterium and produces phage particles that bind to specially treated quantum dots (nanoscale semiconductor particles that give off stronger and more intense signals than conventional fluorescent tags). Fluorescence of the phage-dot complexes can be detected by conventional microscopy or other means. The method can use several different types of complexes simultaneously and can detect and identify up to ten target bacterial cells per milliliter of sample in about an hour. (April 2006) Ref. 453

### **Chopped-up DNA Strands Speed Bacterial Identification**

A team of researchers at the Brookhaven National Laboratory has developed a new technique for rapid and efficient identification of pathogenic bacteria within an unknown mixture of microbes. An enzyme is added to the mixture that chops up the bacterial DNA into short segments, which can be individually isolated and identified, thus enabling the detection of harmful organisms in the environment. This is much faster than preparing bacterial cultures and avoids the possibility of favoring the detection of certain bacteria over others. (March 2006) Ref. 454

### **New Spectroscopy Technique with Superior Results**

Scientists at JILA (originally the Joint Institute for Laboratory Astrophysics, but presently having no definition), the institute jointly sponsored by the National Institute of Standards and Technology and the Univ. of Colorado – Boulder, have developed a new technique for spectroscopy as used in the identification of minute quantities of chemicals in gas samples, such as in environmental monitoring stations, or screening for explosives or biochemical weapons. The JILA system uses an ultrafast laser-based "optical frequency comb" as both the infrared source and as a means for precisely measuring the wavelengths produced after interactions. Its sensitivity of one part in  $10^8$ , and an acquisition time of 7 ms for its 100 nm wavelength range indicate its increased capability for use in systems for monitoring the environment. (March 2006) Ref. 455

**Laser-tracked Honeybees Detect Landmines**

Joseph A. Shaw at Montana State University and colleagues have developed an improved landmine detection system which first trained honeybees to sniff out explosive fumes leaking from buried landmines, and then tracks them with polarized laser scanning beams. The accuracy is better than 97% at a distance of 83 m, and there is no danger of setting off the landmines. (August 2005) Ref. 456

**Real-Time Antibody-based Bioterrorism Detection System**

A major weakness in most bioterrorism detection technologies is the time lag between sample collection and laboratory verification of the presence of target pathogens. Scientists at the United Kingdom's Defence Science and Technology Laboratory at Porton Down have developed biological sensors based on antibodies. Being based on antibodies, these sensors can detect a bioterrorist attack in real-time, and can distinguish among different pathogens. Since this and other systems being developed by other countries will be important to "scale up" for all countries, international standards and agreements for their deployment and monitoring seem inevitable. (April 2004) Ref. 457

**Russian Discovery of New Bacterial Cleanup Technique**

Scientists from the G.K. Skryabin Institute of Biochemistry and Physiology of Microorganisms of the Russian Academy of Sciences in Pushchino have discovered that the bacterium *Pseudomonas putida* can transform the toxic by-products contained in reaction masses (RMs) that arise when mustard gas residue is destroyed by chemical detoxification. This technology, if extended to other hazardous materials and brought to the point of practical application, could be an alternative to incineration or a process called bituminization for the final cleanup of CW sites. Both those methods are expensive and environmentally risky. (March 2005) Ref. 458

**A Radioactive Element's Rate of Decay Has Been Speeded Up**

Japanese scientists from Tohoku University in Sendai have decreased the half-life of beryllium-7 by about half a day, which represents almost 1%, the most dramatic result obtained so far. While this is a promising success, researchers admit that the possibility of significantly speeding up the process remains "somewhat remote". However, Peter Möller, from the Los Alamos National Laboratory in New Mexico, says that re-creating conditions such as those found in the interior of a hot star (which we don't know yet), might considerably enhance the effect that the Japanese scientists have obtained. (September 2004) Ref. 459

**Nanoshells Dramatically Improve Sensing Capability**

Research at Rice University's Nanophotonics Laboratory has shown that a class of nanoparticles known as nanoshells can enhance the sensitivity of chemical sensing by a factor as high as 10 billion. This is accomplished by using them to produce "surface enhancement" in Raman scattering, an optical technique for chemical analysis. The nanoshells are a few hundreds of nanometers in diameter and consist of a glass sphere coated with a layer, typically gold or silver, whose thickness can be varied to "tune" the shell to a specific optical wavelength. According to Prof. Naomi Halas, the Laboratory Director, this "creates an opportunity to design all-optical nanoscale sensors—essentially new molecular-level diagnostic instruments—that could detect as little as a few molecules of a target substance, which could be anything from a drug molecule or a key disease protein to a deadly chemical agent." (January 2005) Ref. 460

**Iron Nanoparticles for Environmental Cleanup**

A new study from Oregon Health & Science University's OGI School of Science & Engineering, in collaboration with Pacific Northwest National Laboratory (PNL) and the University of Minnesota, shows that some iron nanoparticles may be effective in cleaning up carbon tetrachloride in contaminated groundwater. The researchers studied two types of iron nanoparticles, one with a shell of sulfur-rich magnetite and the other with a coating of oxidized boron. When applied to carbon tetrachloride contamination, the former produced a mix of harmless chemicals while the latter yielded chloroform, a highly toxic material. These fundamental results should aid greatly in the development of nano-iron-based cleanup methods for contaminated sediments and soil as well as for groundwater, and for their application to a range of more complex organic pollutants. (January 2005) Ref. 461

**Dirty Bomb Clean-Up Technology for Porous Structures**

New technology to safely capture and dispose of radioactive elements from outdoor porous structures (brick and concrete) is being developed by Argonne Laboratory's Chemical Engineering Division in Illinois. The new decontamination system is based on engineered nanoparticles and a super-absorbent gel. It is expected to be available in 18 months. (July 2004) Ref. 462

**New and Improved Land Mine Destruction Technique**

A British de-mining specialist corporation, Disarmco, in partnership with ordnance and explosive experts at Cranfield University at Shrivenham, have developed a new environmentally friendly and low-cost mine destruction device, codenamed "Dragon". The device is based on a high-temperature pyrotechnic torch, which burns the explosive material in the mine rather than detonating it, a technique that can cause destruction and contamination over a substantial area. According to the university, "The torches are made in situ in ... [a] portable unit and do not require any specialist knowledge or expensive training in order to be used safely by local communities employed in decontamination efforts." (April 2005) Ref. 463

**Bionanotech Particles Can Detect Bacteria in 20 Minutes**

A team of researchers at the University of Florida created a bioconjugated nanoparticle that can detect single pathogenic bacteria in just 20 minutes. Although demonstrated just for E. coli, researchers say that by changing the antibodies employed, the ultrasensitive particles can be modified to detect a wide variety of bacteria. The team continues to work for enlarging the technique's scope by creating bioconjugated nanoparticles to detect multiple bacteria simultaneously. The new technique is a promising method for detecting bioagents in food and clinical and environmental samples, and for early medical diagnosis. It could also prove important for assisting the enforcement of current and future international treaties that address organic transfers across national borders. (October 2004) Ref. 464

**Chemical Probe Offers Fast Detection of Ricin**

A team of the Dept. of Chemistry and Biochemistry at the University of California at San Diego developed a fast-acting (30 minute) test for the presence of ricin-caused cell damage, based on inserting into RNA a synthetic nucleoside that glows under UV, when it is damaged by ricin. Previous tests, which detect the ricin protein itself, require 48 hours. The researchers anticipate

that the technique can be implemented in a chip for use in the field. (July-August 2008) Ref.465

### **Nanodevices for Biomolecules Detection**

Two U.S. research teams designed nano-devices for virus detection. The nanoelectromechanical device by Cornell University can detect an insect baculovirus, while the nanowire field effect transistors developed by Harvard University can detect single influenza viruses. These techniques enlarge the capability to detect different viruses simultaneously.

Argonne National Laboratory scientists developed a magnetic sensor for bacteria and virus detection. The device relies on measuring the Brownian relaxation of magnetic nanoparticles when they are bound to target biomolecules. The team is now working to improve the sensitivity of the technique. All three methods could be used in medicine and/or the detection of bacteria and viruses in the environment. (October 2004) Ref. 466

### **Nanotubes that Detect and Kill Biological Agents**

With funding from the U.S. Department of Defense's Army Research Office, University of Pittsburgh researchers have found a technology for developing nanotube structures that act both as biosensor and biocide. The objective is to produce a paint that would change color in contact with biological and/or chemical agents and also neutralize the toxic substances. The antimicrobial nanotube structures are the product of a single-step synthesis of a hydrocarbon and a salt compound (quaternary ammonium). (September 2004) Ref. 467

### **Nano-engineered Powders Tackle Toxic Chemicals**

FAST-ACT is a new family of nano-engineered powders that can clean up hazardous substances such as VX nerve gas and sulfuric acid. This toxic-chemical cleaner composed of magnesium, titanium, and oxygen was developed by Kansas State University chemist Kenneth Klabunde and will be produced by NanoScale Materials Inc. (May 2005) Ref. 468

### **Smart Dust could be used to monitor and/or detect hazardous chemical or biological agents in the water and air**

Smart dust has been in development for the last decade, with the intent of providing a cheap, lightweight, lingering, swarm-based technology that could provide multi-spectral intelligence over critical battlefield and post-conflict areas inaccessible or too hostile for other reconnaissance technologies. The University of California, San Diego (UCSD) has developed a smart dust application for optically alerting the presence of oil in water. "Such devices could be used to monitor the purity of drinking or sea water, to detect hazardous chemical or biological agents in the air or even to locate and destroy tumor cells in the body" said Michael Sailor, a professor at UCSD's department of chemistry and biochemistry who led the study. (August-September 2003) Ref.469

### **Bacterial Integrated Circuits**

University of Tennessee scientists have developed a device to collect signals from specially altered bacteria. These Bioluminescent Bioreporter Integrated Circuits (BBICs) have already been used for environmental monitoring. (June 2004) Ref. 470

### **Military Applications of Silicon-Based Ultraviolet Sensors**

A photodetector sensitive to ultraviolet light was produced by researchers at the University of

Illinois at Urbana-Champaign. They used standard lithographic techniques to deposit thin films of silicon nanoparticles on silicon substrates with small conductive pads of gold to complete the assembly. Electricity flows when ultraviolet light strikes the nanoparticles. In addition to commercial applications, the silicon-based ultraviolet sensors could have military and security functions as ultraviolet-based detectors for missile-warning systems and airborne biological agents. They could also be useful in detection of violations of future environmental treaties; and hence might be considered in the implementation section of future treaties. (July 2004) Ref. 471

### **Technology for Perchlorates Cleanup**

Sub-Surface Waste Management (SSWM) of Delaware has developed a technology for rapid cleanup of perchlorates from soil and groundwater. The new technology is based on a special blend of microbes and nutrients that can degrade perchlorates in soils within approximately a week of initial inoculation. (August 2004) Ref. 472

### **Motion Detector Allows Naked Eye to See Motion of 10 Nanometers**

Sandia National Laboratories have developed a motion detector 1,000 times more sensitive than any known so far. It has the ability to sense a motion of 10 nanometers with the naked eye. The device is based on a formerly unrecognized property of optics: light diffracted from very small gratings that move very small lateral distances undergoes a relatively big, and thus easily measurable, change in reflection. That change can be amplified for human visibility, or it can be fed to additional instruments for a variety of measurement and automated control and analysis functions. Such high sensitivity detectors would have extensive applications from improving earlier warnings of earthquakes to detecting future nanotech weapons and surveillance equipment. (October 2004) Ref. 473

### **Designer Bacteria Could Help Cleanup Pollution and Produce Hydrogen**

Craig Venter (who led the Human Genome Project) and his colleague Hamilton Smith are trying to construct the entire genomes of living creatures to create organisms by design. The team first created a virus from its chemical elements in November 2003 and now is trying to create bacteria. The Department of Energy's "Genomes to Life" program coordinates the research and hopes to use future "designer" bacteria to create hydrogen and methane, and clean up nuclear waste. Although it is already known how to use bacteria for some forms of environmental cleanup, building bacteria from scratch would allow the design of very specific bacteria for very specific tasks, including prevention of the designer bacterium's ability to reproduce in the environment beyond the original intended purpose. (December 2004) Ref. 474

### **New More Efficient Microbial Fuel Cell Cleans Wastewater and produces Hydrogen**

The BioElectrochemically-Assisted Microbial Reactor (BEAMR) is an anaerobic, electrically-assisted microbial fuel cell (MFC). It produces four times the amount of hydrogen from dissolved organic matter such as human, agricultural, and industrial waste and simultaneously cleans the wastewater used as its feedstock than bacteria achieve in normal fermentation. It uses 0.25 volts of electrical boost, about one-tenth the voltage needed for electrolysis of water, which helps it surmount the fermentation energy barrier limit. This form of decentralized renewable energy production could make fuel-cell-based transportation and wastewater treatment more efficient, but further study will be needed for commercialization. The National Science Foundation and U.S. Dept. of Agriculture supported this Pennsylvania State University research.



(April 2005) Ref. 475

### **Sunlight-powered System for Cleaning Water and Produce Electricity**

Scientists from Aberdeen University of Scotland began a three-year research project for developing a “photoelectrocatalytic” fuel cell that would harness sunlight to break down various organic pollutants in water and produce electricity as a byproduct. (May 2005) Ref. 476

### **Proposed T-Rays (TeraHertz) Devices Could Detect Almost Anything**

New devices that use terahertz rays (T-rays have a 1000 times higher frequency than microwaves) to see through clothing and packaging can precisely identify chemical and biological weapons, explosives, or conventional weapons. Even hermetically sealed anthrax and plastic guns would be detected. The potential applications of T-rays are huge, ranging from military and security, to the medical sector, and are even promising for nanotechnology. Research is preliminary, but T-ray palm devices might one day detect cancers in the body, determine from a distance the chemicals in a hazardous waste spill, or find victims trapped under rubble, says one of the researchers, Dr. James Kolodzey, of the University of Delaware. Scientists from America, Europe, Asia and Australia shared the latest advances in T-ray technology at the international workshop on TeraHertz for Defence and Security, at Adelaide University, Australia. (December 2004) Ref. 477

### **Automated Water Safety Sensor Units**

Sandia National Laboratory teamed with CH2M Hill of Englewood, Colo., an engineering and construction firm, and Tenix Investments (Australia's largest defense and technology contractor) to develop a monitoring device that can detect currently unmonitored biological agents—such as germs, toxins and bacteria—in water systems. Initial commercial units and wider deployment are anticipated from late 2005 to mid 2007. (December 2004) Ref. 478

### **Arsenic-polluted Water Decontamination Using Sulphate**

Detecting and detoxifying water contaminated with arsenic could become faster, easier, and cheaper according to recent research by the University of Illinois. Tests so far demonstrate that changing the chemical composition of water, by adding sulphate to it, could stimulate the bacteria that control arsenic concentration, precipitating arsenic, which is then easily removable from the water. The research remains to be tested in the field. (November 2004) Ref. 479

### **Water Nanofilters**

Carbon nanotube water filters might replace traditional filtration systems, which are difficult to clean and must be changed frequently. The new technology, developed by a team of researchers from Rensselaer Polytechnic Institute in Troy, NY, and the Banaras Hindu University in Varanasi, India, consists of a quartz tube filled with tightly packed radially oriented nanotubes. The water molecules can squeeze out through nanometer-sized gaps in the walls, but bacteria like E. coli and viruses like the 25-nanometer-wide poliovirus get stuck. The resistant structures can be cleaned repeatedly. (October 2004) Ref. 480

### **Sandia National Laboratories funded to develop improved Desalination and Arsenic Removal Technology**

Sandia will conduct a \$6 million research program to develop techniques for desalination (\$3

million) to increase the supply of drinking water and removal of arsenic (\$3 million) from water sources. The groundbreaking ceremony for the Tularosa Basin National Desalination Research Facility in Alamogordo was held on June 29th. (June 2004) Ref. 481

### **Low-cost, Non-polluting Sewage Treatment System**

Nothing escapes into the ground or water supplies from BIPU (bio-remedial in field personnel unit), a low-cost, non-polluting, flush toilet sewerage system. It holds solids in a special plastic chamber where they break down, while the liquid content is removed and evaporates in an elevated absorption system. The system is produced by Tasmanian Environmental Solutions at George Town, Tasmania. It has been used in Tasmania for several years, and the UN used 150 BIPU systems during the East Timor peacekeeping operations. (October 2004) Ref. 482

### **New diamond film connects electronics and biology for on-going bio-alert systems**

Chemists at the University of Wisconsin – Madison have developed a technique for chemically modifying diamond so that it can be deposited on silicon as a highly stable, DNA-modified surface film. This film, which can be integrated with microelectronic devices, has the advantage of being much more chemically stable than other substances, such as gold, glass, and glassy carbon, which have been considered for detectors. “Bare” silicon oxide degrades on contact with water, and other materials have proven to be either unstable or difficult to integrate. Scientists are quoted as saying that they can detect the electrical response when biomolecules bind to the diamond surface. These biosensors could be "sprinkled in public places such as airports, bus depots, subways, stadiums and other places where large numbers of people gather." One scientist says they could act as a "bio cell phone, where they just sit in place and sniff, and when they detect something of interest, send a signal" to warn of danger. They also note that more work has to be done on the engineering of systems using these components. The technique may also turn out to be capable of producing reusable “biochips” for laboratory use. (March 2003) Ref.: 483

### **New chip speeds field detection of specific DNAs**

Technological change creates opportunities to change international treaties’ enforcement requirements. For example, a new chip could make it possible to do faster DNA analysis of biological materials in the field. Scientists Todd Krauss, Benjamin Miller, and Hui Du at the Univ. of Rochester have developed a technique for creating microchips which will detect the presence of specific DNA sequences in a sample. The new chips eliminate the complex series of steps now necessary to perform DNA testing. They contain a field of bent DNA fragments attached vertically at one end to a substrate. When a piece of DNA from the sample attaches to a matching fragment, it straightens it out, exposing the previously concealed free end, which contains a chemical “flag” that fluoresces under proper illumination. (February 2003) Ref.: 484

### **On-chip antenna to solve communication problems among microscopic sensors**

University of Florida electrical engineers have installed a radio antenna less than one-tenth of an inch long on a computer chip and demonstrated that it can send and receive signals across a span of several feet. By covering a large area with a number of such radio chips, each powerful enough to transmit information to the next radio, one can create a single large network that could be monitored from a distance. (May 2004) Ref.485

**Miniature spectrometer can detect biological hazards**

The Oak Ridge National Laboratory has developed a miniature device that can identify molecules in a fraction of a spore of anthrax and other biological hazards within 30 milliseconds by examining their photothermal signatures. The process uses thermal detection to identify peaks in the specimen's absorption spectral response produced using an infrared monochromator. The Calorimetric Spectrometer (CalSpec™) device technology can accurately identify biological hazards such as anthrax almost instantly, and may be able to reach sensitivities as high as one part per trillion (enabling the "fraction of a spore" level). The device is expected to be available in 2004. It is now hand-held; miniaturization efforts are underway to reduce it to coin-size. (March 2003) Ref.:486

**Detecting chemical threats with "intelligent" networks**

A new system based on microsensor arrays connected to artificial neural networks has the potential to provide early warning of chemical warfare agents well before concentration levels become lethal. The Prototype, presented by National Institute of Standards and Technology (NIST) scientists and a guest researcher at the annual meeting of the American Chemical Society, has the potential to detect compounds such as sulfur-mustard gas and nerve agents (tabun and sarin) at levels below 1 part per million and predict their concentration in the ambient air. The research, funded by NIST and the Defense Threat Reduction Agency, continues. (August-September 2003) Ref.487

**Invention of a new multisensor system required to speed up landmine clearance**

RAND estimates that unless considerably improved detection and demining technology is created, then at the current rate it will take 450-500 years to clean up the world of hidden anti-personnel mines. Its study "Alternatives for Landmine Detection" estimates it will cost \$60 million to produce the initial prototype over the next 5-8 years to develop the necessary technology, beyond the \$100 million per year the US already spends on humanitarian landmine clearance. (February 2003) Ref.: 488, 489, 490

**Hand-Held Chemical Analysis and Detection System can identify the presence of some hazardous chemical or biological agents**

Sandia National Laboratories has developed and tested a series of hand-held chemical analysis and detection systems that can identify the presence of hazardous chemical or biological agents: biotoxins, viruses, and bacterial agents; chemical warfare agents and a selection of toxic industrial chemicals, explosives, and organic solvents. Developed mainly for homeland security, Sandia seeks commercial partners to further develop the technology and make it available on the market to other organizations concerned of environmental quality and control. (October 2003) Ref.491

**Muon Technology can help detect smuggled nuclear material**

Los Alamos National Laboratory research indicates that fragments of cosmic rays could help in the detection of smuggled nuclear materials. Dense materials such as uranium can be detected and imaged by tracking the paths of muons as they pass through the target materials. Muons are created naturally when cosmic rays from space interact with the Earth's atmosphere, and pass through the Earth's surface at a rate of approximately 10,000 particles per square meter per minute. The concept offers a promising addition to conventional X-ray, gamma and neutron-

detection systems.

"We found that we could detect a 1-liter block of uranium in the equivalent of a truckload of sheep, for example, and the greater the efforts at shielding the material, the more obvious it becomes with the muon technology" said Priedhorsky, chief scientist of the Laboratory's Nonproliferation and International Security Division. For example, a 1-minute shower of particles would be required to reasonably scan a suspected smuggler's vehicle. (March 2003) Ref.: 492

#### **Molecular pattern matcher for chemical detection**

A new paper describes an improved technique for fast, portable, accurate, and flexible quantitative detection of organic molecules such as those which are degradation products of nerve agents. In the reported test, molecules of methylphosphonic acid (MPA) were embedded in an organosilane layer, and then washed away, leaving behind an imprint which, when later filled with another MPA molecule, produced a detectable electrical signal. (May 2004) Ref. 493

#### **New Production Process for Gold Nanoparticles Make Biosensors Less Costly**

Mass availability of low cost biological sensors may be available sooner than previously thought. A new process has been demonstrated that allows bullion quality gold nanoparticles to be deposited on silicon from relatively low quality gold sources. Organic molecules can then be deposited on the gold surface of the computer chip. Since gold does not corrode in air, it is the best computer-biology connection. This connection is what can link computer systems for improved biological surveillance. (December 2002) Ref.: 494

#### **Nanoscale Iron Particles as an environmental cleanup technology by reducing toxic chemical and heavy metals into less toxic compounds**

A National Science Foundation sponsored study has found that nanoscale (1 to 100 nanometers in diameter) powdered iron is an effective environmental cleanup tool. Nanoscale iron breaks down chlorinated organics into less toxic organic compounds and electrochemically reduces heavy metals to a less soluble form, which reduces their migration through groundwater. Since nanoscale iron can be suspended in a slurry and pumped into contaminated areas, no pump-and-treat or earth moving approaches are needed for remediation of contaminated soil and groundwater. (August-September 2003)Ref. 495

#### **Nanoporous Ceramic uses for heavy metals cleanup**

A nanoporous ceramic developed by researchers at Pacific Northwest National Laboratory, US, can be used to remove mercury from water, having as an immediate application treating wastewater from coal-fired power stations. However, researchers say that the thiol-SAMMS material could also remove mercury from water streams resulting from the vitrification of radioactive wastes, battery manufacturing, fluorescent lamp recycling and dental preparations. Also, the technology could be adapted to target other substances such as lead, chromium or radionuclides instead of mercury. (May 2004) Ref.496

#### **Nano-engineered Gold Surface Mercury Vapor Sensor**

Professor Suresh Bhargava and a research team from the Industrial Chemistry Group at RMIT Univ., Melbourne, Australia, have developed a greatly improved sensor for mercury vapor, using

a nano-engineered gold surface as the mercury-attracting element, producing a device which is less susceptible to interference from organic compounds, ammonia, and water vapor. The modified surface is 180% more sensitive than a non-engineered one. (May 2009) Ref. 497

### **Nanotubes could be used to detect nerve gas and other chemical warfare agents, and toxic chemicals**

Naval Research Laboratory researchers developed nanotube-based sensors from random networks of single-walled carbon nanotubes that could detect sub-parts-per-billion concentrations of nerve agents, other chemical warfare agents, and other toxic chemicals. Nanotube network sensors combined with filters coated with polymers that are sensitive to certain chemicals could make sensors that detect specific chemicals. Arrays of sensors could be incorporated into handheld or remotely operated devices designed to detect a variety of substances. According to the researchers, carbon nanotube sensors could become available within two to five years. The U.S. Department of Homeland Security's Research & Technology Division is currently accepting proposals to develop such capacities for the civilian population, while previous military research has focused on protection of military personnel.

Meanwhile, at the Harvard Biosecurity 2003 conference, government officials were more skeptical, offering the opinion that fast, inexpensive, reliable devices for detecting biological agents are still at least six years in the future. (November 2003) Ref.498

### **Bacterial Conversion of soluble uranium to insoluble uraninite might eventually be used to clean heavily contaminated sites**

The University of Massachusetts Amherst has enabled *Geobacter* bacteria to convert soluble uranium to insoluble uraninite. A recent test showed that after 50 days, in the presence of artificially elevated levels of acetate, 70% of soluble uranium had been converted into uraninite. (October 2003) Ref.499

### **Artificial organisms and/or genetically engineered living bacteria used in cleanup operations**

Craig Venter, who sped up genomic research, is now trying to speed up the creation of a partly artificial life form, by creating an artificial chromosome. It would be a first step towards his eventual goal of creating an artificial organism from scratch. The objective is to try to make microbes that can clean the air of excess carbon dioxide or to produce cheap hydrogen fuel. This is a different approach than to genetically engineer living bacteria to do dirty work, such as absorbing radiation or toxic chemicals, which consists of inserting genes from one species into another. (November 2002) Ref.:500

### **Microbes as part of post-battle field clean up**

If we are able to create microbes that clean up a variety of environmental damages, then such microbes could be required in future post-battle field cleanup treaties. In theory we could alter microbial DNA to do almost anything conceivable including restoring training and battlefield environments. "Scientists have long looked at extremophiles—bacteria that live in hotter, colder, more toxic, and more radioactive environments than we do—as sources for tools." (August 2002) Ref.:501

**Pollution-eating microbe may help clean up**

A Michigan State University study has discovered a microbe (called TCA1), which derives energy by breaking down trichloroethane in to a less-toxic substance. Trichloroethane contaminates ground water and also erodes the ozone layer when released into the atmosphere. This is another discovery of bacteria that consume toxins, suggesting a strategy for bioremediation of the environment. (November 2002) Ref.:502

**Real-time antibody-based bioterrorism detection system**

A major weakness in most bioterrorism detection technologies is the time lag between sample collection and laboratory verification of the presence of target pathogens. Scientists at the United Kingdom's Defence Science and Technology Laboratory at Porton Down have developed biological sensors based on antibodies. Being based on antibodies, these sensors can detect a bioterrorist attack in real-time, and can distinguish among different pathogens. Since this and other systems being developed by other countries will be important to "scale up" for all countries, international standards and agreements for their deployment and monitoring seem inevitable. (April 2004) Ref.503

**Manure Aids in Removing Hydrogen Sulfide from Biogas**

SulfaMaster is a product combining manure and other ingredients to produce a filtering material that removes hydrogen sulfide, an acid rain- and corrosion-causing component, from biogas, a renewable energy source derived from the breakdown of animal waste. It is especially suitable for small biogas-producing operations that cannot afford large scrubbers. The developers are Gary Harman, professor of plant biology at the New York State Agricultural Experiment Station in Geneva, and Terry Spittler, a retired analytical chemist at Cornell. (January 2009) Ref. 504]

**Transgenic plants to decontaminate the environment**

Researchers at the University of Georgia have announced the successful development of a transgenic plant, a member of the mustard family, which removes arsenic from contaminated soil and concentrates it in its leaves, to be harvested and safely destroyed. Two arsenic-protective *Escherichia coli* (*E. coli*) genes were transferred into thale cress, which then flourished in a normally poisonous arsenic-rich soil, and concentrated two to three times as much arsenic as wild specimens.

Although this particular approach applies only to the absorption of arsenic, it is possible that similar transgenic methods could be developed, to produce phytoremediants for chemicals that are more likely than arsenic to be battlefield contaminants. If so, then these could find their way into international agreements on post-conflict environmental agreements. (October 2002) Ref.:505

**Aquatic Plant Removes POPs from Wetlands**

Scientists at the Georgia Institute of Technology have discovered that duckweed, a common floating aquatic plant, can remove persistent organic pollutants (POPs) from wetlands, particularly chlorinated, fluorinated and mixed chloro-fluoro compounds. It remains to be determined how to dispose of the plants after they absorb and store the compounds. (August 2004) Ref. 506

**Bacteria-modified Yellow Lupine to Remove Toluene from Soil**

A bacteria-modified yellow lupine seems to be very effective in removing toluene from soil. The scientists who have created it say that depending on the type of bacteria utilized, the approach can be used to develop different varieties for cleaning up other chemical pollutants. [See also the related item on a transgenic plant—a member of the mustard family--which removes arsenic from contaminated soil.] (April 2004) Ref.507

**Implementation steps for Landmine Control Convention: new genetically modified plant to detect landmine explosive**

Researchers at the University of Alberta, Canada, will receive support over the next two years from the Department of National Defence's Canadian Centre for Mine Action Technologies to work on genetically modifying a plant, related to canola, by inserting a TNT-sensitive gene into its DNA. After its seed is planted in suspected minefields and the plants' roots come into contact with TNT, their leaves or flowers will change color, alerting people to the presence of landmines. The project is one small part of a larger joint U.S.-Canadian military threat detection effort called Project BIOS, or biological input-output systems, funded in the United States by DOD.

Anthony Faust, of the Defense Department's landmine detection, who came up with the idea of landmine-detecting plants, said that while the Canadian project deals with landmine detection, the American project deals with biological systems as chemical sensors.

Note: This effort has a larger spectrum as the plant will be able to detect a specific explosive rather than just a simpler breakdown product, as is the case with the Thale Cress, a genetically modified flower that turns to warning red when its roots come in contact with nitrogen-dioxide (NO<sub>2</sub>), mentioned in the *Flower-power could help clear landmines* item (see below). (April 2004) Ref.508

**Invasive Species of Genetically Modified Animals for Reconnaissance and/or Cleanup**

As there have been international issues with genetically modified plant and food controversies, it is likely that there will be with genetically modified animals as well. "The report's authors said the most challenging issue facing these agencies is the development of biotech animals. "One concern is that they could escape and mate with wild relatives, spreading new genetic traits throughout wild populations," the 178-page report said." (April 2004) Ref.509

**Flower-power could help clear landmines**

Thale Cress, a genetically modified flower that turns to warning red when its roots come in contact with nitrogen-dioxide (NO<sub>2</sub>) evaporating from explosives buried in soil, could help detect landmines. Scientists hope that Thale Cress might also be useful for detecting and cleaning soil contaminated by heavy metals such as lead, copper, zinc and chromium. Restricted tests will begin this year and the prototype might be ready within a few years, says the Danish developer, Aresa Biodetection. (January 2004) Ref.510

**Polymer Nanofibers Provide Chemical Warfare Defense**

Researchers at the Nanobioengineering Labs of the National University of Singapore's Faculty of Engineering have developed a polymer nanofiber membrane on which chemical warfare agents, like nerve gases, are physically adsorbed and then catalytically decomposed. Previous protective materials have only adsorbed the toxin, so their disposal presented a problem; here the chemical is actually destroyed. (June 2006) Ref. 511

## COUNTER BIOTERRORISM OR PANDEMIC TECHNOLOGIES

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### **Dirty Bomb Treatment Technology Developed in U.K.**

Scientists in the UK have developed a suitcase-sized device that could help fast treatment of large numbers of people following exposure to a radiological ‘dirty bomb.’ The device could test 30 samples per hour, determining the level of cellular damage a person is suffering following exposure to radiation. (September 2009) Ref. 512

### **Paper biosensors to detect toxins, pathogens, and viruses**

A team of Canadian researchers from McMaster University in Hamilton, Ontario reports developing a paper biosensor technology that would enable fast and cost-effective detection of harmful substances, including toxins, pathogens, and viruses. The system is similar to printers using cartridges, but with two layers of “ink” (the first one comprising biocompatible silica nanoparticles, and a second containing an enzyme), which form a bio-ink that changes color upon contact with a specific biological agent. (July 2009) Ref. 513

### **Work Proceeds on Optical Fiber Detector for Bacterial Agents**

Thomas Inzana, a bacteriologist at the Virginia-Maryland Regional College of Veterinary Medicine at Virginia Tech, and his team have received a grant by NIH to continue their work on development of nanoscale optical fiber biosensor tests for detection of biological agents such as



might be used in a terrorist attack. According to the story in Nanowerk News, “the optical fiber is coated with antibodies or DNA that will bind to antigens or DNA in the specimen. When this happens, the light that normally passes through the fiber will be decreased, indicating the presence of a biological agent.” (January 2010) Ref. 514

### **New Polymer Fights Both Biological and Chemical Toxins.**

A team led by Dr. Alan Russell of the McGowan Institute for Regenerative Medicine, Univ. of Pittsburgh School of Medicine, claims synthesis of a single, multifunctional polymer material that can decontaminate both biological and chemical toxins, such as are used in weapons. According to an announcement, it comprises a “polyurethane fiber mesh containing enzymes that lead to the production of bromine or iodine, which kill bacteria, as well as chemicals that generate compounds that detoxify organophosphate nerve agents.” (Maerch 2010) Ref. 515

### **Scanning Instrument for Chemical Agents Detection**

Researchers at Queen’s University in Belfast, Northern Ireland, are developing a new sensor that has the potential to detect chemical agents within seconds. The system consists of special gel pads to collect samples from people or objects, and a scanning device (using Raman spectroscopy). Mixing the samples with nanoscale silver particles amplifies the signals of compounds, allowing detection of even very small traces of chemical agents. (October 2009) Ref. 516

### **Ultrasensitive Sensor Could Detect Bacteria in Minutes**

According to an article in MIT’s Technology Review, a new sensor developed by Benjamin Miller, professor of dermatology and biomedical engineering at the University of Rochester Medical Center, and associates, could be the basis for a portable instrument that could detect bacteria in the environment in 15 minutes to two hours. The sensor is based on a folded strand of complementary DNA that unfolds upon bonding with a sensed target sequence, allowing a fluorescent molecule attached to one end of the DNA to glow. Lighthouse Biosciences in West Henrietta, New York is commercializing the technology. Other similar efforts at Northwestern University (used in a product by Nanosphere of Northbrook IL) and MIT are also briefly cited in the article. (October 2009) Ref. 517

### **Neurotoxins Detected/Neutralized by New Fast Molecular Configuration**

A new type of organophosphate neurotoxin sensor molecule that detects such neurotoxins as sarin up to 105 times faster than previous reagents was developed by researchers from the Scripps Research Institute in La Jolla, CA. The detector also renders the toxin harmless, and signals its activity by significantly increasing the intensity of its fluorescence. (September 2009) Ref. 518

### **New Laser-based Gas Sensor Is Tunable over Wide Wavelength Range**

A new type of optical gas sensor, using vertical-cavity, surface-emitting semiconductor laser diodes (VCSELs) has the important property of being tunable over a 5 nm spectral range, and thus able to detect a variety of different gases. The technology is being developed by NEMIS, an EU FP6 project at the Walter Schottky Institut, Technische Universität München in Munich. (December 2009) Ref. 519

**New On-the-spot Test for Avian Flu and Other Influenza Strains**

Scientists at the University of Colorado are perfecting a new “chip” that can test almost instantly for 11 different influenza strains, including avian flu. The test device was already developed and tested for accuracy by the Centers for Disease Control and Prevention and researchers are working now to develop it into a user-friendlier on-the-spot test for influenza. Currently available technologies either take a long time to get a diagnosis of specific influenza strains; or, if giving faster results, do not differentiate among influenza strains. (November 2005) Ref. 520

**Chinese Find 16 Native Toxin-absorbing Plants**

Chinese scientists studied over 5,000 native plant species for their abilities to remove toxins (mainly heavy metals) from the environment. The five-year study identified 16 plants that could safely clean up pollutants such as arsenic or heavy metals, as well as techniques to process the resulting heavy-metal-absorbing plants so that they don’t become another pollution problem. The study estimated that using these plants costs less than one-tenth as much as the current chemicals-based cleanup techniques. One of the scientists said that “genes from the species identified could be used to genetically modify other plants” and hence, could enlarge the scope and spectrum of pollution-cleaning plants. (November 2005) Ref. 521

**Faster and Cheaper Virus Detector Uses Indium Nanowires, Synthetic Antibodies**

A more rapid and cheaper type of SARS virus-detector is being developed by a team from the University of Southern California. The active elements are indium oxide nanowires carrying bioengineered synthetic antibodies, reportedly resulting in a system which is lower in cost and produces results in minutes rather than hours, compared to existing devices. (June 2009) Ref. 522

**Anti-anthrax Protein Found**

A lysin (specialized enzyme protein) that selectively destroys the anthrax bacterium has been identified by Vincent Fischetti, professor and co-head of the Laboratory of Bacterial Pathogenesis and Immunology at Rockefeller University. The new protein, PlyPH, which is found in a bacteriophage, has the advantage of working over a wide range of pH values and also of killing only anthrax and not any other possibly beneficial organisms. The researchers hope to combine PlyPH with another compound that causes anthrax spores to germinate, and thus become vulnerable to destruction. (April 2006) Ref. 523

**New Microcantilever for Biochemical Detection**

Researchers at the Nanomaterials for Cancer Diagnostics and Therapeutics Center for Cancer Nanotechnology Excellence at Northwestern University have developed a new device that generates a direct electrical signal from the bending that occurs when a suspect biological molecule bends a cantilever in binding to an antibody or complementary nucleic acid sequence attached to it. The cantilever’s motion has been detected optically in previous devices, but here the tiny beam forms part of a MOSFET semiconductor, and causes a sharp change in current when displaced. The device can be mass-produced using standard computer chip design and manufacturing techniques, and can detect bending of as little as 5 nm when triggered by DNA or antigens. (March 2006) Ref. 524

**Possible Cure for Bird Flu**

A scientist from the Laboratory of New Veterinary Drugs at the Lanzhou Institute of Animal Husbandry and Veterinary Drugs, part of the Chinese Academy of Agricultural Sciences, declares that he has used traditional Chinese medicine to develop a plant extract—hypercine — that can effectively treat poultry infected with the bird flu virus H5N1. The extract proved efficient in all cases tried on poultry and is now in testing on rats for eventual efficacy for humans. (November 2005) Ref. 525

**Genetically Engineered Vegetables as Vaccination System to Counter Bioterrorism**

At a meeting of the G-7 and WHO to discuss weapons of mass destruction and avian flu threats, Italian researchers launched the idea of a “vegetable-vaccination” by incorporating pathogens’ DNA into various vegetables’ genetic strings (such as potatoes and carrots), which when eaten would help produce antibodies and boost the body’s natural defense system against the pathogens. (November 2005) Ref. 526

**Assessment and Recommendations for Biosecurity**

The *Globalization, Biosecurity, and the Future of the Life Sciences* report by the Committee on Advances in Technology and the Prevention of Their Application to Next Generation Biowarfare Threats of the National Research Council, assesses the concerns related to developments in biomedical research under the circumstances of globalization. It reinforces the role of international scientific exchange; the need for national and international codes of ethics and conduct for researchers and scientists working in life sciences; and the need for improved health infrastructure to respond to emergencies such as bioterrorist attacks or pandemics. It also recommends better integrated work between the scientific and intelligence communities to anticipate and manage the potential misuse of biomedical research and the technologies it generates. (June 2006) Ref. 527

**Antigenic Maps Help Trace Development of Diseases**

Derek Smith, professor of infectious disease informatics at Cambridge University’s Department of Zoology, and colleagues at Los Alamos National Laboratory and Erasmus Medical Center in Rotterdam, have developed software that, according to a *Scientific American* article, “create[s] an antigenic [stimulates the production of antibodies] map that documents 13,000 human flu strains isolated over the past five years. When these results are plotted on a digital antigenic map, researchers can see in fine detail how the body’s immune system responds to different mutations of the virus.” (April 2008) Ref.528

**Google to Support Development of Early Warning System in Vulnerable Regions**

Google.org, the philanthropic arm of Google Inc., unveiling its charity plan over the next five to ten years, announced \$25 million in grants aimed at addressing global challenges. One of the five core initiatives, ‘Predict and Prevent’ aims to empower communities to predict and prevent ecological, health or social crises before they become local, regional, or global crises, by identifying ‘hot spots’ and enabling rapid response. InSTEDD (Innovative Support to Emergencies, Diseases and Disasters) is allocated \$5 million to improve early detection, preparedness, and response capabilities for global health threats and humanitarian crises. Other recipients in this category include the Global Health and Security Initiative (GHSI) and Clark University. (January 2008) Ref.529

**New Nanotube-based Design Yields More Sensitive Pathogen Detector**

Hiroshi Matsui, professor of bionanotechnology at Hunter College in New York, and collaborators from the Nanobiosensors and Molecular Nanobiophysics Group at the Research Center on Nanoscience and Nanotechnology at Universitat Autònoma de Barcelona in Spain, developed a new design for lab-on-a-chip pathogen (e.g., bacteria and viruses) detection devices, using an AC-driven peptide nanotube capacitance probe to increase sensitivity of the element. It appears that the design can be scaled up to provide multiple-threat detection in a single device, although there are challenging problems with registration of a number of electrodes. (December 2008) Ref. 530

**Paper biosensors to detect toxins, pathogens, and viruses**

A team of Canadian researchers from McMaster University in Hamilton, Ontario reports developing a paper biosensor technology that would enable fast and cost-effective detection of harmful substances, including toxins, pathogens, and viruses. The system is similar to printers using cartridges, but with two layers of “ink” (the first one comprising biocompatible silica nanoparticles, and a second containing an enzyme), which form a bio-ink that changes color upon contact with a specific biological agent. (July 2009) Ref. 531

**Chemical Weapons-Resistant Chameleon Fabric to be Developed**

Scientists at the Sandia National Laboratories in New Mexico are working on research that could lead to developing synthetic materials that would react to surrounding conditions—change color and temperature, and even “seal” upon contact with a hazardous chemical agent. Now that the theory is understood, they hope to get material results (mainly using nanotechnology) in five to ten years. “The long-term goal and payoff has a number of different applications, both in civilian applications as well as military ones,” said principal investigator George Bachand. (April 2009) Ref. 532

**Promising Environmental-friendly Technologies**

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[Technologies for New Generation of Cars](#)

[Increasing Energy Efficiency Technologies](#)

**Various technologies that could help preserve or restaurate the environment**

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Integrated Monitoring/Control System Aids Buildings' Environmental Performance  
New Scheme for Wireless Sensor Networks Improves Many Metrics  
New "Nanohybrid" Plastic Is Stronger and More Biodegradable  
Biodegradation of Carbon Nanotubes Could Mitigate Potential Toxic Effects  
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New Power Sources Needed for the Soldiers of the Future  
Sandia researchers develop unique 'surfactant' material  
Sanitizing Fabrics for Environmental Workers  
New Technique to Convert Liquids to Semi-solids and Back Again  
New Antibacterial and Antitoxin Textiles  
Inorganic Fullerene-like Materials May Lower Hazards  
New Protection for Plastic Electronics  
Infrared Radiation for Deicing Aircrafts Cuts Pollution  
New Techniques May Help Solve Wind farm/Radar Problem  
New Technique May Solve Wind Farm Interference with Radars  
Space Elevator Technology has both economic and environmental benefits for the military  
Korean Nanotechnology production techniques Cut Costs and Environment Impact  
'On-Off Switch' for Buckyball (C60) Toxicity  
Zircon Options for Nuclear Waste Storage  
Biodegradable Mobile Phones  
Degradable Plastic Could Reduce Environment Footprint  
Nanomaterials Help Stop Bullets  
Environmentally Polluting Ash Turned into Concrete-like Structural Material  
Another "Green" Concrete Announced  
Fiber Check Dams with Chemicals Control Polluting Construction Runoff

### **Improved Techniques for Water Desalination**

A team led by Bruce Logan, Kappe Professor of Environmental Engineering, Pennsylvania State University, has modified a microbial fuel cell. It simultaneously desalinates salty water, and internally produces the electrical power required for operation, thus lowering the cost of water

treatment. A different line of investigation, by Professor Shin-Ho Chung and a group from the Computational Biophysics Group of the Research School of Biology at the Australian National University, led to the discovery that using boron nitride nanotubes in desalination filters allows four times faster water flow, yielding a much faster and more efficient desalination process. (August 2009) Ref. 533

#### Evaporation Provides Power in New Desalination System

Saltworks Technologies in Vancouver, BC, Canada claims to have developed a desalination technology that uses up to 80% less energy than current commercial processes, according to the originators. The method depends on using heat in the environment to evaporate salty water to a high degree of concentration, and then setting up an “ionic current” which removes the Na and Cl components. The result, according to the developers, is a system that needs only enough external energy to drive its pumps. (November 2009) Ref. 534

#### New Membranes Claim to Cut Desalination Energy Requirements

A start-up company, NanoH<sub>2</sub>O, is claiming a 20% reduction in the energy required for reverse osmosis desalination using its new membranes. Other companies (Danfoss, Novozymes, Aquaporin) are engaged in similar efforts. (January 2010) Ref. 535

#### Desalination Reverse Osmosis Improved by Ion Concentration Polarization

Sung Jae Kim and Prof. Jongyoon Han of MIT’s Dept. of Electrical Engineering and Computer Science, and colleagues in Korea, have developed a new technique – ion concentration polarization – which promises to avoid two of reverse osmosis’s problems: large power consumption and membrane fouling. The system is based on using microfluidics fabrication methods to produce microscopic filtration cells that could be assembled into an array with 1,600 units on an 8-inch-diameter wafer, capable of producing about 15 liters of water per hour. Since the system removes only salts and larger particles, it may need to be supplemented by a conventional filtration component (e.g. charcoal) for certain types of pollutants. (March 2010) Ref. 536

#### **A New Water Management Tool**

The Mapping Evapotranspiration with High Resolution and Internalized Calibration (METRIC) tool, developed by the Idaho Department of Water Resources and the University of Idaho, offers specific measurements of the water consumed across a region. Using surface temperature readings from satellites, air temperature, and a system of algorithms, the tool allows measurement of water quantities consumed on a certain piece of land through “evapotranspiration” (water that leaves the land for the atmosphere.) (September 2009) Ref. 537

#### **Plastic Waste Yields Porous Paving for Walks and Drives**

Civil and Environmental Engineering Prof. Naji Khoury of Temple Univ. has developed a technique for turning plastic bottle waste and coarse aggregate into a cement-like material, Plastisoil™, that he says is both cheaper and more energy-sparing than concrete or asphalt and that also has the advantage of being porous, so that rainwater drains through it. It also, of course, disposes of plastic bottles (30,000 per ton). (April 2010) Ref. 538

**Progress Announced in Methane-to-Liquid Process Development**

Scientists at the departments of chemistry at the University of North Carolina at Chapel Hill and the University of Washington have announced the first observation of a metal complex (a compound consisting of a central metal atom connected to surrounding atoms or molecules) that binds methane in solution. This is an important first step in the development of a process for converting methane to a more easily transported and stored and more environmentally friendly liquid fuel. (October 2009 Ref. 539)

**New Tool for Reducing Carbon Emissions from Building Construction Projects**

The Rocky Mountain Institute has released a new on-line computational tool, Green Footstep, which provides the design targets required to achieve carbon neutrality, net zero site energy, and other environmental objectives for a building construction project. It is based on information input about the location and other characteristics of the building, and the local ecosystem. The Green Footstep will produce a carbon emissions performance report for all phases of the work. (November 2009) Ref. 540

**Grease-repelling Surface Coating Reduces Need for Detergents**

A new surface coating reportedly repels oils while allowing water through; hence, surfaces can be cleaned using reduced quantities of detergents, which are damaging to the environment. The research team is led by Prof. Jeffrey Youngblood, of the School of Materials Engineering at Purdue University. (August, 2009) Ref. 541

**New Liquid Spray Glass Offers Rugged Surface Protection**

A new spray-on liquid glass produces a water-resistant 100 nm-thick coating claimed to be environmentally harmless and easily wiped clean. Reportedly, it is “transparent, non-toxic, and can protect virtually any surface against almost any damage from hazards such as water, UV radiation, dirt, heat, and bacterial infections”, and is also flexible and breathable. The spray is being marketed by Nanopool GmbH of Hülzweiler-Schwalbach, Germany. (February 2010) Ref. 542

**Nanoporous Alumina Membranes Useful for EHS Applications**

A paper with senior author Dr. Roger Narayan, of the Joint Department of Biomedical Engineering, Univ. of North Carolina and NC State University, reports the use of atomic layer deposition onto nanoporous alumina membranes to produce a material for use in a variety of medical and environmental health applications; e.g., water purification using a zinc-oxide-coated membrane able to neutralize E. coli and Staphylococcus aureus. (April 2010) Ref. 543

**Review of US National Nanotechnology Initiative**

The President's Council of Advisors on Science and Technology (PCAST) discussed a review of the US National Nanotechnology Initiative Program Report in a meeting on March 12. The webcast of the meeting is archived at <http://www.whitehouse.gov/administration/eop/ostp/pcast/meetings> ; the nanotech portion is at 5:30 into the recording. (March 2010) Ref. 544

**Proposed Uniform Device-Charging Scheme Could Yield Environmental Benefits**

Green Plug of San Ramon California seeks adoption of its environment-friendly charging

technology for battery-operated devices. The technique depends on a “smart” universal plug-in-the-wall charger that communicates with a proprietary chip in the attached user device to determine what voltage level to provide to it for recharging. Adoption of this hardware (which would use a single connector configuration) would allow a single multiple-outlet charger to service all portable devices at a given location. In addition to eliminating the proliferation of discarded obsolete chargers into electronic waste dumps, the technology, unlike conventional transformer-type chargers, also uses almost zero power when not actually supplying current. (November 2008) Ref.545

### **Integrated Monitoring/Control System Aids Buildings’ Environmental Performance**

Agilewaves Inc. of Menlo Park, CA combined its Resource Monitor with a Crestron control system to produce a smart building system through which energy consumption can now be automatically tracked and controlled in real time. The Resource Monitor collects data from sensors placed in key areas, providing real-time information on resource consumption that can be broken down to specific floors, rooms, and appliances. It then alerts the Control System to act and keep energy consumption within limits by adjusting a thermostat, lights, water or blinds, for example. (July-August 2008.) Ref.546

### **New Scheme for Wireless Sensor Networks Improves Many Metrics**

Los Alamos National Laboratory computer scientist Sami Ayyorgun developed a new communications scheme for wireless sensor networks that improves a number of network performance measures, e.g., connectivity, energy, delay, throughput, system longevity, coverage, and security. The technique depends on each node’s using a dynamically variable transmitting power, chosen according to an algorithm described in the paper. (July-August 2008.) Ref.547

### **New “Nanohybrid” Plastic Is Stronger and More Biodegradable**

A new biodegradable ‘nanohybrid’ plastic that can be engineered to decompose much faster than existing plastics was developed by researchers of Cornell University. The plastic is a modified form of polyhydroxybutyrate (PHB), a promising biodegradable plastic produced from bacteria. The use of PHB has been limited because of its brittleness and unpredictable biodegradation rates. The new material, which is also stronger than the original, contains nanoparticles of clay; its biodegradation rate depends on the amount of clay added. In one case it had almost completely decomposed after seven weeks, while the unmodified version was barely affected. However, bioplastics definition and recycling procedures are yet to be agreed upon and the need for international standards and regulations is increasing as the research and applications expand. (December 2007) Ref.548

### **Biodegradation of Carbon Nanotubes Could Mitigate Potential Toxic Effects**

Work done by Dr. Alexander Star, Dr. Valerian Kagan, and colleagues, at the Univ. of Pittsburgh, and reported in Nanowerk, has shown that carbon nanotubes, which can have negative biological effects, can be destroyed by natural biodegradation through enzymatic catalysis, using horseradish peroxidase and hydrogen peroxide over a period of several weeks. This technique is milder and more natural than the previous method, which involved a harsh solvent consisting of sulfuric acid and high concentrations of hydrogen peroxide. (November 2008) Ref. 549]



**New Material Makes Biodegradable Plastic Bags**

A research group led by Truong Phuoc Nghia at the Ho Chi Minh City University of Sciences has developed a nanocomposite plastic bag material that is less expensive than others, made from renewable sources, and is biodegradable in landfills. Its application may be somewhat limited by the facts that the resultant bags are reusable only if they do not come in contact with water, and that they rely on bacterial degradation for their low environmental impact. (January 2009) Ref. 550

**Advanced Membrane Technology for Water Treatment to Counter Water Scarcity**

The Advanced Membrane Technology for Water Treatment project conducted under the auspices of the Australian Commonwealth Scientific and Industrial Research Organization (CSIRO) seeks to develop advanced membrane technology for efficient, low energy processes to produce clean water from industrial and/or salt water resources, thus reducing the financial and environmental costs of addressing water scarcity problems. The research area consists of the following projects: low energy desalination membranes; membrane technology for industrial water reuse; and carbon nanotube (CNT) membranes. (May 2007) Ref. 551

**New Techniques for Improving Water Desalination**

Yale University researchers have developed a new energy-saving forward osmosis technique for water purification. The method, which is claimed to require only 10% as much power as previous ones, uses a new formulation for the “draw solution” in the osmosis process. Oasys Water, Inc. has been formed to exploit the discovery. (January 2009) Ref. 552

A team led by Bruce Logan, Kappe Professor of Environmental Engineering, Pennsylvania State University, has modified a microbial fuel cell. It simultaneously desalinates salty water, and internally produces the electrical power required for operation, thus lowering the cost of water treatment. A different line of investigation, by Professor Shin-Ho Chung and a group from the Computational Biophysics Group of the Research School of Biology at the Australian National University, led to the discovery that using boron nitride nanotubes in desalination filters allows four times faster water flow, yielding a much faster and more efficient desalination process. (August 2009) Ref. 553

**Water decontamination improved with gallium**

Researchers at Sandia National Laboratories have discovered that adding an atom of gallium to the key molecules in a coagulant widely used for water decontamination greatly improves its effectiveness and shelf life. (July 2009) Ref. 554

**Smog-Eating Materials**

Environment-friendly materials such as "smog-eating" products are increasingly in demand by architects and are developed not just for the façades of buildings, but also for paint, plaster, and paving materials for roads. An EU initiative for "smart" antipollution materials has found that construction products containing titanium dioxide help to destroy air pollutants found in car exhaust and heating emissions. The new environment-friendly substances are being tested in buildings, squares and highways in Europe as well as Japan. (November 2006) Ref. 555

**New Power Sources Needed for the Soldiers of the Future**

At the request of the U.S. Army, the National Academies' Board on Army Science and Technology conducted research to assess the present and future technological needs for effective power systems for the "soldier of the future." The report presents a review of various technology options, suggests future design concepts, and makes recommendations for more energy-efficient technology development and system design. (September 2004) Ref. 556

**Sandia researchers develop unique 'surfactant' material**

Sandia National Laboratories has developed a new class of surfactants (surface active agents) that are thermally degradable and easily removable in an inexpensive and environmentally friendly manner. These thermally cleavable (easily broken molecules) surfactants could have very large applicability in any field requiring modification of surface properties and where biodegradability is a primary concern. (June 2005) Ref. 557

**Sanitizing Fabrics for Environmental Workers**

Researchers from Cornell University and the University of California, Davis, have developed a technique for incorporating bacteria-killing halamides into fabrics that can then be used to produce protective clothing for personnel working in biologically hazardous environments, such as where anthrax may be present. They expect testing in 2006 and commercialization in 2008. (March 2006) Ref. 558

**New Technique to Convert Liquids to Semi-solids and Back Again**

Chemist Takeshi Naota, at Kyoto University in Japan, has developed a technique able to convert fuels, lubricants and paints into gelatinous semi-solids by adding a palladium-based compound and applying ultrasound. The process can be reversed by heat or more ultrasound to produce liquids. (June 2005) Ref. 559

**New Antibacterial and Antitoxin Textiles**

Researchers from North Carolina State University and textile scientists from Egypt have created a fabric that is up to 90% effective against three commonly occurring microorganisms: *Lactobacillus planterum*, *E. coli* and *Staphylococcus aureus*. Unlike conventional methods of coating, this plasma-based process eliminates chemical wastes, making it a more environmentally sound investment. The antimicrobial agents are attached to the molecular structure of fibers, creating a permanent bond between the fibers and the agent so that washing and wearing do not reduce the efficacy.

Using nanotechnology, researchers from North Carolina State University and University of Puerto Rico have developed "smart textiles" by attaching nanolayers to natural fibers. These layers can be customized for different chemicals and can block agents such as mustard or nerve gas while keeping the fabric breathable. Nanolayers can be attached to a fiber without undermining its comfort or usability, providing very high levels of protection. (June 2005) Ref. 560

**Inorganic Fullerene-like Materials May Lower Hazards**

The Nano-materials Synthesis Group in the Israeli Weizmann Institute has developed a new class of nanomaterials, inorganic fullerene-like substances, based on tungsten disulphide and similar compounds, rather than carbon. These materials, marketed commercially by ApNano, have many

of the physical properties of true fullerenes, but are reported to be easier and cheaper to produce, chemically stable and less reactive, and less flammable. They also have been tested and purportedly found to be safe. (February 2006) Ref. 561

### **New Protection for Plastic Electronics**

Researchers at the University of Texas at Dallas have developed a new form of self-healing for the metal oxide thin film layers that protect the plastic covering for a wide variety of electronic devices, e.g., displays, low-cost solar cells, and chemical- and pressure-sensitive sensors. These layers are subject to damage from moisture and flexing. The technique uses a nanocomposite material that combines a water-degradable polymer and a titanium tetrachloride healing agent, which act together to seal minute defects in the protective layer. (December 2008) Ref. 562]

### **Infrared Radiation for Deicing Aircrafts Cuts Pollution**

A system for cutting pollution by deicing aircraft with infrared radiation rather than chemicals is being further tested at the Oslo airport. This heat-inducing system replaces the present technique of spraying the aircraft with anti-freeze or glycol, which pollutes the environment. The InfraTek Radiant Energy Deicing System is built by the Radiant Energy Corp. of Port Colborne ON, and is already in use at Newark International Airport, and at Rhinelander-Oneida County Airport, Wisconsin, with a hangar under construction at JFK. (November 2005) Ref. 563

### **New Techniques May Help Solve Wind farm/Radar Problem (update)**

A previous item in these reports [*Wind Power vs. Air Defense Radar*, March 2004] reported on the problem arising when return signals from wind farm fans interfered with military aircraft control radar systems. Two new developments offer some hope of solutions to this conflict. BAE Systems in the UK has produced a signal-processing algorithm, which uses fuzzy logic to filter out the returns from the rotating blades, leaving only genuine aircraft tracks. The system will be tested this summer and may be ready in a year. Stealth technology for the moving surfaces is also being investigated as a possible way of hiding the blades from the radar beam.

Another approach is being taken by Grimshaw Architects in association with Windpower Ltd, whose Aerogenerator is a Darius-principle wind turbine with a vertical axis that can be operated at ground level (or rather, sea level, since it's planned for off-shore use.). (July 2005) Ref. 564

### **New Technique May Solve Wind Farm Interference with Radars**

Cambridge Consultants Ltd. of Cambridge UK and Boston MA is working on the development of a holographic-infill radar, which aims to solve the problem of wind turbine interference with air traffic radars. The system works by covering the area of the turbines with a short-range radar “patch” with a different characteristic. A test has shown that the method provides a Doppler effect for a target moving on the ground different from one produced by a turbine, a distinction, which it is believed would enable a full-scale system to detect an aircraft intrusion into a wind farm interference area. Flying tests are planned. (November 2008) Ref.565

### **Space Elevator Technology has both economic and environmental benefits for the military**

Space elevator technology, centered on the concept of stretching a light but strong ribbon from the surface of the earth to a point in space geosynchronous with the location of the ground end, is quickly approaching technical feasibility. Such technology could be used to boost payloads into earth orbit at an economy of scale that rocket technology cannot match. Preliminary studies

indicate that this technology could be ready in 15 years. (August-September 2003) Ref. 566

### **Korean Nanotechnology production techniques Cut Costs and Environment Impact**

Prof. Taeghwan Hyeon and associates at Seoul National University's School of Chemical Engineering have announced the development of a safe and inexpensive way to directly produce a large amount of monodisperse (uniformly sized) nano-crystals using non-toxic salts. Hyeon said that these are truly revolutionary findings, enabling large-scale production of nano-particles at low cost—just 250 won (about 25 cents) per gram. His team used metal salts as a reactant to regularly produce as much as 40 grams in a single reaction. Although the technique reduces the environmental impact in production, it does not mean it reduces the environmental impact of the nanomaterials after production and application. (December 2004) Ref. 567

### **'On-Off Switch' for Buckyball (C60) Toxicity**

Researchers at Rice University's Center for Biological and Environmental Nanotechnology (CBEN) have demonstrated that adjusting the surface properties of buckyballs can control the nanoparticles' toxicity. They identified specific surface alterations that can reduce or augment buckyballs' toxicity depending on the purpose for which they are designed. Although just at the cytotoxicity level, these findings are important for buckyball toxicological risk assessment, and more extensive toxicological studies are already planned. However, this should not be confused with the concept of creating “off-switches” for future nanoweapons, a requirement in need of research and development. (September 2004) Ref. 568

### **Zircon Options for Nuclear Waste Storage**

Cambridge-MIT Institute (CMI) in the UK discovered that the mineral zircon ( $ZrSiO_4$ ) might be a solution for long-term nuclear waste storage. Computer simulations show that when radioactive materials heavily damage the zircon, the atoms rearrange themselves to form a protective shell around the damaged area. Once the principle is proven and it's fully understood what is going on at the atomic level, then it will be possible to explore alternative materials that could be produced on a much larger industrial scale. (July 2004) Ref. 569

### **Biodegradable Mobile Phones**

Researchers at the University of Warwick, together with high tech materials company PVAXX Research and Development Ltd, and Motorola, designed a mobile phone that can be turned into compost and even flower when discarded. The phones are made of a new high tech biodegradable material, which disintegrates in a few weeks when buried in compost, and grows a flower from a seed placed in the phone's cover. (December 2004) Ref. 570

### **Degradable Plastic Could Reduce Environment Footprint**

David R. Tyler, a chemist at the University of Oregon, and his colleagues have developed a molybdenum/chlorine-containing plastic which degrades to dust in three days under exposure to light. Items made from this material would, of course, have to be limited to those concealed from illumination until used, and then be required to function for only a short time. However, this disintegration property would offer a simple, environmentally friendly solution to disposal of used devices meeting the above constraint. (April 2005) Ref. 571

**Nanomaterials Help Stop Bullets**

Bulletproof vests' performance could be improved by chemically attaching different nanoparticles to already well-known materials such as Kevlar, says Professor Victor Castano, of the Universidad Nacional Autónoma de México. Ceramic nanoparticles would make the material UV-shielded, and chemically functionalized nanoparticles linked to organic structures could be used for waterproofing. (November 2004) Ref. 572

**Environmentally Polluting Ash Turned into Concrete-like Structural Material**

Prof. Mulalo Doyoyo of Georgia Tech's School of Civil and Environmental Engineering has developed a new structural material, Cenocell, that is produced by treating with organic chemicals fly ash and bottom ash left over from coal burning systems. It offers high strength and light weight, uses no cement, and could replace concrete, wood and other materials in many applications. (November 2008) Ref.573

**Another "Green" Concrete Announced**

In a press release, Ekocrete, Inc. announced, "...the availability of a new 'green' concrete that uses 90% recycled and by-product materials without sacrificing strength or durability." The new product uses crushed recycled concrete for aggregate, plus fly ash waste from coal mills, and other industrial byproducts that provide nano-fibers for crack reduction and nano-particles for surface density to reduce water penetration. (January 2009) Ref. 574]

**Fiber Check Dams with Chemicals Control Polluting Construction Runoff**

Research by Dr. Rich McLaughlin, associate professor of soil science at NC State Univ., and colleagues has shown that fiber check dams constructed from a mix of straw wattles and coir logs, with added granulated, anionic polyacrylamide (PAM), are enormously more effective in protecting watercourses from the muddy runoff around road and other construction projects than the currently used "sediment traps" and rock check dams in ditches. Turbidity of road runoff improved by a factor of more than 100. (April 2009) Ref. 575

**Technologies for New Generation of Cars**

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### Battery Performance Improvements

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### **Techniques Provide Improved Lithium-ion Battery Performance**

An article in MIT's Technology Review reports that an advance in lithium-ion battery design by Prof. Yi Cui and colleagues at the Dept. of Materials Science and Engineering, Stanford University, has dramatically increased efficiency. A new anode structure using carbon nanowires coated with amorphous silicon provides about 2000 milliampere-hrs/g. This is an almost six-fold increase over today's graphite-based 360 mA-hrs/g. The article also briefly describes related work being carried out at other laboratories. In a related development, researchers at the Chinese Academy of Sciences' Key Laboratory of Molecular Nanostructure and Nanotechnology have

synthesized a nanocomposite of LiFePO<sub>4</sub> nanoparticles embedded in a nanoporous carbon matrix as a superior cathode material for lithium-ion batteries. Although this compound offers 170 mA-hrs/g, it has other deficiencies that the new structure ameliorates. Next Alternative Inc. of Ottawa, Canada also claims to have a greatly improved battery design based on carbon nanotubes. (August 2009) Ref. 576

Stanford University Assistant Professor Yi Cui has developed an electrode material for lithium-ion batteries (used in laptops, iPods, video cameras, and cell phones) that increases their energy storage capacity ten times above current batteries. This could help make future electric cars more attractive. The material uses silicon nanowires to hold the charge-bearing lithium ions. Silicon structures can hold more lithium than the conventional carbon, but tend to disintegrate because of size changes during recharge cycles; the nanowires do not exhibit this characteristic. (December 2007) Ref.577

#### New Lithium-ion Battery Offers Multiple Advantages

A123 Systems of Watertown MA developed a new lithium-ion battery design with significant advantages for demanding mobile applications, such as electric vehicles and portable electronic devices. The new units feature greatly increased safety (not bursting and igniting, when overheated or damaged), longer life, and greater energy capacity, stemming from an innovative electrode material that contains nanoparticles of lithium iron phosphate modified with trace metals. (May 2008) Ref.578

#### New Lithium-Ion Material Improves Recharging Time

Gerbrand Ceder and Byoungwoo Kang of the Dept. of Materials Science and Engineering at the Massachusetts Institute of Technology announced development of a new lithium-ion battery electrode material which they hope will give batteries a fast charging time equivalent to that of a supercapacitor. The material consists of nanospheres with a core of lithium iron phosphate and a surface of glassy lithium-phosphate, with the latter providing a fast path for electron travel during recharging. (March 2009) Ref. 579

#### Lithium-sulphur Battery Problem Solved by Nanotechnology

Researchers led by Prof. Linda Nazar at the Univ. of Waterloo, Ontario, have developed a cathode nanostructure for a lithium-sulphur battery that can store and deliver more than three times the power of conventional lithium ion batteries, according to Nanowerk News. (May 2009) Ref. 580

#### **Electric Vehicle Powered by Sodium-Nickel-Chloride Batteries**

The prototype of Electric Daily, the first zero emission light commercial vehicle produced in Latin America was presented by Iveco in Brazil. The prototype uses three Zebra Z5 sodium, nickel, and chloride batteries claimed to be completely recyclable and not producing gaseous emissions. (September 2009) Ref. 581

#### **New Ceramic Membrane Enhances Battery Performance**

Ceramatec Inc. of Salt Lake City, Utah announced development of a new battery design, based on a paper-thin ceramic membrane. The company claims that their sodium-sulphur unit will store 20-40 kWh in a package the size of a refrigerator, operate below 90°C, and withstand 3,650 daily

discharge/recharge cycles over 10 years. The expected sales price is around \$2000. (August 2009) Ref. 582

### **New Low-cost, Durable Hydrogen Producing System**

A team led by Thomas Nann and Christopher J. Pickett at the University of East Anglia reports a new technique for light-driven catalytic production of hydrogen from water. The new system consists of a gold electrode covered with layers of indium phosphide (InP) nanoparticles, combined with an iron–sulfur complex,  $\text{Fe}_2\text{S}_2(\text{CO})_6$ , and irradiated while immersed in water with a small electric current. The system produces hydrogen with an efficiency of 60%, and lasts much longer than present systems with organic components. Another improvement in hydrogen production may come from the work at the laboratory of Prof. Jin Zhang at UC Santa Cruz, where a combination of elemental doping and quantum dot sensitization has produced improved photoanodes for photoelectrochemical cells. (February 2010) Ref. 583

### **New Developments in Hydrogen Production**

Several new techniques have been added to the published set of tools for economical production of hydrogen; e.g. as input to fuel cells. Sun Catalytix of Cambridge, MA has been awarded \$4 million through ARPA-E for work on its artificial photosynthesis based on a cobalt-phosphate catalyst that converts water and carbon dioxide into hydrogen and oxygen. The laboratory of Prof. Craig Hill at Emory Univ. has announced the fastest homogeneous carbon-free molecular water oxidation catalyst (WOC) yet created, based on cobalt. Univ. of Wisconsin-Madison geologist and crystal specialist Huifang Xu and colleagues have designed “a simple and cost-effective technology for direct water splitting that may generate hydrogen fuels by scavenging waste energy, such as noise or stray vibrations from the environment”, according to the developers. The new piezoelectric device uses zinc oxide and barium titanate nanofibers placed in water. Dr. Di Zhang, of Shanghai Jiao-Tong University, and collaborators have embedded a nitrogen-doped titanium dioxide catalyst in a complex physical structure modeled on natural plant leaves’ micro-architecture to produce, “enhanced light-harvesting and photocatalytic hydrogen evolution activities”. (March 2010) Ref. 584

### **Nano Gold May Offer Miniaturized Photoelectric Cell**

Prof. Dawn Bonnell, Director of the Nano/Bio Interface Center at the University of Pennsylvania, and colleagues have announced a technology that uses gold nanoparticles to increase the efficiency of production of current in photovoltaic cells by factors of 4 to 20 over present structures. “If the efficiency of the system could be scaled up without any additional, unforeseen limitations, we could conceivably manufacture a one-amp, one-volt sample the diameter of a human hair and an inch long,” says Prof. Bonnell. (February 2010) Ref. 585

### **Promising Research for Emission-Free Car that Makes Its Own Fuel**

A unique project in the incubator program of the Chief Scientist in Israel called Engineuity has put several technologies together to create a stable metal combustion system that avoids oil and pollution. The technique is based on a metal-steam combustor system that produces a continuous flow of hydrogen using water and common stable metals such as magnesium and aluminum. At high temperature and pressure, the metals combine with the oxygen from water forming an oxide and liberating the hydrogen to be used by the car. The metals can be recovered and recycled. The research leader in an audio recording referenced below claims that adapting conventional cars to



run on the Engineuity technology should be easy and the overall running cost would be about the same as today's cars. Pending investments, a prototype car based on the new system could be demonstrated to commercial auto companies in three years. (October 2005) Ref. 586

### **Hydrogen Tablets**

Scientists at the Technical University of Denmark (DTU) have invented a hydrogen tablet that can efficiently and safely store and transport hydrogen in a solid form. The tablet consists solely of ammonia absorbed efficiently in sea-salt. When hydrogen is needed, ammonia is released through a catalyst that decomposes it back to free hydrogen. The tablet can be simply recharged just by a "shot" of ammonia. DTU and SeeD Capital Denmark have founded the company Amminex A/S to develop and commercialize the technology. (September 2005) Ref. 587

### **Hydrogen Farming as a Possible Alternative to Petroleum**

If biological and technological obstacles (already identified) can be resolved, then hydrogen farming might become an alternative to petroleum production in 10-20 years, according to Tasios Melis of the University of California, Berkeley. His research is one of several funded by the DOE, aimed at trying to use algae to provide cheap and environmentally friendly hydrogen. It is based on the use of transparent tubes full of water inoculated with the green alga *Chlamydomonas reinhardtii*, which when put out in the sun naturally produces hydrogen as a by-product of photosynthesis. A system of such tubes with hydrogen collection capacity would form a hydrogen farm. "To displace gasoline use in the US would take hydrogen farms covering about 25,000 square kilometers" (less than a tenth of U.S. soy bean fields), says the researcher. (February 2006) Ref. 588

### **Biodiesel Increasingly Considered a Viable Alternative to Crude Oil**

Growing demand for green fuels brings biodiesel into the spotlight of the global oils industry. It was the focus of the two-day Price Outlook Conference for edible oils, held in Kuala Lumpur, Malaysia, as Southeast Asian countries are looking into increasing their biofuels production. Malaysia and Singapore are the world's leading palm oil producers. Solomon Islands plans to replace its imported fuel with internally produced coconut oil with the help of three Australian companies. Major increased biodiesel demand is expected to stem from the EU policy that, by 2010, 5.7% of its diesel fuel must be biodiesel. (February 2006) Ref. 589

### **Synthetic Biology to Produce Hydrocarbon-based Fuels**

LS9, a synthetic biology company based in San Carlos, CA, has genetically engineered various bacteria, including *E. coli*, to custom-produce hydrocarbons that could be processed into fuel. A pilot plant is planned for 2008, and sales of synthetic biocrudes to refineries for further processing are expected within three to five years. Another company, Amyris Biotechnologies, of Emeryville, CA, is using plant and animal genes to make microbes produce renewable hydrocarbon-based fuels. (August 2007) Ref. 590

### **Battery Performance Improvements**

#### Sandia Advancing Research on Batteries' Life and Safety

As part of the Department of Energy-funded FreedomCAR program, Sandia National Laboratories' Power Sources Technology Group is researching ways to make lithium-ion batteries work longer and more safely. According to an SNL news release, the research could

lead to these batteries being used in new hybrid electric vehicles in the next five to ten years. The work is centered on developing a higher degree of abuse tolerance in the batteries. Another project at Sandia is studying key phenomena that affect the durability and byproduct management of hydrogen-fueled PEM (proton exchange membrane or polymer electrolyte membrane) fuel cells, which are also important candidates as components for advanced vehicles. [See related item *Update on more efficient vehicles: Program of the FreedomCAR and Fuel Partnership* in July 2005 environmental security report.] (January 2006) Ref. 591

Ceramatec Inc. of Salt Lake City, Utah announced development of a new battery design, based on a paper-thin ceramic membrane. The company claims that their sodium-sulphur unit will store 20-40 kWh in a package the size of a refrigerator, operate below 90°C, and withstand 3,650 daily discharge/recharge cycles over 10 years. The expected sales price is around \$2000. (August 2009) Ref. 592

#### **New Inter-electrode Material Yields 50% Fuel Cell Power Increase**

MIT Professor Paula T. Hammond and her team produced a new thin film material for the membrane separating the electrodes in direct methanol fuel cells. The current material is not impervious to methanol leakage across the boundary. Applying the new film produced a 50% gain in power output from the cell. Drexel University chemical engineering professor Yossef Elabd had earlier investigated the leakage mechanism in the present membranes, and produced several other alternatives. (May 2008) Ref.593

#### **New Fuel Cell Membrane May Solve Dry Surroundings Problem**

Researcher Cy Fujimoto of the Sandia National Laboratories is developing a new type of polymer electrolyte membrane for fuel cells. The new material aims to solve the problem of dehydration and consequent diminished functioning of fuel cells in dry desert environments. (June 2009) Ref. 594

#### **New Palladium-Platinum Catalyst Structure Increases Fuel Cell Efficiency**

Prof. Younan Xia has led a group of scientists at Washington University and the Brookhaven National Laboratory in the development of a fuel cell catalyst nanostructure comprising a palladium core supporting dendritic platinum branches. This material and arrangement is two and a half to five times more effective than existing techniques. (May 2009) Ref. 595

#### **Compressed Air Car May Offer Environmental Advantages**

Zero Pollution Motors of New Paltz, NY is developing a compressed air vehicle planned for US production in 2010. The car may be viewed as an analogue of an electric car, with the battery replaced by a tank filled with air previously compressed by any electric energy source. The air runs a 2-, 4- or 6-cylinder engine, replacing the pressure otherwise generated by the explosion of fossil fuel vapors in the cylinders. (November 2008) Ref.596

#### **New Catalysts Improve Hydrogen Generation Processes for Energy Storage**

Prof. Daniel Nocera of MIT announced development of a new electrolyzing technique that provides an efficient way to use electricity, as generated by solar panels or a wind farm, to split water into hydrogen and oxygen for storage and later use in a fuel cell. The technique is based on a novel cobalt/phosphate catalyst that allows the process to be carried out in an inexpensive non-

specialized environment.

Similarly, scientists of Monash Univ. “have developed an efficient water oxidation catalyst, based on a manganese cubane cluster, which combines features of photosynthetic enzymes with the light harvesting power of dye-sensitized solar cells ... [and, paired] with a proton reducing catalytic cathode, ... have produced a photoelectrochemical cell that produces pure H<sub>2</sub> and O<sub>2</sub> from water and sunlight.”

Finally, Prof. Umit Ozkan, of Chemical & Biomolecular Engineering at Ohio State University, designed an inexpensive cerium-based catalyst that produces hydrogen from ethanol or other biofuels. This would allow conversion from liquid fuel to hydrogen to be done at the final fueling point. (July-August 2008.) Ref.597

### **New Materials Provide Hope for Improved Ultra-capacitor**

EEStor, of Cedar Park TX, claims that its electrical energy storage unit will have more than three times the energy density of the top lithium-ion batteries today. The unit is based on a ceramic material consisting of a barium titanate powder coated with aluminum oxide and a type of glass material. Some experts have expressed doubts about the material’s ability to withstand the high voltage gradients necessary to achieve the stated capacities, but others are more supportive. (July-August 2008.) Ref.598

### New Materials Provide Improved Ultracapacitor Storage

Hao Zhang of the Research Institute of Chemical Defense in China is lead author of a paper in Nano Letters describing a new structure for ultracapacitor electrodes consisting of flower-shaped manganese oxide nanoparticles deposited on carbon nanotubes vertically grown on a tantalum-foil base. The authors report that the new arrangement delivers five times as much power as activated-carbon electrodes. Cost may be a problem with this technique. Also, Prof. Rod Ruoff of the University of Texas at Austin is working with graphene as an electrode material, and believes that it may double the storage capability of ultracapacitors. Jiyoung Oh and Mikhail “Mike” Kozlov at the Univ. of Texas at Dallas’ NanoTech Institute are conducting similar work using sheets of single-walled carbon nanotubes embedded with the polymer polypyrrole. (September 2008.) Ref.599

### **Clean Green Hydrogen-Making Process**

Lanny Schmidt, Brandon Dreyer and colleagues at the University of Minnesota’s Department of Chemical Engineering and Material Science have developed a new process called “flash volatilization” that can turn waste biomass into hydrogen. It uses rhodium and cerium as chemical catalysts, is supposed to be 100 times faster than existing techniques, and is scalable. It generates a hydrogen and carbon monoxide gas mixture called synthesis gas, or “syngas” which can be used to make fuels, or its hydrogen can be separated in order to power fuel cells. (December 2006) Ref. 600

### **New Generator Produces Hydrogen from Aluminum and Water**

Prof. Jerry Woodall of Purdue University and associates have developed a new technique that uses aluminum-gallium alloy pellets to generate hydrogen from water, providing a novel source for the new “green fuel”. Aluminum reacts with the oxygen in water, releasing hydrogen and transforming into aluminum oxide (alumina). The key to the new process is the use of gallium, which prevents the formation of a skin over the aluminum that would stop the process—with the

gallium, all the aluminum in a container can contribute to the reaction. The researchers envision that the alumina could be recycled back into aluminum by electricity derived from nuclear plants. The advantage of this indirect hydrogen fuel process is that aluminum is much more easily stored and transported than hydrogen, so there are potential gains in producing the hydrogen at the point of use in an “aluminum-fueled” engine. However, serious questions come to mind about the environmental effects and the overall cost and energy efficiency of producing and recycling the aluminum, and transporting it and the alumina, and about driving range with a feasible load of metal. This complex “non-rechargeable battery” will require much careful end-to-end analysis in order to gain acceptance, but it is an interesting approach. (May 2007) Ref. 601

### **Enzyme-based Biofuel Cells Using Nanotechnology**

A team of Japanese scientists from Kyoto University in Japan has engineered carbon electrodes with carbon nanoparticles to develop a simple biofuel cell based on direct electron transfer-type bioelectrocatalysis. The cell uses enzymes to catalyze oxidation of D-fructose and reduction of dioxygen to generate electricity, without needing a mediator molecule. This might represent a significant development for simplifying the construction of biofuel cells. (February 2007) Ref. 602

### **Printing Fuel Cells**

EoPlex Technologies, in Redwood City, CA has developed a process, which allows the printing of three-dimensional structures with "ink" containing various materials, such as polymers, metals, and ceramics, layer by layer. Microreactors for chemical and drug processing, miniature fuel cells, wireless sensors, and thermal management systems are just some of the envisioned applications of this technology able to cheaply and easily create microscale devices. (October 2006) Ref. 603

### **New Device to Suck CO<sub>2</sub> from the Air**

Towers with materials that absorb carbon dioxide (CO<sub>2</sub>) directly from the air and then release it as a pure stream of carbon dioxide for sequestration have been developed by scientists from Columbia University and Global Research Technologies, LLC. It is estimated that if these devices had openings 10 meters by 10 meters they could each extract about 1,000 tons each year; hence, one million of these units could remove 1 billion tons of CO<sub>2</sub> from the air per year. These could be placed at the best locations for carbon sequestration, regardless of carbon source. (April 2007) Ref. 604

### **Carbon Nanotubes Could Replace Expensive Platinum Catalysts in Fuel Cells**

Prof. Liming Dai at the University of Dayton (Ohio) and his group have shown that arrays of vertically grown, nitrogen-doped, carbon nanotubes could be used as the catalyst in fuel cells, replacing expensive platinum catalysts now used; it is claimed that they would also be longer lasting than the platinum types. Other work in fuel cell electrodes is underway by Kotaro Sasaki at the Brookhaven National Lab (atom-thick platinum films), at Monash Univ. in Australia (a polymer, PEDOT), and at the Argonne National Lab (nanotube arrays with small quantities of platinum or iron). (February 2009) Ref. 605

**Ion Jelly Electrolyte Offers Environmental Advantages**

A team of researchers led by Susana Barreiros at the New University of Lisbon, Portugal, has developed a conducting “ion jelly” for use as an electrolyte in batteries and fuel cells. The new technique is superior to previous methods of turning environmentally friendly ionic liquids into solids. (October 2008) Ref.606

**EU ‘hydrogen research strategic agenda’ expects to replace 20% of vehicle fuels with alternative fuels by 2020**

The European Union (EU) announced its ‘hydrogen research strategic agenda’. The EU hopes to replace 20% of vehicle fuels with alternative fuels by 2020. By way of background, a National Science Foundation official has told the Millennium Project, that methanol may well prove more feasible than hydrogen for fuel cells, but hydrogen is the current direction of research. The EU will fund hydrogen development and deployment research projects in order to develop a sustainable hydrogen economy, with component technologies for applications in transport, stationary and portable power. The EU strategy will include a policy framework across transportation, energy, and environmental domains, a public-private partnership to promote commercialization, and a framework to develop international co-operation. (August-September 2003) Ref.607

**Nanotechnology Used to Produce Hydrogen for Fuel Cell Cars**

Using nanotechnology, scientists from the Department of Physics and Astronomy, and Laboratory for Surface Modification, Rutgers, The State University of New Jersey, might have found an efficient and environmentally friendly solution for the hydrogen fuel cell-powered car industry. The nanostructured catalyst-based hydrogen production technology seems also to provide solutions for safe and easy distribution by “binding hydrogen with atmospheric nitrogen into ammonia molecules,” so that the “resulting liquid could be handled like gasoline and diesel fuel”, thus avoiding the high costs involved in building a new infrastructure for fuel cells. Using this technology, “pure hydrogen could be extracted under the vehicle's hood on demand, as needed by the fuel cell, and the remaining nitrogen released back into the atmosphere. The atmosphere is normally four-fifths nitrogen, so the nitrogen emissions are not viewed as polluting” comments an Environment News Service article. (April 2005) Ref. 608

**The U.S. Army to use hydrogen fuel cell powered cars enables to reduce logistics costs around the world and comply with future environmental requirements for overseas bases**

The U.S. Army recently announced that General Motors agreed to develop an off-road vehicle for the military powered by hydrogen fuel cells. California-based Quantum Fuel System Technologies is to build the prototype vehicle. This reflects the recent focus by the U.S. government on using alternative fuel systems to power the country’s military, enabling it to reduce logistics costs around the world. (In Iraq, for example, a gallon of fuel cost about \$400 due to the transportation costs of moving the fuel around the world and around the battlefield.) (October 2003) Ref.609

**All-Electric cars coming from Norway and China with More than Hundred Mile Ranges**

An all-electric car is expected to be available for purchase next year (2009) in the U.S.; it is called “Think City” from Think North America, a Norwegian-California joint venture startup. The car runs on sodium or lithium batteries and can travel up to 110 miles on one charge. In 3-5

years BYD Auto Co. of Shenzhen, China, plans to market its all-electric car in the U.S. with a 185-mile range on a single full charge. (April 2008) Ref.610

### **Largest Chinese Car Maker Produces All-electric Model**

China's largest independent carmaker, Chery Automobile, has begun producing its first plug-in electric car, the S18, rated at 93 miles per charge, 72 mph, and charging times of 30 minutes/half charge, six hours/full. No general availability date has been announced (February 2009) Ref. 611

### **Implications of the Growing Biofuels Industry**

Global ethanol production more than doubled between 2000 and 2005 and biodiesel expanded nearly fourfold versus oil production that increased by only 7% over this period, notes *Biofuels for Transportation: Global Potential and Implications for Sustainable Agriculture and Energy in the 21st Century* report by Worldwatch. Since the world's oil demand and prices are increasingly hindering energy security and development, there are strong growing incentives for the biofuels industry and increased trade. Furthermore, 25 of the world's 47 poorest countries import all of their oil, while having a substantial agricultural base to grow energy crops. While noting the advantages of biofuel industry, the report also warns of the problems such as replacing food crops for energy crops, expansion of agricultural land, and water needs. International biofuel trade regulations and standards will be needed. (June 2006). Ref. 612

### **Environmental Advantages in New Methanol Production Process**

Scott Barnett at Northwestern Univ., Evanston IL, and colleagues have demonstrated a new environmentally friendly technology that uses a solid oxide electrolysis cell to turn CO<sub>2</sub>, hydrogen, and water into syngas (H + CO), which can then be converted into methanol, a competitor to hydrogen for energy storage and production. A "methanol economy" has the advantage over hydrogen of using the existing liquid-fuel-oriented storage and distribution infrastructure. The current syngas production processes are based on fossil fuels, and have negative environmental impacts. (June 2009) Ref. 613

### **New Material for Storing Hydrogen**

Physicists Adam Phillips and Bellave Shivaram of the University of Virginia have found a new class of materials, transition metal-ethylene complexes, which may offer a much more efficient way of storing hydrogen for fuel cell applications than previous substances. An example uses titanium with an ethylene nanostructure, which their measurements indicate will hold 12% by weight of hydrogen, more than twice the target of 5.4% set by DOE to support the development of hydrogen fuel cell vehicles. (April 2008) Ref.614

### **New Capacitor Promises 100× Improvement over Batteries in Charge/Weight Ratio**

Lockheed Martin has signed an agreement with EESstor of Cedar Park, Texas for the military applications of a new type of ultracapacitor based on barium titanate that Lockheed Martin believes will be able to hold 10 times the energy in 1/10th the weight of typical batteries. (January 2008) Ref.615

### **Bacteria-Generated Electricity from Waste to Power Fuel Cell**

Microbial fuel cell technology, being developed by scientists from Arizona State University's Biodesign Institute, is based on the use of bacteria to convert a variety of liquid organic waste

(such as sewage or pig manure) into electricity. (January 2008) Ref.616

### **Converting CO<sub>2</sub> into Fuels using Sunshine**

The Sunlight to Petrol (S2P) project developed by researchers at Sandia National Laboratories in New Mexico is using sunlight to convert CO<sub>2</sub> into fuels like methanol or gasoline. Although the innovation seems to be working, large-scale implementation could take 15-20 years to reach industrial scale. (January 2008) Ref.617

### **Polymer Dielectric Promises Higher Energy Storage**

North Carolina State Univ. physicist Vivek Ranjan and colleagues have discovered that combining the polymer polyvinylidene fluoride (PVDF) with chlorotrifluoroethylene (CTFE)—another polymer— produces a dielectric material that may allow capacitors to store up to seven times more energy than those currently in use. (July 2007) Ref.618

### **Nanotechnology Produces Battery/Capacitor in a Sheet of Paper**

Scientists from the Rensselaer Polytechnic Institute have developed a device that resembles a sheet of paper in all respects, but that can serve as a battery or capacitor. The material is formed from cellulose and carbon nanotubes, and can be soaked with any of a variety of fluids (including sweat or blood) to serve as an electrolyte. It can operate at temperatures between -100 and +300 degrees Fahrenheit and can be printed like paper. (August 2007) Ref.619

### **New Insight into Methane-converting Catalyst**

New work reported by the International Consortium for Clean Energy, a collaboration among DOE's Pacific Northwest National Laboratory, the Chinese Academy of Sciences' Dalian Institute of Chemical Physics, and China's Institute of Coal Chemistry, sheds light on the optimum structure for a catalytic material, molybdenum oxide on a zeolite substrate, which can turn methane into benzene. (May 2008) Ref.620

### **New Materials Better for Separating Hydrogen from Other Gases**

One of the biggest difficulties for the fuel cell economy is efficiently producing pure hydrogen. Mercuri G. Kanatzidis, a chemist at Northwestern University, has developed a new class of honeycomb-like porous materials (a new family of germanium-rich chalcogenides) that are much more effective than current methods at separating hydrogen from complex gas mixtures. The technology is based on the differing behaviors of varieties of gas molecules as they pass through the separation material. (February 2009) Ref. 621

### **Electrostatic Capacitors Offer Energy Storage Improvement**

Prof. Gary Rubloff, director of the University of Maryland's NanoCenter, and his team have developed a family of nanotech-based electrostatic capacitors suitable for energy storage for such devices as electric vehicles. They are said to offer a 10 times improvement in energy storage density over current commercially available devices, while preserving high power and fast recharge characteristics. (March 2009) Ref. 622

## **Increasing Energy Efficiency Technologies**

'Energy Harvesting' Offers Possibilities for Environment-sparing Power  
New Wearable Energy Charger Technologies  
Highly Conductive Fabrics Promise More Efficient Energy Storage  
Power-generating Flexible Films Might Power Body-worn Devices  
New Materials May Be Solar Cell Breakthrough  
Nanowire Solar Cells Have Prospect of Higher Efficiency  
New Structure Almost Doubles Solar Cell Efficiency  
New Selective Radiation Surfaces May Save on Cooling Energy  
Nano-infused Paper Substrate Improves Energy Storage Capabilities  
Algae Provide Material for New Thin and Flexible Battery  
Genetically Modified Virus Claimed to Separate Hydrogen from Water  
Inexpensive Metal Catalyst for Hydrogen Generation from Water  
Fiber Bundles Claimed Safe for Hydrogen Storage and Cuts Costs and Weight  
Fiber-based Solar Cells Decrease Cost and Double Output  
New Dye-Sensitized Solar Cells Show Increase in Energy Conversion Efficiency  
Thin Crystalline-Silicon Photovoltaic Cells Offer Many Advantages  
Quantum Dots Offer New Possibilities for Energy from Waste Heat  
Carbon Nanotubes Yield Threefold Increase in Thermocell Efficiency  
Genetically Engineered Bacteria Convert CO<sub>2</sub> to Liquid Fuel  
Biofuels Production from Sunlight and CO<sub>2</sub>  
Solid Oxide Fuel Cell Claims Reduced Lifecycle Cost  
Nanofibers Provide Energy-efficient White Light  
Study of Cost and Availability of Possible New Solar Cell Materials  
Small Omnidirectional Wind Turbines Could Provide Remote Power  
Nano-based Solar Cell Material Offers Inexpensive Alternative  
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Magnetic Resonance Provides Short-range Power Source  
Silicon Nanocrystals Promise More Efficient Solar Cells  
Space-based Solar Power Has Significant Environmental Security Potential  
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Energy-free Glow Material  
Dye-sensitized Solar Cells Offer Shorter Energy Payback Time  
World Record solar cell efficiency achieved  
Photonic Crystal Provides 50% Cost Reduction  
Genetically Engineered Viruses Produce Advanced Battery Electrodes  
Genetically Engineered Virus May Improve Future Batteries  
Diatoms Help Build Better Dye-sensitized Solar Cells  
Refrigerator Temperature Sensor Mod Saves Energy  
Biologically Based Dyes Dramatically Lower Solar Cell Costs  
New Solar Cell/Battery Combination Saves Size and Weight  
Urine-powered Battery  
New Nanotechnology Batteries with Long Shelf Life  
Tiny Batteries Offer Several Promises  
New Promises for Flexible Solar Cells  
Flexible Plastic Solar Cells Converting 30% of Sun's Power into Usable Energy  
Flexible Solar Cells could be sewn in Clothing  
New Environmental-friendly Lighting Based on Gallium Nitride  
First Flexible Supercapacitor Built  
Mobile Unit Turns Waste into Energy  
Light Emitting Diodes Offer Big Environmental Advantages  
New Technique Provides Cheaper LEDs  
Photoelectric Energy Efficiency Increase by Photosynthesis-type Semiconductor Structure

### **'Energy Harvesting' Offers Possibilities for Environment-sparing Power**

A team of researchers at the Department of Aerospace Engineering, University of Bristol, UK, are investigating technologies for 'energy harvesting'—the gathering of energy from low amplitude vibrations that occur naturally in the environment, such as from machines or even the human body. Their research is directed at making use of a much larger variety of vibrations than is currently possible, by employing transducers that respond to a wider range of frequencies. (December 2009) Ref. 623

### **New Wearable Energy Charger Technologies**

A wearable electrocardiograph energy-harvesting device, which provides tens of microwatts of energy per square centimeter, was developed by two R&D organizations, Holst Centre of Eindhoven, Netherlands, and IMEC of Leuven, Belgium. Reportedly, they combined a thermal harvester, matched specifically to a human body, with a large reduction in the power consumption of the driven wearable electronics. The system was able to charge two 2.4 v. batteries, can be easily integrated into fabrics, and can be well protected against damage. It earned the inventors the 2009 European Frost & Sullivan Award for Technology Innovation. A technology for dye-based solar cells developed by Dr. Michael Grätzel, a chemist and professor at the École Polytechnique Fédérale de Lausanne in Switzerland, has been licensed for application by G24 Innovations of Campbell CA, and other companies. The cells are being

installed in sport bags, backpacks, and the like to allow users to recharge cell phones and other devices as they go about their activities; six to eight hours of sunlight is required for a full charge. Reportedly, companies like Nokia, Intel, Texas Instruments, Varta, and PG&E are carrying out R&D in this new field of “energy scavenging.” [Related item: *Energy Harvesting Offers Possibilities for Environment-sparing Power* in the December 2009 environmental security report.] (February 2010) Ref. 624

#### Advances in Generating Electricity from the Body

The Parametric Frequency Increased Generators (PFIGs) developed by researchers of the Univ. of Michigan’s Engineering Research Center for Wireless Integrated Microsystems are reported to be able to generate 0.5 milliwatts from typical vibrations in the human body. Both piezoelectric and electromagnetic induction types have been tested and are claimed to be more efficient than previous devices with vibrations that are non-periodic and occur at low frequencies. (March 2010) Ref. 625

#### **Highly Conductive Fabrics Promise More Efficient Energy Storage**

Dr. Liangbing Hu of Stanford University and colleagues have developed a family of highly conductive fabrics that hold out the promise of providing battery and supercapacitor electrodes with much higher energy density and durability than current exploratory materials like paper. (February 2010) Ref. 626

#### **Power-generating Flexible Films Might Power Body-worn Devices**

Michael McAlpine, a professor of mechanical and aerospace engineering at Princeton University, and colleagues have developed power-generating rubber films that are highly efficient in generating electrical energy when flexed. The films combine silicone and nanoribbons of lead zirconate titanate (PZT), a piezoelectric ceramic material that the developers say is 100× as piezo-efficient as quartz. (January 2010) Ref. 627

#### **New Materials May Be Solar Cell Breakthrough**

Two technologies developed by Prof. Benoît Marsan and colleagues at the Chemistry Dept. of the Université du Québec à Montréal may allow commercialization of the Grätzel dye-synthesized solar cell, a promising design based on the principle of photosynthesis, but whose application has been blocked by having a corrosive, opaque electrolyte and an expensive platinum electrode. Prof. Marsan's variant uses a newly formulated transparent and neutral electrolyte and an electrode coated with relatively inexpensive cobalt sulphide. (April 2010) Ref. 628

#### **Nanowire Solar Cells Have Prospect of Higher Efficiency**

Researchers at the Eindhoven University of Technology in the Netherlands are working on nanowire-based solar cells, which, when combined with proper mirror systems, might reach an efficiency as high as 65%, at a cost of less than \$0.50/watt. (June 2010) Ref. 629

#### **New Structure Almost Doubles Solar Cell Efficiency**

Researchers Kui-Qing Peng of Beijing Normal University, and Shuit-Tong Lee of the City Univ. of Hong Kong have developed a silicon solar cell with a unique and robust geometry of nanoholes having diameters of about 500-600 nm, achieving a power conversion efficiency of

9.5%, almost double the just over 5% efficiency of other current designs. (May 2010) Ref. 630

### **New Selective Radiation Surfaces May Save on Cooling Energy**

Prof. Geoff Smith and Dr Angus Gentle of the Institute of Nanotechnology at the University of Technology, Sydney, Australia, are conducting research on materials for building surfaces that radiate back into the atmosphere at night, heat that was absorbed during the day. The heat is radiated at wavelengths which are not absorbed by the atmosphere but continue on out into space. The surfaces are coated with a mixture of silicon carbide and silicon dioxide nanoparticles, and have cooled surfaces to 15°C less than ambient temperature in Sydney. The scientists point out that the surfaces could cool air or water, which could then be pumped through buildings to cool them. (January 2010) Ref. 631

### **Nano-infused Paper Substrate Improves Energy Storage Capabilities**

A research group at Stanford University, led by Yi Cui, assistant professor of materials science and engineering, has shown that paper coated with ink made of carbon nanotubes and silver nanowires makes a more durable component for flexible batteries and supercapacitors than the plastic used in previous experiments. According to Cui, "The paper supercapacitor may last through 40,000 charge-discharge cycles—at least an order of magnitude more than lithium batteries. The nanomaterials also make ideal conductors because they move electricity along much more efficiently than ordinary conductors." (December 2009) Ref. 632

### **Algae Provide Material for New Thin and Flexible Battery**

Scientists at the Ångström Laboratory at Uppsala University, Sweden, have developed a new type of battery, using algae-derived polypyrrole-coated cellulose for electrodes, separated by saline-soaked filter paper, yielding a product which, although less powerful than conventional units, is light-weight, inexpensive, and environmentally friendly to produce. (October 2009) Ref. 633

### **Genetically Modified Virus Claimed to Separate Hydrogen from Water**

Scientists at MIT have used a genetically modified virus to split water molecules into hydrogen and oxygen, similar to photosynthesis. (April 2010) Ref. 634

### **Inexpensive Metal Catalyst for Hydrogen Generation from Water**

Researchers with DOE's Lawrence Berkeley National Laboratory and the Univ. of California, Berkeley, have discovered an inexpensive metal catalyst that can effectively generate hydrogen from water. The proton reduction catalyst is based on a molybdenum-oxo metal complex that is about 70 times cheaper than platinum, today's most widely used metal catalyst for splitting the water molecule, according to Dr. Hemamala Karunadasa, who also states "In addition, our catalyst does not require organic additives, and can operate in neutral water, even if it is dirty, and can operate in sea water". At present, however, the process requires an excessive expenditure of electrical energy. (May 2010) Ref. 635

### **Fiber Bundles Claimed Safe for Hydrogen Storage and Cuts Costs and Weight**

Israeli scientists working for C. En Ltd. in Geneva claim that their new hydrogen-filled capillary fiber bundles provide safe storage of hydrogen for less than half the space and weight of tanks installed in existing hydrogen cars. A unit containing 4 million of the hair-thin capillaries will

store enough gas for 400 km of auto travel, according to the researchers. (April 2010) Ref. 636

### **Fiber-based Solar Cells Decrease Cost and Double Output**

Wake Forest University's Center for Nanotechnology and Molecular Materials has announced a new technology that inexpensively produces solar cells with double the power output of other designs. The cells are based on microscopic plastic optical fibers, enhanced with red dye or other absorbent. This raises the prospect of shipping the untreated cells to less developed areas for finishing with dye from pokeberries, which thrive under sub-optimal conditions, and where costs for such a processing facility would be low. The technology has been licensed to FiberCell Inc. in Winston-Salem NC. (April 2010) Ref. 637

### **New Dye-Sensitized Solar Cells Show Increase in Energy Conversion Efficiency**

A new type of dye yields dye-sensitized solar cells with a three-fold increase in energy conversion efficiency over current versions. The dye has been developed by researchers from Monash University and the University of Wollongong, Australia, and the University of Ulm, Germany. (December 2009) Ref. 638

### **Thin Crystalline-Silicon Photovoltaic Cells Offer Many Advantages**

Scientists at Sandia National Laboratories have developed crystalline-silicon photovoltaic cells from 14 to 20  $\mu\text{m}$  thick and 0.25 to 1 mm across. According to the announcement, the new devices "are expected eventually to be less expensive and have greater efficiencies than current photovoltaic collectors that are pieced together with 6-inch-square solar wafers." Further, "they use 100 times less silicon to generate the same amount of electricity," and "Since they are much smaller and have fewer mechanical deformations for a given environment than the conventional cells, they may also be more reliable over the long term." A major manufacturing convenience is that a very large number can be created from a single 12- or 18-inch diameter wafer, allowing defective cells to be individually discarded. (December 2009) Ref. 639

### **Quantum Dots Offer New Possibilities for Energy from Waste Heat**

Peter Hagelstein, an associate professor of electrical engineering at MIT, and associates have published a paper setting forth new results that promise major improvements in devices for converting waste heat into electrical energy, offering both high efficiency and high throughput power. Additional technological development will be needed, but MTPV Corp. of Boston is working on exploitation of these ideas. (November 2009) Ref. 640

### **Carbon Nanotubes Yield Threefold Increase in Thermocell Efficiency**

Dr. Ray Baughman, director of the Alan G. MacDiarmid NanoTech Institute at the Univ. of Texas at Dallas, and an international team of collaborators, report a way to use carbon nanotubes in large thermocells to generate electricity from heat at about 60% of the cost per watt of existing solar cells. (March 2010) Ref. 641

### **Genetically Engineered Bacteria Convert CO<sub>2</sub> to Liquid Fuel**

Scientists led by James C. Liao, Professor of Chemical and Biomolecular Engineering at UCLA's Henry Samueli School of Engineering and Applied Science, have genetically modified a cyanobacterium to consume CO<sub>2</sub> and use sunlight-driven photosynthesis to produce the liquid fuel isobutanol, which can potentially be used as a alternative to gasoline. (December 2009) )

Ref. 642

### **Biofuels Production from Sunlight and CO<sub>2</sub>**

Prof. David Wendell and colleagues at the Univ. of Cincinnati describe a design for foam loaded with natural (e.g. algal) enzymes that produce sugars from sunlight and carbon dioxide. The sugars can then be converted into biofuels. The process is more efficient than the natural one since all the incoming solar energy is used for the conversion, without part being diverted to support a living organism.

Meantime, Joule Biotechnologies, Inc. of Cambridge, MA announced arrangements for building its first pilot plant, in Leander TX, for developing and testing its continuous process system that uses genetically engineered organisms to directly convert sunlight and CO<sub>2</sub> into ethanol or other fuels. It claims that its lab-scale ethanol tests have already reached productivity rates exceeding 6,000 gallons/acre/year. (March 2010) Ref. 643

### **Solid Oxide Fuel Cell Claims Reduced Lifecycle Cost**

Thomas Adams and Prof. Paul I. Barton of the MIT Chemical Engineering Dept. have proposed a design for a natural-gas-powered solid oxide fuel cell that they claim, under a favorable carbon pricing structure, has a lower lifecycle cost than present designs. Their system produces pure CO<sub>2</sub>, avoiding the step, presently required for carbon sequestration, of separating that gas from the total output stream. (December 2009) Ref. 644

### **Nanofibers Provide Energy-efficient White Light**

Researchers at RTI International, Research Triangle Park, North Carolina report developing an energy-saving light source using polymer nanofibers. The device produces 55 lumens/watt of light output, more than five times as much as traditional incandescent lamps, provides excellent color-rendering, and, unlike CFLs, does not contain mercury. (February 2010) Ref. 645

### **Study of Cost and Availability of Possible New Solar Cell Materials**

A new study from the Energy and Resources Group and the Department of Chemistry at the University of California, Berkeley, and the Lawrence Berkeley National Laboratory (LBNL) investigates the cost and availability of a number of possible solar cell materials. According to a story from the Environmental News Network, "The UC Berkeley study evaluated 23 promising semiconducting materials and discovered that 12 are abundant enough to meet or exceed annual worldwide energy demand. Of those 12, nine have a significant raw material cost reduction over traditional crystalline silicon, the most widely used photovoltaic material in mass production today." (February 2009) Ref. 646

### **Small Omnidirectional Wind Turbines Could Provide Remote Power**

quietrevolution ltd. [sic] of London, England, has developed a wind turbine, which is silent, only 16' tall and 9' in diameter, and responds to wind from any direction. The manufacturer estimates its probable output on a typical site at 6000-10000 kWh per year, i.e., up to about 1 kW continuous equivalent. Further development is expected to greatly reduce its current cost of almost \$45,000 plus installation. (September 2008) Ref. 647

### **Nano-based Solar Cell Material Offers Inexpensive Alternative**

Scientists at New Jersey Institute of Technology's Department of Chemistry and Environmental

Sciences have developed an inexpensive polymer solar cell material that can be painted or printed on flexible plastic sheets. The material uses a carbon nanotube complex combined with buckyball fullerenes, and offers a cost advantage over purified silicon. [See also *Biologically Based Dyes Dramatically Lower Solar Cell Costs* in April 2007 and *Photonic Crystal Provides 50% Cost Reduction* in March 2007 environmental security reports.] (July 2007) Ref.648

#### **New Solar Cell Design Raises Efficiency**

Prof. Ely Sachs and colleagues at MIT have developed a solar cell design that offers a 27% increase in efficiency over existing devices. They predict that the cells' present cost of \$1.85/watt can be reduced to about \$1.35/watt. The new multi-crystalline silicon cells embody several improvements, which increase the amount of light reaching the active elements in the cells. Commercialization of the development is being done by 1366 Technologies. [See also *New Project for Nanowire Solar Cells* in January 2008, *Reducing Military Footprint with Solar Energy at 30 Cents per Watt* in November 2007, and other similar items in previous environmental security reports.] (April 2008) Ref.649

#### **Improved Solar Cell Promised in a Year**

SUNRGI Company announced the development of a solar cell technology which they say will deliver power at 7¢/kWh, around the price of coal-fired energy. Their panels use lenses to concentrate sunlight, and a proprietary cooling system to prevent consequent cell damage from heating. Start of production is scheduled for mid-2009. IBM has also released details on a similar technique. (May 2008) Ref.650

#### **Nanoparticles Increase Solar Cell Light-gathering Efficiency by 30%**

Work led by Kylie Catchpole, now at the Australian National University, has resulted in the discovery that a thin film of metallic nanoparticles applied to the surface of a solar cell can increase light capture for long-wavelength light by a factor of more than ten, and improve overall cell light-gathering efficiency by 30%. (December 2008) Ref. 651]

#### **Two New Nanotech-based Power Source Improvements**

Nanotechnology has pointed the way to two new improvements in portable power sources, suitable for environment-sensing devices. In the first, a team under Prof. Joel Schindall of the Laboratory for Electromagnetic and Electronic Systems at MIT has developed a capacitor whose electrodes are covered with a forest of millions of nanotubes, enormously increasing their effective surface area, the governing factor for the amount of charge a capacitor can hold. Such a device can compete with a conventional battery in terms of the total amount of power it can deliver over a period of time, and, since it does not involve a chemical reaction, has the added advantages that it is almost instantly chargeable and would not wear out with hundreds of thousands of recharging cycles, avoiding the used battery disposal problem.

The other new technology comes from France, where Prof. Patrice Simon of the Université Paul Sabatier, who was aided also by colleagues at the Université Picardie Jules Verne, describes the development of lithium-ion battery electrodes that have several times the energy capacity by weight and volume of existing electrodes. As in the scheme above, the electrodes are covered with a forest of nanotubes. This 3D configuration provides 50 sq cm of active area for each sq cm of base area. (June 2006) Ref.652

**Formic Acid Provides New Fuel Cell Medium**

Matthias Beller and colleagues at the Leibniz Institute for Catalysis, in Rostock, Germany have developed a technique to convert formic acid into hydrogen at low temperatures (26°C to 40°C). The new process is suitable for low-power fuel cell applications, like mobile electronic devices, rather than for vehicle usage. It does not require a high-temperature steam reforming unit, as methanol does (instead, it is converted to hydrogen by a ruthenium-based catalyst) and its power/weight ratio is only one-third that of methanol. (May 2008) Ref.653

**Titanium Nanotube Catalyst A Step Forward in CO<sub>2</sub> to Methane Conversion**

Craig Grimes and his group at the Materials Research Lab of the Pennsylvania State University have developed a technology, based on catalytic titanium dioxide nanotubes coated with copper and platinum particles, that uses sunlight to convert a mixture of carbon dioxide and water vapor to natural gas at a rate twenty times higher than any previously published results. This is not yet a practical level, but the researchers are working on improvements that they hope would provide at least two orders of magnitude better performance. (February 2009) Ref. 654

**New Low Power Chip Suitable for Tiny Environmental Sensors**

The new Phoenix Processor, developed by Scott Hanson and Mingoo Seok at the Univ. of Michigan's Dept. of Electrical Engineering and Computer Science, uses just 30 picowatts in sleep mode and only 90 nanowatts in active mode. The chip measures 1 mm<sup>2</sup>, the same as its battery, which can be so small because of the low power requirement. The small size means that the sensors using the chip could be scattered around in an environment-sensing network. The chip contains a built-in low power timer that causes it to run on a 0.1 sec/10 min awake cycle, suitable for sensing applications. (June 2008) Ref.655

**New Sunshine Distribution System Provides Energy-free Lighting**

The Solatube system collects sunlight from a rooftop unit and distributes it to interior spaces through specially designed optical tubes, eliminating the need for external power for illumination when daylight is sufficient. (January 2008) Ref.656

**New Project for Nanowire Solar Cells**

The Department of Engineering Physics at McMaster University in Hamilton ON, Cleanfield Energy, and the Ontario Centres of Excellence (OCE) have formed a partnership for a three-year project to pursue the commercialization of nanowire technology in the production of more affordable solar cells. (January 2008) Ref.657

**Magnetic Resonance Provides Short-range Power Source**

Marin Soljacic of the Massachusetts Institute of Technology has developed a technique for transmitting electric power at usable efficiency over distances of a few meters, using tailored oscillating electric and magnetic fields. Dr. Zhong Lin Wang and colleagues at the Georgia Institute of Technology have succeeded in using nanotechnology to produce an electric generator that can be embedded in the human body and may have the potential, when fully developed, of producing usable amounts of power from such mechanical sources as the pulsation of the arterial system. The combination offers locally produced, locally consumed, and environmentally friendly electricity. (July 2007) Ref.658

**Silicon Nanocrystals Promise More Efficient Solar Cells**

Scientists at the National Renewable Energy Laboratory (NREL), in Golden CO, have shown that silicon nanocrystals can increase the efficiency of conventional solar cells from its present 20% to 40%, at much lower cost than other approaches to high efficiency cells. [See also *Nano-based Solar Cell Material Offers Inexpensive Alternative* in July 2007 and other previous environmental security reports.] (August 2007) Ref.659

**Space-based Solar Power Has Significant Environmental Security Potential**

A US National Security Space Office (NSSO) report, *Space-Based Solar Power: As an Opportunity for Strategic Security*, states that Space Based Solar Power (SBSP) can reduce half a trillion dollars a year in military costs by stopping energy-related wars before they start, and that SBSP can be tested in orbit within five years. SBSP has the potential to provide base load electricity on a global basis without producing greenhouse gases or nuclear waste. Geostationary satellites could convert solar energy into electromagnetic beams that are transmitted to receivers around the world that feed local electric grids. The report argues that military leadership in development and demonstration is probably necessary to speed civilian commercialization, as was the case with the Internet. One hundred and seventy academic, scientific, technical, legal, and business experts around the world participated in the study. The Executive Summary of the NSSO report states that, "...perhaps the greatest military benefit of SBSP is to lessen the chances of conflict due to energy scarcity by providing access to a strategically secure energy supply." (October 2007) Ref.660

**Reducing Military Footprint with Solar Energy at 30 Cents per Watt**

Current solar photovoltaic technology costs about \$3.00 per watt. Nanosolar Inc. has announced that it will lower costs to \$0.30 per watt, commercially available next month. The new production process makes the solar cell sheets 100 times thinner and 100 times faster with solar-absorbing nano-ink that can transfer sunlight into electrical power. [See also *Nano-based Solar Cell Material Offers Inexpensive Alternative* in July 2007 and other similar items in previous environmental security reports.] (November 2007)661

**Energy-free Glow Material**

MPK Co. of Clayton, WI has developed a tritium-based material, "Litrosphere", which produces a low-level glow for more than 12 years without energy input. Trace tritium beta decay in phosphor microspheres provides the energy source. Safety is claimed. It can cover a standard sheet of paper for about 35 cents, comes in a variety of colors, and can take the form of either paint or injection-molded plastic. Its luminous output cannot compete with conventional lighting sources, but it is highly suitable for marking objects that need to be spotted in the dark, saving energy and lowering maintenance requirements. (December 2007) Ref.662

**Dye-sensitized Solar Cells Offer Shorter Energy Payback Time**

It is estimated that conventional photovoltaic solar cells must be in service for around three years before they have produced as much energy as that required to manufacture them. However, the "Grätzel" or "dye-sensitized" solar cell has now gone into large-scale production. This type of device uses a combination of titanium dioxide and an organic dye molecule, often containing ruthenium, which are immersed together in a liquid electrolyte. A Netherlands independent photovoltaic-research firm has estimated that such dye-sensitized cells installed in southern



Europe would have as short an energy payback time as six months. G24 Innovations, in Cardiff, Wales, has announced that it expects to be able to make enough dye-sensitized photovoltaic cells each year to provide 30 megawatts of peak generation capacity. Other companies are also pursuing this development. (December 2007) Ref. 663

### **World Record solar cell efficiency achieved**

Spectrolab, a subsidiary of Boeing, announced the development of a new solar cell that can convert 40.7% of the sunlight into electricity. The conversion efficiency of today's conventional solar cells is between 12% and 18%. The Department of Energy claims that 'this breakthrough may lead to systems with an installation cost of only \$3 per watt, producing electricity at a cost of 8-10 cents per kilowatt/hour, making solar electricity a more cost-competitive and integral part of our nation's energy mix.' (January 2007) Ref. 664

### **Photonic Crystal Provides 50% Cost Reduction**

StarSolar, in Cambridge MA, has developed a technology which allows a solar cell to produce the same amount of electricity with much less silicon, thereby cutting the cost of the energy by up to half, according to the developing organization, a licensee of MIT. The technique uses a so-called photonic crystal to reflect the incident light in such a way that more of it reaches the silicon layer, which can therefore be thinner. (March 2007) Ref. 665

### **Diatoms Help Build Better Dye-sensitized Solar Cells**

Researchers at Oregon State University and Portland State University have created a new way to make "dye-sensitized" solar cells, according to an announcement by chemical engineering Prof. Greg Rorrer at OSU. It turns out that diatom skeletons have an ideal nanostructure to serve as the basis for the semiconductors for a dye-sensitized solar cell. The skeletons may have come from diatoms raised in an environment containing titanium rather than silicon, so that they actually consist of titanium dioxide, or they may be normal skeletons that have been "frosted" with the titanium material. In either case, the physical "shape" of the diatom film is such that a solar cell made with these semiconductors is more efficient at converting incident light into energy. (April 2009) Ref. 666

### **Genetically Engineered Viruses Produce Advanced Battery Electrodes**

Profs. Angela Belcher, Gerbrand Ceder, and Michael Strano of MIT have developed the first devices that use a potentially fast and inexpensive technology in which battery anodes and cathodes are "grown" by a genetically engineered bacteriophage that accumulates conductive materials on a polymer separator. The researchers are now working on up- and down-sizing the components, and improving their rechargeability life. (April 2009) Ref. 667

### **Genetically Engineered Virus May Improve Future Batteries**

A genetically engineered virus has been used by scientists at MIT to produce the positive electrode of a lithium-ion battery. The virus proteins contain an amino acid that binds to cobalt ions in a solution, giving the proteins, after some treatment, a coating of cobalt oxide, which has much higher storage capacity than the carbon-based materials now used in lithium-ion batteries. A further improvement was obtained by adding gold as an ingredient, in addition to cobalt. This technique holds a promise for much improved battery manufacturing methods, although much development remains to be done. (April 2006) Ref. 668

**Refrigerator Temperature Sensor Mod Saves Energy**

The UK firm eCube Distribution Ltd., of Ilford, Essex, is marketing a device that modifies the operation of a refrigerator's temperature sensor in a way that may significantly reduce the unit's energy consumption. It consists of a wax sleeve that fits around the sensor and which has the thermal characteristics of a solid like food. An unmodified refrigerator senses the temperature of the air in the unit, rather than that of the contained food. When the door is opened, the temperature of the air rises rapidly, often triggering the cooling element to start, even though that of the food remains unchanged. The modified sensor causes cooling to be activated only when the temperature of the actual contents exceeds the preset limit. In a test in a hotel, where the doors are frequently opened and closed, the device reduced energy consumption by 30%. (March 2007) Ref. 669

**Biologically Based Dyes Dramatically Lower Solar Cell Costs**

Massey University's Nanomaterials Research Centre in Wellington, New Zealand, has developed a range of colored dyes for use in dye-sensitized solar cells that promises to lower costs by 90% compared to silicon-based photo-electric solar cells. The dyes are related to such organic molecules as chlorophyll and hemoglobin. The cells have the added advantage of working well in low-light environments. (April 2007) Ref. 670

**New Solar Cell/Battery Combination Saves Size and Weight**

A new family of batteries incorporating solar cells for self-charging is being developed by an international partnership of Konarka Technologies of Lowell MA, a maker of thin-film "plastic" solar cells, and the German company VARTA-Microbattery, which layered Konarka's technology onto a lithium-polymer battery. Not only are the new devices small and light, they also operate even at lower levels of illumination. (April 2007) Ref. 671

**Urine-powered Battery**

Ki Bang Lee and a team of researchers at Singapore's Institute of Bioengineering and Nanotechnology have developed a very inexpensive and miniaturized power source suitable for biochips used for healthcare testing and disease detection, as in a BW situation. The battery is formed by soaking a credit-card-sized piece of paper in copper chloride, sandwiching it between strips of magnesium and copper, and laminating it between transparent plastic films. When the paper is moistened with a drop of urine, the device generates 1.5 volts of electricity. (August 2005) Ref. 672

**New Nanotechnology Batteries with Long Shelf Life**

Scientists at Lucent Technologies Bell Labs have developed a new class of batteries, which they call "nanobatteries". They are estimated to have a shelf life of at least 15 years, and are based on a silicon "nanomembrane" whose tiny honeycomb-like grid holds the electrolyte away from the electrodes until power is needed, at which point it becomes liquid-permeable, releasing the electrolyte drops to pass through, activating the cell. (February 2006) Ref. 673

**Tiny Batteries Offer Several Promises**

Phase Technologies, in collaboration with Rutgers Univ. and Bell Laboratories, is working on tiny batteries that can hold their charge much longer than today's cells, and could be integrated

directly into a circuit board rather than connected by wires. "This is something small, less than postage-stamp size that could be integrated into the same piece of silicon that is housing the electronics," according to Ron Durando, CEO of mPhase. Foresight Institute believes that the work might lead to batteries with a 20-year shelf life. The technology is based on a material called "nanograss", developed at Bell Labs, which permits the control of the interaction of electrolytes within the battery. (September 2005) Ref. 674

#### **New Promises for Flexible Solar Cells**

Researchers at Wake Forest University's Center for Nanotechnology and Molecular Materials have developed an organic solar cell technology (cells are as thin as a coat of paint) with almost 6% efficiency in turning sunlight into useful electrical power. The new technology might be available to consumers in about five years. [See related item *Flexible Plastic Solar Cells Converting 30% of Sun's Power into Usable Energy* in January 2005 environmental security report] (November 2005) Ref. 675

#### **Flexible Plastic Solar Cells Converting 30% of Sun's Power into Usable Energy**

Researchers at the University of Toronto, Canada have invented an infrared-sensitive material that could turn the sun's power into electrical energy at 5 times higher efficiency than present methods. This flexible plastic solar cell harnesses infrared light from the sun (half of the sun's spectrum not previously accessed) and forms a flexible film on the surface of cloth, paper or other materials, becoming a 'portable' energy source. (January 2005) Ref. 676

#### **Flexible Solar Cells could be sewn in Clothing**

A European Union research project called H-Alpha Solar has developed light, flexible solar panels that could be sewn on fabrics and placed on surfaces to charge objects such as cell phones. When in full production, it is estimated to cost about 1 euro (\$1.34) per watt. (December 2004) Ref. 677

#### **New Environmental-friendly Lighting Based on Gallium Nitride**

Prof. Colin Humphreys from Cambridge University, UK, is developing gallium nitride-based light bulbs that could last 100 times longer than light bulbs used today. Scientists agree that using gallium nitride in light-emitting diodes (LEDs) could help cut emissions of carbon dioxide and other greenhouse gases by 15%. While different nitride-based LED applications could soon materialize, it might take 5-10 years to develop the technology to produce gallium nitride LEDs with an acceptably white light for home and office lighting. Since lighting accounts for 20% of electricity use in developed countries and 40% in developing ones, the financial and environmental savings could be considerable. (May 2005) Ref. 678

#### **First Flexible Supercapacitor Built**

Prof. George Grüner's group at UCLA has developed the world's first flexible supercapacitor by spraying carbon nanotubes onto plastic films that serve as both the device's electrodes and charge collectors. Their current designs are relatively inefficient, but the scientists believe that valuable insights are being obtained into the issues of manufacturing and material selection engineering. (April 2009) Ref. 679

**Mobile Unit Turns Waste into Energy**

The IST Energy Corp. of Waltham, MA has announced its new GEM (Green Energy Machine) mobile waste-to-energy conversion system that can turn two to three tons of post-consumer rubbish – paper, plastic, food, wood and agricultural materials – a day into usable “energy pellets” that can be gasified and used to run a natural gas generator, which in turn can power the unit. (February 2009) Ref. 680

**Waste Gasification Still a Controversial Technique**

A recent article in *New Scientist* reviewed the current state of waste gasification and also noted objections being raised to that technology. According to the article, “Pilot gasification plants are being set up at various sites in the US, Canada, France, the UK and Portugal, most of them using the plasma technique. Japan already has two commercial plasma plants, but these are focused primarily on simply disposing of household waste rather than generating energy from it.” Plans for a large plant in Florida have been scaled down, and earlier plasma plants in Germany and Australia were shut down after failing to meet emissions standards. (April 2009) Ref. 681

**Light Emitting Diodes Offer Big Environmental Advantages**

A recent paper in the special energy issue of *Optics Express* summarizes the tremendous environmental advantages LEDs offer over other lighting means, and predicts “a revolution in energy-efficient, environmentally-sound, and powerfully-flexible lighting”. They are 5 to 20 times as energy-efficient as other light sources, and their manufacture does not use toxic materials such as mercury. They also offer controllable color and polarization. Researchers in materials science and engineering at the University of Florida produced organic LEDs in various colors that achieve efficiencies of 50 lumens/watt (with hopes for 100 lumens/w or higher, eventually). (December 2008) Ref. 682

**New Technique Provides Cheaper LEDs**

A team at Cambridge University, led by Colin Humphrey, has developed a new production technique for gallium nitride LEDs that allows them to be grown on a silicon wafer and brings their price down to levels competitive with other types of light sources. [See *Light Emitting Diodes Offer Big Environmental Advantages* in December 2008 environmental security report.] (January 2009) Ref. 683]

**Photoelectric Energy Efficiency Increase by Photosynthesis-type Semiconductor Structure**

Prof. P. G. Lagoudakis of the School of Physics and Astronomy, University of Southampton (England), and colleagues have developed a colloidal nanocrystal quantum dot technique. It was suggested by natural photosynthesis structures, and is reported to yield a six-fold increase in photocurrent conversion efficiency compared to previous semiconductor devices. (March 2009) Ref. 684

**EARLY WARNING SYSTEMS****Multi-component Environmental Sensing System Could Help Anticipate Crises**

Prof. Eyal Ben-Dor of Tel Aviv University’s Department of Geography has recently described applications of his team’s ‘Hyperspectral Remote Sensor’ concept, which combines ground-, air-

, and space-based physical, chemical and optical sensors to provide advance warnings of disasters or post-event damage assessments. (October 2009) Ref. 685

### **Landslide-Predicting Sensors to Be Developed**

Dr. Kirk Martinez, from Southampton University's School of Electronics and Computer Science, and Prof. Jane Hart, of the School of Geography, are continuing to develop fist-sized sensors that will monitor such soil parameters as light, conductivity, tilt, temperature, and movement, and transmit the data by radio, enabling the prediction of imminent landslides. (April 2010) Ref.686

### **Elements of Prototype Tsunami Prediction System Tested**

Reportedly, a team from NASA's Jet Propulsion Laboratory in Pasadena CA has "successfully demonstrated for the first time elements of a prototype tsunami prediction system that quickly and accurately assesses large earthquakes and estimates the size of resulting tsunamis." A key element in the new system's performance is its taking into account the characteristics of the continental shelf near the epicenter. (June 2010) Ref. 687

## **SPACE TECHNOLOGY**

- [Increased Use of Space Technology for Monitoring Environmental Events](#)
- [Greenhouse Gas Observing Satellite Could Help Enforcing Environmental Regulations](#)
- [Space Technology for Environmental Security](#)
- [Space-Based Services for Improving Emergency Response](#)
- [New UN Satellite Standards to Help in Natural Disaster Situations](#)
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- [European Space Agency's Soil Moisture and Ocean Salinity Mission to Help Improve Water Management](#)
- [European Space Agency \(ESA\) UrbEx used to tag urban 'hot spots'](#)
- [International Atomic Energy Agency \(IAEA\) Inspectors Use Satellite Feeds to Track Sensitive Nuclear Materials](#)
- [Improved Satellite Climate Change Monitoring](#)
- [India to Set Up Military Surveillance and Reconnaissance System by 2007](#)

### **Increased Use of Space Technology for Monitoring Environmental Events**

Kopernikus is the new name of the European joint earth observation system GMES (Global Monitoring for Environment and Security). In addition to monitoring environmental events, Kopernikus will enhance people's safety by providing early warnings of natural disasters and a basis of enhanced modeling activities to help better understand the drivers of climate change. The EU 5th Space Council adopted a Resolution on the priorities of Galileo and Kopernikus programs, while the Space Council highlighted the need to improve the coordination between

civil and defense programs, and noted the intention of ESA's Director General to submit a proposal for a program on Space Situational Awareness to set the basis towards the development of a European capability for monitoring European space infrastructure and of space debris. Chinese officials say they have launched their first two natural disaster and environment monitoring satellites.

A report by the U.S. Climate Change Science Program concluded that the utilization of Earth science information to manage resources and protect public health should improve. (September 2008) Ref. 688

### **Greenhouse Gas Observing Satellite Could Help Enforcing Environmental Regulations**

Japanese Greenhouse Gases Observing Satellite "IBUKI" (meaning "breath") is the world's first satellite dedicated to monitoring greenhouse gas emissions. It circles the earth every 100 minutes and monitors the levels of CO<sub>2</sub> and methane at 56,000 observation points. The data should help the global effort to understand and combat global warming. (January 2009) Ref. 689]

### **Space Technology for Environmental Security**

The 2007 ESA Envisat Symposium discussed how ESA (European Space Agency) satellites could improve understanding of the carbon cycle and thus advance climate change forecasting, improve decisionmaking, and also improve monitoring of international treaties aimed at reducing greenhouse gas emissions, such as the Kyoto Protocol. Special sessions were dedicated to the Global Monitoring for Environment and Security (GMES) program, and use of Earth observation satellites in support of international environmental conventions. Prior to the Symposium a high-level conference was held: "The Way to the European Earth Observation System GMES—Munich Roadmap" regarding the first GEMES services, the Commission's proposal for GEMES long-term sustainability, and the proposal for adoption by the Council and implementation of the first generation of GMES-dedicated satellites. GMES is also a key part of the new European Space Policy adopted by the European Commission, to be presented for discussion and endorsement to the Space Council on 22 May 2007. [See also *Space Technology for Improving Planetary Knowledge and Security, Space Technology to Help Enforce Environmental Regulations in November and Climate Change--Improved Satellite Climate Change Monitoring and other related items.*] (April 2007) Ref. 690

### **Space-Based Services for Improving Emergency Response**

The Health Early Warning System will improve warning and emergency response in case of natural disasters and pandemics by using satellite communication. HEWS consists of a communication network via satellite to survey and monitor risk indicators. It is connecting end-user relieve agencies with command centers, provides wide, real-time perspective of the events and knowledge related to the threat, and helps with logistical support, thus improving the emergency effort efficiency. HEWS is an open platform, widely implementable. Another European initiative, Eurisy programme dedicated to Local and Regional Authorities, aims to help end-user communities understand how space technology-based tools can help them in some complex activities such as monitoring environment matters, handling natural disaster, and e-Government. The Conference "Future Challenges for Local and Regional Authorities: How can Space Technology help?" held May 29-30 in Barcelona, is the first event of Eurisy's 3-year programme. The China National Space Administration joined on May 24, 2007, the International Charter "Space and Major Disasters," an international network of international, private and

government space agencies that aims to provide satellite data free of charge in emergency situations to those affected by disasters anywhere in the world. At the Pan African Parliament's (PAP) Seventh Ordinary Session held in May 2007, delegates recommended increased international cooperation in scientific and technological research, including the use of space tools to help decision-making related to fight against desertification and climate change. (May 2007) Ref. 691

### **New UN Satellite Standards to Help in Natural Disaster Situations**

The UN International Telecommunication Union (ITU) approved a set of new recommendations for radio-communication standards for satellite services in case of natural disasters. They refer to radio frequencies that can be used by both fixed-satellite service (FSS) and mobile-satellite service (MSS) systems for facilitating emergency and disaster relief operations. The ITU calls on the international community, policymakers, and service providers to further enhance efforts for developing robust and comprehensive systems for early warning, relief, and mitigation in case of emergencies and disasters at international, regional, and national levels. (March 2010) Ref.692

### **Space Technology to Help Enforce Environmental Regulations**

Space observations have become a major tool for monitoring environmental change, helping policy making, developing adequate strategies, and assisting enforcing environment-related regulations. The European Space Agency (ESA) is participating in the climate change summit in Montreal, to share results from satellite-based forest mapping services developed to support the Kyoto Protocol. Another ESA project, Globwetland, supports the Ramsar Convention on Wetlands by developing a global wetland information service using satellites. ESA's project called CONTRAILS is a satellite-based service to monitor daily contrail and cirrus cloud generation by airplanes over Europe and the North Atlantic for a detailed assessment of the greenhouse impact of aviation-induced contrails. The project results are expected at the beginning of 2006. ESA and the EC Joint Research Centre (JRC) signed an agreement of cooperation for using Earth Observation data in support of the information services of the EU. This will enhance the policy support role of the Global Monitoring for Environment and Security system. [See also Climate Change—Improved Satellite Climate Change Monitoring in June 2005 and other related items on the same issue in previous environmental security reports.] (November 2005) Ref. 693

### **Satellite Technology Use for Environmental-related Issues Expands**

Following the adoption of the Global Monitoring for Environment and Security (GMES) Declaration by the ESA Ministerial Council, December 5-6 2005, new EU Member States can now be formally involved in the program. The ESA Council also reinforced full support for the GMES Program, which aims to provide the public and policy- and decision-makers essential strategic environmental and civil security information based on operational and integrated space, air, ground, and sea observations. The possible applications would include—but not be limited to—environmental monitoring, risk management and early warning, and climate and weather forecasting. GMES should deliver its first operational Service Elements in 2008. As pointed out at the UN Climate Change Conference in Montreal, satellite technology could also play an increasing role in the efforts for monitoring greenhouse gas emission and developing new mechanisms to combat global warming. [See also Space Technology to Help Enforce Environmental Regulations in November and *Climate Change—Improved Satellite Climate*

*Change Monitoring* in June 2005 and other related items on the same issue in previous environmental security reports.] (December 2006) Ref. 694

### **Space Technology for Improving Planetary Knowledge and Security**

Over 8000 scientists convened in Vienna, Austria, April 3–7 for the third annual European Geosciences Union (EGU) General Assembly. The discussions through the 400 thematic sessions revealed the importance of space technology in contemporary planetary sciences. Prominent subjects included changes in CO<sub>2</sub> levels and their impact on biodiversity; the use of satellite technology in enhancing weather predictions; greater understanding of polar ice loss; deep sea research using marine mammals; the use of solar-powered robots for polar research; and satellite altimetry to predict sea level change and predict its impacts. Space technology proves to be of great help in monitoring present flooding in Europe and world population mapping, increasing timely and more efficient response. NASA's CloudSat and CALIPSO research satellites launched this month will help scientists refine computer models that forecast the weather and chart global climate change. [See also *Satellite Technology Use for Environmental-related Issues Expands* in December 2005, *Space Technology to Help Enforce Environmental Regulations* in November and *Climate Change--Improved Satellite Climate Change Monitoring* in June 2005 and other related items on the same issue in previous environmental security reports.] (April 2006) Ref. 695

### **European Space Agency's Soil Moisture and Ocean Salinity Mission to Help Improve Water Management**

ESA's SMOS is consistently mapping soil moisture in land and salinity in oceans, documenting their variations and thus advancing understanding of the water cycle and helping weather and climate modeling, as well as improving water resource management. (February 2010) Ref. 696

### **European Space Agency (ESA) UrbEx used to tag urban 'hot spots'**

As part of ESA's Data User Programme aimed at finding innovative, operational applications of Earth observation data to solve environmental and other problems, ESA Urban Expansion (UrbEx) project worked with WWF Italia for monitoring the urbanization of the Italian coast to catch overdeveloped 'hot spots'. In addition to demonstrating the capability to monitor urban growth using Earth observation information, the project included the development of an imagery database and analytical tools to assess the growth of urbanization and its impact on natural resources. (May 2003) Ref.: 697

### **International Atomic Energy Agency (IAEA) Inspectors Use Satellite Feeds to Track Sensitive Nuclear Materials**

IAEA is building a global network for monitoring nuclear facilities by using direct satellite information. This will enhance the possibility of real-time tracking of sensitive nuclear materials and checking that they are not being diverted for non-peaceful use. The first field trial connecting a nuclear power plant in Slovakia to IAEA headquarters started in April this year and the results of the feasibility study for a prospective global system are expected by the end of the year. IAEA will be working with the European Space Agency on the system. (July 2005) Ref. 698

### **Improved Satellite Climate Change Monitoring**

The UK's National Physical Laboratory designed the first unmanned probe able to calibrate its



instruments in orbit, Traceable Radiometry Underpinning Terrestrial and Helio Studies (TRUTHS). This will reduce the margin of error and be able to supply more accurate satellite data, thus improving climate change parameter monitoring and helping settle international disputes over greenhouse gas emissions and strategies to curb global warming; e.g., carbon trading. [See also *Global Earth Observing System of Systems (GEOSS) Gets 10-Year Mandate* in February 2005, and *Improved coordination of global Earth observation* in August 2003 environmental security reports.] (June 2005) Ref. 699

### **India to Set Up Military Surveillance and Reconnaissance System by 2007**

Indian Defence Minister Pranab Mukherjee recently declared that India's satellite-based Military Surveillance and Reconnaissance (SBS) System that was supposed to be operational this year, is now in an advanced stage of development and will begin functioning by 2007. (August 2005) Ref. 700

### **Technologies that Could Trigger New Forms of Arms Race**

[International Standards Needed to Reduce Hi-tech SIMAD Threats](#)

[Synthetic Gene Ordering Security Screening Up for Discussion](#)

[Computer-Designed Genome Creates First "Artificial Cell"](#)

[Botox Creates Basis for New Terrorist Weapon](#)

[International Legal Frameworks Needed for Cybersecurity](#)

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[Modern Warfare Increasingly Harmful to the Environment](#)

[Future Proliferation of Autonomous Ground and Air Robot Weapons](#)

[Accelerating Synthetic Biology Applications Need Better Monitoring and Regulation](#)

[Technology and Biological Weapons: Future Threats--Report](#)

[SIPRI 2004 Yearbook Warns about Genetic Weapons](#)

[Future Computer-Human Interface Means Cyber Viruses Could Infect Humans](#)

[Futuristic Nanotech and Synthetic Bioweapons Regulations](#)

[Weather modification technologies](#)

[Chinese Use of Weather Modification Technologies Might Cause Disputes](#)

[Nanobacteria in Clouds could Spread Disease](#)

[The Human Epigenome Project](#)

[Laser Technology \(solid-state and chemical lasers\) used in destructive engagements](#)

[Gamma-Ray Weapons would be capable of killing any living thing in the immediate area and any undetonated isomer could be a somewhat "dirty" bomb](#)

[Bioweapons are already possible to make, says new CIA report](#)

[Artificial virus that could lead to a new life form was created](#)

[New lethal viruses development](#)

[Tree Pathogens](#)

[A new Biodefense Agency within the Office of the Secretary of the U.S. Department of](#)

## Defense suggested

### **International Standards Needed to Reduce Hi-tech SIMAD Threats**

The development of artificial biology, cognitive science, nanotechnology, electromagnetic pulses, and other hi-tech advances, combined with the availability of information via the Internet and low-cost components necessary to produce hi-tech weapons by individuals or non-state actors, as well as the increase of terrorism and social unrest (often exacerbated by environmental factors), increase the threat of SIMAD (single individuals massively destructive). “E-bombs” based on electromagnetic pulses are capable of destroying the electronics in civilian aircraft; suitcase-sized electronic warfare devices can disable the power grid of an entire region; and research on computer-mediated telepathy such as Silent Talk might one day be used to intercept and distort thoughts. There are no international standards to help prevent such hi-tech systems’ future use by SIMAD. [See also *New Technologies Need New Regulations Systems* in March 2009.] (May 2009) Ref. 701

### **Synthetic Gene Ordering Security Screening Up for Discussion**

A proposed Code of Conduct for the DNA synthesis services industry is scheduled to be discussed and possibly adopted at the International Association of Synthetic Biology’s (IASB) Second Annual Industry Workshop on Technical Solutions for Biosecurity in Synthetic Biology in Cambridge MA on November 3, 2009. The IASB developed such a code, but a similar but less rigorous and less costly process is advocated by two leading companies, raising safety concerns among scientists. A UC Berkeley scholar characterizes it as “a standards war that is a race to the bottom.” (September 2009) Ref. 702

### **Computer-Designed Genome Creates First “Artificial Cell”**

Researchers at the J. Craig Venter Institute announced the successful construction of the bacterial cell *Mycoplasma mycoides* JCVI-syn1.0, the first synthetic cell designed in a computer and self-replicating, controlled only by the synthetic genome. Since the applications could vary from great improvements to the human condition to new forms of bioweapons, President Obama assigned the Presidential Commission for the Study of Bioethical Issues to assess the potential opportunities as well as risks (such as environmental and security) triggered by the new achievement. Meanwhile, the FBI Biological Sciences Outreach Program launched an initiative aimed at educating scientists on the potential security threats posed by synthetic biology. [Related item: *New Technologies Need New Regulations Systems* in March 2009 and other items on this issue in previous environmental security reports.] (May 2010) ) Ref. 703

### **Botox Creates Basis for New Terrorist Weapon**

Counterterrorist experts claim Al-Qaeda has tried to acquire botulinum toxin (an extremely deadly poison), which is found in the Botox beauty treatment. Chechnya and other parts of the world may have counterfeit Botox production facilities that can produce and sell botulinum on the Internet. Increasing markets for counterfeit beauty and pharmaceutical products could lead to increased access for biological terrorism. Although it is known that such illicit facilities exist, they are difficult to find. Due to specific characteristics, the most likely attack is contamination of food or water supplies. [Related item: *New Technologies Need New Regulations Systems* in March 2009 and other items on similar issues in previous environmental security reports.] (January 2010) Ref. 704

**International Legal Frameworks Needed for Cybersecurity**

After land, sea, air, and space, cyberspace became the “fifth battlespace” on the agenda of security experts. The next ‘Pearl Harbor’ is likely to be a cyberattack, says CIA director Leon Panetta. The disruption of critical infrastructure such as water or electricity by cyberattacks in an IT-dependent world calls for exceptional strategies. “A new legal and policy framework is needed for addressing cybersecurity challenges”, noted Lt. General Keith A. Alexander, nominee to head the Pentagon’s new CyberCommand in testimony before the U.S. Congress, April 15, 2010. Some experts identify three levels of severity for cybersecurity: cybercrime, cyberespionage and reconnaissance, and cyber-leveraged war. There are documented massive cyberespionage schemes such as the one managed from China against several countries (including India and Pakistan). Additionally, electromagnetic pulses could be used for destroying critical infrastructure (see item *International Standards Needed to Reduce Hi-tech SIMAD Threats* in May 2009 environmental security report.)

Efforts to improve managing cyber-leveraged war, so that damage is contained and reduced, include NATO’s recent gathering of top cyber-minds to address the evolution of conflict in an Internet-dependent world, and National Security Agency and other cyber security experts’ participation in the Cyber Defense Exercise (CDX) hosted by Lockheed Martin - Greenbelt (for the eighth year). The European Commission will conduct a feasibility study for creating a body that would assess trends in cybercrime across the EU and facilitate harmonization of related legislation among the different legal systems of the 27 EU countries (while the EU states have yet to ratify the Convention on Cybercrime adopted in 2001). In the meantime, there are proposals to include in the WEEE directive (for waste electrical and electronic equipment) provisions to facilitate protection of data stored on discarded devices. (April 2010) Ref.. 705

**Reconsidering the Rules for Space Security**

*Reconsidering the Rules for Space Security* by Nancy Gallagher and John D. Steinbruner reviews the current regulations that currently govern the use of space and the relevancy of the 1967 Outer Space Treaty. It argues that the U.S. should advance international negotiations based on the Treaty for developing new rules that explicitly address problems of space security, to specifically outlaw weaponization of space, and define the legitimate limits of space-based support for military missions. Some practical recommendations for successful negotiations include strategies for equitable distribution of the costs of compliance systems. (October 2009) Ref. 706

**Modern Warfare Increasingly Harmful to the Environment**

War and the environment, an article published by Worldwatch Institute, shows that modern warfare tactics have an increasingly devastating impact on the ecosystems. By thoroughly analyzing the ecological effect of the American war in Vietnam, the Rwandan and Congolese civil wars, and the current war in Iraq, the article illustrates the long-term damage caused by modern “ecocide.” [See also *Addressing Post-Conflict Environmental Security Issues* in August 2006, and other similar items in previous environmental security reports.] (December 2007) Ref. 707

**Future Proliferation of Autonomous Ground and Air Robot Weapons**

Although today’s robotic weapon systems include humans in decisionmaking, future autonomous systems may be developed by major military powers to act without human intervention. This

technology could be relatively easy to build and at relatively low costs, making proliferation possible. One robotics expert has called on national governments and the international community to assess these risks and seek controls before they become more commonly available. (February 2008) Ref.708

### **Accelerating Synthetic Biology Applications Need Better Monitoring and Regulation**

Recently, there were some significant synthetic biology advances, such as the Genome transplant by the J. Craig Venter Institute (transforming one type of bacterium into another by transplanting of donor chromosome into the host), and MIT and Boston University built viruses to combat harmful 'biofilms' (see item 5.2 above). These developments increased the discourse around security issues related to synthetic biology, thus intensifying the regulations debate. International treaties such as the Convention on Biological Diversity might need to be revised in view of the new synthetic biology field. Along the same line, the International Consortium for Polynucleotide Synthesis appeals for improved regulation and surveillance of DNA synthesis products. They propose an oversight framework to improve biosecurity in the gene-synthesis sector, to prevent ill-intentioned individuals from accessing and using such materials. [See also *Futuristic Nanotech and Synthetic Bioweapons Regulation* in November 2006 and *ETC Report Warns of the Threat of Synthetic Biology and Calls for Global Regulations* in January 2007 environmental security reports.] (July 2007) Ref.709

### **Technology and Biological Weapons: Future Threats**

*Technology and Biological Weapons: Future Threats*, a report published by Bradford University, UK, is an overview of present biological warfare possibilities, with case studies and possible future threats involving the vulnerability of the immune system. The report analyses the possible dual use of research in the area in order to show potential misuses. It finally shows that all biotechnology and bioinformatics areas discussed in the paper are of particular concern for the future for both promoting and combating biological warfare. The authors warn that if governments do not act fast enough, then one day, "... it will be virtually impossible to defend ourselves." (October 2004) Ref. 710

### **SIPRI 2004 Yearbook Warns about Genetic Weapons**

The annual yearbook of the Stockholm International Peace Research Institute includes a warning of the potential for new classes of biological weapons. (June 2004) Ref. 711

### **Future Computer-Human Interface Means Cyber Viruses Could Infect Humans**

As the human-computer interface continues to evolve into a continuum, it is reasonable to assume cyber viruses will one day be able to transfer into electronic components that will have been added into the human nervous system, and so have biological effects. Kevin Warwick, professor of cybernetics at Reading University, and a cyborg pioneer, warned that the emergence of computer-human connection and the production of synthetic viruses comes with great advantages, but also a huge risk: computer viruses will be able to infect augmented humans as they do PCs. (November 2004) Ref. 712

### **Futuristic Nanotech and Synthetic Bioweapons Regulation**

With the forthcoming ability to write genetic code to create new kinds of life forms from scratch, opening a vast potential for new kinds of synthetic bioweapons, a new regulatory environment

should be considered. These developments, along with potentials for nanotech weapons, create unique problems of proliferation, health effects, environmental impacts, and post-conflict cleanups that are not well covered by international treaties. It seems inevitable that treaties governing such futuristic weapons – like treaties that were created for other kinds of weapons in the past – will be negotiated. The factors that make such weapons possible (such as improved computer chips, increased bandwidth, software, nano-engineering) are producing synergistic improvements at an accelerating pace. This makes their speed of development faster than might have been expected. (November 2006) Ref. 713

### **Weather modification technologies**

Over the last 30 years, US research on weather modification has dwindled, and only a handful of research programs exist in other countries. Over this period, atmospheric science has made significant advances, but because weather-modification research has not kept pace, these advances have not been applied in any coherent or sustained way. The National Research Council has published a report calling for a coordinated, sustained national program to answer fundamental questions about basic atmospheric processes and address other issues that are impeding progress in weather modification. (October 2003) Ref. 714

### **Chinese Use of Weather Modification Technologies Might Cause Disputes**

Severe droughts in China, particularly in major cities in the central Henan province, led Chinese authorities to the use of weather modification technologies to produce rain. The bombardment of clouds in one area provoked discontent in the neighboring ones who claimed a loss of moisture. (July 2004) Ref. 715

### **Nanobacteria in Clouds could Spread Disease**

Nanobacteria in clouds could become pathogenic airborne contaminants. They could play a crucial role in the spread of disease and in the formation of rain drops, according to Dr Andrei P. Sommer of the University of Ulm, Germany, and Professor Chandra Wickramasinghe of Cardiff University, UK. Nanobacteria are microorganisms 100 times smaller than ordinary bacteria and can self-replicate. The wind can blow disease-carrying nanobacteria from the ground all the way to the stratosphere where they can oscillate between dormant and active states, as they move between high and low-humidity regions in clouds and then return to different areas on the earth via rain. (April 2005) Ref. 716

### **The Human Epigenome Project could lead to a potential genetics arms race**

The world's first project to map key chemical changes that switch human genes on and off has begun. The Human Epigenome Project follows the completion of the Human Genome Project and aims to map the way methyl groups are added to DNA across the entire human genome. These "epigenetic" changes are believed to turn genes on and off. There is evidence that the methylation pattern of genes is altered in certain tumors. Methylation is a natural process that mainly occurs on cytosine, one of the four bases that make up DNA. When a methyl group is added on to cytosine in the promoter region of a gene - the sequence that causes it to be expressed - the gene is switched off. (October 2003) Ref. 717

### **Laser Technology (solid-state and chemical lasers) used in destructive engagements**

Advances in laser technology may make a functional general-purpose laser weapon system

available for fielding within a decade. Three major technology streams are being pursued: chemical lasers, free-electron lasers, and solid-state lasers. With numerous government and private sector research labs pursuing the goal of building battlefield lasers, it is no longer a question of if but when they will be fielded. (November 2003) Ref.718

**Gamma-Ray Weapons would be capable of killing any living thing in the immediate area and any undetonated isomer could be a somewhat "dirty" bomb**

An explosive being developed by the US Department of Defense could blur the critical distinction between conventional and nuclear weapons. The work has also raised fears that weapons based on this technology could trigger the next arms race. The explosive works by stimulating the release of energy from the nuclei of certain elements such as hafnium but does not involve nuclear fission or fusion. The energy, emitted as gamma radiation, is thousands of times greater than that from conventional chemical explosives. One gram of hafnium isomer could store more energy than 50 kilograms of TNT. The effect of a nuclear-isomer explosion would be to release high-energy gamma rays capable of killing any living thing in the immediate area. It would cause little fallout compared to a fission explosion, but any undetonated isomer would be dispersed as small radioactive particles, making it a somewhat "dirty" bomb. This material could cause long-term health problems for anybody who inhaled it. The current forecast for producing militarily significant quantities is five years. (August-September 2003) Ref.719

**Bioweapons are already possible to make, says new CIA report**

A CIA scientific advisory panel has produced a report that indicates advanced bioweapons are already possible to make. The recent Australian and American mousepox virus manipulation is one example of the use of techniques that could be applied to anthrax, smallpox, or other potential biological agents. The report also brings up the possibility of designer diseases that would be immune to treatment, or that would linger inactivated in the body until the passage of a certain amount of time or until a specified second substance had entered the body. The panel proposed developing defenses aimed at strengthening the body's resistance to all disease, rather than creating treatments for individual diseases. (November 2003 ) Ref.720

**Artificial virus that could lead to a new life form was created**

The Institute of Biological Energy Alternatives in Rockville MD has created a wholly artificial virus and claims that it could lead to a new life form. This synthetic bacteria-scale organism was produced using oligonucleotides (single-stranded DNA fragments) and an adaptation of the commonly used polymerase chain reaction (PCR) technique - the polymerase cycle assembly (PCA) method. Although an artificial virus has been created before, this is the first time one has been constructed to genetically match an existing organism. The researchers suggest that it can be engineered to produce clean energy or clean up pollution. If so, then future modification to environmental treaties could follow, especially as pressures noted in Item 1 of this report continue to increase. (November 2003) Ref.721

**New lethal viruses development**

A new form of extremely deadly mousepox, a relative of the smallpox virus, has been deliberately created through genetic engineering. The new form of virus kills all mice and is resistant to antiviral drugs and the vaccine that would normally have protected the subjects. In a similar way, cowpox virus (which infects a range of animals including humans) was also altered,

as was rabbitpox. Although these modified viruses are not contagious, there is no guarantee that other poxviruses modified in a similar way would also be non-contagious. These researches reveal once more that bioterrorists could use similar techniques to modify a poxvirus that infects humans. (November 2003) Ref.722

### **Military Introduction of Tree Pathogens in Italy**

Researchers at the University of California, Berkeley, and in Italy, have shown the origin of a tree pathogen threatening Italian pine trees to be the US Army units that occupied the area 60 years ago. "This study suggests that when planning military operations abroad, there is a need, and a responsibility, to check for potential micro-organisms that could be introduced to foreign lands, and to take measures to prevent them from spreading." The research in Italy supports a common suspicion among plant pathologists in Europe that certain diseases in that region are linked to US Army bases. Although there does appear to be a correlation, there is no proof yet that other US bases are the cause of similar tree die-offs elsewhere in Europe. (April 2004) Ref.723

### **A new Biodefense Agency within the Office of the Secretary of the U.S. Department of Defense suggested by the Institute of Medicine and the National Research Council**

The issues about how to handle the problems of genetically modified viruses and pathogenic chimeras (artificially created hybrids of disease-causing organisms), in particular those related to smallpox rose on the agenda of the scientific and health communities (including the WHO). The WHO's committee on smallpox research is currently weighing various proposals for new and continuing experimental efforts, including some based at CDC and US Army Medical Research Institute of Infectious Diseases (AMRIID). It is likely that the discussions on bio-safety/biodefense will soon move from the health and research committees to wider international legislative bodies triggering new Protocols to existing treaties (i.e. Biologic and Toxic Weapons Convention) or even new international treaties dealing with genetic manipulation and its hazards. (January 2004) Ref.724

## **B. Preventing or Responding to Environmentally Caused Conflicts**

Increasingly scarce resources, climate change, biofuels, and growing population and higher living standards are all contributing to the long-term rise of food prices. In 2007, dairy prices rose nearly 80% and grain 42%. If this trend continues, the number of people facing famine or malnutrition is expected to grow from at least 850 million today to 1 billion, increasing instability. Food riots have already occurred in some 30 countries, including recently conflict-torn nations such as Haiti, Côte d'Ivoire, Senegal, and Somalia. Meantime, a few agricultural biotechnology companies are trying to concentrate corporate power and gain monopoly over a large part of global food, in some cases undermining agricultural productivity and jeopardizing national food security. With nearly 3 billion people making \$2 or less per day, long-term global social conflict seems inevitable without more serious food policies, scientific breakthroughs, and dietary changes. A new UN Task Force on the Global Food Crisis was designated to prepare a comprehensive plan of action to tackle the rise in food prices.

The UN, OSCE, and NATO are paying increasing attention to environmental security. The UN Security Council debated the relationship of security and the environment for the first time in history in April 2007 and more recently acknowledged that the UN should move from a culture of “reaction” to one of conflict “prevention” and should develop potential tension detection mechanisms. The OSCE adopted a Ministerial Declaration on Environment and Security, and the NATO Security Science Forum on Environmental Security addressed the security implications of environmental issues, forecasting, and cooperation with other international organizations.

The number of weather-related disasters worldwide now averages 400–500 a year compared with 125 in the early 1980s. The number of people affected by natural disasters in 2007 reached 200 million. The UN notes that seven times more livelihoods have been devastated by natural disasters than by war worldwide, and this is likely going to be worsening due to climate change. The intensity of Atlantic storms has nearly doubled over the last 30 years, and computer models show a direct link between climate change and the strength of storms. Some officials say that climate change should be addressed like World War III.

Most of the countries with the highest birth rates are those already affected by the world's worst wars. Growing pressure of people on land and resources is likely to exacerbate conflict in those areas. Semiarid areas of sub-Saharan Africa with some of the highest concentrations of poverty in the world face potential productivity losses of 25% by 2060.

By 2050, some 250 million people could be permanently displaced by climate change-related phenomena. UNHCR remarks that after several years of decline, the number of refugees began rising again. Without a legal framework to address environmental refugees' situation, their rights will not be addressed and conflicts will be difficult to avoid.

The Climate Change and International Security paper to the European Council notes that the “impact of climate change on international security is not a problem of the future but already of today and one which will stay with us” and underlines that the European Security Strategy and related proposals “should take account of the security dimension of climate change.”



## SECURITY IMPLICATIONS OF CLIMATE CHANGE

### Global Security linked to Climate Change

“Violence within and between communities and between nation states, we must accept, could possibly increase, because the precedents are all around”, warned Sir Crispin Tickell, Britain's former ambassador to the UN at the recent London conference, *Climate Change: the Global Security Impact*, hosted by the Royal United Services Institute. Security and climate experts assessed the impact of global warming on world security, noting again that in many cases, climate change consequences happen in already conflict-torn regions. Poverty and despair will increase as millions of people around the world are threatened by desertification, poor fresh water conditions, and rising sea levels. Unless global efforts to accommodate these people increase, the risk of conflict and terrorism grows. At the Economic Forum of Davos, there was a workshop on climate change and security, where panelists discussed the undeniable consequences of climate change on global security. (January 2007) Ref.725

### Climate Change Threats Increasingly Top Security Agendas

"Warming increases the risk of civil war in Africa," the first study assessing quantitative links between climate change and the risk of civil war found that in sub-Saharan Africa, between 1980 and 2002, the incidence of conflicts across the continent rose by nearly 50% with a 1°C temperature increase in a given year. Using these assumptions and 20 global climate models, the researchers warn that without swift mitigation action, the incidence of African civil war could increase 55% by 2030 relative to 1990.

“If uncontrolled, climate change will have security implications of similar magnitude to the World Wars, but which will last for centuries [...] Security sector actors must not just prepare responses to the security challenges of climate change; they must also be part of the solution,” states the report *Climate Change and the Military: The State of the Debate* prepared by the Institute for Environmental Security and partner organizations. In this spirit, the First Statement of the Military Advisory Council of the Climate Change and the Military project calls upon governments to integrate into their respective military strategies the security implications of climate change, and on the military to reduce its own carbon “bootprint.” Climate and Energy the Dominant Challenges of the 21st Century from members of the Center for Naval Analyses Military Advisory Board states that climate and energy security threats “will dominate and shape the state of nations in the decades to come.” (November 2009) Ref. 726

### Climate Change at the UN and G-20

Climate change was the focus of several international summits held in September 2009: the UN Climate Change Summit that attracted 100 Heads of State and Government and was convened by UN Secretary-General Ban Ki-moon, the Climate Change Summit of the Alliance of Small Island States (ASOIS), the UN General Assembly, the G-20 summit, and additional international forums held in parallel with these summits. Although the issues discussed ranged from addressing economic crises to disarmament and reforming the UN system, the theme most mentioned was climate change and policies to address its causes and effects, including adaptation and setting emission reduction targets. The AOSIS underscored security implications of climate change and asked for a greater say in the related negotiations. Vanuatu’s Prime Minister Edward Natapei emphasized that “climate change poses a real threat to the future survival of mankind.”

French President Nicholas Sarkozy reiterated the call for creation of a new World Environment Organization to replace the current several disparate agencies and committees. UN reform ideas converged towards a more representative Security Council and more powerful General Assembly so that its resolutions are implemented and legally binding. (September 2009) Ref. 727

#### UN General Assembly Stressed Environment-related Issues

The issues most frequently mentioned by heads of state and governments at the 63rd session of the UN General Assembly were the global food crisis, impacts of climate change, widespread hunger and poverty, access to water, nuclear control and disarmament, human rights, and terrorism. Ukraine suggested the development of a World Environmental Constitution as a binding framework agreement, and the establishment of a UN entity with authority for ecological protection. Mexico proposed a UN-managed Green Fund to help poor nations cope with the effects of climate change. Small island developing nations that are under imminent threat due to rising sea levels appealed for measures to ensure their survival and the Pacific Islands Forum will resubmit a resolution asking the Security Council to investigate the peace and security implications of global warming, although Solomon Islands' Prime Minister Derek Sikua expressed fears that the magnitude of climate change has already outgrown the existing capacity of the UN system to respond. (September 2008) Ref.728

#### IISS's Strategic Survey 2007 Warns of Global Security Implications of Climate Change

*Strategic Survey 2007* by the International Institute for Strategic Studies (IISS) is a comprehensive analysis of the world security situation in general and by region. The "Strategy Policy Issues" chapter includes 'Climate Change: Security Implications and Regional Impacts' and 'The Military Use of Space'. The report lists the effects of climate change and nuclear proliferation as being on a par with growing Islamist extremism as the biggest security threats. It warns that "Even if effective measures are adopted, there will still be unavoidable impacts on the environment, economies and human security"; and, unless the right preparedness actions are taken, global security consequences of climate change could be equal in disruption to those of nuclear war. (September 2007) Ref.729

#### **Seven Tipping Elements That Could Transform the Planetary Systems**

Increasingly, scientists agree on some tipping elements that are extremely sensitive to climate shifts and therefore might have an important impact on the planetary systems. "The problem with tipping elements is that if any of them tips, it will be a real catastrophe," notes Anders Levermann, climate physicist at the Potsdam Institute for Climate Impact Research in Germany. The seven tipping elements considered are:

- Polar sea ice—passing a potential warming tipping point might cause serious loss of ice sheets and associated sea-level rise
- Amazon rainforest—increased weather-altering deforestation after passing a critical deforestation point
- Chad Bodélé Depression—substantial increase in dust production from the 10,000 square mile Saharan plain that now puts 700,000 tons of dust into the atmosphere annually
- South Asian Monsoons—amplified monsoon systems triggered by increased heat
- The Gulf Stream—due to lack of good models, the IPCC's estimate of 10% Gulf Stream slowdown during the 21st century is uncertain
- Seafloor methane—increased release of methane (a powerful greenhouse gas) from

methane hydrate in the seafloor, due to warming over a tipping point

- The Future—unknown features that could trigger radical changes

Scientists point out that an additional important unknown element is the interaction of these and other known elements. (December 2009) Ref. 730

### **National Security Implications of Global Climate Change Through 2030**

*National Security Implications of Global Climate Change Through 2030* by the National Intelligence Council, is an assessment of climate change security implication for the US in the next 20 years. It is a comprehensive assessment of the impact of climate change in different parts of the world and the possible political instabilities, mass movements of refugees, terrorism, or conflicts over water and other resources in specific countries. The next effort is a scenario exercise and the third effort will be to explore the geopolitics of climate change and how that may shift the relationships between major powers. NIC's Global Trends out to 2025 is expected to be published in December 2008. (June 2008) Ref.731

### ***Global Trends 2025: A Transformed World***

*Global Trends 2025: A Transformed World* by the US National Intelligence Council is an analysis of threats to security and potential geopolitical developments. It features four scenarios: "A World Without the West"; "October Surprises"; "BRICS's Bust-up"; and "Politics is not Always Local." It includes a chapter on "The Demographics of Discord" (chapter 2), as well as a section on "Water, Food, and Climate Change" (in chapter 4: "Scarcity in the Midst of Plenty?") (November 2008) Ref. 732

### **International Conference on Military's Role in Climate Change**

The Importance of Military Organizations in Protecting the Climate 2008 conference, attended by over 100 military and environmental experts from 25 countries, plus the EU and UNEP, discussed the security implications of climate change and the role of the military community in addressing it. There was consensus that climate change is a conflict multiplier with global security implications such as: "creating new geopolitical areas of concern; inhibiting the ability to project power; jeopardizing coalition partnerships; increasing operations other than war; overloading UN peacekeeping deployments; and requiring urgent actions by military and civilian leaders and the public"<sup>4</sup>. Therefore military organizations should increase their role in protecting the climate by showing leadership in increasing energy efficiency through procurement and operations, R&D centers of excellence, and transfer of knowledge. Several best practices were discussed and a project was proposed for a global public-private partnership to cooperate in efforts to collect and destroy ozone-depleting substances. Some "visionary military climate strategies" included "self-sustaining energy at the battlefield; a Carbon Non-Proliferation Treaty; and cooperation on Arctic passage & resources"<sup>5</sup>. The conference, which is the fifth in a series that began in 1991, was held in Paris, November 3-5, co-hosted by the Institute for Governance and Sustainable Development and collaborators. (November 2008) Ref.733

### **Economic and Security Implications of Climate Change**

The *Economics of Climate Change*, an authoritative report by Sir Nicholas Stern, former chief

<sup>4</sup> Conference Conclusions and Opportunities for Co-operation. Stephen O. Andersen, EPA Climate Liaison to the US Department of Defense. <http://www.igsd.org//conferences/Paris2008/3%20Andersen%20conclusions.pdf>

<sup>5</sup> Ibid.

economist with the World Bank, warns that unless rapid action is taken globally to reduce emissions and tackle climate change within a decade, the world will face deep economic recession, with annual costs of climate change consequences ranging between 5% to 20% of the global economic output (about £3.68 trillion--approx. \$7 trillion US dollars). The report calls for a global framework on climate change that is flexible—considering different countries'/regions' specifics. Another report, *Africa—Up in Smoke 2*, by a coalition of UK aid agencies and environmental groups warns that climate change might annihilate efforts to tackle poverty in Africa and emphasizes the need for human progress and development models that are climate proof and climate friendly. Africa is already 0.5°C warmer than it was 100 years ago and temperature increases over many areas of Africa might be double the global average increase, worsening drought patterns and the strain on already feeble water resources, and therefore aggravating the security situation of the conflict-torn continent. As noted by UK Foreign Secretary, Margaret Beckett, climate change is not any longer just an environmental problem, but is “a defence problem. It is a problem for those who deal with economics and development, conflict prevention, agriculture, finance, housing, transport, innovation, trade and health.” (October 2006) Ref.734

### **International Conferences Put Climate Change among Top Security Issues**

Experts and politicians participating at a seminar on climate change held in Ny Alesund, Norway, called climate change the biggest security challenge since the Cold War. British climate change ambassador John Ashton said global warming should be considered a security issue on a par with terrorism, in order to increase global action to cut greenhouse gas emissions from fossil fuels.

“Already seven times more livelihoods are devastated by natural disasters than by war worldwide, at the moment, and this is going to be much worse, the way the climate is developing,” noted Jan Egeland, special adviser on conflict prevention to UN Secretary-General Ban Ki-moon, and former head of UN humanitarian affairs. He underlined again that “those most affected by climate change are the poorest since droughts and flooding will be getting worse.” The Vienna climate change talks organized by the UN Framework Convention on Climate Change this month and attended by about 1,000 politicians, experts, activists, and representatives from the media from over 150 countries give equal importance to adaptation and mitigation. [See also *UN General Assembly 61st Session Pinpoints Global Warming as a Central Issue for Security* in September 2006 and *UK Initiates UN Security Council Debate on Climate Change and Security* in April 2007 environmental security reports] (August 2007) Ref.735

### **Increased Role of the Military in Environment-related Crises**

Senior security policy-makers from 27 countries attended this year’s Shangri-La Dialogue in Singapore May 30–June 1, 2008 to improve military anticipation and response to natural disasters such as those of last year in Bangladesh and this year in Myanmar. Ministers from ASEAN recognized that diverging views on military involvement should be addressed. A French politician suggested that a system of sanctions should be established to “stop this scandal of having hundreds of thousands of people dying with help waiting outside and having a lecture about non-interference in domestic affairs,” and that he will advise the French government to propose that Myanmar government be held liable before the International Criminal Court. Singapore’s Prime Minister Lee Hsien Loong made a few recommendations for addressing climate change, including establishing a ‘technology transfer board’ for helping the LDCs, and

an International Food Fund to address food security. “Between countries, competition for food supplies and displacement of people across borders could deepen tensions, and provoke conflict and wars” he said. (June 2008) Ref.736

### **Climate Change Triggers Redrawing Swiss-Italian Borders**

Switzerland and Italy are cooperating in redrawing their national borders in the Matterhorn mountain area, due to melting Alpine glaciers that previously set the border lines. The new proposal considers the rocks rather than glaciers as border criteria. The Swiss-Italian border change will not affect any inhabited area. Franco Narducci, of Italy’s opposition Democratic Party, who is preparing the bill for redefining the frontier, said that similar negotiations will be proposed to France and Austria. Redrawing these borders creates a precedent with implications for other effects of climate change in other regions such as the Arctic and Antarctic regions, and the Low-lying Island States. (March 2009) Ref. 737

### **Climate Change Impacts Assessment on U.S. National Security**

*Assessment of Select Climate Change Impacts on U.S. National Security* by the Center for International Earth Science Information Network (CIESIN) of Columbia University is a paper in reaction to the *National Security Implications of Global Climate Change Through 2030* produced by the National Intelligence Council [see the respective item in the June 2008 environmental security report.] This extremely well-documented and illustrated paper identifies the countries at high potential security risk by examining and quantifying the security implications in three specific domains: global sea level rise, temperature change, and water scarcity. The aggregate vulnerability index takes into account a nation’s respective climate change aspect and adaptability capacity. As to sea level rise, the most vulnerable are highly populated, low-elevation coastal zones in China, India, Indonesia, Philippines, and Egypt. The countries identified as presenting high instability risk due to temperature change are South Africa, Nepal, Morocco, Bangladesh, Tunisia, Paraguay, Yemen, Sudan and Côte d’Ivoire, while water scarcity might possibly increase instability in Mozambique, Côte d’Ivoire, Nigeria, Iraq, Guatemala, Zimbabwe, Ethiopia, Somalia, China, Syria and Algeria. The paper makes some recommendations on strategies and policies that might help overcome and mitigate eventual threats. (July-August 2008) Ref. 738

### **Recommendations for Addressing U.S. Environmental Security**

*Insecure About Climate Change* is an essay summarizing a recent special report for the Council on Foreign Relations, *Climate Change and National Security: An Agenda for Action*. It makes some specific recommendations to “strengthen national security by reducing U.S. vulnerabilities to climate change at home and abroad,” such as: establishing a new “deputy undersecretary of defense position for environmental security [emphasis added]... to redress the insufficient institutionalization of climate and environmental concerns in the Department of Defense; ... several senior positions in the National Security Council dedicated to environmental security” and eventually a “special advisor to the president on climate change with some budgetary authority.” The author also makes some financial suggestions to help developing countries prepare for climate change, “including \$100 million (over several years) for military-to-military environmental security workshops; ...another \$100 million per year to support an African Risk Reduction Pool” as “part of a broader international risk reduction effort that... should be on par with the president’s five-year, \$15 billion emergency plan for AIDS relief.” The author of the

essay and report, Joshua Busby, is assistant professor at the LBJ School of Public Affairs at the University of Texas at Austin and fellow with the Robert S. Strauss Center for International Security and Law. (March 2008) Ref.739

### **Security Implication of Climate Change to the EU**

Climate Change and International Security. Paper from the High Representative and the European Commission to the European Council analyses the security implications of climate change in general and with specific implications to the EU, and makes some recommendations for EU policies. It reviews the main categories of threats posed by climate change to security (Conflict over resources; Economic damage and risk to coastal cities and critical infrastructure; Loss of territory and border disputes; Environmentally-induced migration; Situations of fragility and radicalization; Tension over energy supply; and Pressure on international governance) and then addresses vulnerabilities by specific regions (Africa; Middle East; South Asia; Central Asia; Latin America and the Caribbean; and The Arctic). The report concludes that “The impact of climate change on international security is not a problem of the future but already of today and one which will stay with us” and underlines that the European Security Strategy and related proposals “should take account of the security dimension of climate change.” Some specific recommendations include “Focus attention on the security risks related to climate change in the multilateral arena; in particular within the UN Security Council, the G8 as well as the UN specialised bodies (among others by addressing a possible need to strengthen certain rules of international law, including the Law of the Sea),” capacity building from detection to adaptation, addressing migration issues, and adapting cooperation with other countries to the new realities induced by climate change. (March 2008) Ref.740

### **Monopoly over Rare Earth Elements Raises Security and Environmental Concerns**

Most new technologies—from low-carbon energy production to defense—require rare earth elements (REEs) for their manufacture. However, the distribution and exploitation of these elements is limited, with over 95% of all REEs for world consumption being produced in China. China’s own increasing technological and green energy generation needs might considerably impact the supply and/or price of some REEs (such as neodymium, praseodymium, dysprosium, and erbium used for wind turbine generators). John Kaiser, a California-based mining expert and rare-earths specialist, warns, “If the world gets really serious about green technology, it could result in a scale of demand that rare-earth suppliers would be unable to cope with.” Pricing and different work and environmental standards are among the main factors impeding exploitation outside China. Business and political leaders should re-assess the supply situation of REEs in view of new technological and security needs. [Related item: *Future Lithium Dependency Raises New Energy Security Concerns* in March 2009 environmental security report.] (January 2010) Ref. 741

### **The Competition for Rare Earth Metals Set to Continue**

As green technology and energy are taking off, the competition for rare metals that are needed for the energy generation and storage equipment is increasing. Although rare earth metals are relatively abundant in the Earth’s crust, their extraction is difficult and environmentally polluting. Presently, over 90% of these minerals are mined in China, who increasingly wants to keep more for its own industry and allegedly expressed intentions to reduce or even stop the export of some of these resources. Meantime, although some of these materials could be

retrieved from recycling used electronics, electronic waste is exported for salvage to countries in Asia and Africa. Although mines are planned in California, Australia, Canada, and Greenland, setting them up, meeting environmental standards, and workforce cost might delay exploitation. (May 2010) Ref. 742

#### The Race for Natural Resources a Potential Impediment for Peace

Afghanistan's natural resources have become more prominent in the media due to the recent discovery of previously unknown mineral deposits, such as copper, iron ore, lithium, and gold. However, concerns increase that the race for rare minerals could exacerbate conflict in vulnerable countries rich in those resources, such as the current case in the Congo. (June 2010) Ref. 743

#### EU Expert Group Suggests Action to Secure 14 Critical Raw Materials

An EU expert group has presented a final report identifying 14 raw materials as "critical" for EU industries, and suggesting that the EU take diplomatic steps to ensure that its companies gain easier access to them in the future. The 14 materials are antimony, beryllium, cobalt, fluor spar, gallium, germanium, graphite, indium, magnesium, niobium, platinum group metals, rare earths, tantalum and tungsten. (June 2010) Ref. 744

### **Improved Governance Needed for Reducing Risks of Environmental Disaster**

*2009 Global assessment report on disaster risk reduction: risk and poverty in a changing climate* is the first biennial global assessment of disaster risk reduction coordinated by the UN International Strategy for Disaster Reduction (UNISDR). The study is a comprehensive analysis of disasters and their effects, with concrete suggestions. It notes that between 1990 and 2007, global disaster risk increased by 13% as mortality, and 35% as economic loss, with low- and middle-income countries bearing far greater burden because of weak economic and governance systems. For example, Japan and the Philippines have roughly equivalent population exposure to tropical cyclones, but 17 times more people would die in the Philippines than Japan. The study identifies three primary 'risk drivers': unplanned urban development, vulnerable livelihoods, and ecosystem decline, each exacerbated by climate change, and proposes a 20-point action plan based on major shifts in development thinking by including preparedness in all strategies at international, national, and community levels.

The study *The View From the Frontline*, to be released in June, conducted by the Global Network of Civil Society Organizations for Disaster Reduction, focus on communities' role in reducing disaster effects and calls for systemic changes in policy by governments. For example, the study says, education in local communities is needed to overcome a tendency to accept high disaster tolls as a matter of fate, instead of, for example, a result of lax building codes or lack of warning systems.

The *Climate Gap*, a study by a team from the University of California, Berkeley, documents how poor people are disproportionately affected by climate change in the U.S., and warns that a widening "climate gap" could exacerbate current and future social disparities. Therefore, the report highlights the importance of including environmental justice in climate change policies. (May 2009) Ref. 745

**Developing Countries Most Affected by Global Warming**

Consequences of global warming are increasingly felt, mostly by developing nations. Rising sea levels force inhabitants of some South Pacific islands to relocate. The World Bank warns that development programs are jeopardized by climate change in many regions around the world and urges the international community to integrate climate risk concerns in development strategies. (September 2006) Ref. 746

**Indigenous Peoples Highly Vulnerable to Climate Change**

An international symposium at Oxford University focused on the threat of climate change to the world's indigenous peoples. They have already begun feeling the consequences of climate change and in some cases their whole way of life has to change radically, as they depend directly on natural resources threatened by global warming. It was agreed that indigenous communities have to work together with scientists and decision makers for designing and implementing adaptation measures for preventing possible catastrophic consequences of global warming on their people. (April 2007) Ref. 747

**Human Ecological Footprint Increasing Each Year**

The 2007 'Ecological Debt Day' was on October 6, three days earlier than in 2006, noted the New Economics Foundation. 'Ecological Debt Day' marks the day of the year when human consumption begins surpassing the Earth's ability to sustain it. The point has been reached earlier every year since the 1980s, when the world began to live beyond its means. The results of a study using the ecological footprint index also revealed that the world is developing very unsustainably. The study is looking at how the lifestyles and ecological footprints of 93 nations have changed in the last 30 years. It is the first study of this kind and was conducted by an international team of the Global Footprint Network. (October 2007) Ref. 748

**Earth's Biodiversity Decline Increasing**

The recently released 2006 IUCN Red List of Threatened Species by The World Conservation Union reveals that Earth's biodiversity continues to decline. According to the latest assessments, globally, the number of known threatened species has reached 16,119. New species on the list include the polar bear, ocean sharks, freshwater fish and Mediterranean flowers. [See also *International Biodiversity Meetings Make Decisions* in March 2006, *New Protected Ecological Sites* in July 2005, and other related items in previous environmental security reports.] Ref. 749

**Threats and Strategies for Addressing Climate Change in the Middle-East**

*Rising Temperatures, Rising Tensions; Climate change and the risk of violent conflict in the Middle East*, by the International Institute for Sustainable Development, is an analysis of the security issues in the Levant region over the period to 2050, in view of the implications of climate change. Acknowledging that the legacy of 60 years of conflict undermines adaptation efforts, it identifies and details six climate change-related potential threats which are likely to become obstacles to peacebuilding: 1) increasing competition over scarce water resources; 2) intensifying food insecurity; 3) worsening poverty and social instability; 4) forced migration; 5) "militarization of strategic natural resources;" and 6) the danger of inaction on climate change, which might lead to "growing resentment and distrust of the West (and Israel) by Arab nations." The study also suggests four strategies that could turn climate change into a peacebuilding tool: promote conservation and efficiency; develop joint adaptation projects, including water



management; advance solidarity and green energy policies; and be actively involved in developing regional and international adaptation strategies. [Previous related items: *Security Risk due to Climate Change* in December 2007, *Security Implication of Climate Change to the EU* in March 2008, and *Food and Water Security* in October 2008 environmental security reports.] (June 2009) Ref. 750

### **Arab Mediterranean Governments' Environmental Security Cooperation**

The Environmental Security in the Arab and Mediterranean sphere: Role of the Civil Society conference was organized by the Association of the Mediterranean Network for Sustained Development (ARREMED) and the Arab Environment and Development Network (RAED), in Tunis. Attended by high-ranking diplomats and environment and security experts, the conference discussed cooperation and common policies for addressing environmental and human security in the Arab Mediterranean spheres. "Governments should unify policies on environmental security and strengthen partnership in matter of scientific research between Arab countries and prepare a survey of possible risks to evaluate their impact and their cost," stipulates the conference declaration. Highlighted was that tackling environmental issues is imperative mainly in conflict-threatened regions. Along the same lines, the *Arab Environment: Future Challenges* report launched at the annual conference of the Arab Forum for Environment and Development held in Manama, Bahrain, recommends urgent action in four major areas: fresh water scarcity, desertification, air quality, and marine pollution, all of which will likely worsen due to climate change. (November 2008) Ref.751

### **Yemen's Internal Conflicts Are Water-Induced**

A new analysis of Yemen's drastic water situation points out that an estimated 80% of conflicts in Yemen are over water. The country's water table is dropping about 6.6 feet per year, and in the capital, Sana'a, water extraction rates are about four times that of replenishment. At this rate Sana'a could become the first waterless capital in the world in five to seven years. Water used for agriculture accounts for about 90% of all consumption, and about 50% of it goes to growing qat (khat), a mild narcotic plant. Since plantations are often controlled by the so-called qat mafia, if farmers would be offered an alternative to qat, the critical water, food, and security situations would be addressed together. (January 2010) Ref. 752

### **Water and Environmental Research Center to Be Established in UAE**

The UAE University in Abu Dhabi has been funded to create a Water Environment Centre of Excellence. The research generated will be published, contributing to solving water- and environment-related problems in the UAE as well as in neighboring countries. Mohsin Al Sharif, head of the new center, said that one of the objectives is also to review UAE water-related policies. (December 2008) Ref. 753]

### **Kyrgyzstan's Deforestation Threatens Central Asia's Security**

The Kyrgyz government's Agency for Environmental Protection and Forestry and environmentalists have issued warnings about the country's rate of deforestation and its consequences. It is estimated that over the past 50 years, half of the forest cover was lost, and illegal logging continues at a rate about at par with the legal one, maintained by corruption and the population's low living standard. Kyrgyzstan forests are crucial for the whole Central Asian ecosystem, their disappearance causing water scarcity, health problems, and more frequent

natural disasters such as floods, landslides and droughts. Experts demand better enforcement of international environmental regulations to which the country is party. [See also *UN General Assembly Adopts Global Forest Agreement* in December 2007 and *Environment and Security Program in the East-Caspian Region* in September 2007, *Network of Environment Centres in Central Asia* in February 2004, and *Prospective International Agreements for Mountain Regions* in October 2002 environmental security reports.] (March 2008) Ref.754

### **Indian and Chinese Assessments of Climate Change Consequences**

Indian and Chinese authorities have increased warnings on the consequences of global warming on the coastal areas. In India, the National Coastal Zone Management Authority notes that millions of people living along India's 3,700 km (2,300 mile) eastern coast are vulnerable to storms, flooding and tsunamis; sea levels in some parts of the Bay of Bengal were rising at a rate of 3.14 mm annually, while off the coast of Khulna in Bangladesh the rate is 10 mm every year, and rising sea levels are eroding 1 meter (3.2 feet) of land every year along the coast of West Bengal state. India plans to conduct a study next year on how to mitigate the vulnerability to climate change of its 7,500 km (4,660 mile) coastal area. The first Chinese official National Climate Change Assessment also warns on devastating consequences of climate change on the Chinese economy (mainly agriculture) and increasing vulnerability of its coastal areas. Nevertheless, economic development remains the country's primary task, neglecting radical measures to address greenhouse gas emissions and pollution, states a report. (April 2007) Ref. 755

### **The Haiti Earthquake Disaster Could Stimulate Improved Resilience Planning**

The current chaotic situation and humanitarian disaster resulting from the 7.3 magnitude earthquake on January 12, 2010 in Haiti demonstrates the need for improved early warning, resilience training, and post-disaster international coordination. Since scientists warn that the number and intensity of natural disasters will increase, the need for such systems and training will increase. Unique preparation is needed for poorer, less resilient countries like Haiti. UNEP is working for the Haiti Regeneration Initiative to be implemented by a wide range of partners for long-term sustainable development and reduction of vulnerability to natural hazards through ecosystem restoration and sustainable natural resource management. [Related item: *International Early Warning Programme to Begin Operations* in March 2007 environmental security report.] (January 2010) Ref. 756

### **Arctic Debate**

#### Arctic Council Declaration, 2009

The declaration adopted by the Arctic Council ministerial meeting held in Tromsø, Norway, April 28-29, 2009, represents a comprehensive instrument for international cooperation and policies in the region. Some of the most significant issues are: negotiation of an international instrument for cooperation on search and rescue services; a demand for the IMO to develop new guidelines for ships operating in Arctic waters and mandatory regulations on safety and environmental protection in the region; development of standards and guidelines for economic activities and oil and gas exploration in the Arctic; creation of a task force on short-lived non-CO<sub>2</sub> drivers of climate change such as black carbon, methane and tropospheric precursors in Arctic climate change; ecosystems-based ocean management; and addressing effects of climate change on indigenous people and ecosystems. Russia said that it opposes the presence of any

military-political blocs in the Arctic and invited support for its new initiative “The Electronic Memory of the Arctic,” an open access on-line information resource. The request of the EU, China, Italy, and South Korea for permanent observers’ status was put on hold for now. The next ministerial meeting of the Arctic Council will be in 2011, although, given the increasing importance of the Arctic, meetings at political level will be held yearly. Denmark will take over the chairmanship of the Arctic Council. (April 2009) Ref. 757

#### Resources Trigger Overlapping Claims for Maritime Areas

A Russia assessment of security threats up to 2020, notes that fights over the world’s energy reserves could trigger military clashes, specifying the Arctic as a vulnerable area along with the Middle East, Central Asia, and the Caspian Sea.

May 13 was the deadline for the 128 states which became parties to the UN Convention on the Law of the Sea prior to May 1999 to submit to the Commission on the Limits of the Continental Shelf claims for extending their rights beyond the present lines. A total of 50 submissions were received from 43 states, while 37 states made preliminary submissions. States that acceded to UNCLOS after May 1999 have 10 years from date of the Convention entered into force for them to make a submission or provide preliminary information to the CLCS. This leaves the Arctic region open to debate, since Canada and Denmark have until November 2013 and November 2014 respectively, while the U.S. has yet to ratify the LOS.

Canada also has disputes with France over the rights to the rich oil and gas reserves of the seabed surrounding the small islands of St. Pierre and Miquelon, off the coast of Newfoundland.

One of the most complicated areas is the South China Sea, where China, the Philippines, Vietnam, Taiwan, Indonesia, and Malaysia have overlapping claims, with China asserting sovereignty over a series of islands and the respective seabed reserves.

A vast area around the Falkland Islands, South Georgia and South Sandwich Islands in the South Atlantic, with seabed rich in oil and minerals, is the object of overlapping claims from the UK and Argentina.

Countries that have also recently made submissions or informed the CLCS of their intention to claim extending their continental shelf include Cook Islands, Fiji, Benin, Somalia, Oman, Vanuatu, Ghana, Pakistan, South Africa, Nigeria, Sri Lanka, Kenya and others. In some cases, the claims are linked to previous unresolved international conflicts and boundary disputes. However, the Commission’s rulings are only advisory and intended to be used for negotiations and, if necessary, arbitration.

Meantime, the energy-rich seabed of the Caspian Sea is the object of negotiations among Russia, Kazakhstan, Azerbaijan, Turkmenistan and Iran, while also being a crucial element for EU’s alternative energy supplies from Central Asia. [See also *New Developments Concerning the Arctic* in April 2009, *Disputes over Polar Regions Expands* in October 2007, and other related items in previous environmental security reports.] (May 2009) Ref. 758

#### Arctic Civil and Military Activities Increasing

Satellite measurements of the thickness of the arctic ice revealed that the Arctic Ocean’s permanent ice cover around the North Pole has thinned by more than 40% since 2004. Experts are therefore reassessing the timing of when the Arctic would be ice-free in the summer.

Jonas Gahr Støre, Norway’s foreign minister predicted that the “northeast passage” for shipping around Russia’s arctic coast and across the North Pole will be opened within a decade. The route through previously inaccessible Russian waters would cut sailing times between

Rotterdam in the Netherlands and Yokohama in Japan by 40%, while also providing a safer and “pirate-free” route for trans-global shipping.

A Danish defense position paper suggests substantial enhancement to the country’s northern military capabilities, including creating a dedicated arctic military body (potentially an Arctic Command) that would combine army, navy and air force assets, as well as upgrade of surveillance systems. A more detailed plan is expected for fall 2009. As many nations increase military resources dedicated to arctic operations, worry increases that conflict potential is also increasing.

*The Arctic Marine Shipping Assessment*, by the Arctic Council, reiterates warnings that an expected increase in shipping threatens the fragile ecosystem due to release of oil and other hazardous substances, harm to marine wildlife, and introduction of new invasive species. Recommendations include, inter alia, that arctic nations increase efforts for reducing pollution from ships, and consider designating special Arctic Ocean areas for environmental protection. (July 2009) Ref. 759

#### New Arctic Maps Detail Geological Features

The most comprehensive geological atlas of the Arctic has been published. It maps detailed information on continental plates, rock types, and highlights the potential reserves of oil, gas, and other mineral resources. It estimates that the area within the Arctic Circle might contain around 30% of the world’s undiscovered gas resources and 13% of oil reserves. The research, published in *Science* magazine, is the result of data compiled over several years by an international team of northern countries researchers. Meanwhile, Durham University updated its map of the Arctic highlighting the disputed territories. These publications should aid in environmental surveillance, resource exploration, and negotiation of Arctic sovereignty disputes. (May 2009) Ref. 760

#### Canada Enhances its Arctic Surveillance

Canada announced the location of the two satellite reception ground stations for the Polar Epsilon project designed to enhance its Arctic surveillance and security capabilities and capacity to exploit space-based data for defense, maritime security and environmental monitoring. (April 2009) Ref. 761

#### New Developments by Canada and the U.S. in Arctic Security

A high-level Canadian delegation, led by the Prime Minister, made a five-day tour of the northern military operations and held a cabinet meeting in Iqaluit as part of an effort to stress Canada’s sovereignty in the region. Nevertheless, it is not clear yet how much Canada will allocate to increase its security capacity in the North. In the meantime, the U.S. Coast Guard is developing strategies to strengthen security in the Arctic region, including a new duty station. The U.S. is among the countries that consider the Northwest Passage an international waterway, rather than Canada’s sovereign waters. (August 2009) Ref. 762

#### Norway Defines Its Continental Shelf

Norway became the first Arctic nation to accept limits to its northern seabed with the new defined continental shelf at 550 kms (342 miles) from the Pole, which is claimed by both Russia and Denmark. (April 2009) Ref. 763

### Potential NATO Military Presence in the Arctic

Delegates to a NATO meeting held in Iceland discussed the security implications of Arctic thawing and the potential need for a NATO military presence in the region. In view of the arguments among powerful nations over sovereignty and resources, NATO Secretary-General Jaap de Hoop Scheffer noted, “It should be a military presence that is not overdone, and there is a need for political cooperation and economic cooperation.” The U.S. Arctic policy was published January 9, 2009. (January 2009) Ref. 764

### Arctic Debates Continue

As foreign ministers of five Arctic states—Canada, Denmark, Norway, Russia and the U.S.—met in Chelsea, Quebec, on March 29, 2010, states member of the Arctic Council that were left out of the talks (Iceland, Sweden, and Finland) along with various northern aboriginal groups publicly expressed their frustration. Although the outcomes of the meeting were not available at the time of this writing, there are speculations that in view of some military strategies calling for measures to ensure that the Arctic remains free of nuclear weapons, Canada might declare the Northwest Passage a nuclear-free-zone.

The Russian Security Council announced that over the next 10-15 years, Russia might face serious national security problems as melting permafrost—that covers roughly 60% of Russian land—could jeopardize important infrastructure, including pipelines, railways, roads, and several urban areas. (March 2010) Ref. 765

### Arctic “Pole of Peace” Suggested to Address Arctic Security Issues

In view of the increasingly heated debate over the Arctic due to increased access to resources, a group of Arctic security experts suggest that the U.S. should take the lead in proposing that the central Arctic Ocean be declared a “pole of peace and international cooperation based on shared interests in environmental security,” and invite Canada, Denmark, Norway and Russia to endorse the initiative. This might address the controversies over sovereign rights and jurisdiction. (December 2009) Ref. 766

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hazardous substances, harm to marine wildlife, and introduction of new invasive species. Recommendations include, inter alia, that arctic nations increase efforts for reducing pollution from ships, and consider designating special Arctic Ocean areas for environmental protection. (July 2009) Ref. 767

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#### Canada to Map about 2,500 miles of Arctic Seafloor

While national claims over the Arctic's potentially mineral-rich seafloor are increasing, only about 5% of the Arctic floor has been mapped with modern sonar technology. Canada will send two robot submarines in March 2010 to gather evidence to help Canada's claims for extending its continental area. The two 20-foot autonomous underwater vehicles will be equipped with specialized echo-sounder equipment, potentially helping scientists create a three-dimensional geographical map, as well as continuously collecting data for about 250 miles at a time, creating images of the expedition's 2,500 or so miles. (February 2010) Ref. 769

#### Russia and Norway Agree on Maritime Delimitation of Disputed Arctic Territory

Norway and Russia reached agreement over the borders and use of a disputed territory of 175,000 square kilometers (108,740 sq miles) of Arctic shelf, concluding some 40 years of negotiations. The joint declaration signed on April 27, 2010 stipulates the maritime delimitation lines and creates cooperation opportunities for exploitation of the area's rich natural resources. Some further technical details need to be worked out until the final treaty, which then will need to be ratified by the two countries' parliaments. The agreement might also represent an important step forward in the multilateral negotiations concerning the Arctic territories. (April 2010) Ref. 770

#### Russia Suggests Opening New Transportation Corridor via the Arctic

Russia is suggesting the opening of a new transport corridor from Europe to Southeast Asia, via the Arctic region. One of Russia's largest shipping companies, Sovkomflot, intends to send a tanker from Murmansk to Southeast Asia in November to validate the new waterway. In addition to being much shorter, the new pirate-free route is also safer. If the plan proves viable, Russia will set up the administrative infrastructure to manage navigation across the Arctic, such as small maintenance ports. (May 2010) Ref. 771

#### Arctic Opens to International Commercial Use

The first telecommunication project in the Arctic is to link Tokyo and London by underwater fiber optic cable through the Northwest Passage, thus cutting the transmission delay from 140 milliseconds to 88 milliseconds. Branch lines would also link to the U.S. East Coast, ensuring quicker transmission times between Tokyo and New York. In addition to being faster, these lines

are apparently also more secure, avoiding critical regions.

A report by UNESCO, “Climate Change and Arctic Sustainable Development” is a comprehensive assessment of the environmental and social transformations of the Arctic due to climate change, proposing an integrated approach for monitoring and adapting to climate change in the Arctic based on multilateral collaboration among scientists, circumpolar communities and decisionmakers. (January 2010) Ref. 772

#### Arctic Needs New International Regulations

Legal experts participating to the Polar Law Symposium hosted by the United Nations University and the University of Akureyri in northern Iceland, September 7-9, 2008, concluded that a new legal framework is needed for the fragile and changing polar regions. They put forward a set of recommendations to governments, international bodies and other interested parties (to be distributed within six weeks of the event). “Many experts believe this new rush to the polar regions is not manageable within existing international law,” said A.H. Zakri, Director of the UNU Yokohama-based Institute of Advanced Studies, while Tatiana Saksina of the WWF expressed that “there should be new rules, stricter rules. We are proposing a new convention for the protection of the Arctic Ocean.”

Meantime, Russian President Medvedev re-launched military patrols in the Arctic waters and called on the security agency to establish a formal border in the region since it had “strategic importance” for Russia, while Gazprom announced the creation of a subsidiary company for the Arctic reserves exploration.

The economic benefits of an ice-free Arctic are also pushing the EU’s polar strategy up on the policy agenda, while a US-Canada expedition will explore the Arctic region, collecting data for mapping the Arctic seafloor and studying the geology of the sub-seafloor to build the case for the two countries’ rights. [See also *The Debate over Strategic Control of the Arctic is Heating Up* in July-August 2008, and other related items in previous environmental security reports.] (September 2008) Ref. 773

#### European Parliament Adopted Resolution on Arctic Governance

A resolution adopted by the European Parliament on October 9 regarding Arctic governance stipulates that the European Commission should get an ‘observer status’ on the Arctic Council to increase its proactive role in the region and should set up a “dedicated Arctic desk.” It also suggests that the EC open negotiations for an international treaty for the protection of the Arctic, which at the beginning should cover at least the unpopulated and unclaimed areas. Along with preservation, the commission should also consider a framework for possible exploitation of the Arctic’s potentials. The MEPs expressed concerns that the ongoing race for Arctic resources could lead to security threats for the EU. The EU is due to publish its own guidelines for work in the Arctic this November. (October 2008) Ref.774

#### EU Arctic Policy Guidelines

The recently published EU ‘Communication’ concerning the Arctic stipulates that the Arctic becomes a priority in the European Northern Dimension policy due to potential implications for European security and stability. It outlines the EU Arctic framework built around three main policy objectives: “1) Protecting and preserving the Arctic in unison with its population; 2) Promoting sustainable use of resources; and 3) Contributing to enhanced Arctic multilateral governance.” (November 2008) Ref. 775]

### Nordic Countries Alliances for Addressing Arctic Issues

At a NATO Seminar on Security Prospects in the High North, held in Reykjavik, Iceland, Secretary General Jaap de Hoop Scheffer underlined that changes in the Arctic region will increase the Alliance's role in the area. The Allied nations have the necessary capabilities and equipment to address potential risks linked to increased activities in the Arctic region, and the Euro-Atlantic Disaster Response Coordination Centre has the necessary expertise for relief and rescue operations. Along the same lines, a 13-point Proposal was presented at the extraordinary meeting of Nordic foreign ministers held in Oslo, February 9, 2009, laying out the framework for the creation of Nordic cooperation on foreign and security issues, including a Scandinavian Defence Union to include Denmark, Finland, Norway, Sweden, and Iceland. Considering the rapid Arctic ice retreat, the report suggests the establishment of a monitoring and early warning system (including a polar orbit satellite system by 2020), as well as a common rescue force (to include both civilian and military personnel), rapidly deployable in case of disastrous events in the Nordic sea areas. The integrated Nordic system and "battlegroup" would be the first such regional initiative. The proposal will be further discussed in April, at the Nordic foreign ministers meeting in Reykjavik. (February 2009) Ref. 776

### Russian Security Unit and Draft Law for Reinforcing Arctic Claims

The Arctic Group of Forces under the jurisdiction of the Russian Federal Security Service is planned to be deployed by 2020. Its mission will be to consolidate security and environmental protection in the area, as well as to participate in defining the Arctic Shelf "with respect to Russia's national interests." In the meantime, Russia is drafting a new law that would allow it to block foreign military vessels, deny entry to, or impose Russian escorting on, commercial ships deemed unsafe for navigation, and charge fees. NATO's recent report, *New Horizons*, highlighting that the Arctic is becoming of "prime strategic importance," notes that Russia will begin exploitation at a major oil and natural gas field in the Arctic in 2013—the deadline year set by the UN for the Arctic continental shelf demarcation. (March 2009) Ref. 777

### The Debate over Strategic Control of the Arctic is Heating Up

This year, for the first time in known human history, both the Northwest and Northeast Passages are free of ice, opening the opportunity for the Arctic shortcut shipping route. Scientists estimate that by the summer of 2030, the Arctic might be completely ice-free for a few weeks. This increases concerns over security, environment, and resource-race issues, but, most of all, over the strategic control of the Arctic. While the multilateral negotiations are stalled, the Nordic countries continue to build their cases for territorial and security claims.

Canada is expanding by half a million square kilometers its Arctic Ocean territory—doubling the 100 nautical miles of the coastline that it presently regulates—and will make it mandatory for all ships entering its polar waters to report their presence. By the current regulations, registration with national authorities of ships in the Arctic is voluntary. "Canada takes responsibility for environmental protection and enforcement in our Arctic waters," said Prime Minister Stephen Harper. The claim includes the Northwest Passage, which no other country recognizes as a Canadian waterway. At a geology conference in Norway, Canada detailed its territorial claims to the Lomonosov Ridge, arguing that the ridge is part of the North American continent, not part of Siberia, as Russia has asserted. Canada's argument is supported by the Danish government, which also hopes to expand its part of the energy-rich ridge. Meantime, Greenland, encouraged



by possible increased revenues from resource exploitations, hopes to become financially independent and therefore aspire to its own sovereignty.

Meantime, a U.S. Coast Guard-led expedition was sent out on a mapping mission to determine the extent of the continental shelf north of Alaska and map the ocean floor. The data gathered could be used for oil and natural gas exploration. Margaret Hays, the director of the oceanic affairs office at the U.S. State Department, said the Alaskan continental shelf may lie up to 600 nautical miles from the coastline, far beyond the 200-mile economic exploitation zone. The UN deadline for territorial claims is 2013.

Meantime, China sent its third expedition to the North Pole, saying its purposes are purely scientific, for studying climate change in the area and possible implications for China, rather than exploration of natural resources.

In view of the Arctic debate, Durham University's International Boundaries Research Unit has prepared a map and explanatory notes showing the region's current state of affairs and key disputed territories. The map should help politicians and policy makers to understand areas of maritime jurisdiction as they engage in and try to settle sea territorial disputes.

As the ice recedes, new rules are needed to prevent "a rush to exploit all the available resources of the Arctic - another Klondike - and avoiding the destabilizing effects of massive infrastructure developments," said Jacqueline McGlade, executive director of the European Environment Agency. (July-August 2008) Ref.778

#### Arctic Access, Territorial Claims, Energy Resources and Environmental Management

Global warming is expected to increase access to the Northwest Passage and other Arctic areas. Canada announced the construction of up to eight Polar Class 5 Arctic Offshore Patrol Ships and the establishment of a deep-water port in the far North. A Canadian opposition party and some Canadian analysts say Canada should do much more to assure its sovereignty over the area. The status of some Canadian Arctic waters is not clear among the relevant neighboring countries with varying territorial claims in the Arctic. Russia planted its flag on the seabed 4.2 km below the North Pole to strengthen its claims over a large Arctic area. [See also *The Disputes over the Northern Territories Set to Continue* in June 2007, *New Canadian Strategies for Monitoring the Northwest Passage* in August 2006, and *Arctic Northern Passage Opens New International Issues of Regulation* in February 2006 environmental security reports.] (July 2007) Ref.779

#### Arctic Debate Intensifies

Debate over the Arctic ownership is intensifying, as Canada, Denmark, Norway, Russia and the U.S. are all building their political and legal cases to claim jurisdiction over different (sometimes overlapping) areas. Russia declared that the first results show that the Lomonosov Ridge is an extension of Siberia, thus backing the country's bid to take control of the region. Denmark sent scientists on a month-long expedition seeking evidence that the Lomonosov Ridge is a geological extension of Greenland. Canada is determined to defend its sovereignty over the region's Northwest Passage and some Arctic territory; "We either use it or lose it. And make no mistake, this government intends to use it," said Canadian Prime Minister Stephen Harper. Canada is establishing an army training center at Resolute Bay (about 370 miles south of the North Pole) and a deepwater port on the north end of Baffin Island. "The Russians, Canadians and Danes all have overlapping claims in the polar region. It is unclear how this can be resolved," said Øystein Jensen, a maritime law expert with Oslo's Fridtjof Nansen Institute. (August 2007) Ref.780

### The Disputes over the Northern Territories Set to Continue

As the North is warming up, opening access to its rich resources, the territorial claims over the Arctic region are set to increase. Reportedly, Russia is prepared to challenge the international community and claim sovereignty over large parts of the Arctic region that is now under the International Seabed Authority, on grounds of the region's geological continuity and similarity with continental Russia. (June 2007) Ref.781

### Arctic Debate Update

Less than one month after the five Arctic countries agreed at the summit to follow the Law of the Sea in resolving the Arctic disputes, Russian Lt. Gen. Vladimir Shamanov, head of the Defense Ministry's combat training directorate said that Russia started the revision of their military training program to be prepared for fast deployment in "the Arctic in case of a potential conflict." He invoked the "reaction of a certain number of heads of state to Russia's territorial claims to the continental plateau of the Arctic" and the large-scale U.S. Northern Edge 2008 military exercise conducted in Alaska in late May. (June 2008) Ref.782

### Canada to Begin Monitoring Traffic in Northwest Passage by mid-2008

In view of increasing disputes over the Northwest Passage, Canada announced that it will begin monitoring the area's sea traffic by underwater listening devices. Beginning in mid-2008, Canada's military will monitor ships and submarines using detection technology installed at Gascoyne Inlet on Devon Island, near one of the main arteries of the passage. Canada is at odds with Russia, Denmark, Norway and the United States over the Northwest Passage. (September 2007) Ref.783

### Arctic Disputes Continue

An authoritative report, *Climate Change and International Security*, to the European Council, among other recommendations for addressing security issues in the new context of climate change, recommends "Develop an EU Arctic policy based on the evolving geo-strategy of the Arctic region, taking into account i.a. [inter alia] access to resources and the opening of new trade routes." It notes, "The increased accessibility of the enormous hydrocarbon resources in the Arctic region is changing the geo-strategic dynamics of the region." A recent U.S. survey revealed that the Alaska continental shelf might extend more than 100 nautical miles farther from the U.S. coast than previously assumed, therefore eventually giving the U.S. the right to claim access to extra seabed resources if it were party to the Law of the Sea treaty. In the meantime, the US-based Arctic Oil & Gas Company has filed a claim with the UN to act as the sole "development agent" in the Arctic region, with exclusive rights to extract oil and gas from the central Arctic Ocean currently beyond the territorial control of the polar nations. (March 2008) Ref.784

### Arctic Northern Passage Opens New International Issues of Regulation

Thawing of the Arctic sea ice opens up the Northern Passage as an international shipping route, triggering international disputes over sovereignty and ecological implications. Although scientists, politicians, and environmental activists are increasingly warning about the complexity of the problem, no international regulations are yet in place for this fragile region. Alex Wolfe, from the University of Alberta and leading researcher on the Arctic, says that besides the sovereignty and ecosystem issues of the opening of the Northern Passage, there are also shipping

safety problems that are not yet adequately addressed. As of our information, there are no international shipping standards or regulations in place for ecosystem protection for Northern navigation. Canada claims that the waterway is Canadian territory, while other countries consider it international waters. There is no international treaty dividing the Arctic between the eight countries with claims: Canada, Denmark, Finland, Iceland, Norway, Russia, Sweden, and the U.S. This exposes the northern passages to other possible problems, such as: transportation of illicit materials and illegal immigrants and as a place and route for terrorism, as well as difficulty in solving eventual disputes over tanker accidents, contamination, and overfishing. In March 2006, Canadian military forces will begin Operation Nunavut ("land that is ours" in Inuktitut, the Inuit language), over the Arctic islands and sea ice of the Northwest Passage. (February 2006) Ref. 785

#### Northwest Passage to Become "Canadian Internal Waters"

The Canadian government mounted an expedition to defend the Northwest Passage as Canadian territory. This is the largest Canadian expedition in 60 years in the Arctic, with troops traveling 2800 miles across the region that is changing rapidly as a consequence of climate change. In addition to sailing, the opening of the Northwest Passage is an opportunity for access to rich resources, including oil. Recent research suggests that the passage could become ice-free and open for navigation as soon as 2015. While Canada claims sovereignty over the region, it is at odds with other countries including Denmark and Russia who argue that the area is a continuation of their territory. [See also *Arctic Northern Passage Opens New International Issues of Regulation* in February 2006 environmental security report.] (April 2006) Ref. 786

#### **Greenland Moving Towards Independence**

In what might be an example of political and sovereignty implications of climate change, Greenland took another step towards full independence from Denmark. It was granted self-rule status, recognizing Greenlanders as a distinct people with Greenlandic as the territory's official language and with the right to self-determination, including control over its natural reserves — gas, gold and diamonds. The warming climate could open access to the untapped wealth and pave the road towards economic independence. A referendum held in November 2008, showed more than 75% support of the residents for taking charge of the police, justice, and security responsibilities. (June 2009) Ref. 787

#### **Greenland Conference on Global Warming**

Environmental ministers and other officials from 23 countries around the world and the EU met on the edge of a retreating glacier (110 Km in 45 years) in Greenland and agreed that nations must take action against global warming. The proceedings of the conference were not made public and although the group didn't make specific action recommendations, there was consensus that discussions need to be urgently replaced by action. (August 2005) Ref. 788

#### **Disputes over Polar Regions Expands**

The race for claiming polar territories expands from the Arctic to Antarctica. The Antarctic should be protected by the 1959 Antarctic Treaty and related agreements that protect the continent against activities relating to mineral resources except scientific ones. Nonetheless, Britain's Foreign Office plans to claim 1 million sq km (386,000 sq miles) of seabed off the coast of the British Antarctic Territory. Greenpeace and WWF warned that Britain's possible oil, gas,

and mineral exploration in the region would represent an environmental disaster for the fragile ecosystem. Similar claims for seabed areas might also be submitted by Chile and Argentina, which might overlap some of the British territorial claims.

Meantime, the Arctic disputes continue. Encouraged by the prospect of increased oil and minerals access due to global warming, Greenland is contemplating eventual independence from Denmark. Warning that climate change is becoming a threat to worldwide peace and security, German Foreign Minister Frank-Walter Steinmeier noted with concern that the rival territorial claims in the Arctic could turn into a Cold War. “Policies to fight climate change can, and will, become an important part of peace policies,” he added. Note: On August 21st this year, for the first time on record, the Northwest Passage was opened to ships not accompanied by or armored as icebreakers. [See also *Arctic Debate Intensifies* in August 2007, *Arctic Access, Territorial Claims, Energy Resources and Environmental Management* in July 2007, and other similar items in previous environmental security reports] (October 2007) Ref. 789

### **Environmental Performance Index 2010 Score Worse for Vulnerable States**

The 2010 Environmental Performance Index ranks 163 countries on 25 performance indicators tracked across ten policy categories. It facilitates cross-country comparisons as well as analysis of how the global community and individual countries are performing in particular sectors and policy issues, therefore helping assess the sectors that should be improved. The 2010 EPI reveals that most of the lower ranked nations are also vulnerable states, hence proving again the importance of including environmental aspects in peace and vulnerability strategies. (January 2010) Ref. 790

### **Global Climate Risk Index 2008**

*Global Climate Risk Index 2008 Weather-Related Loss Events and Their Impacts on Countries In 2006 And In A Longterm Comparison* by Sven Harmeling analyzes to what extent countries and country groups have been affected by the impacts of weather-related loss events (storms, floods, heat waves etc.) whereby losses are quantified using four indicators: 1) total number of deaths; 2) deaths per 100,000 inhabitants; 3) absolute losses in million US\$ PPP (purchasing power parity; and 4) losses per unit GDP. These analyses are based on assessments of the Munich Re database NatCatSERVICE®. The Global Climate Risk Index 2008 was published by Germanwatch, an independent NGO, with financial support from the German Federal Ministry for Economic Cooperation and Development (BMZ). (July-August 2008) Ref. 791

### **Tools for Addressing Humanity’s Growing Ecological Footprint**

Earth Overshoot Day this year was on September 23 and is moving forward each year, notes Global Footprint Network. In 2008, humanity used about 40% more than nature can regenerate resources and absorb waste. The Living Planet Report 2008, which documents the extent of human pressure on the planet, reveals that 75% of the human population lives in countries that are “ecological debtors,” demanding more biocapacity than they have within their borders. According to UN moderate projections, by the mid-2030s we will need the equivalent of two Earths to support us. The Ecological Footprint Atlas 2008 offers country-by-country graphs, data tables, and sources, representing a valuable tool to help manage our ecological assets. Conservation International is launching a new environmental protection resource, the Integrated Biodiversity Assessment Tool (<http://biodiversityinfo.org/ibat/>), which will provide a centralized source from which organizations can obtain comprehensive information on their possible

ecological impacts. (October 2008) Ref.792

### **miniAtlas of Human Security**

The miniAtlas of Human Security, produced by the Human Security Report Project at Simon Fraser University, Canada, is a comprehensive illustrated guide of global and regional trends in human insecurity—with details on: armed conflicts, genocides and other forms of deadly violence against civilians; fatalities from political violence; numbers of refugees and other displaced peoples; and respect for human rights. (October 2008) Ref.793

### **Reports addressing the Link between Climate Change and Conflict**

*'Human Securitising' the Climate Security Debate*, by Lorraine Elliott, is a working paper of the Asia Security Initiative Policy Series. It assesses the connection between climate change and national, regional and international security from a human security point of view. The recommendations basically advocate pro-active rather than reactive strategies based on vulnerability vs. risk and adaptation and social resilience vs. mitigation. In order to avoid conflict, scarce resource management should include equity provisions regarding those most vulnerable to environmental scarcities.

*Climate Conflict: How Global Warming Threatens Security and What to Do about it*, by Jeffrey Mazo from the IISS Environmental Security and Science Policy, provides a view of how climate changes affects security from a historical perspective. It points out that the most vulnerable countries are not necessarily the fragile states or those most affected physically by the effects of climate change, but those that fail to overcome cultural, social, political, and economic barriers to successful adaptation to a changing climate. (April 2010) Ref. 794

### **Twenty Years of Environmental Security**

*An Uncommon Peace: Environment, Development, and the Global Security Agenda* by Geoffrey D. Dabelko, ECSP Director, published on the 20<sup>th</sup> anniversary of *Our Common Future* (commonly known as the Brundtland report) is an assessment of the evolution of our understanding of environmental concerns with implications for national and international security. It addresses changes in the traditional state-centered approach to new security threats such as: the possible environmental consequences of nuclear war replaced by the increased threat of dirty bombs; new threats such as genetic mutations; and health and poverty. Dabelko notes that these new realities outline the pathway to “one facet of our common future: environmental peacemaking.” (May 2008) Ref.795

### **GEO-4**

UNEP's fourth *Global Environment Outlook: environment for development* (GEO-4) warns once more that changing temperatures, rapid rates of species' extinction, and unsustainable depletion of the world's scarce resources are the most important threats to human survival. The report reiterates that in order to avoid catastrophe, a new proactive policy approach is needed, since environmental problems worsen faster than response policies are presently adopted. An analysis by region shows that in Africa, the biggest problem is caused by land degradation due to unsustainable use and climate change; in Asia and Pacific, despite improvements in many domains, the environment is further threatened by increasing consumption and associated waste—including hazardous waste; Europe, although a leader in environmental policy, has to make greater efforts to reduce greenhouse gas emissions and change its unsustainable patterns of

production and consumption; the Latin America and Caribbean environment is threatened by lack of land-use planning—including urbanization and deforestation, and high income inequality; in North America, high energy consumption and low efficiency, low fuel economy standards, and urban sprawl are the main environmental problems. (October 2007) Ref. 796

### ***UNEP Year Books***

#### *UNEP Year Books 2009*

The UNEP Year Book 2009 offers a view on scientific understanding of global environmental change and foreseeable issues, helping to raise awareness about potentially threatening issues. It outlines some policies and actions that could help mitigate climate change and reduce the human environmental footprint. (February 2009) Ref. 797

#### *UNEP's Year Book 2008*

UNEP's Year Book 2008 highlights the impacts of global warming (from the melting of permafrost and glaciers to extreme weather events), also showing the changes in policies and actions of leaders of governments, companies, and the UN itself in addressing issues related to climate change. It shows that business begins to see climate change as an opportunity rather than a burden, as a growing numbers of companies embrace environmental policies and investments in clean technology and renewable energies are increasing. (February 2008) Ref. 798

#### *GEO Year Book 2007*

UNEP fourth annual report, *GEO Year Book 2007*, was released at the opening of the Global Ministerial Environment Forum in Nairobi [see item *Governing Council/Global Ministerial Forum Makes Progress on Global Environmental Governance*]. The report offers a comprehensive overview of global and regional developments over the past year; focuses on implications of globalization on the environment (linkages among ecosystem health, human well-being, and economic development and assesses how policy decisions respond to global change); analyses the environmental implications of nanotechnology; and features several key indicators related to the environment. (February 2007) Ref. 799

### ***State of the World Reports***

#### *State of the World 2010 Calls for a New Paradigm in Addressing Security*

Worldwatch Institute's annual report *State of the World 2010: Transforming Cultures; From Consumerism to Sustainability* is a comprehensive assessment of the strategies and measures necessary for improving humanity's prospects by switching away from consumerism-based patterns. Concerning security, the report argues that as "it will become increasingly clear that the biggest threats to national security are not foreign armies or terrorist groups but the weakened state of the planet," there will be important changes to the security and legal systems, including new concepts such as "Earth jurisprudence," while a more balanced military-to-climate budget would "do more to protect people than the largest nuclear arsenal ever could, and in the process it will create additional economic opportunities and new openings to improve diplomatic relations between countries." The recommendations include, inter alia, the establishment of global political institutions for guaranteeing security, and increasing use of environmental

restoration, diplomacy, and cooperation for addressing conflict. (December 2009) Ref. 800

*State of the World 2009*

*State of the World 2009: Into a Warming World* by Worldwatch Institute is a comprehensive analysis of potential evolution of climate change by the end of the century and of the urgent actions and policies that need to be taken now. It is “intended to inject new inspiration and energy into national and international climate negotiations.” It examines the technologies that would be the most efficient for reducing greenhouse gas emissions; policies and strategies to address climate change; ideas for saving biodiversity; and security implications of climate change. It also includes a climate change reference guide and glossary. (January 2009) Ref. 801

*State of the World 2007: Our Urban Future*

Worldwatch Institute’s *State of the World 2007: Our Urban Future* warns of possible perils from urbanization, if policies, technologies, and behaviors are not changed. The report assesses social and economic impacts of rapid urbanization, and suggests policies. (50% of the world is expected to be urban within a year.) The chapter *Reducing Natural Disaster Risk in Cities* notes that of the 33 cities projected to have at least 8 million residents by 2015, at least 21 are coastal cities that will be affected by possible sea-level rise due to climate change. (January 2007) Ref. 802

*State of the World 2006*

The Worldwatch annual report, *State of the World 2006*, is a comprehensive overview and analysis of the world situation from the point of view of resources, biodiversity, population, and economic growth, and their impact on the world’s ecosystems. This year’s report has a special focus on the two fastest growing economies and most populated region: China and India. The report highlights the huge impact that the policies and paths of development of these two countries has on the whole globe from all points of view, even to the point of being a determinant for a better or catastrophic future. (January 2006) Ref. 803

***Living Planet Report 2006***

*Living Planet Report 2006*, by the WWF and the Global Footprint Network, reveals that humanity’s impact on the planet has more than tripled since 1961 and Earth’s resources are being used faster than they can be replaced by nature, and it warns that, if present trends continue, by 2050 humanity will demand twice as much as the planet can supply. The report breaks down the ecological footprint into components, such as CO<sub>2</sub>, food production needs, infrastructure requirements, etc. The countries with the highest ecological footprint are: the United Arab Emirates, U.S., Finland, Canada, Kuwait, Australia, Estonia, Sweden, New Zealand, Norway and Denmark. (October 2006) Ref. 804

***Global Risk 2007, the World Economic Forum***

*Global Risks 2007: A Global Risk Network Report* by the World Economic Forum (WEF) explores three risk scenarios: *Pandemic and Its Discontents*; *Out of the Global Warming Frying Pan (and Into the Fiscal Fire)*, and *Oil Shock and Its Consequences*. It also addresses policy issues related to mitigation and risk prioritization, the risk of water shortages, tropical storms and inland flooding, international terrorism and civil war. The report warns that climate change could cause up to \$250 billion loss over the next 10 years, and a sharp increase in oil prices could cause up to \$1 trillion of economic losses and trigger a global recession. (January 2007) Ref. 805

***World in Transition –Climate Change as a Security Risk***

*World in Transition –Climate Change as a Security Risk*, a report by the German Advisory Council on Global Change based on the work of international experts and organizations including the UN Environmental Program (UNEP), assesses the possible security implications of climate change and warns that inaction might lead to destabilization and raise the threats to international security to a new level. It suggests four 'climate-induced conflict constellations': 1) freshwater scarcity, 2) decline in food production, 3) increased natural disasters, and 4) environmentally-induced migration. The geographic areas at greater risk include: northern and southern Africa and the Sahel zone; central Asia, India, Pakistan and Bangladesh, China; Caribbean and the Gulf of Mexico (especially Central America); and Andean and Amazonian regions of Latin America. The report makes extensive recommendations, including: shaping global political change, reforming the UN, developing pro-active climate protection and adaptation policies, and “financing international conflict prevention.” It also underlines the need to develop strategies for avoiding destabilization and conflict in the event that climate protection fails. (December 2007) Ref.806

***Six places in the world where climate change could cause political turmoil***

A Christian Science Monitor article, *Six places in the world where climate change could cause political turmoil* gives another view of areas vulnerable to consequences of global warming: 1) Nepal (lack of freshwater due to melting glaciers causes migration and increased power of Maoists); 2) Indonesia (deforestation); 3) Lagos, Nigeria (sea-level rise in an overpopulated and unstable region); 4) U.S. (overstretched America's armed forces due to disaster relief and war-fighting); 5) Arctic (race for natural resources and navigation change sovereignty questions as Arctic ice melts); 6) East Africa (desertification and decreased food production induced migration). (December 2007) Ref.807

***An Uncertain Future: Law Enforcement, National Security and Climate Change***

*An Uncertain Future: Law Enforcement, National Security and Climate Change* is a comprehensive analysis of the security implications of climate change, including some recommendations. It warns that “traditional attempts to maintain the status quo and control insecurity” and use “military force to secure resources overseas, while attempting to create a fortress state at home” are doomed to failure. Mentioning “almost certain” future mass movement of 200 million people by 2050 due to climate change, the report calls for an international legal framework for environmental refugees’ management. Climate change has the potential to change the geographical and political world map and in addition to being a “threat multiplier” in already vulnerable areas like the Horn of Africa and the Persian Gulf, it could also cause civil unrest in developed countries of North America and Europe. Increased research is needed to identify areas of highest vulnerability and instability and to consider climate change in foreign aid programs. Military and police will have to change from reactive to proactive strategies in order to prevent and manage security issues triggered by climate change. Unrest could range from protests against polluting companies and government inaction to new forms of ecoterrorism (although the author considers the term misleading).

Recommendations include changes in “Policing new legislation” and “important operational and strategic concerns that military planners will need to consider over the coming decades:

1 Difficulties maintaining military capability; 2 Loss of strategic defence assets; 3 Greater calls



for peacetime deployments; 4 Instability in strategically important regions.” A whole chapter covers “Implications for National Security and the Military”, including “Difficulties maintaining military capability; Loss of strategic defence assets; Greater calls for peacetime deployments; and Instability in strategically important regions.” The report concludes: “The risks of climate change demand a rethink of approaches to security.”

The report is authored by Chris Abbott of Bristol University's Centre for Governance and International Affairs, published by Oxford Research Group “building bridges for global security.” (January 2008) Ref.808

***World Resources 2005 -- The Wealth of the Poor: Managing Ecosystems to Fight Poverty***

This joint report from UNEP, UNDP, the World Bank, and the World Resources Institute suggests an approach to addressing poverty by focusing on environment and local natural resources beyond the conventional aid projects, debt relief, and trade reform. It presents models on how natural resources—soils, forests, water, and fisheries—managed at the local level--could be the most effective means for the world’s rural poor people to generate a better life. The report pleads for community stewardship of local resources as a critical element of any poverty-reduction activity. UNEP executive director Klaus Toepfer called the report, “essential reading for any world leader serious about defeating poverty.” This is the 11<sup>th</sup> in a series of biennial reports on global environment and governance. (September 2005) Ref. 809

**Environmental Change and Security Program 11<sup>th</sup> Report**

The 11<sup>th</sup> report of the Woodrow Wilson Center Environmental Change and Security Program discusses the implications and eventual links among environmental problems and population dynamics, and conflict. According to the international panel of experts, stabilizing population growth, and protecting natural resources and the environment should be part of the long-term strategy for resolution and avoiding of conflicts around the world. The report emphasizes that more research is necessary for understanding regional aspects of the links connecting environment, population, and security. (March 2006) Ref. 810

**New Report Summarizes Pacific Environmental Threats and Solutions**

The Pacific Ocean Synthesis report, from the Center for Ocean Solutions, presented at the World Ocean Conference in Manado, Indonesia, in May 2009, discusses environmental threats and potential solutions in seven regions of the Pacific, It represents the results of a review of more than 3,400 publications from 50 countries in the Pacific basin, and both synthesizes information from research and points out gaps in the studies. (June 2009) Ref. 811

***Climate Change: A New Threat to Middle East Security***

The *Climate Change: A New Threat to Middle East Security* report by Friends of the Earth Middle East (FoEME) highlights that consequences of climate change—mainly rising sea levels and freshwater shortage could exacerbate security risks in the Middle East. Unless adequate adaptation actions, the large-scale consequences include threat to “national, regional, and global security” warns Nader Khatib, Palestinian Director of FoEME. (December 2007) Ref.812

**NATURAL DISASTERS**

The increasing number and intensity of natural disasters, the toll of lost lives, the devastating impact on human habitat and environment, as well as the financial implications for aid and reconstruction brought natural disasters to a leading place on the international agenda.

### **New 2009 Terminology on Disaster Risk Reduction**

United Nations International Strategy for Disaster Reduction (UNISDR) released an extensively upgraded terminology to help international common understanding and application of disaster risk reduction concepts. It also includes new concepts that are not in widespread use but are of growing professional relevance. (January 2009) Ref. 814

### **Scientific Evidences and Potential Consequences**

(Listed by month in reverse chronological order)

May 2010 was the 303<sup>rd</sup> consecutive month that was hotter than the 20<sup>th</sup> century global average for that month, according to NOAA's National Climatic Data Center. The combined global land and ocean surface temperature for May was 59.84°F (15.46°C), which was 1.24°F (0.69°C) above the 20<sup>th</sup> century average of 58.6°F (14.8°C).

The Web-based climate policy assessment system 'Climate Action Tracker' ([www.climateactiontracker.org](http://www.climateactiontracker.org)) shows that present developments and actions pledged globally "give virtually no chance to limit global mean temperature increase to below 2°C by the end of the century. ...[and] give us a virtual certainty of exceeding 1.5°C, with global warming very likely exceeding 2°C and a more than 50% chance of exceeding 3°C by 2100" (June 2010) Ref. 816

Scientists have found that the upper 700m of the ocean has warmed significantly between 1993 and 2008 – the period covered by the study – and slightly faster than IPCC estimates. NASA scientists observed that 80-90% of the increased warming ends up in the ocean, with a double effect on potential sea level rise: from expansion of water volume, as well as diminishing capacity to absorb CO<sub>2</sub> and therefore further stimulating the effects of global warming. The research was conducted by an international team of scientists from NOAA, NASA, the Met Office Hadley Centre in the United Kingdom, the University of Hamburg in Germany and the Meteorological Research Institute in Japan, and published in the report *Robust Warming of the Global Upper Ocean*. Meantime, oceans are more acidic "than they have ever been for at least 20 million years," according to a report by the European Science Foundation. It reveals that seas have already become 30% more acidic in the past 200 years as the oceans absorbed about a third of the CO<sub>2</sub> emissions from human activities since the Industrial Revolution and if current trends continue, they could be 150% more acidic by 2100 than they were in pre-industrial times. (May 2010) Ref. 817

In March 2010, the combined global land and ocean surface temperature was the highest since record keeping began in 1880, according to NOAA and confirmed by NASA. NOAA found the combined global land and ocean average surface temperature 1.39°F (0.77°C) above the 20<sup>th</sup> century average, while NASA found the March combined average global land-surface air temperature a record 1.9°F (1.05°C) above the 20<sup>th</sup> century average.

Climate change and man-made CO<sub>2</sub> emissions are changing ocean chemistry and marine ecosystems, reveal new studies. *Ocean Acidification: A National Strategy to Meet the Challenges*

*of a Changing Ocean* by the National Research Council, warns that the level of ocean acidity is increasing at an unprecedented rate and since the ocean absorbs approximately a third of CO<sub>2</sub> emissions, unless man-made CO<sub>2</sub> emissions are substantially curbed or controlled by technological means, the ocean will continue to become more acidic. Meantime, global warming is changing oceans salinity, making some regions saltier, while other are getting fresher, according to research conducted by the Australian government's research agency CSIRO Wealth from Oceans Flagship using data gathered by the global network of 3,200 Argo buoys. (April 2010) Ref. 818

Global temperatures have risen steadily since the 1970s, reveals the 'Current GISS Global Surface Temperature Analysis' by the NASA Goddard Institute for Space Studies (GISS). Comparing the global surface and ocean temperature changes, researchers conclude that global temperature continued to rise at a rate of 0.15-0.20°C per decade, despite large year-to-year fluctuations associated with the El Niño-La Niña cycle.

Australia's temperatures rose 0.7°C (0.4°F) over the past 50 years, with warming occurring across the country, with the last decade being the hottest on record, reveals the "State of The Climate" report by the Commonwealth Scientific and Industrial Research Organisation (CSIRO). The report also shows that sea levels rose 7-10 millimeters (0.3-0.4 inches) per year around Australia's north and west, while rainfall patterns varied sharply among regions. The past southern hemisphere summer was 0.2°C (0.32°F) warmer than the previous high in 1997-1998, reaching an average of about 29.6°C (85.3°F).

Severe droughts affecting some East and Southeast Asian countries caused water levels of rivers and reservoirs to drop at dangerous levels. China's State Commission of Disaster Relief announced that the worst drought in Southwest China in 60 years is affecting 51 million people and is having a devastating effect on regional power supply and farming. In the Philippines, what seems to be the worst drought since 1998 affects 23 provinces. In Vietnam, drought dried up riverbeds and aggravated saline water intrusion into coastal areas, threatening the country's southern Mekong Delta. Thai Department of Disaster Prevention and Mitigation announced that nearly 4 million people in some 36 out of Thailand's 76 provinces have been affected by drought since November.

CO<sub>2</sub> levels rose to a median 393.71 parts per million in the first two weeks of March, from 393.17 ppm in the same period of 2009, and the increase seems accelerating, reveal new measures at Norway's Zeppelin station on the Arctic Svalbard archipelago. Similarly, a 2009 study of the ocean off Africa indicated CO<sub>2</sub> levels in the atmosphere were at their highest in 2.1 million years. (March 2010) Ref. 819

The UNEP information note "How Close Are We to the Two Degree Limit?" reveals that under present pledges by countries to cut greenhouse gas emissions, there are slim chances of reaching the goal of keeping a global temperature rise at below 2°C (3.6°F) at the end of the century.

The Antarctic Climate and Ecosystems Cooperative Research Centre in Tasmania found evidence of interdependence between drought in Western Australia and snowfall in Antarctica: the heavier the snowfall is in Antarctica, the less the rainfall is in Australia's southwest. The conclusions are based on studying 750-year-old ice-core samples.

In 2009, the average temperature in the Tibet Autonomous Region reached a record high of 5.9°C (42.62°F), 1.5°C (2.7°F) higher than "normal" (an average over several decades.). Chinese

climatologists report that temperatures in Tibet rose by an average 0.32°C (0.58°F) per decade since 1961, when meteorological records began, which is considerably higher than the global average of 0.2°C (0.36°F) per decade. (February 2010) Ref. 820

A preliminary analysis from the National Climatic Data Center of the National Oceanic and Atmospheric Administration (NOAA) found that the decade 2000-2009 is the warmest decade since instrumental measurements of temperatures began in the 1880s, and 2009 (tied with 2006) was the fifth warmest year on record, based on measurements taken on land and at sea. The average trend over the past three decades is warming at about 0.36°F (0.2°C) per decade, while average global temperatures have risen by about 1.5°F (0.8°C) since 1880.

According to the Met Office's forecast made using the Decadal Prediction System (DePreSys), 2010 could yet be the hottest year on record, due to a new El Niño warming period that has just started in the Pacific. Additionally, the sun should also begin to brighten, as part of its 11-year brightness fluctuation cycle (in 2009 it was at the bottom of the cycle.) Further, if not for 2010, then "a record breaker will still occur in the next few years" says Doug Smith, climate expert at the Met Office.

*Oddball Winter Weather: Global Warming's Wake-Up Call for the Northern United States*, a study by the National Wildlife Federation, documents how climate change is linked to precipitation increase, including intense snowstorms, as warmer winter weather causes more surface water evaporation (and less freezing), thus recharging the atmosphere with moisture. This explains the unusually heavy snowfall in many parts of the world. (January 2010) Ref. 821

The past ten years have been the warmest in 160 years of recorded history, reveals preliminary data released by the UK Met Office based on temperature records from over 1,500 global monitoring stations. Similarly, based on preliminary data the World Meteorological Organisation announced that 2009 will be one of the ten warmest individual years recorded, with a temperature 0.44°C (0.79°F) above the long-term average of 14°C (57.2°F).

Preliminary disaster figures for 2009 show that over 75% of the people killed and 95% of the total affected by natural hazards were due to extreme weather events, says a joint press release by the UN International Strategy for Disaster Reduction, UNDP, and World Meteorological Organization. Although the 2009 statistics show lower figures compared to previous years, Margareta Wahlström, UN Special Representative of the UN Secretary-General for Disaster Risk Reduction, warned that "extreme weather disasters remain top of the list and will continue to affect more people in the future."

The Global Climate Risk Index 2010 compiled by Germanwatch, shows that the top 10 countries most affected in the past 20 years by extremes of climate are: Bangladesh, Myanmar, Honduras, Vietnam, Nicaragua, Haiti, India, the Dominican Republic, Philippines, and China. The Global Climate Risk Index analyzes the impacts of weather-related loss events—mainly storms, floods and heat waves—and is based on the NatCatSERVICE database of Munich Re. (December 2009) Ref. 822

Global mean warming might reach 7°C (12.6°F) by the end of the century, without drastic mitigation efforts, estimate scientists contributing to the IPCC AR5, due in 2013. *The Copenhagen Diagnosis* is "an interim scientific evaluation" prepared for the December climate Summit. Similarly, the Global Carbon Project warns that unless urgent actions are taken to reduce CO<sub>2</sub> emissions, global temperatures are on course to rise by about 6°C by the end of the

century. They estimate that emissions rose by 29% between 2000 and 2008, and suggest that in order to limit global temperature rise to 2°C, average carbon emissions per capita for goods and services should be reduced to 0.3 metric tons by 2050, from 1.3 metric tons now.

The 2008 Greenhouse Gas Bulletin by the World Meteorological Organization also reveals that the global trend of rising atmospheric global greenhouse gases (GHG) continues. Globally, the averaged mixing ratios of carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O) reached new highs in 2008; and, while some halocarbons, such as chlorofluorocarbons (CFCs), are decreasing slowly as a result of the implementation of the Montreal Protocol on Substances that Deplete the Ozone Layer, concentrations of their substitutes, such as HCFCs and HFCs, are increasing rapidly. Simultaneously, the first comprehensive study accounting for oceans' intake of CO<sub>2</sub> over the past 250 years reveals that since 2000, as the oceans' acidity increases, their carbon-sequestration capacity is declining. Therefore, "we cannot count on these sinks operating in the future as they have in the past, and keep on subsidizing our ever-growing appetite for fossil fuels," says lead author, oceanographer Samar Khatiwala, from Columbia University. A recent assessment financed by the Global Environment Facility indicates that 61 of the world's 64 large marine ecosystems experienced a significant increase in sea surface temperatures in the last 25 years. (November 2009) Ref. 823

Scientists found that Arctic Ocean waters are acidifying at an unprecedented rate, as more CO<sub>2</sub> can dissolve in cold water than warm. Research carried out in the archipelago of Svalbard revealed that seawater could reach corrosive levels within 10 years, thus jeopardizing shellfish and other life forms and livelihoods depending on it. At this rate, scientists fear that 10% of the Arctic Ocean will be corrosively acidic by 2018; 50% by 2050; and entirely by the end of the century. (October 2009) Ref. 824

By 2060, the global average temperature could rise by 4°C (7.2°F), unless sound greenhouse gas emission reduction strategies are implemented, revealed a study by the UK Met Office, prepared for the Department of Energy and Climate Change. Nevertheless, UNEP's "Climate Change Science Compendium 2009" estimates that even in the best case scenario—if the world's most ambitious targets are met—the planet will still warm by 3.5°C (6.3°F) by the end of the century. The calculations consider the upper-range targets of nearly 200 nations' climate policies (e.g. U.S. emissions reduction of 73% from 2005 levels by 2050, EU 80% from 1990 levels by 2050). The report also notes that sea level might rise by 6 feet by 2100 instead of 1.5 feet, as projected by the IPCC.

The August 2009 ocean surface temperature was the warmest since 1880, when record keeping began. The average ocean surface temperature for June–August was 16.9°C (62.5°F), which is 1.04°F above the 20<sup>th</sup> century average, according to NOAA's National Climatic Data Center. For the same period, the combined global land and ocean average surface temperature was 16.2°C (61.2°F), the third warmest on record, and 1.06°F above the 20<sup>th</sup> century average. (September 2009) Ref. 825

In July 2009, the world's oceans reached the highest average temperature since record keeping began 130 years ago. Some NASA scientists suggest that warming oceans could cause Earth's axis to shift more than previously estimated, with potential implications for interpreting how the Earth wobbles.

Another record was set by big tropical storms in the Atlantic, as the average frequency of

hurricanes over the past decade was higher than at any time in the last 1,000 years, reveals a study published in the journal *Nature*.

As CO<sub>2</sub> levels are increasing at a faster rate than the IPCC worst-case scenario, the planet might be heading for an “irreversible” climate change by 2040 says a paper by Andrew Brierley of St. Andrews University and Michael Kingsford of the James Cook University in Australia, which specifically examines the effect of CO<sub>2</sub> emissions on ocean ecosystems. (August 2009) Ref. 826

Scientists say that the effects of El Niño on the global climate vary and might be altered by global warming, and they warn that an emerging El Niño could cause droughts, floods and an increased number of forest fires. There is a strong correlation between intense El Niño and droughts in Southeast Asia and floods in western Latin America—Colombia, Ecuador and elsewhere. In a recent study, periodic warming of the central Pacific was linked to an increase in Atlantic hurricanes. (July 2009) Ref. 827

A new IPCC report, summarizing over 1,400 studies that were presented at the climate conference of March 2009 in Copenhagen, warns that changes in ocean temperatures and sea levels, extreme climate conditions, and the retreat of the Arctic sea ice are happening more rapidly than experts predicted two years ago, and concludes that “The world faces a growing risk of abrupt and irreversible climatic shifts.”

*World Disasters Report 2009* states that the 326 natural disasters that occurred worldwide in 2008 had a 235,736 death toll and the developing world suffered 76% of the disasters and 99% of the deaths. The *Human Impact Report: Climate Change—The Anatomy of a Silent Crisis* report claims that climate change affects 325 million people a year, at a total economic cost of \$125 billion, and predicts that, by 2030, more than 660 million people would be affected, with potentially 500,000 deaths, and an economic loss rising to \$340 billion

The Korea Meteorological Administration 10-years analysis shows that the Korean Peninsula is closer to a subtropical climate, due to climate change. For the 1999–2008 period, the average temperature was 0.6°C (1°F) higher than the 30-year average of the 1971–2000 period, while precipitation increased by an average 9.1%. (June 2009) Ref. 828

Weather pattern changes observed now in Australia were not expected to manifest until 2020, says Professor Ian Lowe, one of the country’s most prominent climate change scientists, who made such estimates 20 years ago.

*The Assessment Report on Climate Change and its Consequences in Russian Federation*, by the Russian Federal Service for Hydrometeorology and Environmental Monitoring, notes that over the past century, the average surface air temperature in Russia has risen by nearly 1.3°C, almost twice as much as the global mean. The assessment also details potential changes in permafrost by 2020 and 2050 due to climate change. Permafrost covers 60% of the land in Russia. (May 2009) Ref. 829

A poll conducted by Reuters with experts, who were among authors of the 2007 IPCC report, attending the Bonn Climate Change meeting revealed high agreement that it is “unlikely” (less than 1/3 chance) the world would manage to limit warming to 2°C (3.6°F) above pre-industrial levels. Out of 11 scientists participating in the survey, 6 said world average annual temperatures would set a new record by 2015, and 4 said it would happen by 2020. As for sea level rise by 2100, projections varied from 30-40 cm (11.8–15.7 inches) to up to 140 cm (55.1

inches), and 10 of those polled projected that Arctic late summer sea ice could vanish before 2050, with two saying it would happen by 2020. A similar poll conducted by the Guardian with participation of 261 experts showed that 46% of those who answered the question on temperature rise estimated that it would reach 3–4°C (5.4–7.2°F) by the end of the century.

The *Right to Survive* report by Oxfam International reveals that the number of people affected by the 6,500 climate-related disasters recorded since 1980 has doubled in 30 years and estimates that by 2015 it might further increase by 54%, to an average of more than 375 million people per year. The emergency organizations might be overwhelmed by the rising number of people in poor countries affected by climate hazards, while worldwide emergency aid spending would need to be doubled to at least \$25bn a year to help cope with the situation. (April 2009) Ref. 830

“Worst case” scenarios are already becoming reality and an increase in average temperatures of 6°C (10.8°F) by the end of the century is not ruled out, cautioned over 2,500 leading environmental experts attending a climate summit held in Copenhagen ahead of the December post-Kyoto negotiations. They issued a statement warning that unless swift political action, “dangerous climate change,” was imminent. Steven Sherwood, climate expert at Yale University, noted that due to the physiological limits of the human body, temperature rise by 7°C (12.6°F) over pre-industrial levels would render many parts of the globe uninhabitable, while 10°C (18°F) would encompass the bulk of today’s population. Along the same lines, Hans Joachim Schellnhuber, director of the Potsdam Institute for Climate Impact Research in Germany, said that 5°C (9°F) global warming over present values would reduce human population to 1 billion.

Global warming might be further exacerbated by CO<sub>2</sub> released from the Antarctic Ocean because of shifting wind patterns due to orbital shift, found a team of scientists at Columbia University’s Lamont-Doherty Earth Observatory.

"Assessing Dangerous Climate Change Through an Update of the IPCC 'Reasons for Concern", a study published in the Proceedings of the National Academy of Sciences, updates some of the findings of the IPCC’s 2001 Third Assessment Report. It found that even a lower level of increase in average global temperatures could have serious consequences in all five domains of concern analyzed: 1) risk to threatened ecosystems; 2) risk of extreme weather events; 3) vulnerability disparities; 4) damage assessment; and 5) risks of large-scale discontinuities due to phenomena with very large impacts (e.g. melting of major ice sheets.) (March 2009) Ref. 831

A decade of drought, a record-breaking heat wave, and strong winds created exceptional conditions for the rapid spread of the bushfires in the state of Victoria, Australia. Over 200 people were killed and thousands of homes burned by the worst fires in the country’s history. However, the region might expect longer and more extreme dry periods in the future due to climate change. The International Workshop on Drought and Extreme Temperatures organized jointly by the World Meteorological Organization and the China Meteorological Administration in Beijing, February 16-17, 2009, warned that the frequency and intensity of severe drought, heat waves, and wildfires are likely to increase this century. The regions considered most vulnerable to severe drought are: continental U.S. and Mexico, the Mediterranean basin, parts of northern China, southern Africa and Australia, and parts of South America. Severe heat waves are expected to increase everywhere, but especially in the continental western U.S., northern Africa, the Middle East, central Asia, and southern Africa and Australia. The issues will be further addressed at the World Climate Conference-3 to be held August 31-September 4, 2009 in Geneva. It was recommended that a drought index be developed to help the world better cope

with increasing droughts and extreme temperatures.

The level of Africa's Lake Victoria, a vital source for the Nile, had dropped 3 meters over the past six years, due to warmer temperatures and reduced precipitation.

"The Humanitarian Costs of Climate Change" report reveals that natural disasters affect an average of some 250 million people yearly; and since 1992 nearly \$2.7 trillion dollars have been spent on international response to environmental disasters. The report estimates that this spending could increase by 32%, considering changes in the frequency of disasters, and 1,600%, factoring in other criteria, such as intensity.

New data from the National Climatic Data Center show that global temperatures have risen 0.22° F since 1990. The organization warns that even lower warming levels in the future will cause serious consequences of water shortage, extreme weather events, and threats to ecosystems and humans. (February 2009) Ref. 832

The UN Inter-Agency Standing Committee and the UN International Strategy for Disaster Reduction noted that the number of disasters doubled over the past 20 years, reaching more than 400 annually and it is expected that the intensity, frequency, duration, and extent of weather-related hazards will rise over the next 20 years around the world. The UN Office for the Coordination of Humanitarian Affairs (OCHA) noted that in the period 1988-2007, over 75% of disasters were climate-related, and accounted for 45% of deaths and 80% of the economic losses caused by natural hazards.

According to the World Meteorological Organization, in 2008 the average temperature on Earth was 0.31°C higher than the 1961–1990 levels, with serious changes in climate patterns, such as the warmest winter in more than 100 years in Scandinavia, the longest hot summer on record in parts of Australia, and unusual cold for a large part of Eurasia. Some parts of the U.S., India, Pakistan, Vietnam, and Bangladesh were the nations worst hit by the devastating effects of flooding and cyclones as a result of climate change, with tens of thousands of people losing their homes and more than 10 million displaced. The re-insurance company Munich Re said that 2008 was one of the most devastating years in terms of natural disasters, in both human and economic terms.

The British Met Office warns that the average global temperature for 2009 is expected to be more than 0.4°C above the long-term average, despite the La Niña phenomenon. NASA estimates that a 1°C increase in ocean surface temperatures could trigger a 45% increase in thunderhead formation, potentially increasing the frequency of severe tropical storms and their devastating impacts on developing countries by 6% in the next decade.

Other studies warn about climate change in different parts of the world: Latin America and the Caribbean might experience more destructive hurricanes and melting glaciers; New Zealand is threatened by drought, while the Arctic might have reached the point of irreversible climate change with temperatures rising much faster than anywhere else in the world. (December 2008) Ref. 833

The World Meteorological Organization's Global Atmosphere Watch reports that climate-warming greenhouse gases reached record levels in 2007. Using the NOAA annual greenhouse gas index, it found that the total warming effect of long-term greenhouse gases has increased by 1.06% compared to 2006 and by 24.2% since 1990. WMO's *Greenhouse Gas Bulletin* reports that, compared to the previous year, CO<sub>2</sub> rose 0.5%, methane 0.34%, and nitrous oxide 0.25%, while slight decreases were noted for chlorofluorocarbons (mainly due to the implementation of



the Montreal Protocol).

The 2008 Atlantic hurricane season set a few records in U.S. and Cuban recorded history—as to number, force, frequency and length of storms, say meteorologists. Data on consequences are still being calculated. (November 2008) Ref. 834

Worldwatch Institute reports that 874 weather-related disasters were recorded in 2007, representing 91% of all natural disasters, the largest annual total since systematic recordkeeping began. These disasters caused \$69 billion in recorded losses worldwide. The Institute says that there is a 66% likelihood that climate change will lead to more heat waves, heavier precipitation, broader droughts, and more-intense tropical cyclones—all of which could further increase the number of catastrophic weather events. Along the same lines, WWF's report *Climate change: faster, stronger, sooner* warns that Europe will be confronted with more extreme weather conditions from severe cyclones to heat-waves, floods, and droughts. (October 2008) Ref.835

The four tropical storms, Fay, Gustav, Hanna and Ike, destroyed all of Haiti's harvest, killed at least 328 people, and left some 800,000 people—about 10% of the population—in need of emergency assistance. Cuba, struck by hurricanes Gustav and Ike also suffered what the government described as the worst damage in the island's history. In India, the unusually strong monsoon caused enormous flooding, with an estimated 3 million people in need of assistance “such that only the Army can handle it,” said Parshuram Rai, director, Centre for Environment and Food Security (CEFS) in New Delhi.

Meantime, in the arid Somali Region of Ethiopia it has not rained for three years, and the Horn of Africa is facing a humanitarian crisis, with 17 million people, including 3 million children, in urgent need of food and other critical assistance.

Australia's national science agency, the Commonwealth Scientific and Industrial Research Organization, warned that the country should prepare a network of long-term coastal observation sites to improve large wave understanding and increase preparedness for more severe and frequent storms. (September 2008) Ref.836

The “Weather and Climate Extremes in a Changing Climate” report by the U.S. Climate Change Science Program and the Subcommittee on Global Change Research warns that extreme weather events such as the drought that hit this year in Atlanta, the heat-wave in New York, and the flooding of Des Moines are likely to increase in frequency across North America as the planet warms.

At the opening of the 11th International Coral Reef Symposium in Fort Lauderdale, attended by more than 2,500 scientists and government officials, NOAA revealed that nearly half of U.S. coral reef ecosystems are considered to be in “poor” or “fair” condition.

A “Position Analysis: CO<sub>2</sub> Emissions And Climate Change: Ocean Impacts And Adaptation Issues” by the Australian Antarctic Climate & Ecosystems Cooperative Research Centre suggest that oceanic acidification rose to the point that it should be considered in security strategies and longer-term national risk assessments. The analysis states that CO<sub>2</sub> in the atmosphere is at its highest level in 650,000 (possibly 23 million) years, and half has been dissolved in the oceans, increasing their acidity. Ocean acidification affects coral structures, marine life, and fisheries, potentially threatening the food security of millions in the Asia-Pacific, and presenting strategic and humanitarian challenges. As environmental threats for Pacific Island communities increase, so mount demands on Australia to assist countries facing environmental disasters. (July-August

2008) Ref.837

The Northern hemisphere spring of 2008 was the seventh warmest on record, nearly one degree warmer than the 20<sup>th</sup> century average, according to the National Climatic Data Center. It was also marked by weather extremes around the world: Cyclone Nargis which devastated Myanmar (Burma); record low spring snow in Europe and Asia; severe drought in China; North America devastated by strong storms, flooding, tornadoes (reported number for half-year exceeding 10-year annual average) and drought (in the West); and the first two big tropical storms hitting Central America. Meantime, Australia's fall is unusually dry, aggravating the drought in many parts of the country. (June 2008) Ref.838

Tens of thousands of people died and hundreds of thousands lost everything in Myanmar as tropical cyclone Nargis hit the Southeast Asian country, also known as Burma. The tragedy was increased by the lack of preparedness and response capability of the country and the ban on intervention by foreign aid agencies.

Although there is no consensus on linking storms' number and strength to climate change, some experts say that there is evidence of a probable trend that storms are becoming more powerful as global warming heats up the oceans. Professor Kerry Emanuel, an MIT meteorologist says that the power of tropical cyclones has roughly doubled since the 1950s, with the most increase occurring over the last three decades, consistent with man-made global warming.

Considering the rate so far, 2008 might be the year with the most tornadoes in the U.S. since 1950—when modern recordkeeping began—and the deadliest in a decade, reports The Weather Channel. In some states, the number to date of such storms already exceeds the yearly average: Mississippi had 49 tornadoes compared to an annual average of 39 twisters average; Alabama 45 versus 42, and Arkansas 49, compared to 48.

A comprehensive study conducted by an international research team from 10 institutions around the world, led by NASA's Goddard Institute for Space Studies, found conclusive evidence of the link between human-caused climate change and the trends of change of Earth's natural systems. The research analyzed a database of more than 29,000 data series of physical and biological systems, and natural phenomena, on land and in water, with at least 20 years of records between 1970 and 2004. In about 90% of the cases from North America, Europe, and Asia, a link could be established between warming and changes of the systems' patterns or behavior. The results for Africa, South America, and Australia are not conclusive, due to lack of enough historical scientific data.

Scientists from Switzerland, France and Germany, working on the European Project for Ice Coring in Antarctica, found that "today's concentrations of carbon dioxide and methane are 28% and 124% higher respectively than at any time during the last 800,000 years," increasing the likelihood that human activity is a cause of climate change.

Chinese and Australian scientists are examining possibilities for deeper drilling in parts of Antarctica to find atmospheric records dating back 1.5 million years.

The Living Planet Index reveals dramatic biodiversity reduction since 1970: land species have declined by 25%, marine life by 28%, and freshwater species by 29%. Scientists estimate the current extinction rate being 10,000 times faster than the historical rate. The main causes of species decline are consequences of human behavior: climate change, pollution, destruction of animals' natural habitat, spread of invasive species, and overexploitation of species.

The Arctic is warming at about twice the global average and the changes of climate and moisture highly impact the region's vegetation, with possible negative consequences that will further influence global climate. The tundra is shrinking due to the expansion to the north of the boreal forests, which creates large dark surfaces that will absorb—instead of reflecting— solar heat. Reduced moisture increases wild fire potential in the tundra (in 2007, about 250,000 acres of Alaskan tundra burned), further improving the conditions for forest expansion. However, due to likely future drought in the region, the death of trees will be releasing carbon into the atmosphere instead of absorbing it, thus increasing greenhouse gas emissions. (May 2008) Ref.839

Scientists have detected dilution in salinity of the sea around Antarctica and warn that this could have significant effects on the world's climate and ocean currents. The so-called Antarctic bottom water of this region controls the system of ocean currents spanning the Southern, Pacific, Indian and Atlantic Oceans that shift heat around the globe. The phenomenon might be due to global warming, and in its turn will influence climate change.

For the past 20 years, no significant correlation can be established between climate change and the Sun's activity, found UK Lancaster University scientists, using three different research methods. The findings support the assessment of the Intergovernmental Panel on Climate Change that man-made greenhouse gas emissions outweigh solar activity variations as a cause of global warming.

Climate change-induced effects might prove costly for the US. Although there is no consensus on the link between global warming and the number of hurricanes, scientists agree that climate change could increase storms' damaging forces. The National Hurricane Center estimates that the US might be hit by a hurricane that could cause more than \$100 billion in damage. Highly populated coastal areas are at highest risk. A category 5 hurricane could produce at least \$140 billion in damage to South Florida. (April 2008) Ref.840

The number of people affected by natural disasters in 2007 reached 200 million, considerably higher than the 135 million in 2006, according to the annual study by the Belgian research center Centre for Research on the Epidemiology of Disasters (CRED) of the Catholic University of Louvain. Except for the August earthquake in Peru, the ten deadliest disasters were all climatic, with flooding affecting the most people and being the deadliest. Asia was the region most touched by climatic disasters, but overall, the U.S. experienced the highest number of natural disasters (22), ahead of China (20) and India (18).

Heavy rains for several weeks caused heavy flooding in Zambia, Mozambique, Zimbabwe and Malawi, displacing thousands of villagers and devastating the largely agriculture-based economies of the region. The UN noted that the Mozambique floods could be the worst in memory.

Australian meteorologists suggest that the country's weather patterns are changing and that stronger storms, droughts, and higher temperatures might become the norm. Statistics show that 2007 was the warmest year on record for New South Wales and the Murray-Darling Basin, and the 11th year in a row experiencing above normal temperatures and the 7th with below-average rain, with the southeast of Australia facing the worst drought in living memory. (January 2008) Ref.841

Summarizing the notable climate events of 2007, the World Meteorological Organization (WMO) remarks on devastating floods; drought and falling freshwater reserves; intense storms in

various places around the world; and record-low Arctic sea ice extent that opened the Canadian Northwest Passage for the first time. It reports that the decade of 1998-2007 is the warmest on record, with the global mean surface temperature for 2007 estimated at 0.41°C (0.74°F) above the 1961-1990 annual average of 14°C (57.20°F). Extreme temperatures included unusually cold winters in South America, heat waves affecting Europe, and making 2007 probably the hottest year on record in the Northern Hemisphere. Some scientists believe that weird weather patterns might become the norm and that the world is more than 50% likely to experience serious climate change as it is unlikely to keep greenhouse gases levels low enough to avoid the critical 2°C (3.6°F) temperature rise. (December 2007) Ref.842

The number of weather-related disasters worldwide now averages 400–500 a year, compared to 125 in the early 1980s, and the world should increase mitigation and preparedness efforts, notes Oxfam report *Climate Alarm Disasters increase as climate change bites*. Geological disasters—such as earthquakes, are about the same, indicating that global warming is to blame, remarks the report. Factoring in population growth, the number of people affected also rises considerably. As of August 2007, some 248 million people were affected by flooding in 11 Asian countries alone. The November cyclone Sidr claimed another estimated 10,000 human lives and left about 3 million homeless in Bangladesh. (November 2007) Ref.843

The International Federation of Red Cross and Red Crescent Societies have stated that more than 250 million people a year are now affected by so-called natural catastrophes, a third more than ten years ago. The federation has already responded to more than 100 floods in 2007; in 2006, the humanitarian groups responded to 482 disasters, up from 278 in 2004. Climate change is cited as one of the causes that led to 60% of Georgian farmers losing all of their crops. Australia's first bush fires also triggered fears over the intensifying effects of climate change. By 2030, the already dry continent might get warmer by about 1.8 degrees Fahrenheit, and drier due to estimated 3% annual rainfall reduction, forecasts the *Climate Change in Australia* report produced by the Commonwealth Scientific and Industrial Research Organization and the Bureau of Meteorology. Note: a survey of 1,213 people conducted in July showed that 40% of Australians consider global warming a greater threat to security than Islamic fundamentalism; only 20% deemed it less. In Southern Africa, environmental degradation and global warming change rainfall patterns, decreasing in some regions—thus causing drought, and increasing in others, which might produce floods, warned scientists attending the Southern Africa Development Community meeting at mid-September. They also discussed adaptation strategies. (October 2007) Ref.844

In Africa, the worst rains in 30 years caused flooding affecting an estimated 1.5 million people in 22 countries, including Ethiopia, Niger and Sudan, increasing the humanitarian crisis, reports the UN Office for the Coordination of Humanitarian Affairs (OCHA). Hundreds of thousands of people have been displaced and the risks of epidemics are rising. In other parts of the world, strong hurricanes also produced serious damages during September. (September 2007) Ref.845

Between 2004 and 2006, the number of emergencies due to natural disasters doubled, from 200 to 400. This year's monsoon affected an estimated 30 million in South Asia, and millions of Africans were also affected by flooding throughout the continent. Scientists expect increased natural disasters over the next decades and researchers warn that risks of flooding might be

underestimated. (August 2007) Ref.846

Japan's Meteorological Agency announced that the ocean around Japan has warmed up by 0.7 to 1.6 degrees Celsius over the last century, far higher than the world average of 0.5 degree Celsius. (May 2007) Ref.847

The United Nations Intergovernmental Panel on Climate Change 4th Assessment Report, *Climate Change 2007: The Physical Science Basis*, intensified the debate and worries about global warming and is likely to increase response efforts. The report assesses the global situation as a whole (changes in the Earth's climate including atmospheric composition, global average temperatures, melting glaciers, rising sea levels, ocean conditions, and other climate changes) and presents global and regional future climate projections. It states with “very high confidence” that global warming is being caused by human activity and that “carbon dioxide emissions will continue to contribute to warming and sea level rise for more than a millennium, due to the timescales required for removal of this gas from the atmosphere.” It presents a grim picture of the future — rising sea levels, more intense storms, extensive drought, and spread of some diseases. “We must, without further ado, agree on the definition of an institutional framework that will enable us to take more effective and efficient collective action,” said UN General Assembly President Sheikha Haya Rashed Al Khalifa. “Momentum for action is building; this new report should spur policymakers to get off the fence and put strong and effective policies in place to tackle greenhouse gas emissions,” said Achim Steiner, Executive Director of the United Nations Environment Programme. (February 2007) Ref. 848

The US National Oceanic and Atmospheric Administration revealed that the CO<sub>2</sub> growth rate for 2006 was 2.05 ppm and the yearly average rise since 2001 was 2.1 ppm, meaning a faster accumulation in the atmosphere than scientists expected, and raising fears over the time available to tackle climate change. Preliminary data compiled by the World Meteorological Organization show that globally, the year 2006 is estimated to be the sixth warmest year since recordkeeping began in 1880. Also, 2006 registered the largest ever ozone hole area (September 21-30, 2006) and the second lowest average sea ice extent for the month of September. The organization notes that the September sea ice decline rate is about 9% per decade. Heat waves and droughts hit many parts of the world. The final figures will be released in March 2007. Newly released data by the World Glacier Monitoring Service reveal that in the period 2000–2005, mountain glaciers around the world melted at 1.6 times the average rate of the 1990s and 3 times that of the 1980s. A new study presents a doom-laden future for Europe, arguing that Europe is warming faster than the global average, and climate change will transform the face of the continent, affecting all sectors, but mainly its economy—particularly agriculture and tourism—and health.(January 2007) Ref. 849

Preliminary findings by the World Meteorological Organization (WMO) show that 2006 might be the sixth warmest year on record, with the average temperature estimated to be 0.42°C above the 1961-1990 annual average. It notes heat waves and prolonged drought in some regions, heavy rainfall, storms, and flooding in others, and the continuously decreasing Arctic sea ice. Along the same lines, analysts note that in Europe, this fall, continental temperatures were 1.8°C higher than the long-term average, and the past ten autumns have been the warmest on record. Also in Australia, this year the weather has been exceptionally warm and rainfall in many

regions has been at near record lows. Drying has increased significantly in Africa in the past three years, reveals Gravity Recovery and Climate Experiment satellite data.

The Chinese Ministry of Science and Technology warns that global climate change will increase "extreme weather events", threatening China's food production. (A comprehensive government assessment is likely to be released in the first half of 2007.) Central India's extreme rainstorms rose in number and strength over the past fifty years, most probably due to global warming (December 2006) Ref. 850

During the Climate Change Conference held in Nairobi many reports and papers documenting new climate change-related evidence and challenges were released. Noteworthy ones include: A report by German scientists is renewing the call on nations to promptly consider strategies for dealing with "sea level refugees"—population living in coastal areas endangered by the rising sea levels and increasing frequency of extreme storms. Canada's northern native peoples might become environmental refugees, being increasingly isolated as their ice roads and paths to supplies melt.

According to the Office of Maritime Transportation and Hydrography in Hamburg, the North Sea was 2.4°C warmer in October 2006 than the 1968-1993 average; and, since 1988 is in its strongest heating period since the start of recording (1873). Another German institute of research, WGBU, notes that everywhere seas and oceans are transformed by the climatic change: the surface water is heated, the sea level rises, the oceans become more acid, the storms are stronger. (November 2006) Ref. 851

With extreme heat waves in Europe and the hottest summer in North America, scientists argue whether global warming is the cause; most of them agree that it is. "Ten of the last 12 years were the warmest since 1850. The global temperature (since then) rose 0.7 degrees Celsius and most climate models suggest it's going to continue to warm by 2 to 5 degrees Celsius this century," says Philip Jones, climate research professor at Britain's East Anglia University. He also adds that globally, sea levels are rising by around 1.5 millimeters (0.06 inches) per year and have risen some 20 centimeters (7.8 inches) since the late 19th century. Warmer seas due to global warming will most probably also cause changes in precipitation patterns and increase intensity of hurricanes. (The IPCC's Fourth Assessment draft text, which will be released next year, forecasts a 2–4.5° C warming by 2050—a faster change than their 2001 forecast of 1.4–5.8° C warming by 2100). (July 2006) Ref. 852

A new study by the National Center for Atmospheric Research demonstrates that global warming played an important role in 2005's record 28 tropical storms and hurricanes in the Atlantic. The study also predicts that, although not necessarily setting another record, 2006 might also experience a 'very active' season, with 13-16 named storms, 8-10 hurricanes, and 4-6 major hurricanes. The researchers warn that in the long-term, ocean warming will raise the baseline of hurricane activity.

New scientific evidence that the increased number and intensity of extreme weather events is linked to climate change were presented at the 40th annual Canadian Meteorological and Oceanographic Society (CMOS) congress in Toronto. Over 800 scientists discussed evidence and debated strategies to cope with climate change effects. There is unanimous agreement that reducing greenhouse gas emissions should be high on political and industrial business agendas. (June 2006) Ref. 853

At the European Geosciences Union meeting in Vienna, several scientists revealed recent research and data on greenhouse gas emissions; global warming and its consequences; glaciers' unprecedented melting rates; and the increasing acidity of oceans and its consequences on marine life. There was consensus that human activity is an important driver and that swift action to change current trends and practices should be mandatory. (April 2006) Ref.854

In the preamble to his upcoming book, 'The Revenge of Gaia', James Lovelock, who formulated the Gaia theory— a planetary system which keeps the Earth fit for life—made the astonishing statement that climate change has reached the point of no return due to humans' abuse of the environment. He argues that before the end of the century the devastating effects will be considerable, as the result of an uncontrollably accelerated process of warming mainly caused by huge emissions of greenhouse gases such as CO<sub>2</sub>. He suggests that governments' efforts — mainly in Europe—should concentrate more on preparedness to cope with consequences of climate change than countering it. The temperature might rise 8°C in the temperate regions and 5° in the tropics. Although some consider Lovelock's assumptions controversial, there is consensus that the situation is critical and more intense actions are needed to curb global warming. Scientists studying the Arctic are also noting that the polar region is close to or on the edge of the “no return” point. They warn about the effects that the thaw will have all over the world, not just in the north: accelerating global warming, possibly even changing the Earth's weather systems, including significantly changing Europe's climate. (January 2006) Ref.855

Data from climatologists around the world show that 2005 is the record year on many counts: warmest year on record; worst Atlantic hurricane season for intensity, number, and consequences; hottest Caribbean waters ever; worst drought; and least perennial Arctic sea ice cover. The global mean surface temperature in 2005 is currently estimated to be +0.48 degrees Celsius above the 1961-1990 annual average of 14 degrees C, according to World Meteorological Organization (WMO) records. (December 2005) Ref. 856

Several research papers published recently link the increasing numbers and intensity of powerful storms to increasing ocean temperatures, suggesting that global warming is the main cause. Most climate models indicate that the effects of climate change will be felt more intensely farther from the equator. ESA's CryoSat measurements of sea ice are expected to confirm or refute this theory and also help with better weather forecasting.

Dr. Nathan P. Gillett argues in an article published in *Nature* that the impact of global warming on European weather patterns has been underestimated. The Northern Hemisphere Circulation study compares the results of nine state-of-the-art climate models with real situation of Northern Hemisphere air pressure changes at sea level over the past 50 years. It concludes that the simulations underestimate the sea-level air pressure circulation trends, which questions their accuracy in showing changes of weather patterns or predicting regional climate changes.

A report by population health experts from Australia and New Zealand warns that even with action to reduce global warming, thousands of Australians are likely to die by the end of the century because of heat waves caused by human-induced climate change. It is estimated that by 2100 the annual average temperatures could increase by 1 to 6°C over most of Australia, with significantly larger changes in some regions. The report, *Climate change health impacts in Australia*, also addresses the danger of spread of dengue-carrying mosquitoes, as well as possible

large-scale poverty and migration in the Asia-Pacific region, mainly in the Small Island States that are particularly susceptible to climate change.

Shishmaref, a whole community of 600 residents of NW Alaska, needs to be permanently relocated on the mainland to be protected from storm systems that are certain to arrive, as a consequence of global warming. Other communities from farther north might follow. (September 2005) Ref. 857

A recent paper in Science by NASA scientists reports that Earth is absorbing much more heat than it is losing, a result that adds weight to the pessimistic forecasts on global warming. Their prediction shows a global rise of 1° F. this century even if greenhouse gases remained at their present level. Some of their new data comes from the Argo ocean sensing project and, combined with readings from other sources, indicates that the planet's surface has a solar energy imbalance of +0.85 watts/square meter.

Researchers found that the amount of sunlight reaching the Earth's surface is increasing, and has been for at least the past ten years, reversing a dimming trend that extended over several prior decades. The reasons for these fluctuations are obscure, but it is likely that this brightening, and consequent increased warming, is at least partly due to a decrease in the emission into the atmosphere of particulates and other sunlight-shielding pollutants from industrial operations. If this trend persists, or even stabilizes, it raises doubts as to whether the current forecasts of global warming are pessimistic enough. (May 2005) Ref. 858

Several UN reports issued in December 2003 warn of dramatic consequences of climate change, which may increase efforts around the world to implement the provisions of the Kyoto Protocol or to make “other deals on the environment.” A WHO report “examines, for example, how weather, air pollution, and water and food contamination affect the way diseases emerge. It further suggests effective means for all countries to monitor and control the health effects of climate change.” The report estimates that 150,000 deaths and 5.5 million Disability-Adjusted Life Years were caused in the year 2000 due to climate change.

A FAO report highlights the growing vulnerability of Small Island Developing States to sea level rises. World Meteorological Organization (WMO) reports that late 20th century temperatures were the highest for the past millennium, the 1990s were the highest decade in the Northern Hemisphere, and 1998 was the warmest year in the past 1000 years. Actions to achieve the objective of the United Nations Framework Convention on Climate Change (UNFCCC) are becoming increasingly urgent. (December 2003) Ref.859

### **Greenhouse Gas Emissions**

(Listed by month in reverse chronological order)

The American National Academy of Sciences found that CO<sub>2</sub> emissions grew faster than forecasted by the International Panel on Climate Change (IPCC). Between 2000 and 2004, worldwide CO<sub>2</sub> emissions increased at 3.1% per year, three times the 1.1 % per year during the 1990s. The growth was predominantly driven by developing and least-developed economies, which accounted for 73% of global emissions growth in 2004. (June 2007) Ref. 861

An international team of researchers has found that the Southern Ocean’s capacity to absorb man-made carbon dioxide from the atmosphere is weakening, stating that this is the first time



they have “convincing evidence that a change in the uptake of CO<sub>2</sub> by the oceans is linked to climate change.” They didn’t expect that to happen until much later in the 21st century. (May 2007) Ref. 862

The Global Carbon Project report shows that carbon dioxide emissions over the last five years grew four times faster than in the preceding 10 years. Global growth rates in 2000–05 reached 3.2%, compared to 1990–1999’s 0.8%. The report also draws attention to environmental inertia, by which the environment stores up part of the energy generated by greenhouse gas emissions; causing global temperatures to continue to increase for two or more centuries after emissions are stabilized or begin to drop. (November 2006) Ref. 863

Greenhouse-gas concentrations reached new highs in 2004, reveals the first annual Greenhouse Gas Bulletin published by WMO. Globally, average concentrations of carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O) in the Earth’s atmosphere exceed those of pre-industrial times by 35%, 155%, and 18% respectively, reaching their highest-ever recorded levels. The WMO prepared the Greenhouse Gas Bulletin in cooperation with the World Data Centre for Greenhouse Gases (that archives observations from some 44 WMO Members), and with assistance of the U.S. National Oceanic and Atmospheric Administration’s Earth System Research Laboratory. The bulletin with 2005 data is expected in November 2006. NOAA reports that in 2005, the CO<sub>2</sub> average atmospheric concentration reached 381 ppm, an increase of 2.6 ppm since 2004 (although compared to WMO data, the difference would be 3.9 ppm), noting that half a century ago, the annual increase was less than 1 ppm. (March 2006) Ref.864

Permafrost covers much of Russia, Canada, and Alaska. As it melts, trapped methane gas is released, which is twenty times more effective in creating the greenhouse effect than is CO<sub>2</sub>. Scientists disagree about how much permafrost will be melted over what period of time; however, the phenomenon has not been properly factored into global warming forecasts. With less snow and ice, solar radiation that used to be reflected off the earth is now absorbed, which furthers the warming impact. New climate simulations using the National Center for Atmospheric Research (NCAR) Community Climate System Model (CCSM) show that global warming may thaw over half of Northern Hemisphere’s permafrost by 2050 and as much as 90% by 2100. This would alter ecosystems across the northern latitudes and might increase runoff to the Arctic Ocean and release vast amounts of carbon as well as methane into the atmosphere in greater volume than now released by fossil fuel usage. Canadian Arctic sea-ice cover has been reduced by about 24% in extent and about up to 50% in thickness since 1978, remarks Louis Fortier, chief scientist aboard the Canadian icebreaker CCGS Amundsen and director of several Arctic research programs. Even more alarming, he notes, since 2004 there are indications that the melting has begun to accelerate, with 2005 an all-time record minimum for sea ice cover. In discussing opening of the Northwest Passage for commercial navigation, besides the ecological implications, he warns about risks linked to pollution, as well as major problems of sovereignty and security for Canada. (December 2005) Ref. 865

### **Natural Disasters as an Environmental Security Issue**

Recent natural disasters increased environmental security concerns. The last few years’ storms, droughts, and heat waves increased poverty and migrations in regions already vulnerable to conflict. David Anderson, former Canadian Environment Minister, said that global warming

posed a greater long-term threat to humanity than terrorism. Although natural hazards cannot be avoided, their dramatic consequences can be reduced by preparedness and risk reduction measures including early warning systems, environmental protection, land-use planning, technology development, and education. The World Meteorological Organization (WMO) says that early warning and advance planning, and building a “culture of prevention” could halve the rates of death and destruction in the decade following 2010 compared with this decade. To address these goals, the WMO has launched the Natural Disaster Mitigation and Prevention Programme. The new Early Warning Promotional Platform for natural disasters has been set up in Bonn, Germany, under the auspices of the International Strategy for Disaster Reduction (ISDR). Several international organizations are working closely with the Secretariat for the ISDR in preparing the World Conference on Disaster Reduction to be held in Kobe, Japan, January 18-22, 2005. (October 2004) Ref. 866

### **Worldwatch Institute: Assessing the Relation between Disasters and Conflict**

*Beyond Disasters: Creating Opportunities for Peace*, a report by Worldwatch Institute: analyses the nature and effect of disasters over the past 20 years and the impacts of human activities on the climate; highlights the factors of vulnerability; and makes a few recommendations to reduce the social consequences of disasters and to eventually use post-disaster reconstruction as an opportunity for building lasting peace. The report considers three case studies: Aceh, 2004 Indian Ocean tsunami—that became a catalyst for peace; Sri Lanka—despite the ceasefire, the conflict continued mainly because of an inadequate post-disaster reconstruction strategy; and Kashmir—the earthquake didn’t influence the stalled reconciliation process. (June 2007) Ref.867

### **Fourth Assessment Report Climate Change 2007**

The first part of the four-volume *Climate Change 2007, the Fourth Assessment Report* of the Intergovernmental Panel on Climate Change (IPCC) will be released on February 2, 2007. News released in advance shows that climate change could be far worse than previously expected. A report on this first part of the IPCC Assessment will appear in next month’s environmental security report. The other three parts of the Assessment focus on: impacts, adaptation and vulnerability to climate change—to be released in April; mitigation—to be released in May; and the Synthesis Report—to be published in November 2007. (January 2007) Ref. 868

### **Adaptation and Vulnerability Report by the IPCC**

The Intergovernmental Panel on Climate Change (IPCC) report *Climate Change 2007: Impacts, Adaptation and Vulnerability* reinforced the scale of the implications of climate change and focused the international community on the emergency of acting on mitigation and adaptation strategies. The report shows that the most severe impacts of climate change will be experienced by people in the poorest regions who have emitted the least amount of greenhouse gases. Billions of people would face water scarcity and hundreds of millions, hunger. Vulnerability to climate change could be exacerbated by other stresses—such as poverty, unequal access to resources, and conflict. Africa will be mostly affected by water and food shortage; low-lying areas worldwide are threatened by floods, erosion, and rising sea levels; changes in precipitation patterns and the disappearance of glaciers from Asia to Latin America will affect water availability for human consumption, agriculture and energy generation; heat waves, forest fires, and extreme weather conditions will increase mainly in North America and Europe. “These projected impacts tell us that we urgently need to launch an agreement on future international

action to combat climate change, as well as look for effective ways to generate the funds needed for adaptation,” says Yvo de Boer, executive secretary of the United Nations Framework Convention on Climate Change. The “Summary for Policymakers” suggests that a portfolio of adaptation and mitigation measures is needed to diminish the risks associated with climate change. The Summary, approved by government officials, will most probably guide future strategies such as a post-Kyoto policy, and establishing global mitigation and adaptation frameworks. The third report, *Mitigation of Climate Change* is scheduled for release in May, and the final Synthesis Report for November 2007. (April 2007) Ref. 869

### **Human Footprint on Earth Ecosystem at Critical Stage**

Two recent studies at the National Center for Atmospheric Research in Boulder Colorado have indicated that global warming will continue to increase even if its causative factors are brought under better control. The investigators, Gerald Meehl and Tom Wigley, used three computer simulations, two extremely detailed, to derive the predictions that, even assuming greenhouse gas content stayed at the 2000 level, there would still be a minimum 0.9° F rise in the global temperature, and a 4" ocean level elevation by 2100, causing severe dislocations. In the worst case, the temperature change could be as much as 6.3°F, with a one-foot rise in the ocean with no further input of greenhouse chemicals.

At the recent meeting in London, environment and energy ministers from 20 of the world's biggest polluters discussed the best policies for sustainable growing non-polluting economies. Britain emphasized that environment-centered economic policy and international cooperation are the only effective way to prevent a crisis caused by global warming.

The UN Secretary-General's report for the reform of the UN also lists climate change as one of the three major challenges for the international community that requires particularly urgent action. (March 2005) Ref. 870

### **Joint Science Academies' Statement on Climate Change**

The heads of eleven national academies of sciences (all G8 countries plus Brazil, China, and India) issued a joint statement: “Climate change is real”. Documented with scientific and statistical data, the statement makes clear that global warming is occurring and all nations should engage in sustained long-term actions to reduce greenhouse gas emissions, and prepare for the inevitable consequences of climate change. Since the most affected would be those in developing nations, poverty and migration are likely to increase. Although global collaboration will be necessary, the statement also calls on G8 nations to show leadership in addressing climate change and assisting developing nations to meet the challenges of adaptation and mitigation. [See also 8.4 *Climate Change Updates* in April 2005 and other previous environmental security monthly reports.] (June 2005) Ref. 871

### **Millennium Ecosystem Assessment Reports**

*Millennium Ecosystem Assessment Synthesis Report (Millennium Ecosystem Assessment 1)*, conducted by 1,300 experts from 95 countries, reveals that approximately 60 % of Earth's vital ecosystem services are being degraded or used unsustainably. Without improved ecology-centered policies, revised consumption patterns, better education, and implementation of new eco-friendly technologies, the situation will worsen in the next 50 years, seriously endangering life on earth. This is the first report in a series of seven synthesis reports and four technical volumes that assess the state of global ecosystems and their impact on human well-being. It has

been released together with a statement by the Millennium Ecosystem board of directors entitled “Living beyond Our Means: Natural Assets and Human Well-being.” (March 2005) 872

*Biodiversity Synthesis Report* (Millennium Ecosystem Assessment 2)

The second Millennium Ecosystem Assessment report, Biodiversity and Human Well-being: A Synthesis Report for the Convention on Biological Diversity (CBD) was released on May 22 to mark the International Day of Biodiversity. [See the March 2005 ES Report, Item 8.7, for the first in this series of seven similar Millennium Assessment papers] In response to requests for information received through the CBD, the report synthesizes and integrates findings related to biological diversity from the four MA Working Groups: Conditions and Trends, Scenarios, Responses and Sub-global Assessments. The key findings of the report are: in the last 50 years, human actions have changed the diversity of life on the planet more than at any other time in human history; biodiversity is the foundation for human well-being; human activities are leading to the loss of the variety of life; in the past, actions and programs that promoted conservation and the sustainable use of biological diversity limited biodiversity loss; the size of the task ahead of us is so great that the 2010 biodiversity target will only realistically be achieved in certain areas and regions if we engage in substantial efforts. (May 2005) Ref. 873

### **Dust and Climate Change**

At a recent meeting of the International Geographical Congress, the issue of dust as a hidden climate problem was raised. The deposition of dust can affect the environment in several ways, including climate change, soil salinization, disease transmission, ocean fertilization, ice cap reflectivity change, air pollution, and the neutralization of acid rain. Professor Andrew Goudie of Oxford University claims that in parts of Africa, which appear to be the major sources of global dust, annual dust production has increased tenfold in the last 50 years. Research is scheduled for next year to determine whether dust in some parts of the world is more important than pollution in affecting climate change. (August 2004) Ref. 874

### **New Developments for Addressing Natural Disasters**

The UN will be organizing the 3rd International Early Warning Conference in Bonn from 27 to 29 March 2006. Guided by the motto ‘From Concept to Action,’ the conference aims to implement the ‘Hyogo Framework for Action 2005-2015,’ (adopted at the World Conference on Disaster Reduction in Kobe, Japan, January 2005) and set short- and long-term early warning projects and address high priority needs mostly in critical countries and regions. The conference is expected to be attended by over 600 representatives of governments, parliaments and international organizations, as well as practitioners and members of the scientific community. Meantime, the UN World Meteorological Organization (WMO) decided to increase its role in natural disaster mitigation, particularly for helping the world's least developed countries. The program will be mainly based on better implementation and use of latest the S&T in the domain of weather forecast, climate and water, and cooperation with other international organizations that work in disaster risk and preparedness area. (July 2005) Ref. 875

### **ICSU Launched Global Disaster Research Program**

At its 28th General Assembly, the International Council for Science (ICSU) launched a new program on Natural and Human-Induced Hazards to reduce their economic and social effects. The program will connect natural and social sciences to serve policymakers. It would research

ways to improve disaster forecasts and human vulnerability, as well as develop the best policies to mitigate and respond to them. [See also *Better Disaster Planning to Avoid Environmental Catastrophes* in September 2004 environmental security report.] (October 2005) Ref. 876

### **New UN Office Using Space Technology to Assist Mitigation of Disasters**

A new UN Outer Space Affairs office (UNOOSA) has opened in Bonn, Germany, as part of a future network dedicated to carrying out the UN Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER). Providing universal access to space-based information to all countries and relevant organizations, UN-SPIDER covers all stages of disaster, including risk reduction. The program will improve disaster management and help developing countries strengthen their institutional capacities. UN-SPIDER offices are also scheduled to open in Beijing and Geneva. [See also *Space Technology for Improving Planetary Knowledge and Security* in April 2006, and other related items in previous environmental security reports.] (November 2007) Ref.877

### **Google to Support Development of Early Warning System in Vulnerable Regions**

Google.org, the philanthropic arm of Google Inc., unveiling its charity plan over the next five to ten years, announced \$25 million in grants aimed at addressing global challenges. One of the five core initiatives, ‘Predict and Prevent’ aims to empower communities to predict and prevent ecological, health or social crises before they become local, regional, or global crises, by identifying ‘hot spots’ and enabling rapid response. InSTEDD (Innovative Support to Emergencies, Diseases and Disasters) is allocated \$5 million to improve early detection, preparedness, and response capabilities for global health threats and humanitarian crises. Other recipients in this category include the Global Health and Security Initiative (GHSI) and Clark University. (January 2008) Ref.878

## **MIGRATION TRIGGERED BY ENVIRONMENTAL CAUSES**

There is no adequate international system or framework to cope with environmental refugees, estimated to reach 50 million by 2010 and 200 million (possibly 250) by 2050.

### **Progress on Defining Environmental Refugees**

The International Conference on “Environment, Forced Migration and Social Vulnerability” held in Bonn, Germany, October 9-11, 2008, summarized the current state of research and debate on matters concerning environmental migration and moved forward on the issues of definition: what should be considered environmentally-induced migration; measurement procedures and drivers; and legal instruments to protect and assist different categories of environmental migrants. The Council of Europe’s Committee on Migration suggests that environmental migrants’ rights should be considered either in “a separate Convention or as parts of intergovernmental environmental treaties, or as both”, but disassociated from the 1951 Geneva Refugee Convention. The conference considered three categories of migrants: environmentally motivated migrants, environmentally forced migrants, and environmental emergency migrants. The conference also introduced the Climate Change, Environment and Migration Alliance, designed to assist policymakers with environment-related migration issues; and presented

preliminary findings by the Environmental Change and Forced Migration Scenarios Project that analyzes migration due to environmental factors in 22 case studies in nine regions. The EFMSV conference was hosted by the United Nations University, was attended by about 600 experts from nearly 80 countries, and was the largest meeting ever held on the topic. The full outcomes of the conference were not yet available at the time of this writing. (October 2008) Ref. 880

### **New Strategies Needed to Deal with Global Displacement and Migration**

The annual meeting of the UN High Commission for Refugees (UNHCR) governing Executive Committee concluded that new strategies are needed to deal with increasing global displacement and migration, as well as approaches to tackle their causes, scale, and complexity. In addition to conflict and persecution, environmental degradation, and frequency and magnitude of natural disasters, are among the main causes of increased numbers of refugees. After several years of decline, in 2006 the number of refugees began rising again and continues to mount, remarks UNHCR. The difference between categories of migrants is increasingly blurry. “War is many times driven by scarcity of resources; scarcity of resources can be driven by climate change,” said UN High Commissioner for Refugees, António Guterres. Note: A study by Rafael Reuveny from Indiana University, *Climate Change-induced Migration and Violent Conflict*, reveals that of 38 cases of migration directly attributable to climate change during the 20th century, half led to conflicts, some of which were violent. [See also *Climate Change Refugees* in May 2007, *UNU Calls for International Framework for Environmental Refugees* in October 2005, and other similar items in previous environmental security reports.] (October 2007) Ref. 881

### **Climate Change Refugees Trends**

WFP Executive Director Josette Sheeran announced that WFP will step up its support to address the intense droughts in Niger, which are escalating the humanitarian crisis and are contributing to mass migration from rural to urban areas as well as to neighboring countries. In Southern Niger, the food crisis is estimated to be affecting 7.8 million people.

The flooding and landslides in Rio de Janeiro, Brazil, killed over 200 people and greatly affected the impoverished communities. In response, authorities ordered the eviction of thousands of poor people from the favelas, despite their opposition and threats of revolt. (April 2010) Ref. 883

In northeastern Syria, drought lasting for more than three years triggered one of the largest internal displacements in the Middle East in recent years. Some 300,000 families had to move to urban areas, as their livelihood has been destroyed. Lack of economic alternatives and an adequate government response continue to worsen the deteriorating situation. (February 2010) Ref. 884

The small island developing states continue efforts to have their fate stipulated in a binding treaty on climate change. “It is important that the recognition of SIDS as most vulnerable countries be preserved in a legally binding outcome and that these countries receive priority access to resources for urgent adaptation and mitigation projects,” said Mark Jariabka, executive director of Islands First, an organization that promotes and protects the interests of SIDS. In addition to vulnerability, they are concerned about lack of any bilateral or multilateral agreements for eventual relocation. “Even if such an agreement is signed between an island

nation and another host country, this itself will raise a number of issues regarding international law - sovereignty status, U.N. membership etc. etc.” says Ambassador Abdul Ghafoor Mohamed, the permanent representative of Maldives to the United Nations. “Do these people relocate as a ‘nation’ or as individual refugees who are then subsumed into the host nation as their own citizens, or would they enjoy ‘sovereign rights’? Would they continue to have claim to the territory of the land they had vacated? If not, who would have claim on it, if at all?” questions the Ambassador. (January 2010) Ref. 885

In view of the fact that Pacific Islanders are among the most affected by climate change, UNHCR has partnered with other agencies to form a Pacific Humanitarian Protection Group, which will help map and analyze the protection needs of people in the region, and address disaster preparedness, mitigation and adaptation together.

Tuvalu, the fourth-smallest nation on Earth, might become the first country to be rendered unlivable by global warming. Nevertheless, the relocation of some Tuvalu communities has been well-managed so far, given its small population. However, the situation might get more difficult for the relocation of population from other areas vulnerable to climate change such as Africa’s Sahel, coastal Bangladesh, and Vietnam’s deltas. The displacement of those populations could be “a phenomenon of a scope not experienced in human history,” warns Koko Warner, an expert on climate change and migration at the United Nations University in Bonn.

A UNHCR working paper “Climate change, disaster, displacement and migration: initial evidence from Africa,” based on evidence from Burundi and Somalia, indicates that the frequency of climate-related disasters has increased in the past two decades and underscores that disasters and environmental degradation can trigger displacement and conflicts, which can further accentuate environmental degradation.

A report by the Norwegian Refugee Council, “Climate Changed: People Displaced” also explores who are affected by climate related displacement, and how they are assisted and protected, when displaced within the borders of their own country or across borders. (December 2009) Ref. 886

Nearly 10% of the world’s population—500 million to 600 million people—are at risk from displacement by climate change, and up to 150 million “climate refugees” might move to other countries by 2050, predicts the report *No Place Like Home* by the Environmental Justice Foundation. Some countries—Tuvalu, Fiji, the Solomon Islands, the Marshall Islands, the Maldives and some of the Lesser Antilles—are in danger of losing a significant part of their land in the next 50 years, while others could see large movements of people: Bangladesh, Kenya, Papua New Guinea, Somalia, Yemen, Ethiopia, Chad, and Rwanda.

In an address to the Third Meeting of the Global Forum on Migration and Development held November 4<sup>th</sup>, in Athens, Greece, UN Secretary-General Ban Ki-moon, identified climate change along with human trafficking and economic crisis as a cause of international migration, , therefore emphasizing that protection of vulnerable communities should be a priority of adaptation efforts. (November 2009) Ref. 887

UNDP’s Human Development Report 2009, *Overcoming barriers: Human mobility and development*, focuses on different forms of migration. The report indicates that out of about 1 billion migrants worldwide, 740 million are intrastate, and only about a third of the transnational migrants move from a developing country to a developed one. The report notes that

climate change-induced displacement is very difficult to estimate, due to many uncertain variables, and comments that estimates of 200 million to 1 billion migrants by 2050 do not take into account the adaptation and mitigation measures, while environment-related migration is directly dependent on livelihood opportunities and public policy responses combined.

The UN Special Rapporteur on adequate housing, Raquel Rolnik, reiterated the need for some legal framework for environmental refugees, to ensure that people affected by climate change are treated with dignity, offered appropriate housing and livelihoods, and social organizations of those affected are protected. (October 2009) Ref. 888

In 2008, climate-related natural disasters displaced about 20 million people, compared to 4.6 million who were internally displaced by conflicts, revealed a UN report compiled by the UN Office for the Coordination of Humanitarian Affairs and the Internal Displacement Monitoring Centre. Trying for the first time to quantify the number of people displaced by climate change, the UN study estimates that out of the total of 36 million people displaced by rapid-onset natural disasters, 15 million were due to the Sichuan earthquake, while 90% of the others were due to floods, storms, drought and other climate change-related phenomena. (September 2009) Ref. 889

*The Future is Here: Climate Change in the Pacific*, a report by Oxfam Australia, warns that by 2050, more than 75 million people living in the Asia-Pacific region will have to relocate due to the effects of climate change. Some have already been displaced because of food and water shortages, the rising incidence of malaria, and more frequent flooding and storms. Although some islands began adaptation plans, the report underlines that many people will not be able to relocate within their own country; hence, developed nations in the region, such as Australia, should work with Pacific nations' governments to design immigration strategies.

In Bangladesh, thousands of people are becoming environmental refugees every year, and their number is growing due to increased frequency of natural disasters and rising sea levels. Experts warn that unless there is implementation of adequate policies and strategies for addressing adaptation and climate change, by 2030-2050, at least 35 million Bangladeshi will have to migrate, since one-third of the country might be submerged due to sea level rise. (July 2009) Ref. 890

Rising sea levels and extreme heat due to climate change, coupled with environmental degradation, would force Australia's indigenous people to move off their traditional lands, resulting in "cultural genocide" according to the Human Rights Commission's annual Native Title Report.

The Chinese government estimates that 150 million people will have to be resettled, mainly due to desertification, water shortages exacerbated by over-irrigation and climate change, and population increase. The Minqin regional population rose from 860,000 to 2.3 million over the last 60 years. (May 2009) Ref. 891

A panel of experts from the EU and U.S. pointed out that without comprehensive analysis of environment-induced human migration—assessing when, where to, where from, and how many people are going to move—there is a danger of focusing on wrong areas, underestimating certain regions' needs while over-allocating resources to others. They also stressed that: climate security and energy security should be addressed jointly; and worse case scenarios should be analyzed against the tradeoffs that are realistically acceptable to cut emissions and address climate change



causes and effects. The session “Climate Security Roundtable: U.S. and EU Research and Policy” was organized by the Environmental Change and Security Program of the Woodrow Wilson Center.

First the Maldives and now the president of Kiribati are calling on the international community to help relocate their populations due to forecasted sea level increases. (February 2009) Ref. 892

The Australian Defense Force report *Climate Change, The Environment, Resources And Conflict*, warns of possible conflict in the South Pacific triggered by increased illegal immigration and fishing and potential failed states, as a consequence of climate change and rising sea levels.

In an address to the UN Security Council, UN High Commissioner for Refugees António Guterres warned of new forms of displacement, with natural disasters on the rise due to climate change. He explained the interrelationship between climate change, extreme deprivation, and conflict, and how they can exacerbate each other as causes of displacement. (January 2009) Ref. 893

An estimated 6 million people a year could be displaced by climate change effects, meaning that by 2050, the numbers might be between 200 million and 250 million, putting heavy pressure on aid agencies to meet basic needs, said L. Craig Johnstone, UN Deputy High Commissioner for Refugees. At the Poznan climate change conference, discussions concerning environmentally induced migration focused on helping countries to address the problem within their borders by implementing climate change adaptation measures, rather than considering international aspects. Nevertheless, the European Parliament declaration adopted in June 2008 calling for a legal framework for the protection of the victims of climate events and other similar efforts of the global community increase the likelihood of addressing the international dimension of environmentally induced migration. (December 2008) Ref. 894

Because rising sea levels are expected to eventually submerge most if the Maldives’ 1,200 islands, President Mohamed Nasheed announced that the country will create a \$1 billion fund from tourist revenues to explore the possibility of buying land to move its 400,000 population.

A year after cyclone Sidr hit in Bangladesh, 1 million people are still homeless. Additionally, some Bangladeshis have already begun relocating to higher lands. They argue that developed nations should be more open to accepting refugees.

Half of Nigeria’s 150 million people might face displacement, as it is threatened by three effects of climate change: desert expansion in the North, farmland erosion in the East, and flooding from the Atlantic Ocean in the South. (November 2008) Ref. 895

The Australian government has agreed to accept climate change refugees like the ones from Tuvalu, as a last resort, and might create a new visa category to cover climate change refugees. Allegedly, the Tuvalu PM asked Australia to accept all 10,000 Tuvalians in a worst-case scenario. New Zealand now accepts 75 migrants a year. Expert groups indicate that mass evacuation might be necessary within decades. The situation extends to other low-lying nations such as Kiribati and the Maldives. (October 2008) Ref. 896

The United Nations High Commissioner for Refugees stated that the number of people of

concern rose for the past two years. One of the factors cited was climate change making resources scarcer. UNHCR's *2007 Global Trends* reports that the number of international refugees rose from 9.9 million to 11.4 million by the end of 2007, while the number of internally displaced people increased from 24.4 million to 26 million. As conflict and environmental degradation exacerbate each other, unless adequately addressing the situation in its whole complexity, forced displacement will continue to rise. The most at risk are the already vulnerable areas of Africa and the Indian sub-continent. (June 2008) Ref.897

Worldwatch Institute estimates that roughly one in every 36 people worldwide is moving involuntarily and warns that, as the trend increases, the international community is facing special challenges. Climate change will increase the ranks of "environmental refugees," especially of the 600 million people living in low-lying areas. A research team from the School of Oceanographic Studies at the Jadavpur University, Kolkata, India, estimate that out of the 4.1 million people living in the Sunderbans, the largest delta region in the world, 70,000 would become 'environmental refugees,' by 2020. The initial land given to relocated people was decreased and is causing discontent. The rate of sea level rise is currently approaching 3.14 mm per year near Sagar Island and this could increase to 3.5 mm in the next few years due to global warming. (September 2008) Ref.898

Bangladesh is considered among the countries most vulnerable to rising sea levels as a one-meter rise in sea levels could wipe out 20% of its landmass, creating 30 million environmental refugees by 2050. However, based on 32 years of satellite images, scientists from the Dhaka-based Center for Environment and Geographic Information Services, say that Bangladesh's landmass has actually increased by 20 square kilometers (8 square miles) annually due to sediment carried down by the big Himalayan rivers—the Ganges and the Brahmaputra. Nevertheless, the highly populated coastal area remains vulnerable to climate change effects such as shorter but more severe monsoons, more violent tropical storms, longer periods of drought, and increased salinization, all impacting people's livelihoods. (July-August 2008) Ref.899

Janos Bogardi, director of the UNU Institute for Environment and Human Security, called for the UN to create a legal framework to address future environmental refugees, while taking into account fears that by including environmental migrants in the international legislation protecting refugees, "we are weakening one of the strongest tools for protecting refugees." Hence, the UN "should find other means of helping environmental migrants." He also emphasized that environmental factors often lie at the root of more obvious causes of migration.

Christian Aid estimates that a billion people might be forced to migrate over the next 50 years, mostly as a consequence of environmental conditions. The vast majority will be from the world's poorest countries, the Sahara belt, south Asia, and the Middle East. Their report estimates that in 2007 there are 25 million displaced by conflict and human rights abuses, 25 million by natural disasters, such as earthquakes, and 105 million by large development projects, with 8.5 million now officially recognized as refugees. By 2050, it says, 250 million could be permanently displaced by climate change-related phenomena.

Bangladesh, with its 140 million people, is one of the most vulnerable places to climate change. It is likely to face increasingly violent storms, saltwater getting further into the country's rivers, erosion in the coastal areas, severe droughts in the north, and possibly a fifth of the

country vanishing under water, if sea level rises by 3 feet by the end of the century. “One island here has more people than all of the small island states put together,” said Atiq Rahman, executive director of the Bangladesh Center for Advanced Studies. (May 2007) Ref. 900

#### Increasing Weather Extremes and Environmental Refugees due to Climate Change

There might be 200 million climate refugees by 2050, which could increase the likelihood of conflicts in many locations around the world. Experts warn that in addition to the South Pacific low-lying islands that are already affected, millions of people in densely populated countries such as Bangladesh and parts of China, Indonesia, and Vietnam might be forced to move by rising sea levels, while extreme drought might affect 10% of world land by 2050—five times more than now, and 30% by the end of the century (estimate by UK Met Office Hadley Centre). Another study, *Going to the Extremes*, based on advanced computer modeling, warns that by the century's end, the planet will face more weather extremes such as deadly heat waves, prolonged drought, and intense rainstorms due to global warming caused by human emissions of greenhouse gas. (October 2006) Ref. 901

#### **Environmental degradation causes more refugees than war and politics**

A new report by New Economics Foundation claims that more refugees now flee from environmental degradation than from wars or political persecution. It calls for a new category of ‘environmental refugee’ to be created and recognized. The report also goes on to advocate that richer countries have a responsibility for helping poorer ones care for these refugees because of the ecologically destructive economic activities carried out by the more developed nations. It also claims that the Geneva Convention definition of a refugee applies to those uprooted by environmental damage. However, the United Nations High Commission on Refugees (UNHCR) does not agree with the report, citing differences between those forced to flee political persecution and those forced to flee environmental damage. Nevertheless, the sheer number of displaced persons and refugees underscores the need to take environmental security far more seriously. (October 2003) Ref.902

#### **UNU Calls for International Framework for Environmental Refugees**

On UN Day for Disaster Reduction, October 12, the UNU warned that by 2010 the world might have to cope with as many as 50 million environmental refugees, while the international community is not presently equipped with an adequate international agreements system to deal with the situation. UN Under Secretary-General Hans van Ginkel, Rector of UNU, emphasized the need to prepare now “to define, accept and accommodate this new breed of ‘refugee’ within international frameworks,” while Dr. Bogardi, Director of UNU’s Institute for Environment and Human Security (UNU-EHS) in Bonn, cautioned that the term ‘environmental refugee’ might sometimes hide the real cause of displacement, which might be bad policies and practices. [See also related item *Implications of Environmental Migration to National Security* in February 2004 monthly environmental security report.] (October 2005) Ref. 903

#### **UN Establishes New Agency for Internally Displaced People**

Only three of the current 21 conflicts are trans-border wars, the remaining 18 are internal conflicts. There are about 50 million internally displaced people (IDPs) who have fled their homes due to conflicts, environmental causes, and government orders. In order to address the IDPs issues, the United Nations established the Inter-agency Internal Displacement Division on

July 1st. It will initially focus on the major countries of internal displacement - Sudan, Uganda, Somalia, Liberia, Burundi and Colombia; and will negotiate access to the Democratic Republic of the Congo (DRC) and Sri Lanka. If continued environmental deterioration forces increased migration and conflict within countries that UNHCR is not authorized to reach, then IDP could play an important role in conflict prevention. (July 2004) Ref. 904

### **Implications of environmental migration to national security**

Lester Brown, President of the Earth Policy Institute, has written an article on environmental refugees' movements that summarizes the environmental triggers of migration and the relationship of such migrations to national security. Although not precipitated by any single event or addressing any single problem, the article makes the case that a global effort is needed to address the causes of these environmentally-driven migrations. (February 2004) Ref.905

### **Environmental Refugees Cyberseminar Revealed the Difficulty of Defining Environmental Refugees**

A cyberseminar on “Environmentally Induced Population Displacements” conducted August 18-29, 2008 by the Population-Environment Research Network in collaboration with the Environmental Change and Security Program of the Woodrow Wilson International Center for Scholars (<http://www.populationenvironmentresearch.org/seminars.jsp>) revealed the difficulty of defining environmental refugees. However, there were suggestions that the ongoing academic debate should be associated with more practical applications due to the urgency of the situation. (July-August 2008) Ref.906

### **Desertification Triggering Migration**

Increasing desertification of West Africa is forcing people to relocate, causing more conflict among communities. The executive director of UNEP warned that Africa's next major war might be over water, giving Burkina Faso as an example. The Conference of the Parties to the United Nations Convention to Combat Desertification (UNCCD COP8) noted that desertification affects more than 250 million people, and 1 billion more are at risk, and asked for increased and swift action. The Global Humanitarian Forum, to be launched on October 17, 2007, is being set up by former UN Secretary General, Kofi Annan, to address in a preventive and proactive way global refugee movements and humanitarian crises triggered mainly by climate change. Climate change is, “perhaps the single most important humanitarian challenge of years to come,” says Kofi Annan. The forum will act as a catalyst among the different interest groups involved in international disaster relief and prevention: governments, aid agencies, the military, the business world and academics. (September 2007) Ref. 907

### **Desertification Threatens 20% of the World’s Population—UN Secretary-General Says That Climate Change Is a Factor**

June 17 marked the tenth anniversary of the Convention to Combat Desertification, and the UN Secretary General took advantage of the occasion to issue a widely publicized appeal for strong international action to stop this threat to a fifth of the world's population, one that is consuming almost 1400 square miles per year. Climate change is recognized as one of the causes of this creeping plague, and the Secretary General's message is certain to increase worldwide pressure for US and Russian ratification of the Kyoto Protocol on climate change. A recent analysis in an English-language St. Petersburg newspaper speculated that Russia's ratification is being delayed

only by planning for the division of the enormous financial dividend Russia stands to gain from the credit sharing mechanisms of the Protocol.

Note: A new standards system suggested by the Climate, Community and Biodiversity Alliance (CCBA) aims to address global warming by efficient land management. (June 2004) Ref. 908

#### Conference on Desertification Calls for Policies to Address Environmental Refugees

The UN International Year for Deserts and Desertification concluded with a Conference held in Algiers, Algeria, December 17-19, convened by the Canadian-based UNU International Network on Water, Environment and Health (UNU-INWEH), with ten other international agencies and hosted by the Algerian government. About 200 experts from 25 countries discussed policies to address desertification and its consequences, including health, economic, and environmental refugee-related issues. UN experts estimate that desertification threatens 2 billion people and could create more than 135 million refugees. In Africa, if current trends of soil degradation continue, the continent might be able to feed just 25% of its population by 2025, according to Karl Harmsen, Director of UNU's Ghana-based Institute for Natural Resources in Africa. The international community should swiftly adopt adequate policies both to counter the desertification trend and to address desertification-induced migration. "Environmental refugees," although not recognized yet in world conventions, are estimated to outnumber political refugees. [See also *International Year of Deserts and Desertification—2006* in January 2006, and *Desertification Synthesis (MA report 3)* in June 2005 environmental security monthly reports.] (December 2006) Ref. 909

#### **Population and Resources Affecting the Risk of Conflict**

The *UN Population Prospects 2006 Revision* report reveals that most of the countries that top the birthrate list are those already affected by the world's worst wars. Growing pressure of people on land and resources is likely to exacerbate conflict in those areas. At a Woodrow Wilson Center event, 'Demography and Conflict: How Population Pressure and Youth Bulges Affect the Risk of Civil War', Henrik Urdal, Researcher at the Centre for the Study of Civil War, International Peace Research Institute, Oslo (PRIO), discussed the results of an empirical research on the links among global demographics and the potentials for civil unrest. Concluding that certain forms of population pressure—particularly youth bulges—increase the risk for conflict, he makes several recommendations for attempting to minimize conflict, including: measures to enhance local resource management capacity; programs aimed at curbing population pressure, and more research focusing on youth bulges and political stability and conflict prevention.

Another Woodrow Wilson Center event, 'Climate-Security Connections: An Empirical Approach to Risk Assessment,' analyzed the potential relationship between environment and conflict by integrating environment data with conflict data and using the results to improve conflict risk assessments. The outcomes show that although environmental scarcity doesn't necessarily represent a cause of conflict, it might become an important reason in poor and war-torn societies or with other inter-group (horizontal) inequalities. Hence, it is important for preventing and mitigating escalating conflicts to map and watch different environmental anomalies that might lead to food and/or water scarcity and vice-versa and to identify conflict-prone zones that might be exposed to destabilizing environmental factors. Such a world map of areas worth watching for possible crises situations that might lead to conflict was presented.

(March 2007) Ref. 910

### **South Asian environmental migration**

A recent editorial summarized environmental migration issues in South Asia and suggested that there is an environmental migration vector in place between Bhutan and Nepal. [See also related item *Implications of Environmental Migration to National Security*] (April 2004) Ref.911

UN “Programme performance of the United Nations for the biennium 2002-2003” notes that concerning **natural disasters**, “national capacity in the areas of disaster mitigation, preparedness, reduction of vulnerability and disaster management was strengthened in some 65 countries through the provision of assistance in the implementation of national action plans, projects and programmes, the development of strategies for regional consultation, the establishment of partnerships and the deployment of United Nations disaster assessment and coordination teams. The provision of 71 multinational training events at which government officials, at the local and national levels, of some 100 countries were trained, strengthened the officials’ ability to respond to natural disaster emergencies and facilitated the creation of networks to exchange best practices and lessons learned.”(April 2004) Ref.912

### **Rising Sea Level Triggers Rising Refugee Move**

Further to the *Rising Concerns over Rising Seas* item of the February 2006 report on the 11,000 inhabitants of Tuvalu facing the threat of the rising ocean level: now, seeing themselves as climate refugees, some Tuvaluans are leaving their Pacific island homes and moving their communities to safer ground in New Zealand, thus officially becoming environmental refugees. [See also *Several Small Asia/Pacific Countries at Risk because of Rising Sea Levels* in January 2006, *First People Displaced Due to Rising Sea Levels* in December 2005.] (April 2006) Ref.913

## **SEA LEVEL RISE**

### **Scientific Evidences and Possible Consequences**

A tiny island in the Bay of Bengal, known as New Moore Island to the Indians and South Talpatti Island to the Bangladeshis, claimed for years by both countries, has disappeared beneath the rising sea, says the Indian School of Oceanographic Studies in Calcutta. Studies reveal that sea levels in this part of the Bay of Bengal have risen much faster over the past decade than in the previous 15 years. Therefore, it is likely that other islands in the Sundarbans delta region will be covered by the sea, forcing large numbers of people to move. (March 2010) Ref. 915

Sea-level rise might reach 2 meters by 2100, say the new estimates by the interim scientific report *The Copenhagen Diagnosis*. It notes that global average sea-level rise was 3.4 mm/year over the past 15 years, 80% above the IPCC forecasts, but consistent with an accelerating melting of glaciers, ice caps, and the Greenland and West-Antarctic ice-sheets. The report also underlines that sea level will continue to rise over the next few centuries after global temperature have been stabilized. (November 2009) Ref. 916

UNEP reassessment of potential sea level rise based on the combined effects of melting

land-ice and thermal expansion of oceans reveals a rise of 0.8–2.0 meters above the 1990 level by 2100, and 5–10 times that over following centuries.

According to an analysis based on ten years of global daily satellite images, 85% of the world's 33 largest delta regions experienced severe flooding due to sinking land and rising seas. The study warns that if ocean levels increase as projected under the moderate climate change scenarios, delta land vulnerable to serious flooding could expand by 50% this century, Asia being the worst affected. The study was led by the University of Colorado at Boulder. (September 2009) Ref. 917

Computer models show that sea levels could rise faster along the U.S. East Coast than in other densely populated parts of the world, due to changes of pressure from ice caps melting, and ocean current modifications. In addition to sea level rises and erosion, the region from New York to North Carolina is falling about six inches per century.

The Maldives decided to adopt a “safe islands” program that includes 25% of its 196 low-lying islands and is considering abandoning the rest, according to one of the authors of a new study on the impacts of global warming. (June 2009) Ref. 918

New melting estimates and their consequences show that melting of one of the world's largest ice sheets could alter the Earth's field of gravity and even its rotation, and disproportionately raise more sea levels on the west and east coasts of North America. (May 2009) Ref. 919

According to a study by the National Centre for Space Studies in France, over the last 15 years the world's oceans have been rising at 3.4 mm a year, more than twice the average 1.7 mm recorded by tidal gauges over the past 50 years.

A Canadian research team, analyzing how the coastlines around the world would be affected by melting of parts of Antarctica discovered that modifications in the gravitational pull on the ocean will determine water moves that will cause different sea level rises in different parts of the world. An entire West Antarctic Ice Sheet melt might cause the Earth's rotation axis to shift approximately 500 meters from its present position, moving water from the southern Atlantic and Pacific oceans northward. Hence, while Southern Chile and Argentina might not experience sea-level change, Atlantic and Pacific coasts of Canada and the U.S. could experience as much as 6-7 meters sea level rise, inundating cities such as Vancouver and New York.

Erosion is another important phenomenon changing coastlines. *Geophysical Research Letters* reports that the rate of erosion along a stretch of Alaska's northeastern coastline has doubled over the past 52 years, increasing from 6.8 meters per year in the period 1955-1979, to 13.6 meters between 2002 and 2007, while from 2007 to 2008 the coastline lost 25 meters. The changes are attributed mostly to effects of climate change, such as stronger storms, loss of sea ice, warmer ocean, and sea level rise. (February 2009) Ref. 920

According to the Center for Research on Epidemiology of Disasters, in 2008 there were 321 disasters, below the 398 annual average for 2000–2007. Nevertheless, the 235,816 people killed, and the \$181 billion in economic losses were considerably higher than the yearly average for the same period. About 211 million people were affected, with the highest number of deaths in Asia, mainly due to Cyclone Nargis and the Sichuan earthquake. The largest numbers of disasters were recorded in China—26, the Philippines—20, U.S.—19, Indonesia—16, and Vietnam and India—

10 each.

A NASA study based on five years of data shows that for every 1°C (1.8°F) increase in average ocean surface temperature, there is a 45% increase in the frequency of the very high clouds associated with severe storms and rainfall. Senior Research Scientist Hartmut Aumann notes that at the present rate of global warming of 0.13°C (0.23 °F) per decade, the frequency of severe storms could increase by 6% per decade. (January 2009) Ref. 921

A compilation by a team of researchers from the University of Colorado at Boulder shows that when factoring in thermal expansion due to warming waters, total sea level rise could reach about 1–2 meters by 2100. They considered glaciological assumptions for sea rise expected from Greenland, Antarctica and the world's smaller glaciers and ice caps. Along the same lines, the *Abrupt Climate Change* report by the US Geological Survey found that sea level rise could exceed forecasts, possibly reaching 150 cm by the end of the century, an estimate which itself might “likely need to be revised upwards” because it doesn't fully count the ice flow processes. Jim Hansen, of NASA, also says that most estimates of sea level rise are too conservative, since climate system feedback could quickly accelerate ice melt, leading to a runaway collapse.

At the Poznan climate conference, a group of 43 small island states, saying that rising seas could wipe them off the map, called for tougher goals for emissions reductions and limiting global warming to a maximum of 1.5°C (2.7° Fahrenheit) above pre-industrial times, which is far lower than the EU suggested 2°C. “We are not prepared to sign a suicide agreement that causes small island states to disappear,” said Selwin Hart of Barbados, a coordinator of the alliance of small island states, referring to a too weak climate change agreement.

A sudden sea swell hit Papua New Guinea in December, affecting some 32,000 peoples and their livelihood. A UN Disaster Assessment and Coordination (UNDAC) team went to the area to assess first aid needs. (December 2008) Ref. 922

Satellite observations reveal that since 1993 sea level has risen by 3.3 mm a year, almost double the rate of the previous 50 years. While for 1993–2003, about half of the sea level rise was due to the oceans expanding as they became warmer and the other half was due to shrinking land ice, since 2003, about 80% of the annual sea level rise can be attributed to land ice loss from glaciers, Greenland, and Antarctica. (November 2008) Ref. 923

WWF's report *Climate change: faster, stronger, sooner* estimates that sea levels' rise by 2100 might reach more than double the IPCC's maximum estimate of 0.59m. UN-Habitat's *State of the World's Cities Report 2008/09: Harmonious Cities* highlights the vulnerability of 10% of the world population that lives in low elevation coastal zones, mainly urban populations in deltas. Improving infrastructure is one of the essential first steps for reducing the impact of sea level rise on the population. UNDP predicts that there might be 30 million Bangladeshi refugees by 2050, due to sea level rise. Jakarta could be under water by 2025 due to groundwater mining and rising sea levels. Although Bangladesh's landmass is increasing by 20 sq km annually as a result of deposits in the Bay of Bengal by big Himalayan rivers, they become inhabitable only after several years and the country's existing landmass is being washed away faster than new land is being formed. Some islands, such as Kutubdia, are already becoming uninhabitable and the population has to relocate.

A new study by the University of New South Wales examining the effect of climate change on the Australian region from the Central Coast to Wollongong reveals that, by 2050, sea level



rise is likely to be 40 centimeters, reaching 90 centimeters by 2100, threatening Sydney's coastal habitats and infrastructure. It also notes that a 1 centimeter sea-level rise can cause up to 1 meter of erosion on low-lying beaches. The full study is expected to be released in January 2009.

Dubai, Kuwait, and the Nile Delta would be significantly affected by a 1-meter sea level rise, warns Raymond S. Bradley, director of the Climate System Research Centre, suggesting reinforcement measures mainly around Dubai's coastline. (October 2008) Ref.924

A study commissioned by the Dutch government recommends that the Netherlands should spend "an extra 1 to 1.5 billion euros per year" to 2100 (representing about 0.3% of the national income) since "The security challenge is urgent: the climate is changing, the sea level rising and river flows increasing while a quarter of dikes and dams do not meet the current safety norms." The report predicts a sea level rise of between 0.65 and 1.3 meters (2.15 and 4.3 feet) by 2100 and up to four meters by 2200.

A team of US scientists concluded that it is very unlikely that sea levels would rise by more than 2m (7ft) by 2100, even if one factored in faster melting and flow of Greenland and Antarctic ice sheets and glaciers. However, paleoclimatologists at the University of Wisconsin-Madison, analyzing the prehistoric Laurentide ice sheet (today's Greenland is an analog of those earlier climatic conditions) say that Greenland could melt faster than estimated based on contemporary trends, raising sea levels 1.3 meters by 2100.

The representatives of four Pacific island nations—Kiribati, the Marshall Islands, Palau, and Micronesia—called on delegates at the General Assembly's annual high-level debate to increase help and adaptation actions. Kiribati's President Aote Tong noted that his country has only several decades before the country's islands become uninhabitable. Tonga's Prime Minister Feleti Vaka'uta Sevele underlined that "climate refugees from some of the Pacific Island Forum countries is no longer a prospect but a reality, with relocations of communities due to sea level rise already taking place."

Cities along the West coast of Africa from Mauritania to Cameroon will be underwater as a result of rising sea levels by the end of the century, environmental experts say. A separate report from South Africa says Cape Town has a one in five chance of severe flooding within 25 years as a result of global warming. (September 2008) Ref.925

Sea levels could rise four meters, making some Pacific islands uninhabitable within the next decade, warns Australian expert Will Steffen, head of the climate change unit at the Australian National University and science adviser to the federal Government. Tuvalu might be underwater by 2050. He says that polar ice sheets melting have been underestimated.

West Africa's 4,000-kilometre (2500-mile) coastline—from Senegal to Cameroon— might be dramatically changed by the end of the century due to rising sea levels of up to 2 cm (0.8 inches) per year that will damage fragile coastline strips, especially in low-lying and densely populated deltas. Among the cities worst hit would be the Gambian capital Banjul and Nigeria's economic capital, Lagos, home to 15 million people.

Off the southern coast of Ghana, the ocean is rising steadily, forcing residents to move every few years. However, soon, some villages will have no place left to run, as the available properties are too expensive.

In Britain about 70 landmarks sites around the coastline are threatened by rising seas and coastal erosion, according to the National Trust. (July-August 2008) Ref.926

The Ocean Surface Topography Mission (OSTM)/Jason 2 mission to be launched in June will provide data for better understanding ocean currents and the rises in sea levels. Current marine measurements show that sea levels have risen on average by 0.3 centimeters since 1993, twice that, in the whole 20<sup>th</sup> century. The Jason 2 mission is a partnership between NASA, the National Oceanic and Atmospheric Administration, the French National Center of Space Studies (CNES), and the European satellite agency EUMETSAT. (May 2008) Ref.927

A team of scientists from the University of Colorado-Boulder's Institute of Arctic and Alpine Research, INSTAAR, and the Russian Academy of Sciences estimates that by 2100 accelerating melt of glaciers and ice caps could cause 0.1–0.25m (4–9.5 inches) additional sea level rise. This rise might be doubled if the expansion of ocean water warming is factored in. (July 2007) Ref.928

A new study by Australian and US researchers shows that ocean waters are heating up 50% faster at the surface than previous estimates (including those in the IPCC report). This explains the more rapid than estimated sea level rise. They also underline that sea ice melting is not of great concern to sea level rise; nevertheless, land ice melting is: if it all melted, sea levels would rise 70m (however, fortunately, they say, 57m of those are locked up in Eastern Antarctica, which seems to be stable for 20 million years and is not affected much by global warming).

Rising sea levels and coastal erosion will render small Pacific islands uninhabitable by the end of the century. Anote Tong, president of the Republic of Kiribati, has appealed to the international community to take responsibility for relocating the country's 97,000 citizens.

Bangladesh, the world's most densely-populated nation, is at risk of disappearing under the water by the end of this century as result of 'saline inundation' in the inland region, and coastal erosion and flooding at the coastal area. India has already begun to take security measures against the expected mass migration.

Cities along Australia's northern and western coastline became vulnerable to 'the Venice effect' with increased frequency of flooding during seasonal high tides, revealed scenarios outlined in more than 40 submissions to a federal inquiry on the environmental impacts of climate change on coastal communities. Climate models suggest that mean sea-level rises on the east coast of Australia could exceed global averages, said the Bureau of Meteorology.

A report by the Japanese Ministry of the Environment urges the government to consider the effects of global warming—mainly rising seas and stronger storms—in long-term strategies, such as urban planning. It also suggests that residents in vulnerable areas should be relocated to safer places. (June 2008) Ref.929

The coastline along the Pearl River Delta—China's most economically dynamic region—is expected to be the worst hit by rising sea levels by 2050. Egypt is facing similar worries as rising waters of the Nile Delta threaten millions of people and Egypt's food supply. (August 2007) Ref.930

At recent UN meetings, low-lying states reiterated their call for increased action against global warming. The small island-state of Tuvalu could disappear in 30 to 50 years. Increased salinity and flooding could displace millions in Bangladesh. (September 2007) Ref.931

Bangkok, Thailand's sprawling capital of more than 10 million people might be submerged

within the next 15 to 20 years, due to sinking ground and the seawater rising, warn experts. Bangkok is one of 13 of the world's 20 largest cities at risk of being swamped as sea levels rise in coming decades, according to the Intergovernmental Panel on Climate Change. (October 2007) Ref.932

Rising sea levels, increasingly destructive and more frequent storms, erosion, and floods will cause some areas of Britain to sink into the sea over the next 30 years, warn some experts. It seems that some parts of the Norfolk and Suffolk coastline could not be saved, according to leaked findings of a study conducted by the UK Environment Agency and to be published in June 2008. A Department for Environment, Food and Rural Affairs spokesman said, "Spending on flood and coastal erosion risk management has nearly doubled in cash terms, from £307 million in 1996-97 to an estimated £600 million in 2007-08. The Government will further increase spending to £800 million in 2010-11."

Erosion, flooding and permafrost thawing are also menacing some Alaskan areas and peoples' livelihood. On the island of Kivalina, uncertainty and frustration raise tension among the 400 residents whose relocation is yet to be decided. (November 2007) Ref.933

WMO reports that global averaged sea-level in 2007 is estimated about 20 cm higher than the 1870 estimate. Satellite measurements show that, since 1993, global averaged sea-level has been rising at about 3 mm per year, considerably more than the 20th century average of about 1.7 mm per year.

At the Bali Climate Change Conference, small island states reiterated the catastrophic impacts that global warming and rising sea levels could have for their nations and called for swift action to reduce man-made causes and increase adaptation measures.

According to U.S. government reports, more than 180 Alaskan villages are in danger because of shoreline erosion and permafrost melting due to global warming. Some are in immediate need of moving, although there are no clear relocation plans, nor adequate funding.

The *Climate Change: A New Threat to Middle East Security* report by Friends of the Earth Middle East (FoEME) highlights that consequences of climate change—mainly rising sea levels and freshwater shortage could exacerbate security risks in the Middle East. Unless adequate adaptation actions, the large-scale consequences include threat to "national, regional, and global security" warns Nader Khatib, Palestinian Director of FoEME. (December 2007) Ref.934

A forecast model shows that coastal erosion might increase 2-5 times over the next 50 years due to rising sea levels and more powerful storms. One of the most affected areas seems to be Russia's East Arctic coast, which might lose 5 to 15 meters per year in 2040-2045. Russia is already recording high retreat along its 50,000-km northern coastline because of permafrost melt and Arctic Ocean rising levels, waves and tides and subsequent thermal abrasion. About 33% of Russia's eastern Arctic coast also suffers from thermal abrasion. In some places, the coast's annual retreat reaches 15 meters.

Along China's 18,000-km (11,185 miles) coastline, sea levels have risen by an average of 9 centimeters (3.54 inches) over the past 30 years, and coastal waters are getting slightly warmer, reports the country's State Oceanic Administration. The most affected is the northern part, where, over the same period, sea level rise reached 19.6 centimeters (7.72 inches) at Tianjin port city, and 11.5 centimeters (4.53 inches) at Shanghai, causing increasingly huge problems in

highly populated areas. Meanwhile, the *China 2007 Sea Environmental Quality Report* reveals increased pollution of coastal waters as a result of human activity.

The situation of the small islands of Tuvalu becomes increasingly critical. While the highest point of the islands is barely over 4 meters, a typical high tide reaches about 2 1/2 meters and a King Tide can be over 3 meters high; the forecast is that they will get higher due to global warming. The seawater is also surging up through the coral that forms the islands, salinizing the soil and groundwater.

The level of the Mediterranean is rising rapidly and could produce “catastrophic consequences”, warns the study *Climate Change in the Spanish Mediterranean* by the Spanish Oceanographic Institute. Since 1990, the study estimates that the Mediterranean has risen between 2.5 and 10 millimeters (0.1 and 0.4 inches) per year, meaning that if present trends continue, the water levels will rise between 12.5 centimeters (5 inches) and 0.5 meter (20 inches) in around 50 years. Mediterranean water temperatures also rose by 0.12 to 0.50 degrees Celsius since the 1970s. (January 2008) Ref.935

Bangladesh, chair of the Least Developed Countries, insists that developed countries increase LDC’s access to investment, resources and technologies needed to adapt to climate change effects. Of more than \$1 billion pledged at the 2002 Johannesburg Earth summit for improving preparedness of vulnerable countries, less than \$180 million have been delivered, and no contributions were yet made to the investment fund set at Bali. Being the most at risk, LDCs demand to take an active part in the global climate talks. At Bangladesh’s request, Britain offered financial support for LDCs participation in negotiations and will host a conference in May addressing Bangladesh’s vulnerability. A one-meter sea level rise would flood about one-third of Bangladesh, affecting about 25–30 million people.

Recent data from the U.S. Geological Survey warns of the danger that rising sea levels over the next 50 years represent to the U.S. coastal population. Among the most threatened are the islands of California’s Sacramento-San Joaquin delta, the islands in Chesapeake Bay, parts of the Louisiana coast, and the New York subway system. However, the 5,000 residents of the California’s delta islands are likely to become the first environmental refugees in the United States. The threat is the result of the interplay of two factors both effects of climate change: rising sea levels, and increased rainfalls over snow in the Sierra Mountains as a result of warming temperatures, thus raising the risk of floods. (March 2008) Ref.936

### **Rising Concerns over Rising Seas**

Several recent articles have again raised the threat of rising sea levels that could ultimately cause massive coastal and island destruction. A U.S. analysis of satellite data has indicated that the volume of ice falling into the sea from Greenland’s ice cap has doubled over the past ten years, and that the current contribution of Greenland to oceanic level increase is 0.57 mm/year.

Australian research has determined that the average level of the oceans has risen 19.5 cm since 1870 and the rate is increasing, with a prediction of a 31 cm rise by 2100. British reports suggest the possibility of a 5-meter increase over the next several centuries, and mention the effect of increased river outflows on ocean levels. (February 2006) Ref. 937

### **Void in High Seas and Coastal Governance**

The Third Global Conference on Oceans, Coasts, and Islands, “Moving the Global Oceans Agenda Forward,” organized by the Global Forum on Oceans, Coasts, and Islands, took place at

the UNESCO headquarters in Paris, January 24-27. Over 400 participants from 78 countries agreed to accelerate progress for achieving the international ocean policy targets, including integrated ocean and coastal management, and examined two major emerging ocean policy issues: high seas governance and the effects of climate change on oceans and coastal environments. No international organization holds responsibility for tracking the progress of programs in integrated coastal and ocean management, and there is no regular collection of information on the social and economic well-being of coastal communities, where half of the world's population lives. (February 2006) Ref.938

### **Coastline Erosion due to Rising Sea Waters Signaled Around the World**

Coastline erosion as one of the effects of rising sea levels is increasingly felt around the world by low-lying communities. Hundreds of people are being displaced on the Carteret Islands, Papua New Guinea, and millions are threatened along the shorelines from Sri Lanka and Bangladesh, to coastal Louisiana and England. Experts warn that England's coastline erosion might accelerate as global warming leads to rising sea levels and harsh weather. Over the next century, half of the 1,125 kilometer coastline in the administration of the National Trust charity—Britain's largest owner of coastline—is expected to be severely affected by erosion. Lyme Regis in Southwestern England is already threatened by rising seawaters that are carving away its harbor and coast. To this, should be added the increasing acidity of ocean waters—due to CO<sub>2</sub> levels that are over the ocean's natural buffering capacity—dissolving calcium and therefore severely affecting marine ecosystems, especially coral reefs that are the main support to many geologically new islands. [See also *Climate change—Research Documents Continued Global Warming Effects and Rising Sea Level Triggers Rising Refugee Move* in April 2006 and other previous environmental security reports.] (August 2006) Ref. 939

### **Small Low-lying Island States in Jeopardy**

During the recent meeting at the UN Open-ended Informal Consultation Process on Oceans and the Law of the Sea, Indonesia said it has lost 26 islands to climate change. (July 2007) Ref.940

Six of the 18 inhabited low-lying Australian Torres islands have little or no elevation and are in danger of being swallowed by the sea. The islanders are already suffering because of abnormally high tides, land erosion, shifting seasons, and increasingly scarce marine life that traditionally constitutes their food source. Aborigines and Torres Strait islanders regained ownership of their traditional lands in 1992. Already socially and economically marginalized, the roughly 7,000 people are unhappy with the lack of attention and care on the part of the Australian government.

The Ocean Surface Topography Mission (OSTM)/Jason 2 mission to be launched in June will provide data for better understanding ocean currents and the rises in sea levels. Current marine measurements show that sea levels have risen on average by 0.3 centimeters since 1993, twice that, in the whole 20<sup>th</sup> century. The Jason 2 mission is a partnership between NASA, the National Oceanic and Atmospheric Administration, the French National Center of Space Studies (CNES), and the European satellite agency EUMETSAT. (May 2008) Ref.941

If ocean waters keep rising, low-lying states might disappear, making entire nations (such as the 12,000 people of Tuvalu) become environmental refugees forced to resettle elsewhere. Small

island states like Tuvalu may take legal action against high greenhouse gas emitters like the U.S. The situation of these island nations topped the agenda of the tri-annual gathering of the Pacific Leaders Meeting (PALM) held in Okinawa, Japan, in late May. Acknowledging the critical situation of the small island countries, the leaders of 14 Pacific island nations and Japan, adopted the Okinawa Partnership Declaration, which considers a new approach to the dispatch of aid assistance. [See also *Future Sea-level Rise will make Freshwater Brackish* in March 2006, *Several Small Asia/Pacific Countries at Risk because of Rising Sea Levels* in January 2006 and other related items in previous environmental scanning reports.] (May 2006) Ref. 942

#### Rising Sea Level Triggers Rising Refugee Move

Further to the *Rising Concerns over Rising Seas* item of the February 2006 report on the 11,000 inhabitants of Tuvalu facing the threat of the rising ocean level: now, seeing themselves as climate refugees, some Tuvaluans are leaving their Pacific island homes and moving their communities to safer ground in New Zealand, thus officially becoming environmental refugees. [See also *Several Small Asia/Pacific Countries at Risk because of Rising Sea Levels* in January 2006, *First People Displaced Due to Rising Sea Levels* in December 2005.] (April 2006) Ref.943

#### Several Small Asia/Pacific Countries at Risk because of Rising Sea Levels

Possible rising sea levels of over 30 centimeters by the middle of this century would drown or make uninhabitable several small Pacific countries. Although discussions related to the implications for the region's security have begun, there are no regional and/or international policies and procedures to address displaced populations from small island countries. (January 2006) Ref. 944

#### **First People Displaced Due to Rising Sea Levels**

Over 100 villagers of the Pacific island Tegua, in Vanuatu, were relocated to higher ground to be protected from aggressive storms and waves considered consequence of climate change. The move, done under a project entitled Capacity Building for the Development of Adaptation in Pacific Island Countries, might represent a first example of formal mass-displacement as a result of climate change. (December 2005) Ref. 945

#### Rising Sea Levels Claim First Inhabited Island and Threaten Coastal Populations Worldwide

Scientists emphasize that extreme scenarios—as effects of climate change—have to be integrated into the decision-making process. Latest estimates by climatologist Stefan Rahmstorf of the Potsdam Institute for Climate Impact Research show that the world's oceans may rise up to 140 cm (4 ft 7 in) by 2100 due to global warming, considerably higher than the 9-88 cm projected by IPCC. His study is based on air temperatures and past sea level changes rather than computer models. The scientist underlines that the different results obtained “with reasonable methods” show the serious uncertainty concerning sea level forecasts; however, there is compelling evidence that shore communities are particularly at risk.

Rising sea levels have submerged two islands in India's part of the Sundarbans—where the Ganges and the Brahmaputra rivers empty into the Bay of Bengal—and a dozen more islands in the area are at risk, threatening nearly 100,000 people who will have to be evacuated in the next decade. Lohachara, which had a population of 10,000 people, is the first inhabited island to disappear due to rising seas caused by global warming. The people of the Carteret Islands off

Papua New Guinea also live under the continuous fear of stronger and more frequent rising tides threatening their entire livelihood and eroding their land. The islands are expected to disappear in about eight years. Similarly, whole island nations, from the Maldives to the Marshall Islands, vast areas of countries from Bangladesh to Egypt, and many coastal cities are at risk as sea levels continue to rise. In Alaska, 184 out of 213 native villages are at some point affected by erosion and flooding due to global warming, threatening the culture and the very survival of the inhabitants. [See also *Rising Sea Level Triggers Rising Refugee Move* in April 2006, *Rising Concerns over Rising Seas* in February 2006, and other previous environmental security reports.] (December 2006) Ref. 946

### **UN Conference on Small Island States and Climate Change**

The International Meeting to Review Implementation of the Programme of Action for the Sustainable Development of Small Island Developing States, scheduled for 10-14 January 2005 in Mauritius, will address the impact of climate change on the environment, economic development, and security of the Small Island States and will examine the results of the last decade's efforts to address the issue.

Note: Community Climate System Model, version 3 (CCSM3), a powerful new climate modeling system at the National Center for Atmospheric Research (NCAR) reveals that global temperatures may rise more than previously projected if humanity doesn't act on reducing green gas emissions. (June 2004) Ref. 947

### **Small Island States Adopt Position on Addressing Climate Change**

The UN meeting of Small Island Developing States (SIDS) held in Mauritius, January 10-14, concluded with the adoption of the Mauritius Declaration and Strategy that emphasizes the need for developing robust global early warning systems to protect against natural disasters, and measures and strategies to cope with rising ocean levels and other consequences of climate change. As part of fighting pollution, the SIDS asked for regulation of radioactive wastes transported through their national waters. (January 2005) Ref. 948

## **MELTING SEA ICE AND GLACCIERS**

### **Scientific evidences and possible consequences**

A team of scientists led by University of Leeds estimates that net loss of floating sea ice and ice shelves in the last decade is 7,420 km<sup>3</sup>. While melting of floating sea ice and ice shelves do not add directly to sea level rise, it unblocks the way for more land ice to slide and melt into the sea; as well as decreasing the reflection of sunlight, it is warming the local area, further increasing melting and salinity dilution which expands sea volume a bit. They estimate that if all the polar ice melted, sea levels would rise by about 70 meters. (May 2010) Ref. 950

Andean glaciers in Latin America lost more than 40% of their surface area between 1956 and 2006, according to a study to be published by Ecuadorean glaciologist Bolivar Cáceres.

In Europe, almost 90% of Austrian glaciers shrank in 2009, some by as much as 46 meters (150 feet), reports the Austrian Alpine Association. (April 2010) Ref. 951

A new study reveals that Greenland ice loss is happening faster than anticipated and spreading along the northwest coast, with acceleration likely since late 2005. The research is based on results from a combination of satellite [Gravity Recovery and Climate Experiment (GRACE)] and by GPS measurements. They estimate the mass loss equivalent to be about 0.02 inch of global sea-level rise per year.

The Arctic melt might cost from \$2.4 trillion to \$24 trillion by 2050, due to rising sea levels, floods, and heat waves, according to the report “Arctic Treasure, Global Assets Melting Away” by the Pew Environment Group. It is estimated that the loss of Arctic sea ice and snow cover has already cost the world about \$61 billion to \$371 billion annually. (March 2010) Ref. 952

Greenland’s melting is accelerated by ice sheet erosion caused by winds and currents that drive warmer water into fjords, found scientists led by Fiammetta Straneo of Woods Hole Oceanographic Institution in Massachusetts. Detailed measurements of the water properties in the Sermilik Fjord revealed that deep warm water 3-4°C (37.4-39.2°F) is cutting into the base of the glaciers, accelerating their plunge into the sea. At present, sea level is rising at around 3 mm (0.12 inches) per year, compared to 1.8 mm (0.07 inches) a year in the early 1960s.

The Antarctic Peninsula’s ice front on the southern section has been retreating since 1947, with the most dramatic changes happening since 1990, states a U.S. Geological Survey report. “This is the first time since people have been observing the area, since the 1800s, that that ice shelf has not hitched together Charcot Island and the peninsula,” notes scientist Jane Ferrigno. Even in the Antarctic Peninsula’s coldest part, ice shelves are vanishing.

For the first time, the value of the Arctic’s declining ability to cool the climate has been quantified. The Pew Environment Group found that the cumulative cost of rapid melting of the region could range between \$2.4 trillion to \$24.1 trillion by 2050, and \$4.9 trillion to \$91.2 trillion by 2100. The factors considered included thawing permafrost, decline in albedo (reflectivity), and increase in methane emissions. The cost calculations included the impact of Arctic warming on agriculture, energy production, water availability, rising sea levels and flooding. The large range of estimates is due to the high level of uncertainty associated with factors influencing climate change; however, the low end magnitudes are not trivial. (February 2010) Ref. 953

The report “Melting Snow and Ice: A Call for Action” notes that land ice melting is now becoming the dominant contributor to sea level rise, while receding glaciers threaten the livelihood of millions of people by inundation as well as decline of freshwater. The most important findings include: Greenland ice cap reduction rate tripled over the past decade; snow cover is diminishing, and glaciers from the Himalayas to the Alps are melting rapidly, with the greatest reductions in the Andes and the Rockies; while Antarctica, which seemed immune to global warming, now shows signs of net ice reduction on a similar scale to inland Greenland.

According to the report “Antarctic Climate Change and the Environment” by the Scientific Committee on Antarctic Research, although the bulk of the Antarctic ice sheet has shown little change, overall, 90% of the Peninsula’s glaciers have retreated in recent decades. While since 1980 there has been a 10% increase in Antarctic sea ice extent, particularly in the Ross Sea region, regional sea ice has decreased west of the Antarctic Peninsula. Loss of ice from the West Antarctic ice sheet might raise sea level by 1.4 meters (4ft 6in) by 2100, estimates the report.

According to a new study published in the journal *Geophysical Research Letters*, infragravity waves generated by ocean-storms could cause dramatic ice breakups far away from



the storm's origin, as the energy from the waves hitting a shore is echoed back into the sea for thousands of miles. Warming waters will likely aggravate the phenomena. (December 2009) Ref. 954

The interim scientific report, *The Copenhagen Diagnosis* reveals: summer-time melting of Arctic sea ice surpassed by about 40% the Intergovernmental Panel on Climate Change's forecasts for the period 2007–2009, Greenland and Antarctic ice-sheets are losing mass at an increasing rate, and glaciers and ice-cap melting accelerated in most parts of the world since 1990. Similarly, an analysis of data from NASA's Gravity Recovery and Climate Experiment (Grace) mission reveals that the East Antarctic ice sheet, thought to be stable, has been losing 57 billion metric tons per year since 2006. (November 2009) Ref. 955

Losses from both Greenland and Antarctica have accelerated over the past seven years, shows a comprehensive continuous monitoring of the ice sheets using the Gravity Recovery and Climate Experiment (GRACE) satellite mission, which 'weighs' the ice on a monthly basis. NASA geophysicist Isabella Velicogna says that "That is a big thing," and "We should be more concerned." Similarly, based on recent field observation, David Barber, Canada's Research Chair in Arctic System Science at the University of Manitoba, notes that the multiyear ice covering the Arctic Ocean is almost gone. (October 2009) Ref. 956

Findings outlined in the UNEP report "Climate Change Science Compendium 2009" reveal that mountain glacier melting seems to be accelerating. If current trends continue, most glaciers from the mountains of tropical Africa will disappear by 2030, and those from the Pyrenees by 2050. Similarly, most models project that by 2030, the Arctic Ocean might be ice-free in September. The Greenland ice sheet surface melting rate was some 60% higher in the summer of 2007 than the previous record in 1998.

NOAA's National Climatic Data Center noted that Arctic sea ice cover was an average of 6.3 million sq kilometers (2.42 million sq miles) during August, 18.4% below the 1979-2000 average. (September 2009) Ref. 957

Satellite records show that one of Antarctica's largest glaciers is thinning four times faster than thought ten years ago. At its current pace, Pine Island Glacier in west Antarctica could disappear in 100 years, 500 years sooner than previously thought. Meanwhile, at the other pole, three major glaciers — Gulkana and Wolverine in Alaska and South Cascade in Washington — are also decreasing at dramatic rates, according to a study by the U.S. Geological Survey. (August 2009) Ref. 958

Images by the Icesat satellite, launched in 2003, measuring Arctic sea ice thickness, revealed that the Arctic Ocean's permanent ice cover around the North Pole has thinned by more than 40% since 2004 as noted in item 5.5. Although scientists say that the loss was "remarkable", they refrain from speculating when the region would be completely summer-ice-free. Overall, the study says that the ice, typically up to about 3 meters thick, thinned by 67 centimeters over the observed period. The multiyear ice was reduced from 62% of the region's total ice volume in 2003, to only 32% in 2008, thus 68% represents "first-year" seasonal ice, which mostly melts during the summer.

Same rapid melting is revealed by the more than a thousand intelligence images of the Arctic

region taken over the past decade and released at the request of the National Academy of Sciences. The images, being at higher resolution, depict pools of melted water on top of Arctic ice floes stretching across 30 meters. These pools, absorbing rather than reflecting the sun's heat, increase the melting process, further adding to global warming. (July 2009) Ref. 959

While it's still too early to say whether the 2009 melt will exceed the record 2007 melt, since the annual low-point is reached in September, the trend line for 2009 shows a lower sea ice coverage, according to the latest data from the National Snow and Ice Data Center.

Uganda's National Environmental Management Authority said that at the present rate, Mount Speke ice cap, the main water source to the neighboring communities, might be melted away by 2023, threatening the livelihoods of the people of Bundibugyo, who rely on agriculture to survive. It will also impact the Nile basin and Lake George and Lake Albert. (June 2009) Ref. 960

Bolivia's 18,000-year-old Chacaltaya glacier completely melted away this year. Bolivian scientists surveying the glacier since the 1990s predicted that it would survive until 2015. As per the World Bank's estimates, most of the Andes' glaciers will disappear within 20 years.

Temperatures in the Tibetan plateau rose by 0.32°C every 10 years since 1961—much higher than the average national rise of 0.05°-0.08°C, thus accelerating glaciers' melting, reports the China Meteorological Bureau. (May 2009) Ref. 961

Recent evidence of ice loss from both poles renewed the fears that global warming is progressing faster than scientists predicted. The latest evidence from satellite observations from NASA and the National Snow and Ice Data Center show that the decade-long trend of shrinking sea ice cover is continuing, and the ice cap is thinning. Compared to the 1980s and '90s, thicker ice, which lasts two summers or more, decreased to less than 10% of the northern polar ice cap in winter, from 30–40% (and 20% just two years ago), while thinner seasonal sea ice (which melts in summer) now accounts for about 70% of the Arctic total, compared to 40–50%. Similar observations were made by Pen Hadow, the head of a British team walking to the North Pole to assess the Arctic ice sheets melting rate, who found that, so far, the average depth of the ice has been under 1.8 meters (6 feet), suggesting most is new first-year ice that is likely to melt in summer months.

Similar phenomena are happening at the South Pole, where the European Space Agency satellite data show massive amounts of ice are breaking away from the Wilkins Ice Shelf on the western side of the Antarctic Peninsula. (April 2009) Ref. 962

New evidence shows that the Arctic is warming faster than any other place on Earth. Over the past three decades, the average warming over the Arctic Ocean was 3°C, even reaching 5°C (9°F) in some parts where the ice has been lost, while the average global temperature has risen by less than 1°C (1.8°F). The lakes in Siberia are now five times larger than in 2006, notes Katey Walter, ecologist at the University of Alaska in Fairbanks. She underlines some potential consequences, such as increasing permafrost melting and runaway warming, the growing amount of fresh water flowing into the Arctic Ocean from the melting sea ice, glaciers, and rivers, changing the ocean conveyor current, with consequences on the Asian monsoon and rain patterns affecting food and water supply of a large part of world population.

Considering the rapidly melting ice sheets in Greenland and Antarctica, sea levels might be

rising by 1 meter or more by 2100, twice as fast as forecast by the IPCC, said scientists at the Copenhagen environmental conference. (March 2009) Ref. 963

A glitch in satellite sensors caused underestimation of the extent of Arctic sea ice by 500,000 square kilometers (193,000 square miles) the U.S. National Snow and Ice Data Center said. The error was due to a problem called “sensor drift.” The revised data will be available soon.

New evidence shows that the Pyrenees have lost almost 90% of their glacier ice over the past century, and scientists estimate that they might disappear completely within a few decades due to global warming. Other European glaciers seem to have the same fate.

During the International Polar Year (IPY) (covering a two-year period, March 2007-2009), some 160 multi-disciplinary research projects were conducted, involving scientists of more than 60 countries. The findings are summarized in the study *The State of Polar Research* by the UN World Meteorological Organization and the International Council for Science, and a major IPY science conference is planned for Oslo, in June 2010. Although many questions remain, there is consensus that global warming is more intense in the Polar Regions than previously forecasted, and snow and ice are declining in both regions, raising sea levels and changing global ocean and atmospheric circulation, with a wide range of consequences for humans and ecosystems. (February 2009) Ref. 964

The University of Zurich’s World Glacier Monitoring Service published the latest data showing that alpine glaciers from the Andes to Alaska and across the Alps shrank twice as fast as a decade ago, losing on average 0.7 meters of thickness in 2007—the most recent data available. The experts warn that most glaciers will disappear by mid-century.

*Synthesis and Assessment Product 1.2: Past Climate Variability and Change in the Arctic and at High Latitudes* is a comprehensive synthesis of science literature about the Arctic, integrating research on the past 65 million years of climate change, with contributions from 37 scientists from several countries. The conclusions show that faster warming at the Arctic than other places in the Northern Hemisphere is expected to continue, with all its consequences—sea-ice retreat, rising sea levels, increased erosion, etc. Additionally, human activity might induce changes that would exceed documented natural variability and trigger serious transformations.

Despite earlier beliefs, all of Antarctica seems to be warming, reported climatologists in the article “Warming of the Antarctic ice-sheet surface since the 1957 International Geophysical Year” published in the journal *Nature*. The conclusions resulted from combining satellite observations over the entire continent with data from land weather stations for the past 50 years. Warming of the continent’s western side has been twice as rapid as the East Antarctica. (January 2009) Ref. 965

Researchers say that the amount of ice flowing out of Greenland this summer is nearly three times more than that lost last year. (December 2008) Ref. 966

Advanced computer models using new surface temperatures data showed that changes in temperatures at the poles over the 20<sup>th</sup> century could occur only if greenhouse gas emissions and ozone depletion are factored in. This improved understanding of how the ice sheets will evolve over this century, explained the team of scientists led by East Anglia’s Nathan Gillet.

A report by the Dirección General de Aguas de Chile, the country’s official water authority, warned that the Echaurren glacier and other smaller glaciers near Santiago could disappear over

the next half-century. The Echaurren glacier supplies 70% of Santiago's water needs and is the main source for the Maipo River and its tributaries, the water sources for the region's agriculture. Water scarcity might cause massive population displacement in central Chile. (November 2008) Ref. 967

Autumn air temperatures in the Arctic reached a record high this year, 5°C (9°F) above normal, revealed *Arctic Report Card 2008* by U.S. National Oceanic and Atmospheric Administration. The main reason is major loss of sea ice, which allows more solar heating of the ocean, as the region is warming up more rapidly than the rest of the planet. The report also noted that the Arctic Ocean is getting warmer and less salty as sea ice melts; sea level rose nearly 0.1 inch per year, one of the main contributors being Greenland's considerable surface ice melting. According to data from ESA's Envisat satellite, the thickness of sea ice in large parts of the Arctic declined by as much as 19% last winter compared to the previous five winters. WWF's report *Climate change: faster, stronger, sooner* shows that the Arctic Ocean is losing sea ice up to 30 years ahead of IPCC predictions and summer sea ice could completely disappear between 2013 and 2040.

Kolahoi glacier, the only year-round source of fresh water for the Kashmir valley, is melting at an alarming rate and might be all gone in 10 years. As water stress threatens the livelihoods of millions, the perspective of lasting peace in the region disputed by India and Pakistan is becoming even more difficult. (October 2008) Ref.968

The Northwest Passage has been ice-free since early August for the second year in a row and it's the first year that both the Northwest Passage over the top of North America and Russia's Northeast Passage are free of ice. Although the ice is the second lowest (after last year's record), the US National Snow and Ice Data Center (NSIDC) says "some climate modelers expect to see nothing but open water within five years." This is corroborated by Canadian scientists who report that Canada's Arctic ice shelves are disappearing at an incredibly high rate. The greatest changes are occurring at the highest northern latitudes; this summer alone, five ice shelves along the northern Ellesmere Island had shrunk by 23%.

The report *Global Glacier Changes: Facts and Figures* by UNEP and the World Glacier Monitoring Service is a comprehensive analysis of the fluctuations of glaciers and ice caps worldwide and presents the overall trend of glaciers' retreat. The report underlines that while excellent data exist for Europe and North America, monitoring should urgently improve for "some strategically important regions" as the Tropics, Central Asia and the Polar Regions, where data gaps undermine the ability to provide early warning and plan preparedness accordingly.

According to initial calculations, Greenland has lost 150 billion tons of ice a year in the last four years. The Danish-American project GNET is part of a scientific observation network for monitoring and providing estimates on Greenland's ice cap melting rate.

A Spanish research study has revealed that Pyrenean glaciers might disappear by 2050. Glaciological calculations have shown that since 1990 rapid melting has caused total regression of the smallest glaciers and 50%-60% of the surface area of the largest glaciers.

Satellite images revealed that the Karakoram-Himalayan glaciers have been retreating at around 110 meters a year over the period 1978 to 2006 compared to the 30 to 34 meters previously reported. Among human activities that have caused the retreat are listed intense military activities at the Siachen Glacier region, along with dumping of chemical and human waste. The Karakoram-Himalayan glaciers are headwaters for Asia's nine largest rivers,

including the Indus, Ganges, Mekong, Yangtze and Yellow rivers. (September 2008) Ref.969

Experts at the World Water Week conference held in Stockholm warned of the rapid glacial melting and dramatic changes in rainfall in the world's mountainous regions. Himalayan glaciers are retreating the most rapidly, said Mats Eriksson, of the International Centre for Integrated Mountain Development. Stretching across China, India, Nepal, Pakistan, Myanmar, Bhutan and Afghanistan, the Himalayas range constitutes a major source of water for some of the most populous parts of the planet.

Arctic Ocean sea ice might set another record low this summer, according to scientists at the National Snow and Ice Data Center, and to ESA's Envisat satellite observations. The direct route through the Northwest Passage became almost free of ice, while the Amundsen Northwest Passage has been passable since July. (July-August 2008) Ref.970

Out of 14 research teams studying global warming impacts in the Arctic, 11 estimate retreat at least as extraordinary as in 2007, while the other 3 groups estimate ice extent heading back toward, but not equaling, the average minimum for summers since 1979, when satellite-based Arctic sea ice monitoring began. Five other groups chose not to issue a numerical estimate. The ongoing Study of Environmental Arctic Change, SEARCH, continuously presents updated information on ice assessments and explanations.

Meantime, some polar scientists believe that there is a 50% chance of a totally ice-free North Pole this summer. (June 2008) Ref.971

Arctic sea ice has declined by about 10% in the past decade, note scientists from the University of Colorado's Center for Astrodynamics Research. They estimate that there is a 59% chance that this year in September the ice cover will reach a new record low, as currently the ice is thinner and younger than at any time since observations have been recorded. In September 2007, the extent of Arctic sea ice was the smallest on record.

Scientists are increasingly confident that human activity is the cause of the new weather patterns seen at both poles. Their findings are based on computer models that analyzed natural and human-caused variables, and were compared with the observed real conditions. The models revealed an ice-free Arctic by 2030—about two decades ahead of the predictions in the United Nations' Intergovernmental Panel on Climate Change reports. (May 2008) Ref.972

Ice caps and glaciers contribute 60% of the ice melting that is one cause of increasing sea levels. According to scientists from the University of Colorado-Boulder's Institute of Arctic and Alpine Research, INSTAAR, and the Russian Academy of Sciences, the rate has been accelerating over the past decade and 28% of this comes from Greenland, and 12% from Antarctica.

In the Andes, many of the lower glaciers might be gone over the next decade or so, raising concerns over water and power supplies, and thus affecting economic development and the fight against poverty in the region—mainly in Peru.

Scientists observing the modifications in Greenland are also warning of fast paced melting and increasing temperatures in the region. Arctic climatologist Konrad Steffen who spent the past 18 springs on the Greenland ice cap, noted that over the last decade, the average winter temperature rose by 7°F, and cracks and ice quakes are more frequent, as if Greenland is “coming apart.” The Greenland Climate Network established by Steffen serves climate scientists worldwide and is one of the main instruments used by scientists from 60 nations participating in

interdisciplinary research focusing on the Polar Regions, during the International Polar Year. The Chinese Academy of Sciences reports that the Qinghai-Tibetan plateau is warming at 0.7°F a decade, and that the 18,000 square mile area covered by glaciers has shrunk by 30% over the past decades, threatening to dry up the Yellow River and thus causing more droughts, sandstorms and desertification. The Chinese government already had to relocate some of the local population. (July 2007) Ref.973

Arctic sea ice shrank to the lowest extent ever recorded by satellite, and it might be close to reaching a “critical threshold”—which could mean that the region might be ice-free in summer in the next 10 to 20 years. The Tibet Meteorological Bureau reported accelerating melting due to rising annual temperatures at a rate of 0.3° Celsius (0.54° Fahrenheit) every 10 years. (August 2007) Ref.974

This year, the area covered by sea ice in the Arctic shrank to its lowest level since satellite measurements began nearly 30 years ago. The U.S. National Snow and Ice Data Center noted that on Sept. 16, 2007, the Arctic sea ice reached a record low 4.13 million square kilometers (1.59 million square miles), 22% less than the previous record. Himalayan glaciers are melting fast in Indian Kashmir as a result of global warming, noted a report by ActionAid, *On the Brink?* Himalayan glaciers are the main source for Asia’s nine largest rivers; water levels of regional streams and rivers already dropped by two-thirds. Rajendra K. Pachauri, the Chair of the UN Intergovernmental Panel on Climate Change, warned that some one billion people could be threatened by water shortage in South Asia, China and Africa as result of melting glaciers. (September 2007) Ref. 975

Many studies are showing greater warming in the Arctic than in the rest of the world and that the reduction in the sea ice extent has been much faster than global climate models predict. Douglas Bancroft, Director of the Canadian Ice Service, notes that the “overall extent was similar to what some of the models envisioned but decades in advance of when they expected that would occur. In fact, the summer of 2007 looked very similar to some climate model forecasts for 2030 to 2050.” One research station in the Canadian High Arctic recorded temperatures as high as 22°C on Melville Island, where the long-term average is 5°C. According to Walt Meir of the US National Snow and Ice Data Center in Colorado, the wider polar region may have experienced its hottest summer on record.

ESA’s Earth Explorer ice mission, CryoSat-2, to be launched in 2009, will be specifically designated for polar region research, with observations over three-years, providing conclusive data on the rates at which ice cover is diminishing. To complement submarine and satellite measurements and determine with highest accuracy how rapidly Arctic ice is thinning, next year three British polar explorers will chart sea ice melt to better estimate when Arctic summer sea ice will vanish due to global warming. (October 2007) Ref.976

Rapid melting of Andes glaciers indicates that they might disappear by mid-century, threatening agriculture, drinking water sources, and hydroelectric plants. The livelihood of more than 11 million people living in growing cities of Bolivia, Ecuador, and Colombia is jeopardized. As some of the poorest countries of Latin America, they do not have the funds necessary for preparedness and for developing adequate infrastructure to cope with water scarcity and other related challenges. (November 2007) Ref.977

Scientists attending the American Geophysical Union meeting in San Francisco revealed that ice sheets melt faster than expected. The Arctic ice is shrinking and thinning at a much faster pace than expected and latest modeling studies indicate that the northern polar waters could be ice-free in summers within just 5-6 years. Similarly, the Greenland ice sheet melted at a record rate this year, the largest ever since satellite measurements began in 1979.

Scientists observed that over the past few years the speed at which some of Greenland's glaciers flow towards the sea has doubled. They think that one factor might be the holes created in the ice due to warming, through which the water of melting surface ice is penetrating below the ice and thus speeding the flow of ice toward the open ocean. While Greenland's melt water presently increases global sea level by about a quarter of an inch per decade, an accelerated melt would seriously endanger world's shorelines. (December 2007) Ref.978

Modifications of atmospheric energy transport, heat moving toward the North Pole, and changes in the vertical temperature structure might represent the accelerating factor of the Arctic warming, reveals the article *Vertical structure of recent Arctic warming* by a group of scientists from the Department of Meteorology, Stockholm University, Sweden, published in *Nature*. In recent decades, the near-surface Arctic temperature rise was almost double the global average, and the study found that during the summer, the Arctic upper atmosphere was warming up twice faster each decade, thus accelerating thawing of sea ice and snow. Increasing GHG emissions seems to be an influencing factor of the atmospheric heat transport.

Antarctica is losing almost as much ice as Greenland, according to data gathered by an international satellite network measuring the thickness of the glaciers. Analyzing 10 years data (1996-2006), the international team led by Eric Rignot of NASA's Jet Propulsion Laboratory, Pasadena, CA, found that ice loss in Antarctica increased by 75% in the last 10 years. Mapping patterns of ice loss on a glacier-by-glacier basis, they remark that West Antarctica lost about 49 billion metric tons more ice in 2006 than the approximately 83 billion metric tons in 1996, and that total loss of ice from Antarctica in 2006 was enough to raise global sea level by 0.5 mm.

In September 2007 the Arctic ice cap had shrunk to 4.13 million square kilometers (1.6 million square miles), down from 5.3 million square kilometers in 2005, a loss about twice the size of France, notes Jean-Claude Gascard, coordinator of the European scientific mission Damocles, which is monitoring the effects of climate change across the Arctic. 2008 might be a critical year and could result in the loss of another million square kilometers, he added.

The IPCC is inviting scientists to submit material on both Antarctic and Greenland ice sheets, given the huge effect their potential simultaneous melting might have on sea level raise. The aim is to gather information and evidence on the impact of global warming at the poles, and to assess potential consequences to be addressed in an eventual IPCC fifth report. (January 2008) Ref.979

The Japan Agency for Marine-Earth Science and Technology revealed that permafrost in Siberia is thawing at an alarming pace. In some areas the depth of the melted permafrost doubled compared to 2000. Thus the lakes and marshes expand, in some areas being about 3.5 times larger in 2007 than in 2000, consequently accelerating the melting process even more. The research also shows that the annual average ground temperatures at the depth of 1.2 meters from the surface rose gradually from minus 2.4°C in the period from 1998-2004 to minus 0.4°C in 2006. An additional negative result of permafrost melting is the release of high quantities of methane, further promoting global warming.

New research by climatologists from Bern University on ice cores from Greenland and Antarctica shows that Earth warmed faster in the 20<sup>th</sup> century than at any other time in the past 22 millennia, and concentrations of greenhouse gases are increasing at a faster rate.

UK scientists have found instability trends in the ice of part of West Antarctica, which could lead to a significant rise in global sea level. They warn that if the discharge of glacier ice into the sea continues, the Pine Island Glacier alone could raise global sea level by 25 cm and accelerate neighboring glaciers' discharge, which could raise the sea by 1.5m. (February 2008) Ref.980

At the southwestern edge of the Wilkins Ice Shelf of western Antarctica, a chunk of ice with an area of about 400 sq km broke up into icebergs. This might trigger the disintegration of a larger part of the Wilkins Ice Shelf, which totals about 14,500 sq km, and is now connected by only a 6 km strip of ice.

According to data of UNEP's World Glacier Monitoring Service (WGMS), the average rate at which the world's glaciers are melting and thinning has more than doubled between the years 2004-2005 and 2005-2006. Analyzing data from around 100 glaciers, with continual annual data series for 30 reference glaciers since 1980, WGMS found that average 'water equivalent' loss has risen from 0.3 meter per year between 1980 and 1999, to about 0.5 meter per year after the year 2000, and estimates of 1.4 meters in 2006. Out of the 30 reference glaciers only one (Echaurren Norte in Chile) thickened in 2006 compared to 2005, while all the others shrank, with European glaciers being among the most affected. Glaciers represent the only fresh water source for millions of people around the globe. (March 2008) Ref.981

Melting ice caps because of global warming may trigger more volcanic eruptions, scientists estimate. Thinning ice and thus reduced weight on the earth's crust changes the geological stresses inside the crust in general, and also intensifies the rate of magma melting, increasing the possibility of eruptions, explain scientists Carolina Pagli of the University of Leeds, UK, Freysteinn Sigmundsson of the University of Iceland, and Bill McGuire of University College London in the UK.

Arctic permanent ice shelves are breaking off or cracking at a higher rate than feared, noted polar ice researchers who accompanied Canadian Rangers on a patrol around Ellesmere Island. They estimate that the High Arctic ice shelves could all be fragmented in a matter of years. Another study, by scientists of the National Center for Atmospheric Research (NCAR) and Colorado State University (CSU), reveals that new Arctic sea ice is on average so extremely thin, that it melts under the sunshine of clear summer skies it once could survive. U.S. submarines' readings reveal a 40% reduction in sea ice thickness since 1960.

The *Arctic Climate Impact Science – An Update Since the Arctic Climate Impact Assessment* report, produced for the World Wildlife Fund, presented to the Arctic Council, says that there could be factors contributing to climate change that were not even considered, since the real changes are happening much faster than predicted by computer models and scientists. The report estimates that the summer ice pack could be gone in 5 to 32 years.

Release of long-stored methane gas from the thawing of the Arctic is one of the phenomena that could have catastrophic warming effects. At the annual conference of the European Geosciences Union held in Vienna, Russian polar scientists presented evidence that the first stages of melting have already begun off the coast of Siberia, as well as on land in northern Siberia.

There is research underway for the use of this methane as fuel. The state-owned Japan Oil,



Gas and Metals National Corporation announced that it wants to extract some 7 trillion tonnes of methane estimated to exist in Japanese coastal waters. However, there are fears that this might release huge volumes of gas with possible disastrous environmental consequences. (April 2008) Ref.982

New findings show that glaciers are melting fast around the world from Africa's Kilimanjaro—projected to completely disappear sometime in the next 20—50 years, to South America's Andes Mountains, Europe's Alps, and Asia's Himalayas. Tibet's glaciers may disappear within 100 years, threatening hundreds of millions of farmers in China's western regions. (December 2006) Ref.983

NASA satellite observations revealed Greenland snow is melting faster than expected. In 2006, in some monitored areas there were 10 days more of melting snow than the average over the past 18 years. This is consistent with the pattern observed since 1988. "We need to do more. The situation is very dramatic," remarked European Commission President, José Manuel Barroso after visiting Greenland to personally observe the effects of global warming. The hunting and fishing season has shortened to four to five months compared to eight months a few years ago. The UN choice to celebrate World Environment Day 2007 in Tromsø, the Nordic Norway city, was to stress the global environmental impact of melting ice and snow and the role of satellite technology in identifying and analyzing long-term climatic trends and changes in polar regions. (June 2007) Ref.984

Greenland's ice melting rate had tripled between April 2002 and November 2005, compared to the rate between 1997 and 2003, according to research by Jianli Chen and colleagues at the University of Texas in Austin and published in the journal *Science*. Although controversial, the results definitely indicate that rise in sea levels this century will likely be higher than originally forecasted. "If the Greenland cap melted completely, it would raise global mean sea level by about 6.5 meters. If this were to occur, most of the world's coastal regions would be subject to flooding," warn the authors. Meanwhile, the glaciers of Southeast Alaska are shrinking twice as fast as previously estimated, according to a study by Fairbanks and Juneau glaciologists, published in the *Journal of Geophysical Research*. Sea ice is also melting at a record pace near the North Pole, due to a record hot summer that arrived in many northern settlements a full month earlier, following an unusually mild winter and spring, say locals. Inuit peoples of the far north in Canada began ordering air conditioning. The town of Kuujuuaq, at about 1,500 kilometers north of Montreal, has purchased 10 air-conditioning units as the inside temperature reached 31° Celsius (88° F.) in late July. (September 2006) Ref.985

Ice is melting at an increasing rate around the globe, and scientists warn that this might indicate that the effects of global warming are showing up faster than previously expected. Based on the latest calculations, Greenland ice loss increased by 250% between May 2004 and April 2006 compared with the two years between April 2002 and April 2004, which translates to an equivalent global sea level rise of about 0.5mm (0.02 inches) per year. Likewise, 95% of the glaciers in southeast Alaska (stretching from Yakutat Bay to the Stikine Icefield in British Columbia) are thinning at twice the rate that was previously estimated, according to a new study. (September 2006) Ref.986

The National Snow and Ice Data Center reported that the North Pole ice melted again at a record

rate this summer, meaning that the Arctic could be ice-free in summer far sooner than predicted a year ago. Similarly, based on data from Envisat's Advanced Synthetic Aperture Radar (ASAR), European scientists determined that around 5%-10% of the Arctic's perennial sea ice has been fragmented by late summer storms and the ice had retreated to the point of opening a navigation passage from northern Siberia or the Norwegian island of Spitzbergen to the North Pole. "If this anomaly trend continues, the North-East Passage or 'Northern Sea Route' between Europe and Asia will be open over longer intervals of time, and it is conceivable we might see attempts at sailing around the world directly across the summer Arctic Ocean within the next 10-20 years" says Mark Drinkwater of ESA's Oceans/Ice Unit. New evidence also suggests that Antarctica has warmed about 1.4° per century—a fact that was masked at the end of the 20th century by large temperature variations. (September 2006) Ref.987

*Siberia's* melting accelerates global warming. Scientists recently discovered that in the last three or four years the entire western Siberian sub-Arctic region has begun melting, transforming the world's largest frozen peat bog into a watery landscape of lakes. This could cause the release into the atmosphere of huge quantities of methane, 20 times as potent a greenhouse gas as carbon dioxide. Consequently, *Siberia's* melting, considered to be partially caused by global warming, becomes in its turn an accelerating factor of it. This finding follows a similar phenomenon of major expansion of lakes in Alaska's northern extreme, bordering the Arctic Ocean.

The *Arctic Ocean* could be seasonally ice-free within 100 years, concludes a new report by U.S. and Canadian scientists. Climate warming is causing thawing of Arctic glaciers and ice sheets, driving the Arctic system into an ice-free state for the first time in more than one million years. The researchers could find no natural processes that might slow or reverse the accelerating melting process. Indigenous people and animals of Alaska, Canada, Russia, Siberia, Scandinavia and Greenland, are already feeling the warming, but the consequences will be felt worldwide, mostly by the millions of people of coastal areas. The melting is an accelerating process. [See also *Climate Change Updates; Antarctic glaciers shrinking accelerating*, in April 2005 environmental security report] (August 2005) Ref. 988

Several studies have recently revealed that ice at both poles is melting faster than previously forecast. Using satellite technology, scientists found that sea levels rise by 0.4 millimeters a year, due to water pouring into the seas, mainly caused by the bulk loss of ice sheets. Although there is evidence that while the West Antarctic is thinning the East of the continent is thickening, and similarly, Greenland's interior is becoming heavier due to more snowfall, while the edges are thinning, the overall melting is more. A model developed by the National Center for Atmospheric Research (NCAR), also reveals that ice sheets and glaciers in the Arctic and Antarctic have been melting steadily. The model is based on observations of the Last Interglaciation period when shifts in Earth's orbit caused the Arctic to warm by 3-5 °C and the sea level to rise by some 5 meters. The scientists note that half of the sea level rise predicted in 2001 by the Intergovernmental Panel on Climate Change (IPCC) to occur this century has already taken place in the past decade. They warn that passing the 560 ppm CO<sub>2</sub> concentration threshold in the atmosphere (now it's about 380ppm) might trigger unpredictable changes with catastrophic consequences, and are calling for increased efforts to curb greenhouse gases emission and tackle global warming. (March 2006) Ref. 989

Recent studies show that breakup and melting of glaciers is happening faster than expected,

increasing concerns over rising sea levels and threatening low-lying regions of the world. Sunlight previously reflected by ice will not be absorbed, hence furthering the warming effect. A new report by researchers from five U.S. and European institutes and universities analyzes the possible impacts of the rapid dynamic of glacial change in Greenland and Antarctica, warning that this could significantly speed up the melting of major ice sheets, worsening the present projections for the sea level's rise. Recent models by the Max Planck Institute for Meteorology in Hamburg show that the average global temperature could rise by as much as 4.1° Celsius by the end of the century, melting sea-ice in the Arctic and raising world sea levels by 30 centimeters (12 inches). During the conference of Antarctic climate experts held by the Royal Society in London, Dr. Tony Payne Monday, professor of glaciology at the University of Bristol and co-director of the UK's Centre for Polar Observation and Modelling, warned that West Antarctica ice melting "would lead to a sea level rise of five or six meters (16 to 19 feet) around the world, or sufficient to cause effects such as the inundation of much of the state of Florida." Such research will influence the Fourth Assessment Report from the Intergovernmental Panel on Climate Change, which is due to be published in 2007. [See also *Melting of Permanent Frozen Areas Accelerates under Climate Change Issue* in the August 2005 environmental security report.] (October 2005) Ref. 990

The latest report by the World Glacier Monitoring Service, *Fluctuations of Glaciers (FoG) VIII*, examining glaciers' situation over the period 1995–2000, warns of a possible complete deglaciation due to the greenhouse effect in the next few decades. This would be a phenomenon "without precedent in the history of the Earth" notes the report. The conclusion is based on the direct proportionality observed between the losses of average annual ice thickness and accelerated global warming over the last two decades of the 20<sup>th</sup> century. The FoGs are published each five years since 1959, offering a comprehensive analysis and standardized information on changes in glaciers' conditions. (August 2005) Ref. 991

Two separate NASA-funded researches conclude that the glaciers in Antarctica are melting much faster than expected, and contain more ice than previously estimated, meaning considerable sea level rise in case they break up. (September 2004)

*Antarctic glaciers shrinking accelerating.* A joint study by the British Antarctic Survey (BAS) and U.S. Geological Survey (USGS) reveals that in Antarctica 87% of 244 glaciers studied are in retreat due to global warming, and that average retreat rates have accelerated over the past years. Antarctica contains more than 90% of the world's ice. Antarctic melting could dangerously raise sea levels, thus drowning low-lying island states and regions. (April 2005) Ref. 992

A recent study of climate change by Jonathan Gregory, of the Centre for Global Atmospheric Monitoring at the University of Reading, using modeling techniques and reported in *Nature*, paints a gloomy picture of the possible future course of global warming and the melting of large ice deposits, in particular, the Greenland ice cap, if rigorous efforts are not undertaken immediately to reduce greenhouse gases. Not starting for perhaps fifty years and taking place over several centuries, this could effect a 7m rise in the ocean level, flooding many populated areas. A most disturbing further conclusion is that the change could become irreversible. (April 2004) Ref.993

## Arctic Debate

-- see also [Arctic Debate](#) in the section Security Implications Of Environmental Aspects

The Arctic Climate Impact Assessment (ACIA) report reveals that the Arctic is warming nearly twice as fast as the rest of the planet, with dramatic physical, ecological, social, and economic consequences for the whole planet. At least half of the summer sea ice in the Arctic is projected to melt by the end of this century, along with a portion of the Greenland Ice Sheet, possibly raising global sea levels by 1 meter by 2100 and 7 meters in the long-term, threatening millions of people living in coastal areas. The possible disappearance of summer sea ice endangers Arctic animal species such as ice-living seals and polar bears, with devastating consequences for local people for whom these animals are a primary food source.

*Impacts of a Warming Arctic: Arctic Climate Impact Assessment* is the result of four years of research by an international team of about 250 scientists, and was commissioned by the Arctic Council—a ministerial intergovernmental forum comprising the eight Arctic countries and six Indigenous Peoples organizations—and the International Arctic Science Committee—a non-governmental organization for facilitating arctic research. At its Fourth Ministerial Meeting held in Reykjavik, November 24, the Arctic Council failed to devise a plan to address the problem, as the U.S. delegation opposed including any specific recommendations in the council's joint declaration. The Arctic peoples and tropical islanders plan to create an alliance to campaign against global warming and lobby industrial nations to cut greenhouse gas emissions, even threatening to file official complaints against the U.S. (November 2004) Ref. 995

### Arctic Access, Territorial Claims, Energy Resources and Environmental Management

Global warming is expected to increase access to the Northwest Passage and other Arctic areas. Canada announced the construction of up to eight Polar Class 5 Arctic Offshore Patrol Ships and the establishment of a deep-water port in the far North. A Canadian opposition party and some Canadian analysts say Canada should do much more to assure its sovereignty over the area. The status of some Canadian Arctic waters is not clear among the relevant neighboring countries with varying territorial claims in the Arctic. Russia planted its flag on the seabed 4.2 km below the North Pole to strengthen its claims over a large Arctic area. [See also *The Disputes over the Northern Territories Set to Continue* in June 2007, *New Canadian Strategies for Monitoring the Northwest Passage* in August 2006, and *Arctic Northern Passage Opens New International Issues of Regulation* in February 2006 environmental security reports.] (July 2007) Ref.996

### Arctic Debate Intensifies

Debate over the Arctic ownership is intensifying, as Canada, Denmark, Norway, Russia and the U.S. are all building their political and legal cases to claim jurisdiction over different (sometimes overlapping) areas. Russia declared that the first results show that the Lomonosov Ridge is an extension of Siberia, thus backing the country's bid to take control of the region. Denmark sent scientists on a month-long expedition seeking evidence that the Lomonosov Ridge is a geological extension of Greenland. Canada is determined to defend its sovereignty over the region's Northwest Passage and some Arctic territory; “We either use it or lose it. And make no mistake, this government intends to use it,” said Canadian Prime Minister Stephen Harper. Canada is establishing an army training center at Resolute Bay (about 370 miles south of the North Pole) and a deepwater port on the north end of Baffin Island. “The Russians, Canadians

and Danes all have overlapping claims in the polar region. It is unclear how this can be resolved,” said Øystein Jensen, a maritime law expert with Oslo's Fridtjof Nansen Institute. (August 2007) Ref.997

#### Arctic Issues Still at the Debate Stage

Officials from the Arctic coastal countries Canada, U.S., Russia, Denmark, and Norway met in Ilulissat, Greenland, May 27-29, 2008, to address issues related to the Arctic territory. The meeting concluded with The Ilulissat Declaration, by which the five nations reaffirm their commitment for applying the UN Law of the Sea “to the orderly settlement of any possible overlapping claims,” stipulating that there is “no need to develop a new comprehensive international legal regime to govern the Arctic Ocean.” Critics say that this opens the possibility for a polar “carve up” by the five countries. Other Arctic Council group nations (Sweden, Iceland and Finland) as well as the indigenous communities—who are the majority of the population within the Arctic Circle—were not invited to the meeting. Environmentalists and the indigenous groups call for an international treaty similar to the one for Antarctica, which bans all military activity and mineral exploitation. A UN panel is supposed to rule on Arctic control by 2020. By the Ilulissat Declaration, the Arctic coastal nations also agree to cooperate on scientific research, improving navigation safety, and development of environmental monitoring and disaster response systems. [See also *Arctic Disputes Continue* in March 2008 and other similar items in previous environmental security reports.]

However, there is speculation that Russia has the strongest position for increasing its influence in the region and support for its expansion claims. It has infrastructure along the North Sea Route (including ports), has for a long time performed extensive research and possesses essential knowledge about the region. Most of all, Russia has the most powerful fleet and military potential permanently deployed in the Arctic. Russia is also working on gathering more evidence to support its claim for territorial expansion under the Law of the Sea. (May 2008) Ref.998

#### Canada to Begin Monitoring Traffic in Northwest Passage by mid-2008

In view of increasing disputes over the Northwest Passage, Canada announced that it will begin monitoring the area's sea traffic by underwater listening devices. Beginning in mid-2008, Canada's military will monitor ships and submarines using detection technology installed at Gascoyne Inlet on Devon Island, near one of the main arteries of the passage. Canada is at odds with Russia, Denmark, Norway and the United States over the Northwest Passage. (September 2007) Ref.999

#### Arctic Disputes Continue

An authoritative report, *Climate Change and International Security*, to the European Council, among other recommendations for addressing security issues in the new context of climate change, recommends “Develop an EU Arctic policy based on the evolving geo-strategy of the Arctic region, taking into account i.a. [inter alia] access to resources and the opening of new trade routes.” It notes, “The increased accessibility of the enormous hydrocarbon resources in the Arctic region is changing the geo-strategic dynamics of the region.” A recent U.S. survey revealed that the Alaska continental shelf might extend more than 100 nautical miles farther from the U.S. coast than previously assumed, therefore eventually giving the U.S. the right to claim access to extra seabed resources if it were party to the Law of the Sea treaty. In the meantime, the US-based Arctic

Oil & Gas Company has filed a claim with the UN to act as the sole “development agent” in the Arctic region, with exclusive rights to extract oil and gas from the central Arctic Ocean currently beyond the territorial control of the polar nations. (March 2008) Ref. 1000

#### Arctic Northern Passage Opens New International Issues of Regulation

Thawing of the Arctic sea ice opens up the Northern Passage as an international shipping route, triggering international disputes over sovereignty and ecological implications. Although scientists, politicians, and environmental activists are increasingly warning about the complexity of the problem, no international regulations are yet in place for this fragile region. Alex Wolfe, from the University of Alberta and leading researcher on the Arctic, says that besides the sovereignty and ecosystem issues of the opening of the Northern Passage, there are also shipping safety problems that are not yet adequately addressed. As of our information, there are no international shipping standards or regulations in place for ecosystem protection for Northern navigation. Canada claims that the waterway is Canadian territory, while other countries consider it international waters. There is no international treaty dividing the Arctic between the eight countries with claims: Canada, Denmark, Finland, Iceland, Norway, Russia, Sweden, and the U.S. This exposes the northern passages to other possible problems, such as: transportation of illicit materials and illegal immigrants and as a place and route for terrorism, as well as difficulty in solving eventual disputes over tanker accidents, contamination, and overfishing. In March 2006, Canadian military forces will begin Operation Nunavut (“land that is ours” in Inuktitut, the Inuit language), over the Arctic islands and sea ice of the Northwest Passage. (February 2006) Ref. 1001

#### Northwest Passage to Become “Canadian Internal Waters”

The Canadian government mounted an expedition to defend the Northwest Passage as Canadian territory. This is the largest Canadian expedition in 60 years in the Arctic, with troops traveling 2800 miles across the region that is changing rapidly as a consequence of climate change. In addition to sailing, the opening of the Northwest Passage is an opportunity for access to rich resources, including oil. Recent research suggests that the passage could become ice-free and open for navigation as soon as 2015. While Canada claims sovereignty over the region, it is at odds with other countries including Denmark and Russia who argue that the area is a continuation of their territory. [See also *Arctic Northern Passage Opens New International Issues of Regulation* in February 2006 environmental security report.] (April 2006) Ref. 1002

#### **Arctic Observing Integrated Network**

*Toward an Integrated Arctic Observing Network*, by the Committee on Designing an Arctic Observing Network, National Research Council, discusses the need, scope, and implementation of an international observation system for the Arctic region. The Arctic Observing Network (AON) would coordinate existing national and international efforts for reliable and timely detection of conditions and variations in the Arctic for a better understanding of the arctic system’s functions and changes. The network would serve both scientific and operational needs, also contributing to other programs and research studies that help understand the consequences of arctic changes and thus improve decision-making and timely-action. (March 2006) Ref. 1003

#### **International Assessment of Arctic Pollution Triggers Action Plan**

The European Environment Agency (EEA) and the United Nations Environment Programme

(UNEP) have published a report on the environmental impacts of industrialization on the Arctic and its native peoples. The report, compiled by the UNEP GRID Arendal Centre in Norway, warns that the northern polar region faces a diverse range of threats from unsustainable development, pollution and climate change. By focusing attention on the Arctic, the report specifically attempts to facilitate successful implementation of the EU's second Northern Dimension action plan, covering 2004-2006. This document focuses on five priority sectors: economy and infrastructure, social issues (including education, training and public health), environment, nuclear safety and natural resources, justice and home affairs and cross-border cooperation. Within each of these sectors, it sets out strategic priorities and specific objectives, and indicates the priority actions to be pursued in achieving these objectives.

Although the action plan's geographical priority is the Baltic area, it has the potential to address circumpolar and global issues affecting the resources and environment of the entire Arctic. The action plan, which includes a focus on sustainable development, is expected to play an important role in developing cooperation between the EU and regional bodies related to the Arctic, such as the Arctic Council. Specifically, its environmental provisions include (1) enhanced cooperation of all partners to ensure convergence of environmental legislation, standards and norms throughout the region, including Environmental Impact Assessment, (2) enhanced commitment of all partners for the implementation of the HELCOM Copenhagen Declaration on maritime safety and reduced pollution and the rapid ratification of the Kyoto Protocol; the UN/ECE Espoo, Aarhus and Stockholm Conventions; and the UN/ECE Convention on Transboundary Watercourses and International Lakes, (3) cooperation on Kyoto Protocol implementation, (4) enforcement or development of national legislation ensuring convergence with European regulations or directives on chemicals, toxic and urban waste, water and sea pollution, and safety of oil transport by sea, and (5) implementation of the Arctic Council Action Plan to Eliminate Pollution in the Arctic. (March 2004) Ref. 1004

### **Mission to Study Arctic Environmental Changes**

The UN launched a two-year scientific mission in the Arctic to monitor changes in global climate, thinning of the ozone layer, and impacts of chemical pollution. There is evidence that the Arctic climate is warming rapidly and that more serious changes are looming, which, although with global effect, would most drastically affect indigenous communities and polar biodiversity. (July 2006) Ref. 1005

### **Disputes over Polar Regions Expands**

The race for claiming polar territories expands from the Arctic to Antarctica. The Antarctic should be protected by the 1959 Antarctic Treaty and related agreements that protect the continent against activities relating to mineral resources except scientific ones. Nonetheless, Britain's Foreign Office plans to claim 1 million sq km (386,000 sq miles) of seabed off the coast of the British Antarctic Territory. Greenpeace and WWF warned that Britain's possible oil, gas, and mineral exploration in the region would represent an environmental disaster for the fragile ecosystem. Similar claims for seabed areas might also be submitted by Chile and Argentina, which might overlap some of the British territorial claims.

Meantime, the Arctic disputes continue. Encouraged by the prospect of increased oil and minerals access due to global warming, Greenland is contemplating eventual independence from Denmark. Warning that climate change is becoming a threat to worldwide peace and security, German Foreign Minister Frank-Walter Steinmeier noted with concern that the rival territorial

claims in the Arctic could turn into a Cold War. “Policies to fight climate change can, and will, become an important part of peace policies,” he added. Note: On August 21st this year, for the first time on record, the Northwest Passage was opened to ships not accompanied by or armored as icebreakers. [See also *Arctic Debate Intensifies* in August 2007, *Arctic Access, Territorial Claims, Energy Resources and Environmental Management* in July 2007, and other similar items in previous environmental security reports] (October 2007) Ref. 1006

### **International Polar Year 2007-2008**

The International Polar Year, the largest polar research program for 50 years, officially started on 1 March 2007 and will involve thousands of scientists, from more than 60 countries, working on 220 projects focused on the Arctic and Antarctic regions. Its purpose is to enhance the understanding of physical, biological and social processes of those regions, and Earth's climate and ecosystems. The outcomes are expected to improve assessments and forecasts, and eventually generate recommendations for further research and policies. In 2009, after the IPY ends, ESA will launch the Cryosat 2 spacecraft to continue monitoring the Polar Regions mainly for changes in the thickness of the polar ice sheets and floating sea ice. (March 2007) Ref. 1007

### **Stricter Measures to Protect Polar Regions Expected**

The International Polar Year 2007 is expected to intensify research and discussions concerning climate change and its relation and effects to the Polar Regions. The Edinburgh Declaration was adopted this month by the participants in the Antarctic Treaty Consultative Meeting. It pledges full political and financial support for scientific projects and assessment of existing and/or possible new regulations to protect the Polar Regions. Some 300 scientists and legal and political advisors from 45 countries Party to the Antarctic Treaty participated in the Treaty's Consultative Meeting in Edinburgh. They also agreed that the Treaty's next meeting in April 2007 in India would develop a code of conduct or minimum standards for those traveling to the Antarctic. Thousands of scientists from 60 countries will be conducting research during International Polar Year 2007-2008. They will have access to satellite data that cover the complete areas of the Polar Regions for the first time. Ref. 1008

### **First Species declared Endangered Due to Global Warming**

Polar bears were declared a “threatened” species under the U.S. Endangered Species Act, becoming the first species officially designated in danger of extinction because of global warming. Environmental groups are not pleased with the new regulation, since important greenhouse gas emission-related activities, such as offshore oil and gas exploitation, are exempted from compliance with the law. [See also *Melting Glaciers and Sea Ice* in August 2007 and other similar items in previous environmental security reports.] (May 2008) Ref. 1009

## **FOOD AND FRESHWATER**

### **Climate Change and Access to Water Addressed as Human Rights**

The seventh regular session of the Human Rights Council adopted 36 resolutions on a wide range of issues, including two major reports to be delivered in three years to the tenth session of the Council: one on water as a human right, and another on the relationship between climate change and human rights. In the meantime, 2008 is the 60th anniversary of the Universal



Declaration of Human Rights, which will also increase reflections on these two topics. (April 2008) Ref. 1011

#### Proposal for Recognizing Water as a Basic Human Right

The declaration of the first Meeting of the Parties to the Protocol on Water and Health to the Convention on the Protection and Use of Transboundary Watercourses and International Lakes includes a paragraph on water as a basic human right. The meeting adopted several decisions, mostly related to the implementation and compliance procedures of the Protocol, transparency, and involvement of local authorities into the Protocol's implementation at early stage. The European ECO-Forum proposed the development of guidelines for governments (national and local authorities) to help in the implementation of the Protocol and urged that they be adopted at the Second Meeting of Parties that would be hosted by Romania in 2010. The first meeting was held January 17-19, 2007 at the Palais des Nations, in Geneva, Switzerland. The Protocol entered into force on August 4, 2005 and as of January 2007, has been ratified by 21 countries. (January 2007) Ref. 1012

#### Access to Clean Water Treaty

Mikhail Gorbachev wants the UN World Summit in September to declare that access to safe water is a human right and embody this right in a new international treaty. His speech at the 13th meeting of the UN Commission on Sustainable Development called for a legally binding treaty with adequate implementation mechanisms to guarantee the right to clean water and sanitation to all. This former head of the Soviet Union declared that providing clean water for everyone is a bigger challenge than ending the nuclear arms race during the Cold War. (April 2005) Ref. 1013

### **Food Scarcity Issues**

#### **Trends and Regional Aspects**

According to the annual OECD and FAO joint report, food prices might increase drastically over the next ten years, with forecasts for wheat and coarse grain prices to rise between 15% and 40% (in real terms, adjusted for inflation, average levels during the 1997-2006 period—the decade before the price spike of 2007-08); vegetable oils are expected to be more than 40% higher and dairy prices are projected to be 16-45% higher. Much of the increase will be generated by growing demand from emerging markets and for biofuel production. (June 2010) Ref. 1015

UNEP warns in the “Green Economy Report: A preview” brochure that 30% of fish stocks have already been collapsed (i.e. less than 10% of their former potential yield) and virtually all commercial fisheries risk running out by 2050. The lives of some 520 million people are financially linked to fisheries today. While the entire value of fish caught is only \$85 billion, \$27 billion are spent on government subsidies, mostly in rich countries, leading to overexploitation. In “the Yearbook 2010” released earlier this year, UNEP warned that overexploitation, pollution, and rising temperatures threaten 63% of the world’s assessed fisheries stocks. It also warns that governance arrangements, population growth, increasing living standards, over-exploitation, declining water quality, and climate change will cause water scarcity to emerge as a challenge to

governments by 2030. (May 2010) Ref. 1016

The multiple crises in the Arab world, exacerbated by the effects of climate change, might increase the number of emergency situations, requiring food and water distribution to millions of people, warned officials attending the third conference of humanitarian organisations in the member states of the Organisation of the Islamic Conference (OIC). Similarly, the UNEP report “Environment Outlook for the Arab Region: Environment for Development and Human Well-being,” compiled at the request of the Council of Arab Ministers Responsible for the Environment, outlines the multiple challenges facing the Arab region, ranging from climate change and food insecurity to decreasing water availability and unemployment. Highlighting that the region is one of the most water-scarce in the world, the report notes that biofuels and food security are key emerging and intertwined challenges facing the region. The region is predicted to be among the hardest hit by the potential direct and indirect climate change impacts, including: loss of coastal zones; more severe droughts and desertification; increased groundwater salinity; and a surge in epidemics and infectious diseases.

The report “An Overview of the Food Security Situation in Eastern Africa” by the UN Economic Commission for Africa’s (UNECA) Sub-Regional Office for Eastern Africa (SRO-EA) is an assessment of food security-related initiatives, plans, and strategies in the SRO-EA mandate area. Describing the status of food security in six specific Eastern African countries (Uganda, Rwanda, Kenya, Tanzania, Burundi and the Democratic Republic of the Congo), it concludes that East Africa is the sub-region in Africa most affected by food insecurity. Recommendations include: increase investments in the agricultural sector to at least 10% of national budget; promote domestic and regional trade of agricultural products; and implement targeted input subsidies programs to enhance production and productivity. (March 2010) Ref. 1017

The 33<sup>rd</sup> session of the Governing Council of the International Fund for Agriculture Development (IFAD), was held February 17-18, 2010 in Rome, Italy. The session underlined the impotence of smallholder farmers in addressing future agricultural challenges posed by climate change. Noting that food security is an integral part of overall security, both national and global, a high-level panel highlighted the importance of creating better market conditions to promote private investment in smallholder agriculture, developing policies that support smallholder farmers, and allowing smallholder farmers to compete for scarce agricultural resources.

Although avoiding meat is generally considered beneficial to the environment and improved food security, a study by Cranfield University (commissioned by WWF) found a substantial number of meat substitutes consumed in the UK, such as soy, chickpeas and lentils, have a higher environmental footprint because they are imported from overseas. Additionally, potential deforestation to create agricultural land for producing those substitute products is counterproductive to addressing climate change. Similarly, the EU objective of obtaining 10% of all transport fuels from biofuels by 2020 is undermining food security of developing countries as EU companies have taken millions of acres of land for production of biofuels. ActionAid’s new report, “Meals per gallon: the impact of industrial biofuels on people and global hunger,” warns that if all global biofuels targets were to be met, food prices could rise by an additional 76% by 2020 and force an extra 600 million people into hunger.

According to a new report published in the *International Journal of Life Cycle Assessment*, 38% of the world area, in eight out of 15 existing eco-regions, is at risk of desertification due to

unsustainable land use practices. The areas potentially most affected are: North Africa, the Middle East, Australia, southwest China, the western edge of South America (as well as some coastal areas and prairies), the Mediterranean region, savannahs in general, and the temperate, tropical and subtropical steppes.

A University of Sydney study presented at the Carbon Farming conference warned that more than 80% of the world's farming land is "moderately or severely eroded" and an estimated 75 billion metric tons of soil is lost annually. Soil in China is being lost 57 times faster than it can be replaced through natural processes, while in Europe it is 17 times faster, 10 times in America, and 5 times faster in Australia.

A recent Egyptian government study warns, "A 30 centimeter rise in sea level is expected to occur by 2025, flooding approximately 200 square kilometers (77 square miles). As a result, over half a million inhabitants may be displaced and approximately 70,000 jobs could be lost." Given the Nile Delta's importance for Egypt's food and economic security, its environmental health should be considered "a matter of national security," says Mohammed al-Raey of the Regional Disaster Response Centre.

In Niger, food insecurity affecting more than 7 million people and political instability (aggravated by the recent coup d'état) exacerbate each other. (February 2010) Ref. 1018

A new report by the Division for Sustainable Development of the UN Department of Economic and Social Affairs assessed the impact of foreign land purchase for agriculture. Foreign governments and private investors are increasingly purchasing or leasing key farmland in Africa on a long-term basis. The report notes that it is critical to ensure that such contracts promote shared food security interests and meet the need for improving legal and technical capacities of host countries, as well as to conduct impact assessments for the host country on the benefits, costs, and risks associated with land acquisition.

Scientists warn that more attention should be given not only to the impact of climate change on food quantity, but to its nutritional quality too. They found that increasing levels of CO<sub>2</sub> in the atmosphere reduces the nutritional value of many basic food crops. It is estimated that the approximate 20% CO<sub>2</sub> rise since 1960 may have already decreased protein concentration in wheat flour by 5%–10%. A study by researchers at Southwestern University, Georgetown TX, shows that if atmospheric CO<sub>2</sub> reaches 540–960 ppm, it could result in a significant decline (10%–15%) in protein content of major food crops including barley, wheat, soya bean and potato. Additionally, higher CO<sub>2</sub> levels may reduce water flow through a plant, affecting the uptake of micronutrients from the soil, such as sulphur, magnesium, iron, zinc, and manganese. (January 2010) Ref. 1019

*Food Security and Agricultural Mitigation in Developing Countries: Options for Capturing Synergies*, released by FAO prior to the World Summit on Food Security, says that 70% of agriculture's mitigation potential can be realized in developing countries. The report highlights the importance of considering food security, agricultural mitigation, adaptation, and development in global agendas and national strategies for addressing climate change, and it stresses the need for reaching global consensus on measurable, reportable, and verifiable requirements. Agriculture adaptability was also the main theme of the World Summit on Food Security held at FAO headquarters in Rome, Italy, November 16-18, 2009. UN Secretary-General Ban Ki-moon underlined that "there can be no food security without climate security." The Summit adopted a Declaration that outlines strategic objectives, commitments and actions, and establishes the Five

Rome Principles for Sustainable Global Food Security.

The World Bank report *Agricultural Development Under a Changing Climate: Opportunities and Challenges for Adaptation*, focuses on rural development in the context of climate risk management and adaptation, particularly on issues of seasonal climate forecasting, water management in rain-fed and irrigated production systems, sustainable land management, crop and livestock breeding, crop genetic diversity, seed systems, pests, and urban and peri-urban agriculture.

The FAO policy brief *Climate Change and Food Security in the Pacific* warns that climate change will have serious impacts on agriculture, forestry, and fisheries in the Pacific islands, leading to increased food insecurity and malnutrition. Considering climate change as a “threat multiplier” in a region that is already under severe ecological and economic stress, FAO urged governments and donors to start implementing robust and action-oriented climate change adaptation plans for all Pacific islands. (November 2009) Ref. 1020

The number of hungry people in the world rose to 1.02 billion this year. Varying impacts of climate change (including lower water availability, and an increase in plant and animal pests and diseases) could lead to a 30% reduction in agricultural productivity output in Africa and a 21% reduction in Asia, noted FAO Director-General Jacques Diouf, at the two-day high-level forum “How to Feed the World in 2050,” held October 12-13. About 300 experts attending the forum, debated policy, technology, and investment needs to achieve food security by 2050. FAO estimates that in order to ensure food security for over 9 billion people in 2050, investments in agriculture in developing countries should increase by about 50%, to \$83 billion a year (\$29 billion for India and China). Noting the challenge of feeding another 2.3 billion people by 2050 while at the same time limiting the environmental impact of the farm sector, the report *Reaping the benefits: Science and the sustainable intensification of global agriculture* by the Royal Society is calling for a £2 billion “Grand Challenge” research program on global food security including investment in genetically modified crops. The *Climate Change: Impact on Agriculture and Costs of Adaptation* report by the International Food Policy Research Institute, examining the impact of climate change on food security compared to a no-climate-change scenario, forecasts that in 2050 there will be a 90% increase in wheat prices, in the developing world calorie availability will decline relative to 2000 levels, and there will be an additional 25 million malnourished children.

The *Africa Factbook 2009* by the Global Footprint Network warns that if current population and consumption trends continue, Africa’s Ecological Footprint will exceed its biocapacity within the next 20 years, with some countries, including Senegal, Kenya, and Tanzania, potentially reaching that threshold in less than five years. It notes that between 1961 and 2005, while Africa’s population grew from 287 million to 902 million people, the amount of biocapacity (food, fiber and timber resources that are renewably available) per person decreased by 67%. A World Summit on Food Security will be held at FAO headquarters in Rome, November 16-18, 2009. (October 2009) Ref. 1021

By 2050, to feed 9.1 billion people, world food production should increase by 70% and withdrawal of water for irrigation by almost 11%, notes FAO in a paper prepared for the high-level experts forum and World Summit on Food Security to be held in October 2009. Given that 90% of the growth in crop production is projected to come from higher yields and increased cropping intensity, even small changes in precipitation and/or crop yield due to climate change

could have devastating impacts on food security in the world.

A study by the Asian Development Bank warns that if current trends persist until 2050, the yields of irrigated crops in South Asia will decrease significantly and resulting food scarcity will lead to higher prices and reduced caloric intake across the region. Under this scenario, per capita calorie availability in 2050 will be below levels recorded in the year 2000. Afghanistan, Bangladesh, India, and Nepal are identified as particularly vulnerable to falling crop yields caused by glacier retreat, floods, droughts, erratic rainfall, and other climate change impacts. The study, “Addressing Climate Change in the Asia and Pacific Region: Building Climate Resilience in the Agriculture Sector,” was officially launched by ADB on the sidelines of the UNFCCC meeting held in Bangkok, September 28-October 9, 2009.

Researchers reiterated a warning that growing corporate control over seeds is reducing the diversity of traditional seed varieties and traits that help farmers adapt to the effects of climate change, jeopardizing poor farmers’ livelihoods. They suggested that farmers would benefit from a similar legal protection over their traditional seed varieties and associated knowledge as do corporations through the international treaty on the protection of new varieties of plants.

Researchers from the International Institute for Environment and Development (IIED) and partner organizations in China, India, Kenya, Panama and Peru launched the warning ahead of the 2<sup>nd</sup> World Seed Conference held September 8-10, 2009, in Rome, Italy.

A prolonged drought is sweeping across Kenya, thought to be a result of the El Niño cycle worsened by global warming and continued degradation of forest ecosystems. Crops have been destroyed, and domestic and wild animals are dying, negatively affecting the two key industries: agriculture and tourism. Four million Kenyans face mass famine, and foreign aid is reluctantly provided and inadequate. Tensions are spawning ethnic conflict as communities fight over the last remaining pieces of fertile grazing land. (September 2009) Ref. 1022

Competition for food, water and energy is expected to worsen as the world’s population increases faster than expected. The 2009 World Population Data Sheet by the Population Research Bureau reveals that world population will reach 7 billion in 2011 (a year earlier than expected), and 8.1 billion by 2025. With at least 97% of the growth occurring in developing countries, by 2050, nine in ten people under 25 will live in those countries, mostly in Africa and Asia. Africa’s population reached 1 billion and will double by 2050.

*Revitalizing Asia's Irrigation: To Sustainably Meet Tomorrow's Food Needs*, a report by FAO and the International Water Management Institute calls for increased investments in irrigation systems and reforms in the way water is used for agriculture to feed an additional 2.5 billion people over the next 40 years. Otherwise, many developing nations face the risky prospect of having to import more than a quarter of their rice, wheat, and maize by 2050. “If nothing is done, you are going to get an increase in social unrest, migration and a fertile ground for terrorism,” warns Colin Chartres, the director general of IWMI.

In China, 27% of the land area is now desert or suffering from land degradation, and experts warn that desertification is one of the greatest ecological threats to the entire Northeast Asia area. (August 2009) Ref. 1023

FAO announced that the number of world hungry is projected to reach a historic high of 1,020 million people in 2009. The most recent increase is not the consequence of poor global harvests but is caused by the world economic crisis which resulted in lower incomes and increased unemployment undermining access to food. The majority of those most affected live in

areas with already high environmental and conflict vulnerability. The final version of *State of Food Insecurity in the World* will be released in October.

By mid-century, climate change may have outrun the ability of Africa's farmers to adapt to rising temperatures, threatening the continent's precarious food security. Growing seasons throughout nearly all of Africa in 2050 will likely be hotter than any year in historical experience, and even the hardiest varieties of the continent's three main crops – maize, millet and sorghum – would probably not tolerate the conditions. The six most affected nations will probably be Senegal, Chad, Mali, Burkina Faso, Niger, and Sierra Leone. However, the situation might get worse, as the study, published in the *Global Environmental Change* journal, is based on IPCC's mid-range projection, which is considered an underestimate.

The OECD and FAO released an advance summary of the *Agricultural Outlook 2009-2018* that addresses, among other issues, the interdependence between food and energy markets and the possible impacts of expanding demand for biofuels on agricultural commodity prices. It highlights that oil prices above US\$90 per barrel would imply significantly higher food prices. (June 2009) Ref. 1024

The 17<sup>th</sup> session of the Commission on Sustainable Development held May, 4-15, 2009, focused on the interdependence and the role of agriculture and climate change. The meeting's final agreement calls for some urgent policies such as: developing and implementing comprehensive strategies for dealing with climate change, drought, desertification and natural disaster; sustainable management of water and land resources; sustainable agriculture; and providing secure access to food and social safety nets. The CSD's decisions will be forwarded for consideration by the July 2009 meeting of the Economic and Social Council.

For addressing their food and water security, several food-importing countries including China, South Korea, Saudi Arabia, and the UAE, have started buying or leasing land in poor countries in Africa, Latin America, Central Asia, and Southeast Asia, for producing food. The International Food Policy Research Institute, that conducted the study at the request of the UN, estimates that 2.5 million hectares (about 20% of all EU farmland) in poor countries have been subject to transactions or talks involving foreigners since 2004, in deals estimated to worth \$20 billion-\$30 billion, which is at least 10 times as much as an emergency package for agriculture recently announced by the World Bank and 15 times more than the American administration's new fund for food security. Some of the countries involved are Sudan—the recipient of the largest food-aid operation in the world, and Pakistan, which is promising Gulf investors a security force of 100,000 to protect the assets. Left unchecked, this trend could further exacerbate the turmoil in the food market and potentially lead to conflicts over land and food. (May 2009) Ref. 1025

The First G8 Agriculture Ministers' Meeting, held in Cison di Valmarino, Italy, April 18–20, under the theme “The World Food Emergency,” was attended by Ministers of Agriculture of the G8 countries and Brazil, China, India, Mexico, South Africa, Argentina, Australia and Egypt, and the heads of UN agencies. The Declaration adopted includes proposals to place agriculture and food security at the core of the international agenda and sustainably increase renewable energy production from biomass without compromising food security. The Declaration will be forwarded to the G8 Heads of State summit to be held in Italy in July 2009.

Delegates attending the 65th Session of the UN Economic and Social Commission for Asia and the Pacific (UNESCAP) held in Bangkok, Thailand, April 23-29, discussed the financial

crisis and its convergence with other threats to development and the need to work toward a stable and supportive financial system for development. The meeting was convened under the theme of “Sustainable Agriculture and Food Security in Asia and the Pacific” with the special body on least developed and land locked developing countries addressing the food-fuel-financial crisis and climate change, and associated threats to development. (April 2009) Ref. 1026

Population growth to 8.3 billion by 2030 will increase food and energy demand by 50% and fresh water by 30%, said John Beddington, chair of a new UK Cabinet Office task force set up to address food security, at the Sustainable Development UK 09 conference. Underlining a belief that climate change will be an exacerbating factor, he suggested swift policy measures to improve agriculture and consumption practices. For addressing the situation at the European level, he proposed the creation of a position of chief science adviser to the European Commission.

A new report by the Institute for Agriculture and Trade Policy (IATP), calls for a global shift from the industrial model of agriculture toward sustainable practices. The recommendations include an international rights-based approach that ensures water availability for ecosystems and people and harmonization of policy approaches to water, agriculture and climate.

At the annual UNIS-UN conference on “The Food Crisis: A Global Challenge”, held March 5-6, 2009, UN Secretary-General Ban Ki-moon discussed the linkages between food security and climate change and stated that helping communities around the world adapt to climate change will be a key issue at the UN Climate Change Conference in December 2009.

“The Roadmap to End Hunger” report prepared by more than 30 organizations, calls for the US to boost spending on food and agricultural aid by 60% in 2010 to \$6.36 billion, and commit to further increases to \$13.31 billion by 2014. Other recommendations include: a strengthened emergency response to better address short-term hunger needs; more flexible safety nets to mitigate the impacts of shocks on vulnerable populations; improved nutrition programs to ensure that people in the developing world have access to the nourishment needed to lead healthy lives; and expanded programs to enhance the productivity of smallholder farmers, which is critical in addressing chronic hunger. New bipartisan legislation expected to be unveiled in the coming weeks incorporates key recommendations of the Roadmap.

Gender inequality has amplified the impact of the financial, food and climate crises on African women, said Isatou Njie-Saidy, Vice-President of Gambia, at the 53<sup>rd</sup> session of the Commission on the Status of Women, held on March 4, 2009. The panel organized by The UN Economic Commission for Africa (UNECA) and the UN Development Fund for Women (UNIFEM) called on the international community to promote gender-specific plans and programs to help women better address these crises. (March 2009) Ref. 1027

“The Environmental Food Crisis: The environment’s role in averting future food crises” report by UNEP warns that 25% of the world’s food production might be lost by 2050 due to environmental breakdown. In the meantime, over half of the food produced today is lost, wasted, or discarded as a result of inefficient food chain management. In addition, the share of the world’s cereals used for animal feed is projected to increase from a third today to a half by 2050. With the global population expected to continue increasing, world food prices might rise by 30-50% over the coming decades. The report proposes seven goals for reducing food insecurity, ranging from short-term price issues to long-term global warming measures.

The High-level Meeting on Food Security for All, held from January 26-27, 2009, in Madrid,

Spain, issued a statement that calls for a consultative process on options for a Global Partnership for Agriculture Food Security and Nutrition. At a roundtable meeting on disaster, risk reduction, and climate change in Nairobi, held February 20th, Kenya's Prime Minister Raila Odinga underlined that climate change is a threat to food security and could dampen efforts aimed at tackling poverty in Africa unless urgent steps are taken to address it. (February 2009) Ref. 1028

Half the world's population might face food crises by 2100, warns a team of scientists from Stanford University's Program on Food Security and the Environment. The main cause is a combination of climate change and water shortage, reducing crop yields in the tropical and subtropical regions (between about 35° north latitude and 35° south latitude) where the world's fastest-growing and poorest populations are. They suggest rethinking the whole agricultural system in view of the new environmental and demographic trends.

The number of hungry people increased by 40 million in 2008, said FAO, but \$30 billion a year investment in infrastructure and agricultural production could eliminate the root causes of hunger by 2025. This represents only 8% of the support to agriculture by OECD countries. In sub-Saharan Africa only 4% of the arable land is irrigated (compared to 38% in Asia), and only 3% of renewable water reserves are used.

Before the high level meeting, "Food Security for All," held in Madrid, January 26-27, the ETC Group released a *Communiqué* on global governance of food and agriculture. It suggests that the four main agencies (FAO, CGIAR, IFAD, WFP) should coordinate and work together along with smaller more specialized organizations from the developing countries.

The UK created a new Food and Environment Research Agency (FERA) by merging several Defra agencies and thus better integrating food and environmental security research and policy.

Indonesia's rice production was very good in 2008, but inefficient implementation of land reforms and improvement of economic conditions of farmers led to numerous conflicts.

In Africa, by 2020, water shortages might affect 250 million people, and agricultural productivity could decline 50%. These points were stated at the two-day meeting organized by the UN Office for the Coordination of Humanitarian Affairs (OCHA) and the African Union (AU), aimed at developing a continent-wide policy framework to protect pastoralists in Africa. (January 2009) Ref. 1029

FAO's *Crop Prospects and Food Situation* report warns that some 33 countries around the world are in need of external food assistance as a result of crop failures, conflict or other forms of food insecurity and high domestic food prices. Although cereal harvests in 2008 reached record highs, with wheat and rice production at over 2 billion tons—more than a 5% rise over 2007, most increases were achieved in richer nations.

Martin Parry, former co-chair of an Intergovernmental Panel on Climate Change (IPCC) working group and lead author of its 2007 report, calculated that the more the year of greenhouse gas emissions reduction is delayed, the higher will be the negative impact on food and water supply, health, coastal areas, and other ecosystems. His study reveals that even in the best-case scenario, 1.7 billion people will face water shortage due to climate change already taking place. This could potentially reach 3.2 billion, if action is delayed. Similarly, crop productivity will be affected through more frequent and more severe droughts, floods, and storms.

In Africa, as 21 countries are affected by food crises, governments should double the percentage of national budgets allocated to increase farm output, improve water sharing, and



adopt policies to adapt to climate change, agreed ministers attending a water conference in Libya. Africa's population of 967 million, of whom 53% are under the age of 20, is forecast to reach 2 billion in 2050. The UNDP Poverty and Environment Initiative implemented in Malawi and other 10 African countries aims to address food security by including environmental objectives such as combating soil erosion, deforestation, and water pollution in development programs.

*Low Carbon, High Growth: Latin American Responses to Climate Change* estimates that without adequate actions, climate change might reduce farm revenues by 12%–50% by 2100. *Climate Change and Food Security in Pacific Island Countries*, a report by FAO, the Secretariat of the Pacific Regional Environment Programme, and the University of the South Pacific, notes that the region's food security is seriously affected by natural disasters. Therefore, says Alexander Müller, FAO Assistant Director-General, Natural Resources Management and Environment Department, "integrating climate change adaptation into national policies, strategies, programmes and budgets related to agriculture, forestry and fisheries should become a major priority." In the Solomon Islands, food security and livelihood of villagers of Luanua and Pelau, are already affected by continuous tidal surge onto the land, reports the Ministry of Home Affairs and the National Disaster Management Office.

The UK set up the Council of Food Policy Advisers in order to address the growing concern of food security and find strategies to feed the world's growing population. Professor Lang, member of the newly formed Council, lists "new fundamentals" that will shape future food production, including: oil and energy price volatility; water scarcity, through auditing foods' water requirements; biodiversity replacement and enhancement by changing practices of land use and food growing; urbanization; and complete use of produce independently of appearance. (December 2008) Ref. 1030

About 960 million were malnourished and over 100 million people worldwide were driven into poverty this year due to the food and fuel crisis. The World Bank warns that the situation will continue to get worse as unemployment rates rise, commodity prices remain volatile, and governments face shortages in public money and outside financial assistance. The financial crisis is eclipsing and aggravating the food crisis. Production is threatened by: farmers' increasingly difficult access to credit, high input costs, and a growing monopoly over seed and agrochemical sales.

"The impact of natural resource degradation is potentially even more devastating in financial terms than the current global meltdown," said Christian Mersmann, Managing Director of the Global Mechanism of the UN Convention to Combat Desertification, at the seventh session of the Committee for the Review of the Implementation of the Convention. Some 12 million hectares of land are lost yearly due to degradation and environmental causes. Desertification threatens regions that are already the most vulnerable: 65% of agricultural lands in Africa—where 60% of the population depends on agriculture, and nearly 70% of the Arab region.

Countries still strongly affected by food crises include Kenya (where officials have been accused of artificially creating a maize shortage), Zimbabwe (where the political impasse has only made the situation worse), Afghanistan (where attacks on food convoys amplify food insecurity), Swaziland (threatened by another year of drought), Haiti (where 26 children have died in just four weeks from malnutrition), Bangladesh (where broken dams have flooded 13 Khulna villages), North Korea (where there are signs of massive malnutrition despite efforts to hide the evidence), West Africa (where the UN is seeking US\$361 million to solve the crisis),

and the horn of Africa (with 12 million hungry in Ethiopia, 3 million in Somalia, 2 million in Kenya and Uganda, plus more in Eritrea and Djibouti).

In Latin America, the UN Economic Commission for Latin America and the Caribbean (ECLAC) projects that 10 to 15 million more people could slip below the poverty line in 2008 as a result of food price volatility. (November 2008) Ref. 1031

The food crisis continues in many countries, particularly in North Korea, Somalia, and Zimbabwe, where the situations have been called humanitarian crises. Hunger in Latin America has risen from 45 million in 2006 to 51 million today. Chinese experts warn that the country's food production might drop by 23% by 2050 due to climate change.

World Food Day focused increased attention on the seriousness of the situation, but much attention is diverted by the financial crisis. The credit crisis is aggravating the food crisis as countries like China institute new export taxes to keep their crops and fertilizers in the country, causing the costs of these goods to rise elsewhere. New trade agreements, like the Thailand and Iran barter of oil for rice, reveal new types of reaction to the fluctuating prices of commodities. Leaders worldwide are calling for action on the food crisis, such as the Asia-Europe Meeting recommending coordinated action between Europe and Asia. A new council was set up in Britain to look at food security.

Middle East water scarcity-related issues are aggravated as the Sea of Galilee, Israel's largest freshwater lake, vanishes, threatening the livelihoods of local communities. About 50% of Israel's drinking water comes from the lake, water is already rationed, and its agricultural use is increasingly reduced, jeopardizing food production.

In Bangladesh, drinking water becomes saline as rising sea levels force salt water further inland. In Zimbabwe, the conflict situation over water has started, as some communities' local rivers are drying up. (October 2008) Ref. 1032

The World Bank warns that the global food crises will be long-term as climate change, energy, and water scarcity intensify. In Africa, 100 million people are at risk of moving back into poverty. The International Water Management Institute (IWMI) argues that the world is facing not so much a food crisis as a water crisis, which might intensify, as water is likely to get scarcer due to global warming and increased demand. (September 2008) Ref. 1033

The food crisis continues to deteriorate. Malnutrition in India will get worse as the country may lose up to 17% of its farming income due to climate change. India and Cambodia are promoting the use of rat meat to offset the food crisis. Bangladesh might lose some 30% of its food production by 2050. The island of Mindanao in the Philippines may experience a food crisis as internal conflict forces displacement of many. Tropical storms in Haiti such as Fay worsen the food crisis, triggering new protests. UN agencies say that 50% of Somalia will be totally dependent on food aid and emergency assistance over the next year. UNICEF says that food shortage might affect up to 70% of rural population in the south, with one in six children suffering from acute malnutrition. South Africa might have its maize crop reduced by 20% within 15 to 20 years as drought worsens in the west, while the east is increasingly afflicted by severe storms.

Three successive years of drought in the West Bank and restraint on movement brought some 50,000 Bedouins and herders to the brink of emergency, says the International Committee of the Red Cross, which helps them face an acute water shortage. This is aggravating Palestinian

frustrations over the control of water resources in the Israeli-occupied West Bank. In Afghanistan, though, the food crises might help the government and international community efforts in encouraging the replacement of poppy crops with food crops, tackling both the drug trade and the food crisis.

Meantime, UNCTAD notes that while the world tends to address the urgent humanitarian aspects of global food crisis, attention should be focused on the structure of trade and development policy that underlies the crisis. Similarly, some analysis papers state that the world is producing enough to feed its population, but one of the major problems behind the food crisis is that as much as half of all food grown is lost or wasted (which means also wasted water). A policy brief, "Saving Water: From Field to Fork – Curbing Losses and Wastage in the Food Chain" produced by FAO, the International Water Management Institute, and the Stockholm International Water Institute, calls on all actors in society to reduce food waste by half, by 2025. (July-August 2008) Ref. 1034

Continually Rising Food Prices Threaten Long-Term Global Stability. According to UN data, global food prices rose 35% this year and have already risen 65% since 2002. Biofuels competition for land and water, climate change, oil prices, and increasing population and incomes all contribute to the long-term increases in food prices. The Food and Agriculture Organization found that dairy prices rose nearly 80% and grain 42% in 2007. With nearly 3 billion people making \$2 or less per day, long-term global social conflict seems inevitable without more serious food policies, scientific breakthroughs, and dietary changes. (March 2008) Ref. 1035

As the food crisis intensifies around the world over the past few months, an additional 100 million people began suffering from hunger and there were food riots in some 30 countries, including recently conflict-torn countries such as Haiti, Côte d'Ivoire, Senegal, and Somalia. Some argue that the Security Council should consider the issue in order to stop escalation into larger global security crises. "The Security Council would be remiss in carrying out its responsibility for maintaining peace and security if it fails to take the much needed preemptory steps to stop further deterioration of the security dimensions of the global food crisis," says Anwarul Karim Chowdhury, a former Bangladeshi ambassador and UN High Representative for Least Developed Countries (LDC). He compared the food crises to others—such as HIV/AIDS—that were discussed at the Security Council level and recalls that the bodies dealing with the food situation (ECOSOC and FAO) do not have security-related mandates.

Secretary-General Ban Ki-moon announced a new international UN Task Force on the Global Food Crisis, composed of the heads of key UN agencies and institutions, to prepare a comprehensive plan of action to tackle the global rise in food prices. The elements of the task force's plan will be presented at the UN and FAO High-Level Conference on World Food Security, Climate Change and Bioenergy to be held in Rome, June 3-5, 2008.

The International Planning Committee for Food Sovereignty suggests the creation of a UN Commission on Food Production, Consumption and Trade, as a more inclusive mechanism to replace the UN Task Force. It also advocates that the food emergency situation should override previous trade and international agreements and a new trade dialogue should begin under the auspices of the UN.

At this time, when food security threatens stability around the world, a few agricultural biotechnology companies are trying to concentrate corporate power, gain a monopoly over a large part of global food, undermine small farming and farmers rights, and most likely drive up

costs. “Globally, the top 10 seed corporations already control 57% of commercial seed sales. This is a bid to capture as much of the rest of the market as possible,” explains Hope Shand, Research Director of ETC Group. According to ETC Group’s report, *Patenting “Climate Genes”...And Capturing the Climate Agenda*, Monsanto, BASF, DuPont, Syngenta, Bayer and Dow—along with some biotech partners—have filed 532 patent documents on genes related to environmental stress tolerance at patent offices around the world. In the meantime, poor countries complain that unfair policies are threatening their local seeds, undermining agricultural productivity and jeopardizing national food security. Some Indian farmers are giving up planting rice, because it is not cost-effective anymore, due to the high prices of fertilizer, seeds and pesticides.

Global warming is most probably the cause of changing rainfall patterns in Australia, concluded scientists gathered to discuss recent findings by the South-Eastern Australia Climate Initiative (SEACI). Assessing specifically the decline of rainfall and inflows into the Murray-Darling river systems over the past decade, SEACI, a three-year project that began in 2006, reveals that the Southeast Australian water system will most likely be increasingly stressed in the future as rainfall is expected to be significantly reduced, concomitantly with suspected warmer temperatures. Dr Wendy Craik, chief executive of the Murray-Darling Basin Commission, notes that in some parts of the basin the drought is more severe than the worst climate change predictions for 2055. Since future prospects are not encouraging, drought-adaptation strategies should be considered. (May 2008) Ref.1036

UN Food and Agriculture Organization warns that world food supply is diminishing rapidly and food prices reached historic highs, increasing the “very serious risk that fewer people will be able to get food,” particularly in the developing world. FAO records show that world grain stock—corresponding to the world’s total consumption—declined to 12 weeks for wheat and only 8 weeks for corn. Population growth, the effects of global warming and increase of biofuels industry are among the main factors. Josette Sheeran, executive director of the World Food Program expressed concerns that we are “facing the perfect storm for the world’s hungry.”

New computer projections also warn of possible future crop production reduction due to climate change. NOAA models show the effects that climate changes could have on the tropical belt and the possible consequences to ecosystems and human settlements. New projections by the Massachusetts Institute of Technology indicate that unless there are serious emission cuts, ozone pollution might increase 50% by 2100, which could result in a decrease of global economic value of crop production by 10% to 12%. Nevertheless, the present situation shows that changes are happening faster than computer-based climate simulations have forecast.

Three studies coauthored by researchers from prestigious organizations in North America, Europe and Australia, published by the National Academy of Sciences, warn that the future food situation might be worse than presently estimated, since many parameters that would influence crops were not efficiently factored in. “Many people assume that we will never have a problem with food production on a global scale. But there is a strong potential for negative surprises,” said Francesco Tubiello, a physicist and agricultural expert at NASA’s Goddard Institute of Space Studies, who coauthored all three studies. (December 2007) Ref.1037

The number of riots is likely to rise around the world as the number of people at risk of malnutrition grows due to commodity prices’ increase, warn UN officials. The WFP, which feeds 73 million people in 78 countries (representing less than 10% of world’s total

undernourished) noted that it will face serious difficulties this year in helping to mitigate malnutrition. Food prices rise rapidly, driven mainly by decrease of supply as harvests are reduced by climate change effects (drought, floods, and extreme weather conditions); increasing food demand from countries such as China and India; increasing demand by the biofuel industry; and soaring oil prices. Additionally, the governments of some important food-exporting countries tend to put restrictions on exports, in order to assure their own food security.

Using computer models, analysts assessed how the 12 most food-vulnerable areas are likely to be affected by climate change in the next 20 years. This included the regions where most of world's malnourished people live: much of Asia, sub-Saharan Africa, and the Caribbean and Central and South America. The findings reveal that South Asia and southern Africa are the areas where climate change could cause severe crop losses, unless intense adaptation strategies are undertaken. The study also identified the likely effects by crop, therefore providing governments and aid agencies important information for building a comprehensive adaptation approach.

*Food's Failed Estates = Paris's Hot Cuisine; Food Sovereignty – à la Cartel?* by ETC Group analyzes food security prospects and policy failures and needs. It looks at all aspects that might drive food out of the reach of the marginalized, and warns that, without adequate action, the number of hungry people could increase by 50% by 2025.

The west of North America is seriously threatened by possible future lack of access to fresh water, as snowpack across the mountain ranges is shrinking, according to a computer analysis published in the journal *Science*. Using a complex system of factors' interplay, the results show that up to 60% of the climate change trends in the area are human-induced.

The World Wide Fund for Nature - South Africa (WWF-SA) is warning the country's government about a "looming water crisis for South Africa in the same way that it was warned a decade ago about the present energy crisis." The country already uses 98% of available water resources and it could run out of water by 2025. (February 2008) Ref.1038

An EU report, *Climate Change and International Security* [see item 8.1], warns that water scarcity and food insecurity caused by rising prices and diminishing harvests, particularly in the Middle East, are likely to cause "serious security risks" for Europe and internationally.

African Environment Day, organized by the African Union (AU) Commission to raise awareness of the impact land degradation and desertification have on Africa's development, was observed under the theme "Adapting to Climate Change for Livelihood Security in Africa." (March 2008) Ref.1039

Continuous escalation of food prices worldwide increases distress in poor regions, raising the danger of social and political unrest. Demonstrations and/or riots due to unaffordable basic needs have already erupted in Egypt, Cameroon, Haiti, Burkina Faso, Indonesia, Ivory Coast, Mauritania, Mozambique and Senegal. FAO says that six countries have an "exceptional shortfall" of food supplies: Lesotho, Somalia, Swaziland, Zimbabwe, Iraq, and Moldova, while another six suffer of "widespread lack of access" to food: Eritrea, Liberia, Mauritania, Sierra Leone, Afghanistan and North Korea. Out of the estimated ~40 countries at "food crisis" risk, some 20 are or were recently affected by internal conflicts, and 21 have suffered from floods, droughts, and other weather disasters.

The International Assessment of Agricultural Science and Technology for Development *Synthesis Report* presents statistical analyses of basic food prices, an assessment of the state of

world agricultural regions and threats to production; suggests several strategies and methods to increase agricultural efficiency, such as how to produce food that is less dependent on fossil fuels and favors natural fertilizers and traditional seeds; and offers suggestions for rational use and preservation of soil and water supply.

The International Federation of Red Cross and Red Crescent Societies launched a new five-year food security strategy in Africa focussing on long-term investments to improve food security programmes in 15 African countries. The new plan will include new technologies, seed banks and soil nutrient management, and the establishment of community-based food security monitoring systems.

The Twenty-Fifth Special Meeting of the Council for Trade and Economic Development (COTED) on the Environment held in Greater Georgetown, Guyana, April 17-18, 2008 focused on critical environmental issues that affect the lives of people of Small Island Developing and Low-Lying Coastal States. It was agreed that the Caribbean Community Environmental and Natural Resource Framework should address adaptation to climate change effects and food security and freshwater resources.

In Australia, a six-year-long drought reduced Australia's rice crop by 98% affecting local population, prices, and importing countries' food source.

A conference hosted by the European Water Forum in the European Parliament on 16 April increased the warnings of growing water scarcity concerns, calling for speedy solutions to combat water shortages, which might include higher water prices to deter overuse.

In order to assist countries to adopt a new strategy for addressing food and water security by engaging international action to combat desertification, land degradation and drought, the UN Convention to Combat Desertification Secretariat is convening a high-level policy dialogue to be held in Bonn, Germany on May 27.

Water security will also be affected by earlier melting of glaciers and mountain snow, leaving millions of people in need during the summer when rainfall is lower, warn scientists. The earth's sub-tropic zones, home to 70% of the world's population, are the most vulnerable. The areas most at risk include parts of the Middle East, southern Africa, the United States, South America and the Mediterranean.

The fast melting high altitude glaciers in Andean mountains alter eco-systems, affecting the livelihood of people of Peru, Ecuador and Bolivia. The IPCC estimated that rising temperatures could melt most of Latin America's glaciers by 2022. In some regions, demand for water might exceed supply as soon as 2009. (April 2008) Ref.1040

## **Population Trends and Environmental Impact**

### U.S. National Report on Population and the Environment

U.S. National Report on Population and the Environment by the Center for Environment and Population (CEP) is the first comprehensive assessment of the impact of U.S. national and regional population trends on the environment. The report addresses the main "America's Population-Environment Challenges": land use; water; forests; biodiversity; fisheries and aquatic resources; agriculture; energy; climate change; and solid and toxic waste. It highlights that from 1995 to 2005, the U.S. population increased by 10.6% (29 million people)—the highest rate of industrialized countries—and raises concerns over environmental consequences, since the U.S. already has the largest per-capita environmental impact in the world. It warns that in the future

the situation might become more critical due to uneven distribution of the population, climate change, rising sea levels, and pollution. (September 2006) Ref. 1042

#### World Population in 2025

Mapping Future Population Growth by the Earth Institute at Columbia University is mapping projected population change for the year 2025. It notes that most population growth will continue to be in already densely populated developing countries like India and China, and coastal population will increase by 35%, to 2.75 billion people living within 60 miles of the ocean; therefore, there will be increasing vulnerability to disasters resulting from climate-change and rising sea level. (September 2006) Ref. 1043

#### Demographics and Destiny: Trends We Need to Understand in the 21st Century

*Demographics and Destiny: Trends We Need to Understand in the 21st Century* by Endy Zemenides, argues that demographics is one of the important factors framing the 21st century security agenda, and points out 10 key demographic trends: 1) aging of the developed world; 2) youth bulges in the Islamic world; 3) long term population decline in Russia; 4) rise of urbanization/megacities in the developing world; 5) negative birth rates in Europe; 6) developed world's reliance on immigration; 7) Islamization of Europe; 8) steep increase in the number of Chinese and Russians with lung cancer, heart disease and other pollution-related health problems; 9) population growth around limited renewable resources; and 10) high fertility rates in the developing world. Demographics, the article argues, can change the way we fight war and add reasons for fighting wars. The author concludes that the U.S. must recognize the looming demographic issue and develop a comprehensive demographic strategic plan. (October 2007) Ref. 1044

#### **Grain Harvest Shortfalls may drive conflicts in areas already unstable**

The Earth Policy Institute reports that the global 2003 harvest will fall short of consumption by 93 million tons. This will continue a decline in world grain stocks experienced over the last several years. Elevated temperatures and aquifer depletions are the major drivers of this production decline. The immediate implication is that if such environmental conditions continue, the world will soon be unable to feed itself.

Note: The FAO food outlook preview released this month also reveals a sharp decline in prospects for world cereal output since June, which translates to a much greater global cereal carryover draw down than expected, and a much tighter global supply-and-demand situation. (August-September 2003) Ref. 1045

#### **Sustainable Development and Conflict**

The UN Commission on Sustainable Development's Twelfth Session (CSD-12) was held in New York from 14 to 30 April, 2004. This meeting was the first substantive review of progress on targets set by world leaders at the 2002 World Summit on Sustainable Development in Johannesburg, which include many of the eight UN Millennium Development Goals (MDGs). CSD-12 discussions centered on halving by 2015 the number of people without access to safe drinking water and basic sanitation, and significantly improving the lives of at least 100 million slum dwellers by 2020. A number of the thematic issues reviewed included the intersection of conflict and natural disaster subjects with environmental and natural resource topics. (May 2004) Ref. 1046

**Joint Afro-Arab Strategy for Addressing Agricultural Development and Food Security**

At the Joint Afro-Arab Ministerial Meeting on Agricultural Development and Food Security, held February 14-16, 2010, in Sharm El Sheikh, Egypt, delegates agreed on an action plan to guide their collaboration in agriculture and food security, including climate change-related elements. The action plan includes a section on transboundary and environmental challenges, proposing mitigation and adaptation tools such as: implementation of international and regional environmental conventions and initiatives, development of a common position in international negotiations; creation of joint mechanisms and networks to coordinate and monitor climate change and other environmental issues; and strengthening the institutions dealing with environmental protection and climate change issues. (February 2010) Ref. 1047

**Food Crisis in Southern Africa and Horn of Africa**

Africa is currently facing an acute food crisis, with more than 6 million people at risk in Southern Africa and at least 12 million in the Horn of Africa. Rains have come too little and too late to remedy a serious drought that has decimated crops and led to widespread dependency on donor supplies. According to the U.N. World Food Programme (WFP), 6.5 million people are vulnerable to food shortages in South Africa. Zimbabwe is particularly hard hit. In addition to wild fruits and roots, households in some parts of Zimbabwe are reportedly already eating locusts. According to the USAID, the total number of people facing food insecurity in Zimbabwe could rise to about 7.5 million, or more than half the population, before next year. Even the region's breadbasket, South Africa, has been devastated by the recent drought, which has reduced maize crops to their lowest level in more than half a century. The Greater Horn of Africa Food Security Bulletin estimates that 7 million people in Ethiopia, 2 million in Tanzania, 1.2 million in Kenya and 1.2 million in Eritrea are facing hunger. (January 2004) Ref. 1048

**Food Security Observatory Proposed for Sahel-Saharan Region**

Food security was the main theme of the 10<sup>th</sup> Summit of the Community of Sahel-Saharan States (CEN-SAD). The Tunisian delegation has submitted a proposal to set up a food security observatory for the Sahel-Saharan States (CEN-SAD) region, to prevent and/or deal with food crises. The role of the observatory would be to monitor agricultural products' availability and prices, and investments in agricultural growth, as well as natural resources such as water and soil, and formulate strategies and policies based on food availability and needs. The project should be funded by member states and partners, and the stakeholders should be member states and executive organs of the African Union and sub-regional organizations. (June 2008) Ref. 1049

**Food Security Summit Usefulness Debatable**

About 5,100 people from 181 countries, including 43 heads of state or government and 100 ministers, participated in the June 3-5 FAO conference on World Food Security. The governments adopted the "Comprehensive Framework for Action" and pledged \$13 billion during the conference. FAO Director-General Jacques Diouf estimates that \$30 billion a year will be needed to re-launch agriculture and avert future threats of conflicts over food, and UN Secretary General Ban Ki-moon reiterated that food production should increase by 50% by 2030 to overcome the long-range food crisis. The next forums to address the food crises are the G8 summit in Japan in July, the UN/FAO Food Security Committee meeting in October, and the FAO Conference in November. (June 2008) Ref. 1050



**FAO Launched New Crisis Management Centre**

In collaboration with the World Organisation for Animal Health, the UN Food and Agriculture Organization launched a new Crisis Management Centre to fight avian influenza outbreaks and other major animal health or food health-related emergencies. The center continuously monitors disease information around the globe and is able to respond in less than 48 hours, when a suspected outbreak is reported. (October 2006) Ref. 1051

**OSCE Environmental Security Conference Focuses on Land and Water**

On January 22-23, 2007 the Organization for Security and Co-operation in Europe (OSCE) held a conference with the theme: "Key challenges to ensure environmental security and sustainable development in the OSCE area: Land degradation, soil contamination and water management." The speakers were a diverse mix of mostly European political, governmental, environmental, and security experts, who further developed OSCE's role in environmental security for the region. Germany offered to take the leadership in environmental cleaning up of closed military facilities in the region. OSCE is composed of 56 countries. "The most significant issue presented was the critical rate of loss of arable lands in the arid regions of Eastern Europe. Experts from these countries requested urgent assistance from the OSCE to stem this impending crisis," said Dr. King of the U.S. Army Command and General Staff College, who led the first panel.(January 2007) Ref. 1052

**Dossier about Drylands and Desertification Launched by Scidev.Net**

With the occasion of this year's World Environment Day, June 5, which had the theme *Deserts and Desertification*, SciDev.Net launched an online dossier resource addressing science and policy issues relating to drylands and desertification. The dossier will be continuously updated with news, features and opinion articles addressing different models, uncertainties, and possible implications of drylands and desertification phenomena, including policy briefs and case studies, and progress reports on the UN Desertification Convention. It is a valuable service for those wishing to keep abreast of dryland issues. SciDev.Net's desert science dossier has been produced with the support of the Consultative Group on International Agricultural Research (CGIAR). About 2 billion people live in the world's drylands and 250 million people already left their homes because of unproductive soils. [See also *International Year of Deserts and Desertification—2006* in January 2006, and *Desertification Synthesis (MA report 3)* in June 2005 environmental security monthly reports.] (June 2006) Ref. 1053

**Asia's Progress Jeopardized by Environmental Degradation**

*The Millennium Development Goals: Progress in Asia and the Pacific 2007* report by the Asian Development Bank and UNDP hails progress in Asia, showing that the continent might reach the UN Millennium Development Goals for poverty, gender parity, and primary education coverage before the 2015 plan. However, the report warns that this might be jeopardized by environmental degradation (including deforestation and land degradation), poor water management (including flooding), rising pollution in urban areas, and CO2 emission contributing to climate change. (October 2007) Ref.1054

**Biodiversity for Food Security was the theme of 2004 World Food Day**

The theme of this year's World Food Day (October 16th), *Biodiversity for Food Security*, emphasizes the importance and linkage between biodiversity and food, and ultimately human

security. The connection between food scarcity, migration, and conflict is increasingly recognized by international organizations, which are focusing more attention on ways to address this complex environmental security issue. (June 2004) Ref. 1055

## **Freshwater**

### **Freshwater Scarcity Issues and Regional Aspects**

A ‘water security risk index’, compiled by British-based risk consultancy Maplecroft, found African and Asian nations had the most vulnerable supplies, judged by factors including access to drinking water, per capita demand and dependence on rivers that first flow through other nations. Somalia, where just 30% of the population has clean drinking water, is in the most precarious situation, followed by Mauritania, Sudan, Niger, Iraq, Uzbekistan, Pakistan, Egypt, Turkmenistan and Syria.

At the High Level International Conference on the Midterm Comprehensive Review of the Implementation of the International Decade for Action “Water for Life” 2005-2015, from 8-10 June 2010, in Dushanbe, Tajikistan, participants reviewed the progress during the first five years. The Dushanbe Declaration on Water, which includes a number of conclusions and recommendations, will be submitted to the UN General Assembly. The review highlights the importance of, among others: building resilience and reducing vulnerabilities to extreme events; enhancing hydrologic, hydrogeologic and meteorological data collection, assessment and dissemination capabilities; and sustained and predictable financial assistance and technology transfer to developing countries.

“Vision 2030: The resilience of water supply and sanitation in the face of climate change” is a collection of papers in preparation released by the WHO together with the UK Department for International Development, including a “full technical report, as well as detailed reports on climate change and technology projections, and a review of resilience and adaptive capacity, including a series of technology-by-technology fact sheets.” (June 2010) Ref. 1057

An Israeli consortium unveiled the world’s largest reverse osmosis desalination plant in the coastal city of Hadera. The plant will supply 127 million m<sup>3</sup> of desalinated water a year, representing about 20% of Israel’s yearly household consumption and is the third in a series of five desalination plants being built over the next few years that will eventually supply Israel with about 750 million m<sup>3</sup> annually for addressing the country’s water shortage. While other Middle East countries have bigger desalination plants, those use thermal-based technology that requires more energy and is less environment-friendly.

Several Arab countries are looking into using technologies for increasing their agricultural land. An Abu Dhabi soil survey found that with adequate investment in the right technologies, over 200,000 hectares of land could be reformed for agricultural use, while Qatar and Kuwait are trying to increase domestic agricultural yields through mycorrhizae—the use of selected types of fungus that enhance the growth of plant roots in arid areas. In a matter of 18 months, the institute managed to convert 4,000 m<sup>2</sup> of “hyper-saline waste-land” in Qatar’s southern Dukhan area into a productive land for vegetables and crops production. Similar projects are going on in Kuwait, India, Oman, and the UAE. (May 2010) Ref. 1058

“Arab countries do not disclose enough information on their water out of concern that transparency could fuel unnecessary public concern and unrest,” noted Hosny Khordagui, Regional Program Director of the UNDP Water Governance Programme for Arab States <http://www.alertnet.org/thenews/newsdesk/LDE6300FO.htm>. According to the UNDP’s Arab Human Development Report, people in the Middle East and North Africa have access to an average of only 1,000 cubic meters of water a year, one-seventh the worldwide rate, which by 2025 might be further reduced to 460 cubic meters due to high population growth and the effects of climate change. Arable land is also expected to shrink due to climate change, further jeopardizing poor farmers’ livelihood and pushing people to move to overcrowded cities.

The worst drought in at least 50 years in southern China left tens of millions of people short of water and fuels disputes with countries that share the Mekong River, especially Thailand, over the role of Chinese dams in decreasing river flows. Some argue that more dams in China could help mitigate the Mekong’s seasonal variations by storing or releasing water as necessary. (April 2010) Ref. 1059

The multiple crises in the Arab world, exacerbated by the effects of climate change, might increase the number of emergency situations, requiring food and water distribution to millions of people, warned officials attending the third conference of humanitarian organisations in the member states of the Organisation of the Islamic Conference (OIC). Similarly, the UNEP report “Environment Outlook for the Arab Region: Environment for Development and Human Well-being,” compiled at the request of the Council of Arab Ministers Responsible for the Environment, outlines the multiple challenges facing the Arab region, ranging from climate change and food insecurity to decreasing water availability and unemployment. Highlighting that the region is one of the most water-scarce in the world, the report notes that biofuels and food security are key emerging and intertwined challenges facing the region. The region is predicted to be among the hardest hit by the potential direct and indirect climate change impacts, including: loss of coastal zones; more severe droughts and desertification; increased groundwater salinity; and a surge in epidemics and infectious diseases.

Experts warn that unless swift action is taken to improve water management, Lebanon might lack freshwater by 2015, due to the interplay of several factors, including: the 1975-1990 civil war and years of political unrest, water rights disputes with Israel, weak water management, and inappropriate infrastructure, exacerbated by a growing population. Additionally, some transboundary rivers are not exploited due to their strategic locations—such as the Nahr al-Kabeer and Orontes shared by Lebanon and Syria, and the Wazzani and Hasbani shared with Israel.

The Pacific Institute’s recently updated online chronology of water conflicts shows 6 incidents during 2009, up from 3 in 2008. Peter Gleick, President of the Pacific Institute, notes that a pattern of localized conflict is likely to emerge in sub-Saharan Africa, Southeast Asia, India, China, Pakistan, and Burma in coming decades. Although skeptical about ‘water war’ or full-scale interstate warfare triggered by water, he suggests that water and climate change should still be considered serious security issues. Terrorist groups could start to view water infrastructure as valuable targets as tensions rise over water’s availability, says Gleick. In addition, in countries like Pakistan, discontent with the West could intensify as water becomes scarcer, which could help extremists bring in new recruits.

The UN Food and Agriculture Organization (FAO) collection of three technical papers

provides an overview of the current status of knowledge on “Climate Change and Implications for Fisheries and Aquaculture,” noting that ecosystem approaches to aquaculture and fisheries, as well as precautionary management, can help improve the resilience of the sectors and calling for the integration of fisheries and aquaculture into national climate change and food security policies.

The UN World Water Assessment Programme released two publications: “The Implications of Climate Change for Water—Highlights on Climate Change from the third World Water Development Report” addressing the potential impacts of a changing climate on the availability of water and on the control of water extremes; and “Water and Climate Change—An Overview from the WWDR,” that underscores that water is at the root of a complex vulnerability dynamic and describes the impacts of climate change on water, making some recommendations for responses to climate change focused on water and proactive adaptation measures.

The study “Local Responses to Too Much and Too Little Water in the Greater Himalayan Region” by a consortium of international organizations, based on the work of five field teams in China, India, Pakistan and Nepal, highlights that adaptation practices need to be aligned with other processes if they are to be successful, even over a short period. It also stresses the need for governments to prioritize the development and improvement of national and regional policies to provide better support for local long-term resilience and adaptation to more extreme climate. (December 2009) Ref. 1060

Aaron Wolf, Program Director in Water Conflict Management and Transformation at Oregon State University, said that the source of potential tensions and conflicts over water is not scarcity but poor capacity to deal with changes in the water basin. He gives as examples some regions that had organizations to oversee shared river basins; including those formed by India and Pakistan, and by Israel and its Arab neighbors, which had remained intact for decades.

Colin Chartres, Director General of the Consultative Group on International Agricultural Research (CIGAR) warned that countries depending on snowmelt could expect water levels to drop by up to 30%. He underscored the need for investments amounting to \$270 billion in drinking and irrigation infrastructure in Sub-Saharan Africa and India. Along the same lines, the UNEP report, *Fresh Water Under Threat, Vulnerability Assessment of Freshwater Resources to Environmental Change, Africa*, calls for urgent adaptation measures to combat scientific and technical deficiencies, poor governance and management structures, pollution of water resources, and industrialization and urbanization. (November 2009) Ref. 1061

In India, the four-month monsoon season ended with rains 23% below normal, causing the country’s worst drought since 1972. Food prices already skyrocketed and threaten inflation. About half of India’s 1.2 billion people depend on agriculture for their income. The Water Governance Programme for Arab States was officially launched by the UNDP Regional Bureau for Arab States and the League of Arab States at the high-level Partners Meeting on Water Governance, on October 12, 2009. The Programme aims to support water management in the Arab States by integrating socio-economic and environmental dimensions. Meantime, Egyptian officials warn that the Nile Delta region is facing a double threat, due to freshwater needs which might surpass resources by 2017, and rising sea levels inundating much of the fertile Delta region, where 60% of the country’s 78 million people live. Over the past decade, the Mediterranean is been rising an average of 2 centimeters annually, says Mohamed al-Raey of Alexandria University. A one-meter sea-level rise would submerge Alexandria. Meantime, Egypt is facing disputes with the other ten Nile basin countries that are demanding

bigger shares of Nile water to compensate for reduced rainfall. (October 2009) Ref. 1062

During the past 50 years, freshwater flow dropped up to 14% for some of the major rivers feeding the Pacific and Indian Oceans, mainly due to changing precipitation patterns linked to climate change, according to research by the National Center for Atmospheric Research.

The *Rising Temperatures, Rising Tensions; Climate change and the risk of violent conflict in the Middle East* report [see above item '7.2 Threats and Strategies for Addressing Climate Change in the Middle-East'] specifically warns about potential increasing armed conflict in the Middle East over control of water resources. The report refers to expert opinions that even under the present condition of moderate global warming, by 2100, the Euphrates (which runs through Turkey, Syria and Iraq) might shrink by 30%, the Jordan River by 80%, while the Dead Sea is shrinking by 1 meter per year due to overuse of its tributaries, and climate change. The study notes that Israel's National Communication warned that water supply may fall by 60% of 2000 levels by the end of the century. (June 2009) Ref. 1063

As glaciers in the Andes are melting away, tensions are rising between those living upstream and downstream, small farmers and agribusinesses, and even among states. As per the World Bank's estimates, most of the Andes' glaciers will disappear within 20 years, threatening the water supplies of nearly 80 million people, and jeopardizing energy security in Bolivia, Ecuador and Peru, which depend on hydropower for about half their electricity. (May 2009) Ref. 1064

Rivers in some of the world's most populated regions are losing water due largely to climate change, reveals research led by scientists from the National Center for Atmospheric Research (NCAR) in Boulder, Colo., to be published May 15 in the American Meteorological Society's *Journal of Climate*. Among the 925 big rivers, rivers with decreased flow outnumbered those with increased flow by 2.5 to 1 and freshwater discharges into the Pacific Ocean and Indian Ocean dropped by 6% and 3% respectively over the past 50 years (from 1948 to 2004). Added to the effects from damming, irrigation, and other water use, these changes could become a threat to future supplies of food and water, warn the researchers.

The "Asia's Next Challenge: Securing the Region's Water Future" report produced by the Asia Society, warns that Asia may see more conflicts over scarce water resources in the coming years due to the combination of climate change, urbanization, and population growth. Most vulnerable are the relations between India and Pakistan, and those related to the Mekong River, which is shared by China and its southern neighbors, Myanmar, Laos, Thailand, Cambodia and Vietnam. The ten recommendations put forward in the report include greater regional cooperation and ensuring that water management organizations work directly with those responsible for defense and diplomacy. (April 2009) Ref. 1065

"Water in a Changing World," the 3<sup>rd</sup> World Water Development Report, notes that by 2050 population would reach 9.1 billion if fertility rate continues to decrease, while if it would stay at the present level of 2.56, the population would reach 11 billion, consequently increasing demand for food and water in both cases. Over the last 50 years, freshwater withdrawals have tripled and irrigation doubled due to population growth. The report also made the link between poverty and water resources, noting that "The number of people living on less than \$1.25 a day coincides approximately with the number of those without access to safe drinking water."

Population growth to 8.3 billion by 2030 will increase food and energy demand by 50% and

fresh water by 30%, said John Beddington, chair of a new UK Cabinet Office task force set up to address food security, at the Sustainable Development UK 09 conference. Underlining a belief that climate change will be an exacerbating factor, he suggested swift policy measures to improve agriculture and consumption practices. For addressing the situation at the European level, he proposed the creation of a position of chief science adviser to the European Commission.

The Water and Disaster Action Plan, prepared under the auspices of the Secretary-General's Advisory Board on Water and Sanitation, provides a tool for the UN System to mobilize and coordinate its efforts in assisting member States to face the challenge of natural disasters. It was launched at the fifth World Water Forum, held in Istanbul, Turkey, March 16-22, 2009

The First Ministerial Forum on Water of the Group of 77, held February 23-25, in Muscat, Oman, concluded with the adoption of the Muscat Declaration on Water, which suggests the recognition of human right to clean water and sanitation as a key goal. Ministers in charge of water recommended the promotion of innovative technologies among developing countries to address the negative impacts of water-related disasters.

On World Water Day, the Executive Secretary of the UN Convention to Combat Desertification (UNCCD), Luc Gnacadja, called for prudent water management to halt land degradation and its consequences, including conflict over scarce resources. (March 2009) Ref. 1066

Hundreds of millions of South Asians face growing water stress due to over exploitation, climate change, and inadequate cooperation among countries. All three factors are threatening river basins that sustain about half of the region's 1.5 billion people, warns the report "Freshwater Under Threat: South Asia" by UNEP and the Asian Institute of Technology. South Asia is home to 25% of the global population but has access to less than 5% of the world's freshwater resources. The report calls for urgent policy attention and more research into the impact of climate change on water resources, infrastructure, and management practices, as well as improved cooperation among the affected countries and integrated basin management. China declared a drought emergency and earmarked Rmb400m (US\$58.5m) for relief. The agriculture ministry says water shortages are affecting up to 43% of the country's wheat-producing area and around 3.7m people.

A new study published in *Fish and Fisheries* warns climate change threatens the livelihood of millions of people in fishery-dependent nations. The study identifies 33 countries of high vulnerability, 19 of which are already in the UN "least developed" category. The countries listed as most vulnerable are: Malawi, Guinea, Senegal, Uganda, Bangladesh, Cambodia, Pakistan, Yemen, Peru, and Colombia.

"The World's Water 2008-2009 Biennial Report on Fresh Water Resources" states that providing clean water and proper sanitation to the poorest billions is directly related to governance and commitment to the task, not money or lack of available transport and technology. Discussing "Peak Water," Peter Gleick notes that although water is a renewable resource—and therefore we should never completely run out of it—increasing population and agricultural needs might drain the non-renewable aquifers. Some recommendations include improving water-use efficiency; accurate water pricing; updating the Clean Water Act and the Safe Drinking Water Act to include new contaminants, actively enforcing the standards already in place, and strengthening water institutions.

The 10<sup>th</sup> session of the Human Rights Council to be held March 2-27, 2009, in Geneva, will

consider a report by the High Commissioner for Human Rights on the relationship between climate change and human rights such as right to safe and adequate water and food, health, and housing. The report was produced in consultation with member States and relevant actors, including IPCC and UNFCCC. (February 2009) Ref. 1067

Two-thirds of the Tibetan plateau glaciers might be gone by 2050 if the current temperatures rise continues, note scientists. Water shortages would affect 2 billion people in China, India, Pakistan, Bangladesh, and Bhutan. (January 2009) Ref. 1068

Global warming and melting of Tibetan glaciers might produce 15 million “environmental refugees” in South Asia and conflicts within Punjab and Sindh, warns Simi Kamal, member of the Stockholm-based Global Water Partnership Technical Committee, adding that water distribution is political in nature and needs to be resolved in order to avoid conflict. (December 2008) Ref. 1069

Experts reiterated that half the world will face water shortages by 2080, with Asia being the most affected due to its large population, melting of Himalayan glaciers, and low-lying coastal areas. Southeastern U.S. states are being advised to diversify their water supplies in expectation of a drier future climate. In Australia’s Murray-Darling Basin, irrigated agriculture could be halved by 2050; and in the Sahel region, an estimated 110 million people might be affected by Niger’s seasonal flooding decrease due to changes in rainfall patterns and human exploitation. (November 2008) Ref. 1070

Experts (including Nicholas Stern) attending the Goldman Sachs ‘Top Five Risks’ conference, reiterated the warning that the possible future water shortage would be a bigger threat to mankind this century than the food crises and exhaustion of energy reserves. The Himalayas for instance are the source for all the major rivers of Asia and for almost half the world’s population. In Africa, to shrinkage of mountain glaciers from Mount Kilimanjaro to Uganda’s Rwenzori mountains—which decreased by 50% between 1987 and 2003, drying lakes such as Lake Chad, and falling water levels in Lake Victoria, the atlas adds new cases of disappearing water bodies like Lake Faguibine, as well as the many examples of desertification, unsustainable large-scale irrigation and degraded coastal areas that are further increasing the threat to already scarce water reserves. (June 2008) Ref. 1071

World Water Day theme in 2007 was ‘Coping with Water Scarcity’ to highlight limited water resources and the imbalances between availability and demand.’ If today water scarcity affects 700 million people around the world, by 2025, this could rise to more than 3 billion. Since many of the world’s rivers and aquifers are shared among countries, conflicts are likely to be exacerbated, unless integrated cross-border water management systems are implemented. Several reports released on the occasion of World Water Day reveal today’s realities, suggesting policies and future possible developments. The WWF report, *World’s Top Rivers at Risk*, warns that global warming and man-made causes destroy some of the world’s largest rivers, threatening ecosystem and people’s livelihood. The report assesses pollution, development, and water management of ten of the world’s most important rivers: the Nile, the Danube, the Rio Grande, La Plata, Yangtze, Mekong, Salween, Ganges, Indus, and Murray-Darling. It is calling on policymakers to take notice of the emergency nature of the situation and to set up strategies to

reverse damage to freshwater sources. “Conservation of rivers and wetlands must be seen as part and parcel of national security, health and economic success,” stressed Jamie Pittock, WWF Global Freshwater Programme Director. The IPCC report *Impacts, Adaptation and Vulnerability*, forecasts that “hundreds of millions of Africans and tens of millions of Latin Americans who now have water will be short of it in less than 20 years. By 2050, more than 1 billion people in Asia could face water shortages. By 2080, water shortages could threaten 1.1 billion to 3.2 billion people, depending on the level of greenhouse gases that cars and industry spew into the air.” The report will be released at the beginning of April. As Peru’s glaciers are melting, the country might run out of water. In China, air pollution is causing reduced rainfall, increasing drought in northern China. [See also *World Water Forum 2006, Unless Water Management Improves, Conflicts over Water Are Inevitable*, and other previous environmental security reports on the water issue.] (March 2007) Ref. 1072

#### Future Sea-level Rise will make Freshwater Brackish

The southern Pacific region experienced “king tides” on February 28, 2006, as a result of the 26-year cycle of essentially perfect gravitational alignments of the Sun, Moon and Earth. The island of Funafuti, Tuvalu (max. elevation = 3.7 meters) had tide swells of 3.4 meters above normal in calm weather. While this rise is only minimally attributable to global warming sea-level rise at this stage, it does point to impacts to be expected well before actual inundation of low-lying regions might result from that phenomenon. While only three of the lowest situated homes experienced yard flooding, Dr. Mark Hayes of the University of Queensland observed water bubbling up to emerge on top of the soil. This would have occurred from rapid, significant intrusion of seawater below the lens of brackish and freshwater held in pores and cavities of the island’s rocky structure and soil. Such intrusion will have contaminated some of the freshwater upon which residents depend for direct use and for agriculture. In low rainfall regions, such damage will not self-repair quickly. It is likely that well before physical inundation from general sea-level rise forces residents to flee, they will have to abandon the island owing to unavailability of potable water and water for even salt-tolerant crops and trees. Funafuti is one extreme case, but represents a snapshot of the future for all low-lying islands and littoral zones. [See also *Several Small Asia/Pacific Countries at Risk because of Rising Sea Levels* in January 2006, *First People Displaced Due to Rising Sea Levels* in December 2005 and other related items in previous environmental scanning reports.] (March 2006) Ref. 1073

#### **Water to be Considered Integral Part to Copenhagen Negotiations**

The Stockholm Statement adopted at the World Water Week conference held in Stockholm, August 16-22, 2009, calls for global water management strategies to be considered as integral parts of the negotiations for a global climate agreement in Copenhagen, in December. Some 2,500 water experts from 130 countries attended the meeting. It also stresses the need for a clear framework for more effective use of water across borders, as well as for better cooperation between officials involved in land and forest management, climate, and water issues. [Related item: *A New Step Toward Preventing Water Wars* in July-August 2008.] (August 2009) Ref. 1074

#### **Unless Water Management Improves, Conflicts over Water Are Inevitable**

The 16th annual conference on water took place in Stockholm, during World Water Week, August 20-26. Reports released during this week warned of possible consequences of future



water scarcity, such as increased cost of water, civil unrest, mass migration, and economic collapse. There was consensus that poor management of water resources and soaring water usage are the main causes of water scarcity increasing worldwide faster than expected; and, unless there are drastic policy changes around the world, the grim statistics will only worsen, mostly in the densely populated and poor regions of China, Mexico, and India. A report by The World Wildlife Federation (WWF), *Rich countries, poor water*, warns that wealthy nations are threatened by a water crisis similarly to the drought-plagued poor countries, due to climate change, drought, loss of natural wetlands, and over-consumption by industry, agriculture and big cities. The report suggests seven ways to address the problem. The International Water Management Institute notes that while over the past 100 years water usage had increased six-fold, it is expected to double again by 2050.

The World Bank estimates that 20-40% of water sector finances are lost to corruption. Water experts and businesses formed the Water Integrity Network (WIN) to combat corruption in the water sector. WIN is open to all. Transparency International and water corporations are the initial principal members. WIN seeks reforms to improve regulations and transparency, as well as increase public awareness.

*Asia's Coming Water Wars*, a comprehensive analysis by The Power and Interest News Report, warns of water problems increasing conflicts in some Asian regions already beleaguered by long-standing historical animosities and internal instabilities. The most vulnerable regions for water-related conflicts are Central Asia, South Asia and the Mekong sub-region in Southeast Asia. Considering these regions' rapid development, growing populations and instabilities, water-related tensions might have wider regional and global significance.

*Business in the world of water—WBCSD Water Scenarios to 2025* presents the critical future water situation in three “H2O” scenarios: “H” (Hydro)—urbanization, technical and efficiency-focused, with serious water allocation problems; “2” (Rivers) is a world of water security based on compromise; “O” (Ocean) describes a functional society based on interconnectivity and cooperation of all systems' actors. (August 2006) Ref. 1075

#### Water Management Is the Main Aspect of Water Security Issues

*Water Security: Global, regional and local challenges* published by the Institute for Public Policy Research is a policy brief examining the management of trans-boundary water resources. Analyzing the global policy framework in place for addressing water insecurity, it evaluates and makes recommendations for various policy alternatives to strengthen the framework. Similarly, the *Water Security: War or Peace?* report argues that a failure of politics rather than scarcity per se is a likely cause of “water war.” Noting that transboundary water is generally managed peacefully, the paper suggests disconnecting water and national security discourses and rather associating water with cooperative attitudes. The paper also highlights that the capacity to adapt to scarcity tends to be underestimated. (May 2010. ) Ref. 1076

#### **Prospects for Conflict over Water Rise in Several Regions**

Rapidly melting glaciers in the **Himalayas** could cause vast flooding followed by long-term, severe water shortages in the region, according to World Wildlife Fund's report, *An Overview of Glaciers, Glacier Retreat, and Subsequent Impacts in Nepal, India and China*. Water from the Himalayas feeds into seven great Asian rivers, ensuring the water supply of hundreds of millions of people. Flooding and then water shortage will inevitably cause mass migration. The reduced capacity of the **Jordan** River and the ecological disaster caused by its over-

exploitation triggered discussions between Israel and Jordan. However, no agreement has been reached. The problems are worsened by Jordan's plan to construct a new dam on the Yarmuk River, the largest tributary of the Jordan. Friends of the Earth Middle East (FoEME) tries to mitigate the situation by organizing discussions and joint activities; it also launched the idea of placing the Jordan river on UNESCO's World Heritage List due to its tremendous ecological and cultural significance.

The risk of conflict over water for countries along the river **Nile** or its tributaries increases as the 1929 treaty is being increasingly contested. The treaty allows Egypt to use Nile water only for irrigation or power generation. Meantime, under the umbrella of the Nile Basin Initiative launched by the Nile riparian states in 1999, Italy is funding a new project to improve water management among the ten Nile Basin countries. Implemented with assistance from FAO, the project will integrate technical water resource and water use data with demographic, socio-economic and environmental information to examine how specific policies and projected water use patterns will affect water resources in the region. (March 2005) Ref. 1077

*Israel-Lebanon: Water Project Launched Despite Mounting Tension*

The water-pumping project at the southern Wazzani River, launched by Lebanon in October despite Israel's disagreement, could lead to an escalation of hostilities in the region. There is no formal agreement on sharing water in the region. At a recent meeting at the AAAS, the Israeli Director of Friends of the Earth organization stated the stringent necessity for enforced treaties that clearly stipulate quotas and rules for shared watersheds in the region, to avoid future conflicts. (November 2002) Ref.: 1078

*World Water Week Warns of Wars over Water*

Scientists at the World Water Week conference held in Stockholm, August 16–20, 2004, have stated that the risk of wars being fought over water is rising because of explosive global population growth and widespread complacency. A report prepared by the International Water Management Institute extrapolated present water consumption to a point of conflict over water. The conference called for increased water infrastructure investments. Water tables are falling on all continents. About 40% of humanity lives in the 260 major international water basins shared by more than two countries. According to the recently released joint WHO-UNICEF report, more than 1 billion people drink unsafe water and over 2.6 billion (40% of the world's population) have no access to basic sanitation. (August 2004) Ref. 1079

*Tensions Among Ten Nations May Change Nile Water Usage Treaty*

A committee of representatives from ten African countries bordering the Nile River met in Uganda on 8 March 2004 to decide how they can best share the river. This meeting was a follow-up to one held in Ethiopia last December, during which the committee was set up by the Nile Basin Initiative (NBI). The NBI, based in Entebbe, Uganda, is an intergovernmental organization formed in 1999 to help the countries cooperate in the management and use of the Nile River. Most of these countries have called for the abolishment of the 1929 treaty that prohibits any country from using the Nile in a way that would reduce the water supply of Egypt or Sudan. This effectively prohibits the other countries from using the waters in large-scale projects such as irrigation and hydroelectric power production. As a result, tensions in the region are increasing. The treaty is seen as preventing development. [See also *African Water Issues* in the Millennium Project, April 2003 Environmental Security monthly report.] (March 2004) Ref.1080

The Cooperative Framework Agreement for water-sharing by the ten **Nile basin** countries was postponed for at least another six months. It is mainly opposed by Egypt, which doesn't want to renounce privileges given by previous agreements. Because of increased economic development in the region and the consequences of climate change, the Nile's flow is likely to decrease; hence, a Nile accord could be essential for preventing further escalation of disputes in an already vulnerable region. The ten Nile countries are: Burundi, the Democratic Republic of Congo, Egypt, Eritrea, Ethiopia, Kenya, Rwanda, Sudan, Tanzania, and Uganda. [Related items: *Water Scarcity* in February 2007 and several climate change-related items in previous environmental security reports.] (August 2009) Ref. 1081

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In central **Kenya**, Kikuyu and Maasai tribal fighters clashed over scarce water supplies, killing at least 14 people in two days. Thousands fled the fighting site, some were injured, and dozens of houses were burned. Although officials stopped the fight, tensions remained high.

**India and Pakistan** talks over the Baglihar hydropower dam on the Chenab River failed. Pakistan is objecting to the construction of the dam that would affect the flow of the Chenab into its territory, and contravenes a 1960 water-sharing treaty negotiated by the World Bank. The long-running dispute threatens to cause another setback to an already fragile peace process. (January 2005) Ref. 1083

At a recent regional meeting, **Bangladesh and Nepal** continued to object to **India's** plans to divert water from 37 rivers to its drought-prone areas by building reservoirs, dams, and canals. Bangladesh is claiming the plan would reduce its water levels, threaten the livelihoods of millions of people, turn parts of Bangladesh into desert, and damage the impoverished country's fishing and farming sectors. Nepal is also claiming the project would cause unseasonable flooding in Nepal, where most of the rivers flowing through India and Bangladesh originate. As with the simmering Indian-Pakistani water situation, this water diversion is a potential trigger for armed conflict. Although India's new government has seemed willing to discuss the issue, the fact remains that India has a long-term water scarcity problem that it must somehow address. (August 2004) Ref. 1084

*Indian Water Diversion from 37 Himalayan rivers to be completed by 2016 affects neighboring Bangladesh, Nepal, and Bhutan, who depend upon these rivers for 85% of their drinking water*  
India has been planning to divert water from 37 Himalayan rivers to drier areas of the country. A report on this irrigation scheme is due by 2006, with construction to commence shortly thereafter and be completed by 2016. However, diversion of these rivers affects neighboring Bangladesh, Nepal, and Bhutan, who depend upon these rivers for 85% of their drinking water. Flooding

during the monsoon season is likely to increase as a result of this diversion. Salinity would affect agricultural lands. The mangrove forests of the Bangladeshi deltas, which are a World Heritage site, would suffer from the lack of fresh water influx. Bangladesh is protesting through diplomatic channels. About 40% of humanity lives in the 260 major international water basins shared by two or more countries; hence, one can expect an increasing need for bi- and multi-lateral treaties to prevent conflict. (August-September 2003) Ref. 1085

#### *Asia's Water Security in Jeopardy*

*The Fall of Water* report assesses the situation of Asia's mountain areas, including the Himalayas. It warns that rapid increase in infrastructure, overgrazing, and deforestation, are accelerating threats from highland glaciers shrinking, raising concerns related to the region's future water supplies, flooding, and drought. The report notes that presently about 50% of Asia's mountain region is affected by infrastructure development, which by 2030 could rise to over 70% if current practices continue unrestricted. Similarly, highland glaciers are shrinking by 7% annually, which means that by 2050, about 64% of China's glaciers would have vanished. The report argues that unsustainable local development and climate change accelerated by fossil fuel burning are likely to aggravate the problems. It points out that without fast implementation of sound environmental management policies for sustainable development, water security of about half the world's population could be in serious jeopardy. The outcomes are the results of collaborative work of UNEP, IUCN, Chinese Academy of Sciences, International Centre for Integrated Mountain Development (ICIMOD), and the Netherlands Environmental Assessment Agency. The report was released in preamble to the 2005 World Summit of mid-September. (September 2005) Ref. 1086

#### *China River Basin Issues*

Promoting Sustainable River Basin Governance—Crafting Japan-U.S. Water Partnerships in China, a publication by the Woodrow Wilson Center's China Environment Forum and Japan Institute of Developing Economies, is the result of cooperation between Chinese, U.S., and Japanese water experts on improving Chinese river basin management. The report explores areas of collaboration between the three countries on three central issues: (1) river basin management institutions, (2) financing, and (3) public participation.

Meanwhile, the lower Min River, which is one of the Yangtze's major tributaries, is essentially dry as a result of dams built in its upper section; consequently, the downstream communities do not get water for domestic use and irrigation for millions of hectares of farmland, causing food and water shortage in a heavily populated area. (April 2005) Ref. 1087

#### *African Water Issues*

IRIN (Integrated Regional Information Network), the UN Humanitarian news agency, issued a Web special on African water issues. It includes case stories on the Nile, regional cooperation between South Africa and Swaziland, and the saving of Lake Chad. (April 2003) Ref.: 1088

#### **International agreements are needed for 158 International Freshwater Basins**

Several water security-related reports were released during the largest gathering of water scientists and policy experts at the Third World Water Forum held March 16-23 in Kyoto, Osaka and Shiga, Japan. The "Water for People, Water for Life" report discusses looming water wars and the "Atlas of International Freshwater Agreements" surveyed water-sharing contracts among

nations and found that of 263 international freshwater basins, 158 lack cooperative agreements. UNESCO announced the creation of a “Water Cooperation Facility” to help countries prevent and resolve freshwater disputes.

Mr. Toepfer of UNEP suggested that international organizations “... should perhaps act as the water equivalent of marriage guidance counselors, amicably resolving differences between countries and communities who may be straying apart, or act as go-between for those who are flirting with cooperation but are too coy, too unsure, maybe even too distrustful about how to proceed. So we must hone our skills and develop our capabilities in what will be the increasingly important field of hydro-diplomacy.” (March 2003) Ref.: 1089

### **Global Plan to Address Freshwater Supplies Negotiated**

In preparation for the 5th World Water Forum to be held in March 2009 in Istanbul, senior officials from more than 60 countries met in Rome, January 21-23, to negotiate a global plan of action for addressing issues of freshwater resources and improving water governance. Industrial and agricultural use, growing population, pollution of ground and underground reservoirs, and effects of climate change all reduce the amount of clean water available and threaten water security. The Rome meeting is expected to negotiate a Ministerial Statement to be adopted by the Ministerial Conference at the World Water Forum. [The outcomes of the meeting were not available at the time of this writing.] Meanwhile, addressing the meeting “Managing our Future Water Needs” held in Davos, UN Secretary-General Ban Ki-moon underlined, “The problem is that we have no coordinated global management authority in the UN system or the world at large. There is no overall responsibility, accountability or vision for how to address the related problems of climate change, agricultural stress and water technology.” [See also *Unless Water Management Improves, Conflicts over Water Are Inevitable* in August 2006 and other related items in previous environmental security reports.] (January 2009) Ref. 1090

### **Water Poverty Index**

The newly developed Water Poverty Index is designed to help policy-makers to identify where problems exist and the appropriate measures to deal with their causes. The index, compound of five vectors - resource, access, use, capacity and environment - highlights that it is not the quantity of available water resources that counts the most, but the effectiveness of the use of those resources. (December 2002) Ref.: 1091

### **Tools for Improving Water, Sanitation and Hygiene**

*A Review of Decision-Making Support Tools in the Water, Sanitation, and Hygiene Sector*, a study directed by Peter H. Gleick at the Pacific Institute and by Geoffrey D. Dabelko at the Wilson Center's Environmental Change and Security Program, evaluates 120 existing resources in the sector, analyses the world's situation on access to water and sanitation, and assesses existing technologies and methodologies. The report recommends development of a set of tools to help decision-makers with infrastructure development, available technologies, and possible approaches. The tools would also outline specific needs of geographic locations, evaluate community particularities, and use case studies to demonstrate available technologies. (May 2008) Ref. 1092

### **Improved Database for Stormwater Best Management Practices**

Improvements in the International Stormwater BMP Database ([www.bmpdatabase.org](http://www.bmpdatabase.org)) were

recently announced. They will ease BMP searches, data collection and uploading, and access to BMP performance analyses. The changes include more data, new data analysis results, easier Web site navigation, and simplified data entry. (May 2008) Ref. 1093

### **Central Asian Water Security Tensions Continue**

The Central Asian water summit held on April 28 at Almaty, Kazakhstan, gathered the Presidents of all five Central Asian states (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan) to discuss activities of the International Fund for Saving the Aral Sea. When the contentious cross-border water sharing issues came up, tensions arose between upstream Kyrgyzstan and Tajikistan, who want to build power stations to address energy shortages in their countries, and downstream Kazakhstan, Turkmenistan, and Uzbekistan, which need large quantities of water for their economic activities. No agreement was reached and the final statement mentions only the issues related to the decline of the Aral Sea. Since the Soviet Union's cross-border water distribution system fell apart, the lack of a regional transboundary water management agreement became the most serious Central Asian security concern. Therefore, the international community should intensify such efforts as those started at the Fifth Ministerial Conference, "Environment for Europe", held in Kiev in 2003 to develop a Central Asian Initiative on environment, water and security. (April 2009) Ref. 1094

### **Project to Address the Aral Sea Disaster**

The Government of Uzbekistan and the World Bank have instituted a Drainage, Irrigation and Wetlands Improvement Project, described as "the first meaningful intervention in the Aral Sea Basin to break a vicious cycle of high water applications, water logging and secondary soil salinisation", said Masood Ahmad, head of the World Bank team designing the project. According to a World Bank statement, the agreement hopes to improve the local economy, and the water quality of the Amu Darya River by safe disposal of drainage effluent and enhancing the quality of wetlands in the Amu Darya delta. The team leader added that the project would begin to address the problem by substantially improving drainage conditions and significantly improving water use efficiency in the irrigation sector. (February 2005) Ref. 1095

### **EC Proposal for Water Pricing**

The European Commission released a green paper proposing a water framework directive to deal with possible future water scarcity and assure sustainable water use in Europe. Feedback on specific proposals for pricing water on the "user pays" principle is expected from both the European Council and the Parliament. The EC warns that water shortage and drought might become the norm in Europe by 2070. (July 2007) Ref. 1096

### **Addressing Potential Business-related Water Scarcity Issues**

*Water Scarcity & Climate Change: Growing Risks for Businesses & Investors* report by the Pacific Institute at the request of Ceres (national network of investors, environmental organizations and other public interest groups working with companies and investors to address sustainability challenges such as global climate change) addresses the impact of climate change and business practices on water and the potential consequences of water scarcity to businesses. The report also explores the role of investment strategies to mitigate harmful impacts. Using information from over 100 companies, the report identifies water-related risks specific to eight key sectors such as energy, mining, and computer technology, and offers a framework to

calculate and address industries' "water footprints". (March 2009) Ref. 1097

### **Consultative Group on International Agricultural Research (CGIAR) initiates Program to Fight Water Shortages**

The Consultative Group on International Agricultural Research (CGIAR) plans to launch a \$100 million five-year initiative in 15 developing countries to fight water shortages. Together with the International Food Policy Research Institute (IFPRI), they have produced the Global Water Outlook to 2025: Averting an Impending Crisis, which projects that by 2025 water scarcity will cause annual global losses of 350 million metric tons of food production - more than the annual grain harvest of the US. (November 2002) Ref.1098

### **Singapore's New Institute of Water Policy**

Singapore established an Institute of Water Policy with a US\$5.5 million 5-year budget to research Asia's water problems, address water security, and consult to governments and international organizations. (June 2008) Ref.1099

### **European Water Pollutants List Delayed One Year**

The European Water Pollutants List will be published at the end of the year (one year delay) together with the package of new water quality objectives and emission standards intended to implement the law. The delay is necessary to determine whether the substances under review stay listed as priority substances -- remain in circulation under certain restrictions -- or will be declared priority hazardous substances -- to be phased out entirely within 20 years. (January 2003) Ref.: 1100

### **Decade *Water for Life* Launched**

The International Decade for Action "Water for Life" was officially launched on World Water Day, March 22, 2005. This is intended to focus world attention on improving policies and strategies to achieve the international commitments and targets concerning water-related issues by 2015. The actual debates and policy recommendation issuance are expected to occur in April 2005 at the 13th session of the UN Commission on Sustainable Development. (March 2005) Ref. 1101

### **United Nations International Decade "Water for Life", 2005-2015, will increase attention to the implementation of water projects around the world**

The 1.2 billion people without access to safe drinking water, and the 2.4 billion people without adequate sanitation pose a major long-range environmental security threat. The UN International Decade for Action, "Water for Life", 2005-2015 will increase attention to the implementation of water projects around the world and calls on the UN Secretary-General and others to increase collaboration to achieve the UN Millennium Development Goal #2 on Water. (February 2004) Ref.1102

### **International Year of Freshwater**

Designation of 2003 as the International Year of Freshwater has triggered many events around the world to increase more responsible water use and conservation. The World Water Development Report was launched at the Third World Water Forum (March) highlighted by the World Water Day, March 22, 2003. The report is the first UN system-wide effort to monitor progress in all areas of water from health to ecosystem and governance. "Future of Water" was

the theme of the 21st Century Talks held at UNESCO Headquarters on January 28, 2003. (January 2003) Ref. 1103

### **Reports on Water-related Issues**

The Environment, Development, and Sustainable Peace Initiative, a joint project of Adelphi Research, the WWICS Environmental Change and Security Project, and the National University of Costa Rica, has published in March 2005 two papers analyzing the role of water for security: *Regional Water Cooperation as Confidence Building: Water Management as a Strategy for Peace*, by Aaron T. Wolf. The report analyzes the shift of the “environmental security” concept from a presumed causal relationship between environmental stress and violent conflict to a more intricate framework of “human security” that considers a complex set of relationships between environment and society. Water has been identified as the most critical factor in many areas— from political to economic, social, and environmental. While looking at ‘Indicators of Tension,’ the paper also suggests some opportunities and types of policy recommendations to mitigate possible water-related disputes: the new technologies for water negotiation and management (including modeling and monitoring tools); watershed commissions developed for those basins that do not have them, and strengthened for those that do; improved water-related funding assistance; and better involvement and focus of civil society, private industry and research organizations.

*Environmental Conflicts and Regional Cooperation in the Lempa River Basin: The Role of Central America’s Plan Trifinio*, by Alexander López. Assessing current environmental trends in the Central American context, the report focuses on the region’s international river basins and uses the Lempa example to analyze areas of conflict and cooperation; factors that could reduce conflict potential; and the effectiveness of the Trifinio Plan and its role in facilitating post-conflict dialogue and confidence building among the three signatory countries: Honduras, Guatemala, and El Salvador.

The U.S. National Academies have created the Water Information Center, a new Web site that provides free access to more than 100 Academies reports on water-related issues <http://water.nationalacademies.org/> (March 2005)

*Water, Conflict, and Cooperation*, a “policy brief” featured in the latest Woodrow Wilson Center Environmental Change and Security Project Report (10), argues that water scarcity issues are both a threat and an opportunity for the UN system. Effective UN water policies and management could enhance cooperation and reduce the potential for conflict. The authors suggest the creation of a “one-stop shop” – pooling the many UN organizations that work on water issues – so that nations and organizations would get the best synergies of personnel, technologies, and advice to improve their water improvement systems.

*Making Water a Part of Economic Development: The Economic Benefits of Improved Water Management and Services*, by the Stockholm International Water Institute and WHO, argues that efficient water management for human security could accelerate economic growth, sustainable development, and improving health. The report demonstrates that economic benefits far outweigh the costs and suggests three major investment priorities: access to safe water and basic sanitation; protection of the integrity of aquatic and water-related terrestrial ecosystems; and water-resource management. The report was released at the UN headquarters in conjunction with the 13th Meeting of the Commission on Sustainable Development (CSD). (April 2005) Ref. 1104



## Water Forums

### Forums Discuss Water-Related Security Issues

The conference Water for Peace – Peace for Water: Lessons from the Past and Current Challenges, jointly organized by the UNESCO International Hydrological Programme (IHP), the Chirac Foundation, and the French Agency for Development, addressed two issues: transboundary water and cooperation, and access to water in fragile states. The outcomes [to be available at <http://www.fondationchirac.eu/en/water-for-peace-and-peace-for-water-november-13/>] will be considered in the Political Process of the Fifth World Water Forum, to be held in Istanbul, March 15-22, 2009.

The International Conference on Water Resources and Arid Environment and the First Arab Water Forum took place in Riyadh, Saudi Arabia, November 16-19, 2008 and addressed challenges related to water resources in the area and strategies to address them, including new technologies and Arab water policies for development and water crisis management. In his opening address, Prince Khalid bin Sultan bin Abdulaziz warned of possible terrorism targeting water resources and called for a water summit similar to the world economic summits. [See also *Unless Water Management Improves, Conflicts over Water Are Inevitable* in August 2006 and other related items in previous environmental security reports.] (November 2008) Ref. 1105]

### UNEP's Governing Council Focuses on Water and Sanitation

A recent international gathering of environment ministers focused on the need to boost water and sanitation services for over two billion people in human settlements. The meeting also showcased water saving and water supply technologies that can play a key role in meeting the Millennium Development Goals and the World Summit on Sustainable Development's Plan of Implementation. These call for governments to halve, by 2015, the proportion of people without access to safe and sufficient water and basic sanitation supplies. Ministers and officials from over 150 nations also discussed the need to boost the science base of UNEP in areas including environment and conflict and environment and poverty. (April 2004) Ref. 1106

### 4<sup>th</sup> World Water Forum

“Lack of water or its poor quality, last year [2005], caused 10 times more deaths than all the wars waged on the planet together,” noted Loïc Fauchon, President of the World Water Council, in addressing the 4th World Water Forum held March 16-22 in Mexico City. About 20,000 participants from 141 countries participated. There were over 200 sessions and 1,600 local actions were presented. The dominating discussions were on: universal access to clean water—without border constraints; recognition of water as a fundamental human right and key to development; access to water-related technologies; and improved water management and capacity building. At the Ministerial Conference concluding the Forum, high-level officials adopted the Ministerial Declaration, calling for intensified national and international action on water and sanitation issues by including water and sanitation as priorities in national processes, and support for integrated water resources management.

Some reports produced in conjunction with the WWF:

The second edition of the World Water Development Report, *Water: A Shared Responsibility*, was launched on World Water Day, which's theme this year was “Water and Culture,” stressing

the role of local practices for good water management. The comprehensive triennial assessment of freshwater resources addresses the consequences of climate change on water challenges, health and development implications of water scarcity and, emphasizing that water is shared responsibility, the report recommends improved water governance at all levels, including institutional capacity, legal frameworks, and resource distribution.

Other studies launched around the Forum also underline implications of poor fresh water management ranging from access and administration, to pollution and overexploitation. *Challenges to International Waters: Regional Assessments in a Global Perspective*, report by UNEP, addresses mainly water shortages, overfishing, and pollution, and their implications for health, food security, and development, making several recommendations to reverse the damage and declines. It warns that unless improved water management practices, many of the problems are expected to “increase in severity by 2020”.

Access to clean water and sanitation might be worsened by high rate of urbanization, mainly in small urban centers, warns *Meeting the development goals in small urban centres?* report by UN-HABITAT. Considering that by 2015, more than half of world population will live in urban areas, and the urban population of Asia, Africa and Latin America is expected to reach 4 billion within the next three decades, increased efforts are necessary to develop socially and environmentally sustainable cities.

*Changes in Surface Water Supply Across Africa with Predicted Climate Change*, paper by Africa Earth Observatory Network, University of Cape Town, is a detailed assessment of the consequences of climate change on the water situation in Africa. It warns that without immediate implementation of adequate water management systems, by the end of the century a quarter of the continent would suffer of lack of surface water, and the access to clean water will continue to worsen with half of the African population expected to live in urban areas by 2030. Presently, it is estimated that out the approximately 800 million Africans, some 300 million lack access to safe drinking water, and 313 million do not have access to basic sanitation.(March 2006)

Ref.1107

#### UN Conference ‘Water for Food and Ecosystems’

The recent UN conference ‘Water for Food and Ecosystems,’ attended by 26 ministers and more than 600 delegates from 140 countries, emphasized the need for “a true valuation of water” and called for better strategies for balancing water use between agriculture and environment. It called for better management of water, taking into account socio-economic and environmental concerns, basic human rights, and cultural factors, and adopted a list of actions to improve the efficient use of water, highlighting the importance of public/private partnerships in achieving the goals. Water policy and strategy issues were also discussed at the 23rd session of the UNEP Governing Council/Global Ministerial Environment Forum held 21-25 February 2005, at Nairobi, Kenya. (February 2005) Ref. 1108

#### International Freshwater Forum calls for better watersheds management

In his address to the International Freshwater Forum held at the end of August 2003 in Dushanbe, Tajikistan, UN Secretary-General, Kofi Annan, emphasized that delay in providing safe water results in great risks and called for better regional watersheds management. The same idea was reaffirmed in the message of OSCE Secretary General, Jan Kubis, who also indicated that the OSCE is directly engaged in a number of projects that aim at promoting dialogue and co-

operation on sustainable water management “to enhancing early warning and conflict prevention mechanisms and strengthen processes of confidence-building and co-operation throughout the OSCE area.” The Government of Tajikistan was hosting the forum under the broader theme of “Water, Environment and Security”.

At a side-event, OSCE, the United Nations Development Programme (UNDP) and UNEP presented the joint OSCE/UNDP/UNEP Initiative on Environment and Security (ENVSEC). Phase one of the Initiative identified the key problems affecting the environment and human health and posing an immediate security risk in the region; “the next step will be to map out and implement common environmental priorities and opportunities for strengthening co-operation,” said Frits Schlingemann, Director and Regional Representative, UNEP.

Note: The “World Bank's Board of Directors has recently endorsed a new Water Resources Strategy as well as a new Infrastructure Action Plan in response to strong client-country demand for infrastructure.” (Ian Johnson, Vice President of Environmentally and Socially Sustainable Development; and Nemat Talaat Shafik, Vice President) The United Nations University (UNU) and Tokyo University of Agriculture and Technology (TUAT) will host in October an international symposium on “Public Participation and Governance in Water Resources Management.” (August-September 2003) Ref. 1109

#### Water, Sanitation, Human Settlements next focus for UN Commission on Sustainable Development

The UN Commission on Sustainable Development (CSD) will focus on sanitation and human settlements during 2004 and 2005 and how to halve the proportion of people without access to safe drinking water and basic sanitation by 2015. (May 2003) Ref.: 1110

#### Water Forum Held in Egypt

The UN Economic and Social Commission for Western Asia (ESCWA) held a workshop on mapping methodology, the first of a series of activities to improve water management in Western Asia. The workshop, hosted in cooperation with Egyptian government ministries and UNESCO, was a part of establishing the Arab Integrated Water Resources Management Network (AWARENET). The network links training and research institutes and encourages collaboration on improving and disseminating knowledge on concepts of integrated water resources management in the ESCWA region. Participants learned mapping methodology and developed an AWARENET plan of action that details activities, timetable, management structure, and a fund raising strategy. (May 2003) Ref.: 1111

#### Greece Hosted Transboundary Water Issues Conference

The Government of Greece and the World Bank jointly hosted an international conference -- Sustainable Development for Lasting Peace: Shared Water, Common Problems, Shared Knowledge in Athens, Greece on May 6-7, 2003. The conference discussed transboundary water issues in southeastern Europe and the Mediterranean, focusing on sustainable management of water resources to promote responsible growth, stability and peace. (May 2003) Ref.: 1112

## **HEALTH**

### **Climate Change Consequences, Trends, and Actions**

The International Livestock Research Institute (ILRI), a member of the Consultative Group on International Agricultural Research (CGIAR), has announced the launch of a \$4.4 million research project to build a climate model that can predict outbreaks of infectious disease in Africa. The research is being undertaken in Ghana, Malawi and Senegal, ILRI working with 11 partners and researchers to integrate data from climate modeling and disease forecasting systems in order to develop a capacity to predict the likelihood of epidemics six months in advance of an outbreak. (May 2010) Ref. 1114

To celebrate World Health Day on April 7<sup>th</sup>, WHO and the Commonwealth Secretariat released publications that underline the linkages between urban health and climate change. “Why Urban Health Matters” notes that urban areas concentrate both emitters of greenhouse gases and people at risk from climate change impacts such as heat waves, water scarcity, increasing levels of air pollution, or rising sea levels. A discussion paper by the Commonwealth Secretariat, “The State of the Cities: Why, and how, the Commonwealth must address the challenge of sustainable urbanization”, stresses that climate change and slum-based poverty are exacerbated by today’s urban growth. (April 2010) Ref. 1115

The WHO and UNDP has launched the first global project on public health adaptation to climate change. It involves a series of pilot projects that will seek to increase the adaptive capacity of national health system institutions. The projects will be undertaken by Ministries of Health and other relevant national partners in Barbados, Bhutan, China, Fiji, Kenya, Jordan and Uzbekistan, with varying foci. The project in China, for example, will focus on strengthening early warning and response systems to extreme heat in urban settings. (March 2010) Ref. 1116

WHO has published a draft discussion paper, “Gender, climate change and health” which aims to provide a framework for gender-differentiated health risk assessment and adaptation/mitigation actions in relation to climate change. It offers information on the health risks for women and men through the perspectives of direct and indirect consequences, and the possible interactions and specificities of biological, economic, and social risk factors in determining these impacts, including migration and displacement, shifts in livelihood as responses to climate change, and gaps in understanding needs. (February 2010) Ref. 1117

The WHO report “Protecting Health from Climate Change: Connecting Science, Policy and People” provides an update of the scientific evidence on health risks caused by climate change. It outlines necessary action to protect health from negative impacts of climate change and describes a number of effective interventions that can save lives in the present and reduce vulnerability in the future. In addition, the report singles out several policy options in other sectors, such as transport and energy production, that could simultaneously improve health and reduce greenhouse gas emissions. (January 2010) Ref. 1118

Two reports by the World Health Organization, “Global Health Risks” and “Protecting health from climate change: global research priorities,” assess the potential health implications related to climate change, with detailed global and regional estimates, and making some policy recommendations. Acknowledging that only some of the many potential effects of climate change are quantifiable, it underlines increased deaths from thermal extremes and weather

disasters, vector-borne diseases, a higher incidence of food-related and waterborne infections, photochemical air pollutants and conflict over depleted natural resources. The WHO fact file, “10 Facts on Children’s Environmental Health,” summarizes environment-related causes and conditions of the nearly three million annual deaths of children under five years old, underlying the increased risk of children of injuries and death from floods and extreme temperatures, asthma and respiratory diseases due to air pollution, and diarrheal diseases, malaria, and malnutrition. (December 2009) Ref. 1119

The World Health Organization is increasingly publishing articles that highlight the link between environmental conditions and health, such as the need to examine the spatial distribution of vector-borne diseases in relation to climate change, and design strategies that would help mitigate climate change while also improving human health. The *Feeling the Heat* report by Save the Children notes that climate change is the 21<sup>st</sup> century’s biggest global health threat to children, with impacts including: over 900 million children in the next generation to be affected by water shortages; 160 million more children to be at risk of catching malaria; and 175 million children a year to suffer the consequences of natural disasters such as cyclones, droughts, and floods by 2030. It warns that 250,000 children could die next year due to climate change (a figure that could reach 1 million by 2030). (November 2009) Ref. 1120

*Health Problems Heat Up: Climate Change and the Public’s Health* by the Trust for America’s Health warns that climate change will make Americans more vulnerable to diseases, disasters, and heat waves. According to the report, only five states have published a strategic climate change plan that includes a public health response, including planning for health challenges and emergencies expected to develop from natural disasters, pollution, and infectious diseases as temperatures and sea levels rise. The report includes several recommendations related to setting national guidelines and measures for core public health functions and funding for climate change planning and response, and special efforts to address the impact of climate change on at-risk and vulnerable communities. (October 2009) Ref. 1121

WHO notes that while 37 of the least developed countries admit the link between population growth and climate change, only six of them identify family planning as part of their adaptation strategy. A study of the first 40 National Adaptation Programmes of Action (NAPAs) shows that only 7% of 448 projects across the 40 NAPAs were in the health sector. At the same time, *Lancet* notes that over 200 million women worldwide lack access to contraceptives. Remedying this, could prevent 76 million unintended pregnancies a year, reducing demographic pressure on the environment. A study by the London School of Economics estimates that \$7 spent on family planning would reduce carbon emissions by one ton, while low carbon technologies cost an estimated \$32 per ton reduced (\$24 for wind power, \$51 for solar, \$57-83 for coal plants with carbon capture and storage, \$92 for plug-in hybrid vehicles, and \$131 for electric vehicles).

Researchers warn of increased incidence of dengue fever, which sickens over 50 million and kills 24,000 worldwide every year. The main causes are population growth, increased traveling, and global warming disrupting the natural cold temperature processes that limit the population of dengue carrying mosquitoes. (September 2009) Ref. 1122

Climate change is the biggest global health threat of the 21<sup>st</sup> century, warns Professor Anthony Costello, co-author of the article “Managing the health effects of climate change”

published in *The Lancet*. The article outlines the global health implications of a range of climate change projections from the optimistic average global temperature rise of 2°C to the catastrophic 6°C, considering a wide range of pathways through which climate change could impact human health. Professor Costello proposes three action points emerging from this report: add health experts to the mitigation debate; address the massive inequality in health systems around the world; and develop win-win situations so that mitigation and adaptation to climate change strategies also improve human health and well-being. (June 2009) Ref. 1123

At the 62<sup>nd</sup> World Health Assembly, held May 18-22, 2009, in Geneva, Switzerland, member States unanimously agreed to the resolution and work plan for scaling up the WHO's technical assistance to countries for assessing and addressing the implications of climate change for health and health systems. The work plan is organized around four objectives: advocacy and awareness raising; engagement in partnerships with other UN organizations and sectors to ensure that health issues are included in adaptation and mitigation policies; supporting the generation of scientific evidence; and strengthening health systems to cope with the threats posed by climate change.

The UNFCCC Secretariat posted the submission by WHO, which will be examined in the 6<sup>th</sup> session of the Ad Hoc Groups on Long-Term Cooperative Action in Bonn, Germany, to be held June 1-12, 2009. The paper, "Protecting the health of vulnerable people from the humanitarian consequences of climate change and climate related disasters" is based on the recognition that climate change mitigation and adaptation are important for protecting the health of vulnerable populations and aims to document the range of risks that climate change poses to human health associated with humanitarian emergencies.

WHO also launched a report, "Protecting Health from Climate Change: Global research priorities," during the meeting of Commonwealth Health Ministers held in Geneva, Switzerland. The report, based on a global e-consultation and meeting of over 70 leading experts, proposes a series of recommendations on the most important directions for future work in five research areas: assessing risks, identifying the most effective interventions, guiding health-promoting mitigation and adaptation decisions in other sectors, improving decision-support, and estimating the costs of protecting health from climate change. (May 2009) Ref. 1124

At the ceremony on World Health Day, April 7, Michel Jerraud, Secretary-General of WMO, noted the need for early warning systems for climate hazards. Margaret Chan, Director-General of WHO, discussed the need for long-term planning, especially for those areas that will become disaster-prone due to climate change, and also made connections between climate change and needs to ensure disaster-related health care. (April 2009) Ref. 1125

Changes in rainfall patterns and rapid urbanization increase dengue fever outbreaks in Asian countries such as Indonesia, said an official of the World Health Organization Southeast Asia.

A study published in the journal *Environmental Health Perspectives* notes that higher temperatures, humidity and rainfall associated with climate change have led to increased outbreaks of West Nile Virus infections across the United States in recent years. The authors warn that the pattern will only get worse in coming decades with increased economic and health burdens.

At the international scientific congress "Climate Change: Global Risks, Challenges and Decisions," from 10-12 March 2009, in Copenhagen, Denmark, WHO noted the uneven distribution of health impacts of climate change globally, identifying populations in small island

developing States, mountainous regions, large urban areas, coastal areas, and areas that lack access to water among the most vulnerable. WHO estimates that around 150,000 deaths (85% of them young children) occur in low-income countries each year due to malnutrition, diarrhea, malaria, and flooding as effects of climate change alone.

On World Water Day, March 22nd, UNEP highlighted the potential benefits of investing in the world's freshwaters, including the potential benefits to the global economic recovery and to accelerating a response to climate change. According to UNEP, the market for supply, sanitation, and water efficiency is expected to be nearly US\$660 billion by 2020, and that global economic benefits of US\$38 billion annually could be reaped from investing US\$15 billion annually in halving by 2015 the number of people without sustainable access to safe water and basic sanitation. (March 2009) Ref. 1126

WHO approved a five-year work plan on climate change and health. The work plan aims to enhance capacity for monitoring and assessment. It will also seek strategies and activities that can protect health, especially that of the most vulnerable; and promote the sharing of knowledge with the following four objectives: advocacy and awareness raising; partnership building with other UN organizations and sectors; promotion and support for the generation of scientific evidence; and strengthening health systems to contend with climate impacts.

Jointly with the EU, WHO will conduct assessments of health security and crisis management to enhance the adaptive capacity of EU countries to manage health crises. In addition to topics such as chemical safety and disaster preparedness planning and response, country reports include sections on climate change. Assessments are underway in Armenia, Azerbaijan, Belarus, Georgia, Israel, Moldova, and Ukraine. Climate change will be one of the main topics on the agenda at the Fifth Ministerial Conference on Environment and Health, scheduled for 2010 in Parma, Italy. The agenda includes children's environmental health and climate impacts related to inequality, gender and stakeholder participation, among others. WHO and EU are also expected to propose a European strategy on health and climate change that follows the 2008 World Health Assembly's Resolution 61.19 (call for protecting health from climate change), as well as recommendations that were developed during several European meetings held in 2007-2008 on the topic. (February 2009) Ref. 1127

### **UNEP Report Warns of Increasing Changes in Infectious Disease Patterns due to Environmental Encroachments**

The United Nations Environmental Programme (UNEP)'s *Global Environment Outlook Year Book for 2004/2005* warns that the loss of forests, increasing construction of roads and dams, urban growth, agricultural expansion, mining, and pollution of coastal waters are causing major rises in the incidence of infectious diseases, including the appearance in humans of diseases such as Nipah, which had previously been found only in animals. (February 2005) Ref. 1128

### **World Health Organization: Stress Environmental Impact on Human Health**

The World Health Organization published a report showing correlation between disease and environmental factors for the first time at country levels. The analysis reveals that reducing environmental risks including pollution, unsafe water, ultraviolet radiation, and climate change could save 13 million lives per year. WHO estimates that in some countries, more than one third of the disease burden could be prevented through environmental improvements. Each country profile provide an overview of the health risks caused by the specific environmental situation of

the country, thus helping policy making in setting priorities for disease prevention. (June 2007) Ref. 1129

### **WHO Launched Website on Environmental Health in Emergencies**

The 'Environmental health in emergencies' website launched by the World Health Organization (WHO) provides information and resources for health management related to environmental disasters and emergency situations. Topics include: natural events, technological incidents, complex emergencies, prevention, preparedness and detection, and response and recovery. The subordinate web pages have links to websites and sources specific for different domains. WHO estimates that, in some countries, more than one third of the disease burden could be prevented through environmental improvements. [See also *World Health Organization: Stress Environmental Impact on Human Health* in June 2007 environmental security report.] (January 2007) Ref.1130

### **WHO Report 2007 Addresses Global Health Security Threats**

*The World Health Report 2007 - A safer future: global public health security in the 21st century* addresses for the first time health issues as security issues. It notes the increasing risk of disease outbreaks, epidemics, industrial accidents, natural disasters and other health emergencies, which could become threats to global public health security. The report explains the role of the International Health Regulations, which came into force this year, in helping countries' collaboration to identify and contain risks from outbreaks and other health hazards. The report points out pandemic influenza as the most feared threat to health security. (August 2007) Ref.1131

### **Environment and Human Health Integration**

*Integrating Environment and Human Health*, and *Climate, Poverty and Health: Time for Preventive Medicine* published by the National Council for Science and the Environment (NCSE) address the interconnection between human health and environmental components. The recommendations include: interdisciplinary approaches for better integration of environmental and health perspectives; improved communication between environmental and health communities, and between scientists and decision makers and the public; and improving priority setting in science. The NCSE activities in this area are continuing. (March 2008) Ref.1132

### **World Network of Regional CDC-like Organizations Proposed**

During the EU/US Symposium: Transatlantic Cooperation on Combating Bioterrorism, The idea of a world network of regional CDC-like organizations was proposed as a necessary element of combating the effects of bioterrorism. Initially a European CDC was proposed, but since a global system is really required, the conversation quickly moved to suggesting one for each region of the world. (November 2003) Ref.1133

### **CDC launches the National Environmental Public Health Tracking Network**

The National Environmental Public Health Tracking Network website launched by the Centers for Disease Control and Prevention (CDC) aims to bridge the gaps in investigating how environmental contaminants affect human health. Currently, information is centered on air and water quality, but more data will be added concerning hazardous waste sites (both federal- and state-designated sites), pesticide exposure, and climate change. (July 2009) Ref. 1134



**Global Health Security Initiative Upgrades Its Strategic Policy Process**

The eighth ministerial meeting of the Global Health Security Initiative reviewed the risks and threats of highest priority to global health security, such as chemical, biological, and radio-nuclear terrorism, and pandemic influenza and agreed on a strategy for addressing them. In that view, the group decided “to strengthen its role as a policy forum by identifying emerging issues and coordinating policy development processes to address chemical, biological and radio-nuclear threats” and to strengthen its network and communication capacities. The Global Health Security Initiative is an informal effort involving top health officials from Canada, France, Germany, Italy, Japan, Mexico, UK, U.S., and the E.U. [See also *Asian New Strategy to Improve Health and Environment* in August 2007, *Proposed Global Early Warning System for Monitoring Pandemics* in May 2007, and other related environmental security reports.] (November 2007) Ref.1135

**Proposed Global Early Warning System for Monitoring Pandemics**

Scientists propose a global early warning system to monitor possible pandemic outbreaks. A recent study led by Nathan Wolfe, professor of epidemiology at the University of California, Los Angeles, revealed that the “emergence of the major diseases of humanity is not a random process.” Understanding the patterns between origins of major infectious diseases in temperate and tropical countries and individuals exposed to wild or domestic animals might help prevent eventual migration to humans, as well as forecast and avoid eventual pandemics. Delegates to the 59th World Health Assembly also stressed the importance of rapid, worldwide sharing of knowledge on diseases, since “in a globalized world, health issues have an impact on the collective security of people around the world.” (May 2007) Ref. 1136

**A Community Guide to Environmental Health Available for Liaison Activities**

The Hesperian Foundation is making available *A Community Guide to Environmental Health*, a tool kit for communities working on environmental problems. According to the announcement, the new work “is a collection of best practices from communities worldwide that address both the immediate symptoms of environmental threats as well as the root causes of environmental problems” and “contains numerous easy to follow actions and educational activities, ranging from the simple to the more complex based on a community’s needs and resources.” (June 2008) Ref.1137

**WHO-sponsored pandemic flu task force holds first meeting in Geneva**

The Ad Hoc Influenza Pandemic Task Force held its first meeting to discuss best actions in case of an outbreak. The Task Force is providing independent risk assessments and advising WHO on possible measures to be taken. These could include rapid containment effort, warning governments of risks and accelerating vaccine production. The Task Force includes 21 experts and will function until June 15, 2007, when WHO's revised International Health Regulations come into effect. (October 2006) Ref.1138

**International Response to Contain Influenza A(H1N1) Outbreak**

The World Health Organization raised the level of influenza A(H1N1) alert to five on a one to six scale, meaning that it considers a pandemic highly probable. All countries are asked to activate their pandemic plans and be prepared to deal with emergency situations. The flu—a combination of swine, bird, and human viruses—started in Mexico and rapidly spread around the

world, with cases confirmed in 11 countries, as of the end of April. WHO flu expert Dr Keiji Fukuda said, "Containment is not a feasible operation." In response to the outbreak, WHO has applied the International Health Regulations 2005 that entered into force in 2007 for all member states. Some experts consider that the influenza A(H1N1) will test IHR 2005's efficiency and countries' compliance, as well as provide an opportunity for increased preparedness for eventual future acts of bioterrorism and expedite research for a vaccine that would protect against a larger spectrum of viruses. The Saint Louis University Center for Vaccine Development announced that the development of a universal flu vaccine is getting closer to reality. [See also *Global Pandemic Containment Efforts* in October 2006 environmental security report.] (April 2009) Ref. 1139

### **Global Influenza Pandemic Declared**

The World Health Organization raised the level of influenza A(H1N1) alert to Phase 6, which indicates that a global pandemic is underway and further spread of the virus is 'inevitable.' According to the latest figures from the WHO, there have been 263 deaths and nearly 60,000 cases in some 100 countries and territories. (June 2009) Ref. 1140

### **Avian Influenza**

#### Worries over Avian Influenza Pandemic Increase

Lee Jong-wook, the head of the World Health Organization, has predicted that the avian flu virus will mutate so as to make the disease transmissible from human to human, and says that the world has no time to waste to stop it becoming a pandemic. "The pandemic is likely to be like the seasonal influenza, which is much more infectious than the SARS virus," said Dr Hitoshi Oshitani, who ran the battle against SARS and now leads the fight against avian flu in Asia. The United States is working to rally states behind a new U.S. plan to fight the disease, and Canada will host a major international conference in October to discuss how ready the world is to combat a likely pandemic. Concerns are increasing even more as strains of the virus in Asia seem to be becoming resistant to amantadine, a widely used drug for human cases, possibly because farmers are giving it as a preventative to poultry. It has also been shown that strains less dangerous than H5N1 can be transmitted from birds to people. An important achievement is that scientists in Singapore have developed a test kit that can detect the gene specific to the H5N1 strain (so both in animals and humans) within four hours, compared to the several days that it takes with present lab tests. This might help a lot in controlling the spread of the virus. [See also *Avian Influenza New Developments* in April 2005 environmental security report.] (September 2005) Ref. 1142

#### Bird Flu Spreads Increasing Threats of a Human Pandemic

Bird flu is spreading around the world with new cases confirmed in Europe and—as feared—in Africa, where poverty and disease, and humans' intimate proximity to poultry increases the potential of a human pandemic. Scientists argue that since a global flu pandemic cannot be avoided solely by containing an outbreak at its source, plans should focus on how to limit the chance of pandemic-forming viruses emerging in the first place. There are also debates that migrating wild birds might not be the only cause of the worldwide spread. Dr. David Nabarro, the UN System Coordinator for Avian and Human Influenza, sketched a framework of a global four-prong approach to control the spread of the deadly avian influenza virus, highlighting the different roles of governments, civil society, the private sector, and the media. [See also *Bird Flu Updates* in November 2005 and other previous environmental security reports on this issue.]

(February 2006) Ref. 1143

### Avian Flu Updates

Comprehensive roundups of the latest news on the spread of the bird flu virus and the threat to human health map the cases by countries, and identify actions to counter its spread and effects. Noteworthy actions are the UN Food and Agriculture Organization effort in assembling a 'task force' of health and veterinary specialists to help Indonesia face bird flu; efforts to find/test a vaccine that might be efficient both for birds and humans; the pledge of health ministers from 30 countries to coordinate efforts to fight an eventual influenza pandemic; and some countries (as the UK) commitment to have vaccine for every person in the country. [See also *Worries over Avian Influenza Pandemic Increase* in September, and *Avian Influenza New Developments* in April 2005 environmental security reports.] (October 2005) Ref. 1144

Although much is going on worldwide on this issue, the following are some noteworthy activities and updates on avian flu: The Convention on Migratory Species (CMS) and UNEP are developing a bird flu early warning system based on mapping the different migratory birds' itineraries and timing. This would alert countries and communities and would provide advice on potential hot spot areas, increasing the possibility of preparedness and strategy development.

The number of H5N1 human infections is rising in Asia, and the disease seems to be spreading in animals in Asia. It has also been identified in parts of Europe and North America. World health officials from more than 100 nations met November 7-9 at WHO headquarters in Geneva, to design a concrete global action plan to counter the threat of a possible avian influenza pandemic among humans. The plan outlines a six-point global action plan for countering any eventual pandemic: improved control at source; rapid detection and response; rapid containment; building and strengthening national pandemic preparedness and response plans; integrated cross-sector country plans for coordinated technical and financial support; and factual and transparent communication.

Strategies for combating the avian flu were also on the agenda of the G-7 and WHO meeting on global health risks and threats of WMD, held in Rome.

The seven member countries of the South Asian Association for Regional Cooperation agreed to create two regional centers to detect and respond to natural disasters and emerging health threats such as bird flu. A regional center for disaster preparation, emergency relief, and rehabilitation will be set up in India and the disease surveillance center will be in Bangladesh. Member countries will also develop a regional strategy for facing infectious diseases.

While these meetings and strategies are focusing mainly on human health, veterinarian and environmental scientists, emphasizing the interconnectedness between the nature of animal and human health, are advocating that maintaining healthy ecosystems is the best and most important strategy of defense against pathogens. [See also *Avian Flu Update* in October 2005 and other related items on the same issue in previous environmental security reports.] (November 2006) Ref. 1145

### Bird Flu Outbreak Causes Urge for World Readiness

The H5N1 virus has killed at least 42 people in Asia in 2004, including 30 in Vietnam. WHO warned at mid-January that the bird flu virus was endemic in Asia and it appeared to be evolving towards a possible human outbreak. The "New England Journal of Medicine" reported this

month on the first documented human-to-human transmitted case of bird flu, which occurred in Thailand last September. Infectious disease experts warn that the H5N1 virus could be more dangerous than SARS, as an H5N1 infected victim could appear healthy even while carrying the virus. The outbreak of the deadly virus in Asia prompted the EU to check Europe's preparedness to cope with an eventual pandemic. (January 2005)

*Bird flu Will be a Much Bigger Killer than SARS, According to WHO*

WHO's director of their Western Pacific Regional Office said that the conservative estimate is that bird flu (H5N1) could infect 30% of the world, killing 2-7 million people, but it could go as high as 50 million deaths. SARS killed 800 people last year with a mortality rate of around 15%, while H5N1 kills up to 33%. The Asian practice of selling live chickens and ducks, and slaughtering them in front of customers, should be stopped, and a central abattoir or restriction of slaughtering to a few areas should be substituted. Hong Kong scientists have been fighting to end the widespread practice of killing live chickens in markets since 1997, when the H5N1 virus first spread to humans and killed six people in the territory.

Although bird flu has killed 32 people in Thailand and Vietnam this year, and millions of chickens, ducks and other birds have been culled across Asia, the virus is expected to mutate, allowing it to infect human populations with no immunity. The next indicator of this possibility is expected to be increased infections among pigs. Clinical trials for a vaccine against H5N1 have begun, but even successful results might still have a time lag of half a year, while many humans could be infected and killed. (November 2005)

*Avian Flu Danger at Rise*

According to CDC Director Dr. Julie Gerberding, the avian flu is the "most important threat that we are facing right now." Recent evidence that the avian flu can move between species increases the concern that large-scale human-to-human transmission is possible, and could lead to a pandemic if the virus mutates. A new National Academy of Sciences study of the 2003 bird flu outbreak in the Netherlands confirmed that the avian influenza virus could spread from human to human. The study published in the January/February 2005 issue of the Journal of the American Medical Association shows that both direct and indirect transmission of the virus is possible (over half of those who worked directly with infected birds, and nearly two-thirds of people who had direct contact with farmers tested positive for bird flu antibodies.) Japanese researchers found flies infected with H5N1 virus after the 2004 outbreak among chickens in Japan.

Veterinary officials from 28 countries participating to the recent international conference on avian influenza in Asia also stressed the gravity of the situation and concluded by calling upon the governments in the region and the international community to make combating bird flu a top priority and examine the likelihood of an influenza pandemic and strategies for prevention and response. Shigeru Omi, chief of WHO Asia, warned "the world is now in the gravest possible danger of a pandemic." The conference was held on February 23-25 in Ho Chi Minh City, Viet Nam, jointly organized by the UN FAO, the World Organization for Animal Health (OIE), and the WHO. (February 2005)

*New Worldwide Avian Influenza Network (OFFLU)*

At the recent international conference on bird flu held in Paris, the World Organization for Animal Health (OIE), the Food and Agriculture Organization (FAO), and the World Health Organization (WHO) launched the new Worldwide Avian Influenza Network (OFFLU) to

improve health security by a better collaboration between veterinary and public health services at local, regional and global levels. Reference laboratories specializing in avian influenza in animals will be coordinated by OIE and FAO, and laboratory networks focusing on human influenza will be coordinated by WHO. Also at the conference, the Democratic People's Republic of Korea has formally requested assistance from the international community for fighting avian influenza. On April 25th, it was announced that the outbreak has been successfully contained.

#### *Europe Drafts New Law To Control Bird Flu Epidemics*

The European Commission adopted a draft Directive for a law to control bird flu viruses. The new legislation will require EU states to introduce and reinforce surveillance and control measures against low pathogenicity viruses, in order to prevent mutation into a more harmful strain, mostly one that would be transmissible between humans. The new law is expected to enter into force January 1, 2007, replacing the existing one.

#### *Bird Flu less Deadly but more Infectious*

The human mortality rate from bird flu in Vietnam dropped considerably over the past year, from about 70% of the people with confirmed cases, to about 20%. The good news is that avian influenza seems to be less deadly than was thought. The downside of the news is that the virus might be more infectious, increasing the probability of an outbreak in Southeast Asia and, hence, worldwide. The fact that people can be infected/carry the virus without even showing symptoms further aggravates the situation and alarms international health organizations. (April 2005)

Ref. 1146

#### **Two Viral Diseases Lie in Wait**

A new genus, Henipavirus, has been created for the Hendra and Nipah viruses, causes of serious disease outbreaks in humans and livestock in Australia, Malaysia, Singapore and Bangladesh. Like avian flu, so far these diseases have not shown human-to-human transmission (the primary vector is the fruit bat; an immediate one is swine), and they do not appear to be as contagious in animal-human contacts, but the human death rate was 40% in a Nipah epidemic in Malaysia.

(December 2005) Ref. 1147

#### **The Threat of Pandemic Influenza: Are We Ready? Workshop Summary (2005)**

The Institute of Medicine of the National Academies published summaries of the workshop held June 16-17, 2004, addressing the increased concern about the prospect of an influenza pandemic and exploring the issues that must be resolved to prepare and protect the global community. The summary report, *The Threat of Pandemic Influenza: Are We Ready?* outlines lessons learned from previous influenza pandemics; the avian influenza outbreak in Asia and its implications for human health; influenza pandemic preparedness strategies and planning opportunities and obstacles in different domains and geographical levels.

This month a Vietnamese family of five was infected by Asia's bird flu epidemic, which has killed 49 people since the end of 2003.

Although North Korea has confirmed initial cases of bird flu, South Korean officials suspect that it is far more widespread and is taking steps to protect its border with its northern neighbor. (May 2005) Ref. 1148

**Europe Embarks on Environment and Health Action Plan**

The European Commission has launched an action plan for the period 2004-2010 to reduce pollution health impacts. The new EU system will be focusing on a better understanding of the link between the environment and health, by integrating information on the state of the environment, the ecosystem and human health, and also addressing the eventual effect of emerging environmental issues on health. (June 2004) Ref. 1149

**New UN Office Using Space Technology to Assist Mitigation of Disasters**

A new UN Outer Space Affairs office (UNOOSA) has opened in Bonn, Germany, as part of a future network dedicated to carrying out the UN Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER). Providing universal access to space-based information to all countries and relevant organizations, UN-SPIDER covers all stages of disaster, including risk reduction. The program will improve disaster management and help developing countries strengthen their institutional capacities. UN-SPIDER offices are also scheduled to open in Beijing and Geneva. [See also *Space Technology for Improving Planetary Knowledge and Security* in April 2006, and other related items in previous environmental security reports.] (November 2007) Ref.1150

**Antigenic Maps Help Trace Development of Diseases**

Derek Smith, professor of infectious disease informatics at Cambridge University's Department of Zoology, and colleagues at Los Alamos National Laboratory and Erasmus Medical Center in Rotterdam, have developed software that, according to a *Scientific American* article, "create[s] an antigenic [stimulates the production of antibodies] map that documents 13,000 human flu strains isolated over the past five years. When these results are plotted on a digital antigenic map, researchers can see in fine detail how the body's immune system responds to different mutations of the virus." (April 2008) Ref.1151

**Google to Support Development of Early Warning System in Vulnerable Regions**

Google.org, the philanthropic arm of Google Inc., unveiling its charity plan over the next five to ten years, announced \$25 million in grants aimed at addressing global challenges. One of the five core initiatives, 'Predict and Prevent' aims to empower communities to predict and prevent ecological, health or social crises before they become local, regional, or global crises, by identifying 'hot spots' and enabling rapid response. InSTEDD (Innovative Support to Emergencies, Diseases and Disasters) is allocated \$5 million to improve early detection, preparedness, and response capabilities for global health threats and humanitarian crises. Other recipients in this category include the Global Health and Security Initiative (GHSI) and Clark University. (January 2008) Ref.1152

**Nationwide Health Information Network Could Help in Environmental Emergencies**

According to information from Indiana University, "Investigators from the Regenstrief Institute [on the campus of Indiana University's School of Medicine in Indianapolis] have led a demonstration of how health information exchange technologies developed and tested regionally can be used to securely share patient information across the nation during an emergency." The demo was based on the HHS-supported trial implementation of a Nationwide Health Information Network (NHIN). (September 2008) Ref.1153

**Climate Change Impact on Human Health**

*Climate Change Futures: Health, Ecological and Economic Dimensions (CCF)*, a three-year study by the Climate Change Futures Project at Harvard Medical School's Centre for Health and the Global Environment, is a comprehensive analysis of trends and implications of global warming in several areas: economy (financial, and impact on developing nations), environment (including exacerbating freaky weather); health (spreading and intensifying diseases); and two potential scenarios to outline possible impacts of climate change. The novelty of this study is the analysis of the direct impact of climate change on human health in addition to environmental and economic impacts that are the focus of most other studies. The report concludes that global warming threatens humans and ecosystems alike, particularly if the frequency of extreme weather events increases. It also offers some recommendations of policies and measures for reducing greenhouse gas emissions, and improving the strategies of adaptation and mitigation of climate change effects. (November 2005) Ref. 1154

**Study Shows Deforestation Brings Malaria Epidemics**

A study based on data collected in Brazil's Amazon forests region revealed a direct link between deforestation and the increasing incidence of malaria. The analysis shows that for the period August 1997 August 2001, a 4.2% change in deforestation can be associated with a 48% increase of malaria incidence. (June 2010) Ref. 1155

**ENERGY SECURITY****New International Renewable Energy Agency Opens in January**

The International Renewable Energy Agency (IRENA) will be established January 26th in Bonn, Germany, as an intergovernmental organization to promote renewable energy worldwide. It will assist member countries in matters of technology transfer, assessment and dissemination of information on new technologies and best practices, and will help support projects related to renewable energy and tackling global warming. All interested UN member states are invited to become members of IRENA at the Founding Conference in January. The Japanese government declined to join, stating that the agency's functions overlap those of the International Energy Agency. The organization was initially promoted by Denmark, Germany, and Spain, with strong support from other countries. (December 2008) Ref. 1157

**An International Energy and Environmental Security Foresight Network**

The Energy and Environmental Security Ecosystem (ESEE) is a project initiated by the U.S. Energy Department's intelligence and counterintelligence unit, for compiling and sharing intelligence and improving understanding of possible security implications of energy and environmental security issues. It will involve a coalition of countries and will consist of a members-only website for selected government, industry and expert representatives, and eventual face-to-face meetings. "The character of the energy and environmental security challenge requires a radically different, more globally systemic process," says a report by Natural Resources Canada, mentioning the ESEE project. Countries involved or interested include Australia, Bangladesh, Brazil Canada, China, France, Germany, India, Italy, the Netherlands, Sweden and the U.S. Others may join later. The project is to be launched in the first half of 2009. (November 2008) Ref. 1158

**Energy and Environmental Security Increasingly Addressed Together**

Chinese officials and U.S. Secretary of State Hillary Clinton agreed to join efforts in addressing the world economic crisis and environmental and security issues. The two countries would cooperate on “clean energy” technology that would include such elements as carbon capture and sequestration, and the smart grid.

Some Canadian think tanks related to the oil industry suggest the creation of a North Pacific Energy Security Framework that would include six countries that share geographic proximity and account for 54% of world energy demand: Canada and Russia—two of the world’s top oil and gas producers and exporters; and the US, China, Japan, and South Korea—among the world’s top energy consumers. The pact would address issues related to developing Arctic resources, investment in energy and energy trade, and climate change.

The proposed new U.S. Energy Efficiency Resource Standard (EERS) legislation would require electric and gas utilities to reduce demand by 15% and 10% respectively, by 2020, by increasing energy efficiency. The Obama administration is also considering introducing national rules for regulating greenhouse gas emissions for automobiles, to achieve an average of 35 miles per gallon by 2020. (California’s proposed standard is about 42 mpg.) [See also *European Energy Security Strategies* in January 2009, *North American Environmental Security Action Plan* in June 2008 and other related items in previous environmental security reports.] (February 2009) Ref. 1159

**Suggestions for Addressing Energy and National Security**

The article “Energy Security as National Security: Defining Problems Ahead of Solutions” analyzes the link between energy and national security looking at military and domestic vulnerabilities and economic issues, and suggesting some strategies. The article warns about the danger that associating energy issues with national security to the point of using “military power or the language of security diplomacy” might have negative effects on energy security itself. The suggestions include: improving systemic resiliency of critical infrastructures; reducing energy price volatility by maintaining a climate of non-violence and adequate investment in energy sources; and sharing security information and intelligence cooperation for increasing transparency. The article is part of the February 2009 issue of the *Journal of Energy Security*, a good source of information and analysis in this area. (February 2009) Ref. 1160

**Trends of Energy Use in IEA Countries**

The International Energy Agency’s *Energy Use in the New Millennium: Trends in IEA Countries* is an analysis of trends in energy use and efficiency, as well as CO<sub>2</sub> emissions in IEA countries. It concludes that the rate of energy efficiency improvement is too slow compared to increasing energy demands and it should at least double for a sustainable energy future and reduced impact on climate change. Rich in indicators on current energy use and CO<sub>2</sub> emission patterns, the report is a good tool for policymakers for setting priorities for future actions. (September 2007) Ref. 1161

**World Energy Outlook 2008**

*World Energy Outlook 2008* is the authoritative report on energy prospects. The WEO-2008 provides new energy projections to 2030 by regions and fuel types. It focuses on the two sectors that it considers the most pressing today: oil and gas production, including future global oil and



gas supply and post-2012 climate scenarios, including possible outcomes of the international negotiations and carbon schemes and implications for global energy markets. (November 2008) Ref. 1162

### **EU Energy and Climate Change Policy**

The European Council adopted its new Energy Policy to reduce CO<sub>2</sub> emissions by 20% of 1990 levels by 2020—a target that could rise to 30% if the U.S., China, and other economic powers agreed to comparable reductions; and by 2020 to have 20% if its energy from renewable sources and 10% of its transport fuel be biofuels. The EU Conference of Presidents decided on March 15 to set up a temporary committee on climate change to provide clear information and suggest strategies to address the issue.

On March 28, the Commission unveiled its “green taxes” strategy that suggests splitting the EU-wide minimum excise duties into an energy tax and an environmental tax to reflect products’ impact on the environment and encourage environmentally friendly goods. [See also EU Plans Tougher CO<sub>2</sub> Emissions Cuts in February 2007, and New European Energy Policy Developments in March 2006 environmental security reports.]

Britain’s draft Climate Change Bill is pushing for a drastic emissions’ reduction policy and could make the country the first to limit greenhouse gases by law. The proposal—to become law next year if it passes public and parliamentary consultation—stipulates that an independent panel should set a “carbon budget” every five years, with the goal to cut CO<sub>2</sub> emissions by 60% by 2050, from 1990 levels, and between 26% and 32% by 2020. Governments that miss the set target could be held liable. (March 2007) Ref. 1163

### **Energy Security Challenges for the 21st Century**

*Energy Security Challenges for the 21st Century: A Reference Book* provides an “overview of the world’s energy system and the vulnerabilities that underlie growing concern over energy security”, as well as “various approaches energy producers, consumers and transit states have toward energy security and it examines the domestic and foreign policy tradeoffs required to ensure safe and affordable energy supply.” (September 2009) Ref. 1164

### **World Energy Outlook 2006 Warns on Energy Security and Environmental Implications of Increasing Energy Demands**

The IEA’s *World Energy Outlook 2006*, looking ahead to 2030, names two major issues facing the world over the next 24 years: the threat of “insecure” and “inadequate” energy supplies at reasonable prices, and environmental damages caused by increasing energy demands. The report also suggests that the solutions to these problems are cost effective and reiterates that investment in cleaner energy supplies and more efficient use of energy are vital to cutting energy demand by a significant margin – 10% by 2030. The report notes that energy demand will rise 53% by 2030 and increased nuclear energy and biofuel use are vital to cutting emissions. (November 2006) Ref. 1165

### **World Energy Outlook 2005 -- Middle East and North Africa Insights**

The *World Energy Outlook* is accepted as the most comprehensive source of statistics, projections, and analysis in the energy sector. If energy trends follow the business as usual policy, Middle Eastern and North African oil and gas resources seem critical for meeting the world’s future energy needs. This year’s *World Energy Outlook* focuses on whether the energy

production from these key regions will be able to satisfy global demand over the next 25 years. It assesses energy demand and supply trends for the entire regions; analyzes the implications of these trends for global energy markets, international oil and gas prices and energy security; presents a "Deferred Investment Scenario" and its consequences; and reviews the region's power and water desalination sectors. (November 2005) Ref. 1166

### **Energy and Security: Toward a New Foreign Policy Strategy**

Although focusing on America's energy dependency on oil, the book assesses the world's prospective on oil and gas, the key and most sensitive energy sources for the near future. A contribution of 36 top foreign policy and energy experts, sometimes with divergent opinion, *Energy and Security: Toward a New Foreign Policy Strategy* suggests new strategies and policy approaches that could mitigate the risks implied by continued dependence on oil. (October 2005) Ref. 1167

### **North American Trilateral Agreement for Energy Security and the Environment**

Energy ministers for Canada, Mexico and the U.S. endorsed the first trilateral agreement on energy science and technology—a framework designed to enhance North American energy security and environmental protection. It focuses on cooperation in energy science and technology to increase energy efficiency and advance clean energy technologies across North America and the world. Energy security will also be high on the agenda of the North American Leaders' Summit to be held August 20-21 in Montebello, Quebec. (July 2007) Ref. 1168

### **Increasing Oil Demand in China and India Raise Security Concerns**

The hunger for energy might become a driving force for some countries to disregard international security issues and accords to the point of jeopardizing international security. For example, there were international concerns expressed about the alleged Chinese offers of arms and other sensitive defense technology in return for oil and gas rights in certain countries. "Unprecedented political opposition" probably triggered by strategic concerns in the US Congress forced the withdrawal of China National Offshore Oil Corporation (CNOOC)'s bid for California's Unocal. Similar concerns may affect the rival bids of China and India to buy a Canadian firm with oil fields in Kazakhstan. (August 2005) Ref. 1169

### **China's Climate Change and S&T Action Plan**

China launched its first national climate change program in June 2007. Although it does not include mandatory caps on emissions, it shows a strong commitment to reducing greenhouse gas emissions. The program highlights some major targets and actions to achieve them by 2010: reducing energy consumption by about 20% per GDP unit; increasing the share of renewable energy to 10% of the primary energy supply; keeping emissions of nitrous oxide from industrial processes at 2005 levels; increasing reforestation by 20%, and increasing international cooperation. The program notes that "China's energy efficiency is about 10% lower than that of the developed countries, and its per unit energy consumption of energy-intensive products is about 40% higher than the advanced international level. Science and technology are the ultimate resort for humankind to tackle climate change." In view of this, the Chinese Ministry of Science and Technology has released an action plan for the science and technology (S&T) aspects of China's new climate change initiative.

Note: The Chinese State Environmental Protection Administration report released in June reveals

a continuous deterioration of air and water quality in Chinese cities despite national efforts to reduce pollution levels. Concomitantly, preliminary estimates by the Netherlands Environmental Assessment Agency reveal that in 2006 China surpassed the U.S., becoming the world's largest CO<sub>2</sub> emitter. (June 2007) Ref.1170

#### China's Energy Conditions and Policies—White Paper

China's Information Office of the State Council issued the country's first-ever, white paper on its energy conditions and policies. The paper indicates a shift towards a more environment-centered energy policy, prioritizing sustainable development based on S&T, and strengthened international cooperation in the field of energy. It emphasizes, "China did not, does not and will not pose any threat to the world's energy security." [See also *China May Restructure Environmental Effort* in October 2007, and other related items in previous environmental security reports.] (December 2007) Ref.1171

#### **Energy Security Central to China's Energy Plan**

Although China is one of the world leaders in renewable energy production, its energy plan is still heavily relying on the more traditional energy sources of fossil fuels. While the benefits of renewable resources do include some relief for environmental issues like climate change, the focus of the Chinese energy plans seems to be energy security. Chinese energy legislation is expected to be approved in the fall. (June 2010) Ref. 1172

#### **European Action Plan on Energy Efficiency**

The European Commission outlined its Energy Efficiency Action Plan (EEAP) to cut Europe's energy consumption by 20% before 2020. It includes over 75 measures including new energy efficiency standards, and more energy-efficient products and services. The action plan will be introduced over the next six years and targets several priority areas, including: energy-efficiency labeling, possible legislation for meeting car emissions targets; encouraging investment in energy efficiency; more efficient power plants and energy transmission systems; and energy saving taxes and incentives. [See also *New European Energy Policy Developments* in March 2006 environmental security report.] (October 2006) Ref.1173

#### European Commission's New Low-carbon 20/20/20 by 2020 Energy Plan

The European Commission has proposed a package of measures to reach its "20/20/20 by 2020" targets — produce 20% of its energy from renewable sources and increase energy efficiency by 20%, cut greenhouse gas emissions by 20% of 1990 levels (or 30% in case of a global accord), and considerably reduce reliance on energy imports. The detailed roadmap includes specific renewable energy and CO<sub>2</sub> emission targets for each EU member state; new rules for carbon sequestration; and an updated Emissions Trading System for fair greenhouse gas emissions cuts for different emitters, with the aim of gradually including all industries in the emissions auction scheme. The Commission's proposals have to be endorsed by the European Council and Parliament, with the final package expected to come into force by the end of 2009. The European Commission hopes that the plan will trigger strong momentum towards a global agreement. Meantime, the European Commission is also considering introducing a climate tax on imports from states failing to tackle greenhouse gas emissions, and toughening EU's emission trading system. [See also *EU Energy and Climate Change Policy* in March 2007 environmental security report.] (January 2008) Ref.1174

### New European Energy Policy Developments

A European Commission new Green Paper sets the basis for a common energy strategy for the 25-nation European Union, since energy security and the fight against climate change are common challenges and therefore should be addressed by common and coordinated efforts. The paper includes six specific priority areas with over 20 suggestions: establishing an internal EU energy market; solidarity among EU Member States, including setting up a European Energy Supply Observatory and revision of the present supply framework; a sustainable, efficient, and diverse energy mix (“This in turn may eventually lead to objectives being established at Community level regarding the EU’s overall energy mix to ensure security of supply, whilst respecting the right of Member States to make their own energy choices” states the EU Press Release); global warming response, including an Action Plan on energy efficiency to be adopted by the Commission later this year; strategic energy technology plan that would assure EU competitiveness for efficient and low-emission technologies; and a common external energy policy to reflect an EU common view in the international arena, including a new Community mechanism to enable rapid and coordinated reactions to emergency external energy supply situations.

In order to reduce dependency on non-European countries’ energy sources, European leaders are planning to raise the share of energy generated from renewables from 12% to 15% by 2010 and increasing the proportion of biofuels used in transport from the 5.75% target by 2010 to 8% by 2015. Meanwhile, the EC’s “Euro 5” proposal seeks to impose stricter rules on new car emissions, calling for diesel particulates to be cut by 80%, gasoline hydrocarbons by 25%, and, for both gasoline and diesel, NOX cut by 20%. Individual countries advocate even stronger measures. The new standards, if approved, could enter into force in mid-2008. (March 2006) Ref. 1175

### EU Commission Sets Long-term Energy Goals

In April the EU Parliament’s Industry Committee approved raising the 2006-2015 energy reduction goal from 10% to 11.5%. This month the EU Executive Commission set an objective of 20% reduction by 2020, saving €60B per year in fuel costs. New EU laws requiring efficient buildings and appliances may achieve half the goal, but additional measures will be needed. A group of legislators went further, calling for a goal of 23% reduction. [See *EU to Set Higher Targets for Cuts in Energy Consumption* in April 2005 environmental security report.] (June 2005) Ref. 1176

## **PREVENTION AND ADAPTATION**

### **Adaptation Needs and Actions**

The Environment Council of the EU, which met on 11 June 2010 in Luxembourg, adopted conclusions on water scarcity, drought, and adaptation to climate change, as well as on preparing forests for climate change. The Council stressed inter-linkages of water scarcity and drought with climate change adaptation and biodiversity conservation, and the importance of exchanging experience and best practices with other partners. The Council also supported the development of a European drought observatory which is tasked to contribute to drought forecasting, assessment

and monitoring as well as to the exchange of best practices on this issue.

The first World Congress on Cities and Adaptation to Climate Change was held May 28-30, 2010, in Bonn, Germany, under the theme “Resilient Cities 2010”. During the Congress, the UN Convention to Combat Desertification (UNCCD) and the FAO co-organized a session on “Ensuring food security through adaptation”, where participants discussed adaptation approaches for achieving food security including: diversifying and adapting local and traditional food; securing watershed management; and adapting supply-demand linkages for adequate food supply and processing. At the end of the Congress, members of the Mayors Adaptation Forum signed the Bonn Declaration of Mayors. The Declaration recognizes the failure of the UNFCCC COP 15 to deliver a strong and comprehensive post-2012 climate agreement and identifies ten action points, such as to prioritize local level adaptation strategies that support local sustainable development. (June 2010) Ref. 1179

The third edition of Global Biodiversity Outlook (GBO-3) highlights that the linked challenges of biodiversity loss and climate change must be addressed with equal priority and in close coordination. It confirms that the world has failed to meet its target to achieve a significant reduction in the rate of biodiversity loss by 2010. While listing climate change as one of the five principal pressures that drive biodiversity loss, the report also points out opportunities to address the biodiversity crisis while contributing to other social objectives, including the fight against climate change. It outlines a possible new strategy for reducing biodiversity loss, including addressing the underlying causes of its indirect drivers, such as patterns of consumption, the impacts of increased trade and demographic change, and ending harmful subsidies. The report was produced by the Secretariat of the Convention on Biological Diversity and the UNEP’s World Conservation Monitoring Centre and is one of the key outputs of the 2010 International Year of Biodiversity.

A UN HABITAT conference on Promoting Green Building Rating in Africa was held May 4-6, 2010, in Nairobi, Kenya, with participants from 20 African countries. It adopted the Nairobi Declaration on Green Building for Africa, which sets a framework for strengthening the ability of cities to adapt to climate change by making use of local and naturally available energies and materials, and calls for establishing an African Network of Green Building Councils. (May 2010) Ref. 1180

At the UN International Strategy for Disaster Reduction (UN/ISDR) Second Ministerial Conference on Disaster Risk Reduction (DRR), held April 14-16, 2010, in Nairobi, Kenya, African Ministers adopted the Programme of Action for the Implementation of the Africa Regional Strategy for Disaster Risk Reduction (2006–2015) and a Ministerial Declaration. The Programme aims to mainstream risk reduction management and climate change adaptation as an integral part of sustainable development. The Ministerial Declaration calls on the AU Summit to make disaster risk reduction and adaptation to climate change a national education priority through integration into the educational system. The 2010 Economic Report on Africa, “Promoting High-level Sustainable Growth to Reduce Unemployment in Africa” warns that conflicts in the region will probably increase due to diminishing resources, and emphasizes the need for Africa to develop adaptation and mitigation strategies. Noting that the costs of adaptation and mitigation are beyond the means of African countries, the report calls on the international community to increase help for financing these strategies.

At the 16<sup>th</sup> summit of the Association of Southeast Asian Nations (ASEAN), held April 8-9,

2010, in Hanoi, Viet Nam, under the theme “Towards the ASEAN Community: from vision to action”, the leaders released a joint statement calling for a legally binding global pact on climate change and urged richer nations to provide them with ‘scaled-up’ financial help to combat climate change. The development of an ASEAN action plan to better understand and respond to climate change is also considered. (April 2010) Ref. 1181

The number of people around the world needing humanitarian assistance due to natural catastrophes triggered by climate change might increase from 250 million today to more than 375 million, by 2015. Therefore, the British Government announced that it would recommend a doubling of the UN relief funds budget from the current \$500 million to \$1 billion, along with a reconsideration of the entire system.

The UNDP released a report titled “Screening Tools and Guidelines to Support the Mainstreaming of Climate Change Adaptation into Development Assistance – A Stocktaking Report” which summarizes existing tools and good practices from a range of organizations to guide development practitioners in their climate change mainstreaming efforts. The report provides a comparative overview of existing tools and guidelines, explores the components and entry points of the mainstreaming process, and presents definitions of key climate change adaptation and mainstreaming concepts.

The International Food Policy Research Institute (IFPRI) launched a new project, Global Futures for Agriculture, which will evaluate promising technologies, investments, and policy reforms to improve agricultural productivity and environmental sustainability in developing countries. The project will improve IFPRI’s International Model for Policy Analysis of Agricultural Commodities and Trade, focusing on regions most vulnerable to global changes over the next 30 to 50 years, with special attention on the rural poor and smallholder farmers. (March 2010) Ref. 1182

According to the World Bank, urban populations in areas with significant probability of major earthquakes will increase from 370 million to 870 million between 2000 and 2050. As a result, The World Institute of Development Economics Research of the UN University recommends that cities set up hazard management as an integral part of urban planning and management, not as a separate activity. (February 2010) Ref. 1183

The World Meteorological Organization (WMO) announced its ongoing work towards the establishment of a Global Cryosphere (global solid water system) Watch to serve societal needs for weather, climate and water, and related environmental information and services. The World Meteorological Congress, WMO’s supreme governing body, is to consider ways and means of developing and implementing a Global Cryosphere Watch at its next quadrennial session in 2011. Once established, a Global Cryosphere Watch should enhance the capability of the research community and operational services to predict the future state of the cryosphere and facilitate assessments of the cryosphere and its components on a regional to global scale to support climate change science, decision-making and formulation of environmental policy.

The Joint Session of the Executive Boards of the UNDP, UNFPA, UNICEF, and WFP held on January 15, 2010 focused on the issue of climate change. Noting that 40% of development investment from ODA and concessional lending is sensitive to climate risk, UNDP Administrator Helen Clark spoke on how the UN agencies can support countries in addressing the climate change challenge through their programmatic activities at the country level to support capacity

building for adaptation and mitigation, and access to climate financing. She also said that the UN Development Group (UNDG) developed guidelines to support the UN Country Team on how to mainstream disaster risk reduction and environmental sustainability into the programmatic activities at the country level. Specific guidelines on climate change will be issued soon.

The UN Economic Commission for Europe (UNECE) released a study, “Transboundary flood risk management: experiences from the UNECE region,” which describes problems and progress made regarding transboundary flood management in 10 transboundary river basins in the UNECE region; tools for improving resilience against transboundary flood risk; and useful legal and institutional arrangements for cooperation.” The study also notes that climate change is expected to increase both the magnitude and the frequency of floods, although there is considerable uncertainty. The study was prepared by the Task Force on Water and Climate, under the UNECE Water Convention. (January 2010) Ref. 1184

“Climate Change, Conflict and Fragility”. a new report by International Alert, advises that adaptation strategies should be conflict sensitive and international responses to disasters and conflict should take into account the interlinked nature of the problems. Peace-building, for example, needs to be climate-proofed by paying attention to the availability of resources such as water for agriculture which could be affected by climate change. Similarly, large amount of funds for adaptation given to vulnerable states could encourage warfare unless adequate attention is paid to the systems of power and political reality in these countries. Dan Smith, Secretary General of International Alert and co-author of the report, warned “there is an enormous risk that money will go astray and end up doing more harm than good.”

“Linking Climate Change Policies to Human Development Analysis and Advocacy” by UNDP aims to integrate human development analysis and advocacy into more equitable, sustainable and climate-resilient development planning and policy debates. The guidance note proposes a conceptual framework for the analysis and provides analytical data, policy and advocacy issues that can be adapted to regional and national contexts. (December 2009) Ref. 1185

The UN International Strategy for Disaster Reduction Secretariat (UNISDR) *2010-2011 Biennial Work Programme: Invest Today for a Safer Tomorrow* includes four strategic objectives: 1) accelerate the promotion of national coordination mechanisms for disaster risk reduction with the goal of including climate change concerns; 2) participate in UNFCCC processes; 3) promote joint adaptation and risk reduction measures in countries; and 4) increase global inter-agency coordination on risk analysis and risk reduction, as a tool for climate change adaptation. While the current strategic overview is for two years, the vision, targets, and strategic directions are forward looking to 2015. Key expected outcomes include improved knowledge, strategies, and political and financial commitments, as well as better coherence and coordination among international and regional actors to address climate-related risks.

In partnership with the IPCC, UNISDR is working on a special report, *Managing the Risk of Extreme Events and Disasters to Advance Climate Change Adaptation*, to be released in 2011, representing the first global scientific effort to examine the linkages between disaster risk reduction and adaptation to climate change.

A Declaration of ‘climate vulnerable’ States demands that the Copenhagen outcome document include adaptation finance mechanisms to address the needs of the most vulnerable countries, amounting to at least 1.5% of developed countries' GDP (in addition to the 0.7% for

overseas development assistance) annually by 2015 to assist developing countries to make their transition to a climate-resilient economy and to address the health, human rights, and security implications of climate change, including communities' relocation and a legal framework to protect climate refugees. A follow-up Climate Vulnerable States Forum will be held in Kiribati in 2010.

*The Economics of Ecosystems and Biodiversity for National and International Policy Makers; Summary: Responding to the Value of Nature* assesses reasons and methods for measuring the value of ecosystems and includes a series of recommendations for improving decisions. It highlights that the ratio of benefits to costs for ecosystem protection ranges between 25-to-1 and 100-to-1. For example, expanding marine protection from less than 1% to 30% would cost about \$40-50 billion per year, whereas the annual benefit would be about \$4-5 trillion. "Recognizing and rewarding the value delivered to society by the natural environment must become a policy priority," said The Economics of Ecosystems and Biodiversity study leader, Pavan Sukhdev.

The EU estimates that €100 billion (\$150 billion) a year by 2020 would cost-effectively address climate change. It estimates it would cost about €7 billion (\$10.5 billion) a year for the first three years to "fast-track" funding in the developing world. There is no agreement on who should pay what and if the contributions should be voluntary or mandatory, or linked to the "polluter pays" principle. Chancellor Angela Merkel reportedly said that the European and the U.S. shares should be around one-third each.

The *State of World Population 2009* report by the UN Population Fund focuses on the impacts of climate change on the most vulnerable - and poor women specifically. The report argues that the fight against climate change is more likely to be successful if decisions take into account the needs, rights, and potential of women. (November 2009) Ref. 1186

The Consultative Meeting of Parliamentarians from Central Africa, held October 17 in Chad, recognized the synergies between disaster risk reduction and adaptation, and concluded that disaster risk reduction measures should be a main adaptation tool to the effects of climate change that are already affecting many African countries. The Chair of the African Parliamentarian initiative on Climate Risk Reduction called for a common African position that would link climate change adaptation to disaster risk reduction. Participants to the Southern African Development Community annual emergency preparedness and response workshop held in Johannesburg, South Africa, also pledged to strengthen their ability to respond to natural disasters and reduce risks on their populations. The SADC Secretariat will set up a regional disaster risk reduction unit that will provide leadership and coordination for early warning and disaster risk reduction to SADC member States. At the World Forum on Sustainable Development held October 9-11, 2009, in Ouagadougou, Burkina Faso, under the theme "Climate Change: What Opportunities for Sustainable Development?" African leaders emphasized that climate change adaptation policies and development strategies in the region should be integrated. They also called for the acceleration of the creation of a department for African environmental programs at the African Bank of Development, with a special fund to be contributed mainly by the developed countries. It was also decided that Africa speaks with one voice at the Copenhagen climate summit, including the demand for a compensation to be paid by major polluters, estimated at \$65 billion dollars.

*Managing our coastal zone in a changing climate: the time to act is now*, a report by the Australian House of Representatives Climate Change, Water, Environment and the Arts



Committee, is a comprehensive analysis of the impact of climate change on Australia. The report highlights the importance of the issue since 80% of Australia's population lives in the coastal zone. It recommends new coastal management measures, based on national leadership in a collaborative framework with state and local governments and communities. (October 2009) Ref. 1187

The "World Economic and Social Survey 2009" calls for a 'Global New Deal' at the scale of \$500-600 billion, compared to the 'woefully inadequate' estimated \$21 billion currently allocated internationally for climate change adaptation and mitigation plans. The report presents a range of possible multilateral measures in support of a global investment program, including a global clean energy fund, a global feed-in tariff regime in support of renewable energy sources, and a more balanced intellectual property regime for aiding the transfer of clean technologies. The Christian Aid report "Community Answers to Climate Chaos" estimates that rich countries' overall annual contribution to a proposed Sustainable Development Innovation Facility should be over €10 billion (\$161 billion) to help local communities cope with climate change effects.

Similarly, the World Bank's "World Development Report 2010: Development and Climate Change" estimates that by 2030, developing countries will need \$75 billion annually for adaptation, and another \$400 billion for low-carbon technology development. The report notes that poor nations will bear between 75-80% of the cost of floods, increased desertification and other disasters caused by global warming. Countries in Africa and South Asia are slated to lose as much as 5% of their GDP if temperatures rise just 2°C above pre-industrial levels. The WDR 2010 focuses on the many dimensions of development that are affected by climate change, including: reducing human vulnerability; managing land and water; stimulating development without compromising the climate; harnessing and efficiently using funds for mitigation and adaptation; accelerating the spread of "climate-smart" technologies; and communicating climate change issues to societies.

The World Climate Conference-3 held in Geneva, August 31–September 4, 2009, under the theme "Better climate information for a better future" decided to establish a Global Framework for Climate Services, to improve science-based climate prediction services and long-range seasonal weather projections. This will be an important tool for policymakers in general and for developing nations most vulnerable to the impact of global warming, specifically.

The "Lomé Declaration on Climate Change and Protection of Civilians in West Africa," adopted at the Regional Conference on Protection Challenges to Climate Change in West Africa, from 14-16 September 2009, in Lomé, Togo, calls for broader consideration of the social impacts of climate change through a human rights-based approach. Participants underscored conflicts arising from natural resource depletion and the infringement of displaced people's rights. They also recommended establishment of a special fund to help address climate change-induced impacts on affected parts of the population; called for measures to protect climate-affected persons; and agreed that a regional platform should be established for information exchange. (September 2009 Ref. 1188)

The United Nations is setting up a Global Impact and Vulnerability Alert System to help poorer countries such as those in the Pacific region deal with the combined effects of the global economic crisis and climate change. "Mitigation and adaptation must both be our urgent priorities," said UN Secretary-General Ban Ki-moon in a message to the 40<sup>th</sup> Pacific Leaders Forum in Cairns, Australia.

The study *Assessing the costs of adaptation to climate change: A critique of the UNFCCC estimates* reveals that the real costs are likely to be 2-3 times greater than the estimates by the UN Framework Convention on Climate Change (UNFCCC). Among other things, the UN estimates didn't include key sectors such as energy, manufacturing, tourism, and natural ecosystems. The UNFCCC estimates are \$40 billion to \$170 billion a year until 2030. Pointing out that some existing studies already suggest that costs will be considerably higher, the study calls for detailed case studies of what adaptation costs would be.

Reportedly, a draft resolution by African leaders will ask rich nations for \$67 billion per year to help them cope with the impacts of global warming. The draft resolution is prepared for the summit to be held in December, at Copenhagen.

The UN International Strategy for Disaster Risk Reduction (UN/ISDR) warns that the frequency of landslides is expected to increase as climate change increases the intensity of rainfall. Actions such as building early warning systems to alert people living in landslide-prone areas are necessary to reduce impacts, says UN/ISDR. (August 2009 Ref. 1189)

The Intergovernmental Panel on Climate Change (IPCC) will produce a manual for policymakers and organizations working in disaster relief to help build short-term strategies for managing extreme weather event effects and bolstering resilience, as well as to promote adaptation to global warming.

The UN International Strategy on Disaster Reduction (UN/ISDR) urged the G8 Summit to apply their "considerable influence, resources and political will" to advance five major action points on disaster risk reduction: helping disaster-prone countries institutionalize disaster risk reduction; promoting effective measures to reduce the number of people living with chronic food insecurity; ensuring the research needed at all levels to develop, disseminate and apply climate forecast information, early warning systems, and ecosystem essentials; enabling expeditiously a global structural and functional assessment of all schools and hospitals; and making unequivocal financial commitments to disaster risk reduction. (July 2009) Ref. 1190

The second session of the Global Platform for Disaster Risk Reduction, held June 16-19, 2009 in Geneva, Switzerland, concluded with a call to halve disaster-related deaths by 2015. Other specific targets identified include: by 2010, the establishment of clear national and international financial commitments to disaster risk reduction (DRR), for example to allocate a minimum of 10% of all humanitarian and reconstruction funding, at least 1% of development funding, and at least 30% of climate change adaptation funding to DRR; and by 2015, all major cities in disaster-prone areas to include and enforce DRR measures.

The Scientific and Technical Advisory Panel of the Global Environment Facility recommended that all mitigation projects and also, as appropriate, GEF strategies should incorporate climate adaptation measures and promote mitigation-adaptation synergies. It also advised that the GEF should consider the whole landscape approach regarding natural resource and chemicals life cycle management, and that it critically apply risk assessment to its proposed actions in order to maximize resilience to climate change while investing in mitigation.

The Zambezi River Basin Initiative (ZRBI) launched by The International Federation of Red Cross and Red Crescent Societies is an adaptation project focusing on disaster preparedness rather than post-emergency relief operations. About 80% of the region's 32 million people depend on agriculture and fishing. It is a joint program among seven southern African countries: Angola, Botswana, Malawi, Mozambique, Namibia, Zambia, and Zimbabwe, combining risk

reduction efforts with food security, health, HIV prevention, and capacity building activities.

Gordon Brown says that developed nations should create a \$100 billion per year fund to help developing nations cope with the effects of global warming. This is less than the 1% of developed countries' GDP that the G77 group has suggested. Brown's suggestion still needs to be endorsed by the EU-bloc before it could be put forward at the Copenhagen negotiations. (June 2009) Ref. 1191

During the 17<sup>th</sup> session of CSD, UNEP launched a new report, "The Environmental Food Crisis: The Environment's Role in Averting Future Food Crises," which provides an overview of how environmental stresses such as climate change, water stress, invasive pests and land degradation may impact food prices and world food security. The report stresses the need for a Green Revolution in Africa, noting the challenges of water scarcity, lack of infrastructure and impacts from climate change, and proposes a seven-point plan to reduce the risk of hunger and food insecurity in the 21<sup>st</sup> century. At the launch, UNEP Executive Director Achim Steiner stated that reversing environmental degradation and investing in ecological infrastructure such as forests, soils, and water bodies is part of the Green Economy solution. He also pointed to opportunities to diversify livelihoods and incomes via the emerging carbon markets, including renewable energy and income from conserving forest, soil and vegetation cover to sequester carbon. (May 2009) Ref. 1192

The European Commission presented a White Paper outlining the framework for reducing the European Union's vulnerability to the impacts of climate change. Since the impacts of climate change vary by region, the strategy would complement Member States' policies through an integrated and coordinated approach, particularly in cross-border issues. It underlines that adapting to climate change should be integrated into all EU policies. The plan has two phases: the first one spans 2009-2012 for preparing the knowledge base and policy instruments for phase two, commencing in 2013, that would be the implementation of the adaptation strategy. The White Paper covers phase 1, which is based on "four pillars of action" covering increasing understanding of climate change and identifying actions and policy instruments to be embedded in key EU policies. The paper specifies that a Clearing House Mechanism should be established by 2011 to exchange information on climate change impacts and adaptability measures. The Commission will set up an Impact and Adaptation Steering Group to ensure the successful completion of phase 1. The Commission also presented three discussion papers on water, coasts and marine, and agricultural and health issues based on the framework set out in the White Paper.

UN Deputy Secretary-General Asha-Rose Migiro highlighted links between the issues of gender, disaster risk reduction, climate change, and poverty reduction in a statement delivered to the International Conference on Gender and Disaster Risk Reduction, from 20-22 April, in Beijing, China. Migiro stressed that women, who constitute 70% of the world's poor, are disproportionately impacted by disasters and warned that climate change is expected to exacerbate this suffering, as well as threaten food security, health, and water supplies. She called for a "21st Century multi-stakeholder partnership" to mitigate the growing scourge of disasters.

Nearly 500 indigenous representatives from 5,000 distinct indigenous groups across 80 nations gathered for the Indigenous People's Global Summit on Climate Change, hosted by the Inuit Circumpolar Council, April 20-24, in Anchorage, Alaska, to discuss how to integrate indigenous views, policies, traditional values and visions into the global response to the challenges of climate change. The Summit's final recommendations contain two options

regarding the use of fossil fuels: the first calls for a moratorium on new oil and gas drilling, while the second proposes an eventual phase-out of fossil fuels use, while at the same time respecting the rights of indigenous people to develop their resources. The recommendations will be presented to COP15. (April 2009) Ref. 1193

NATO's "New Horizons" report emphasizes that energy and environmental standards should be considered in security-related reconstruction and stabilization activities (e.g., levees, earthquake-proof housing, improved agricultural practices, and alternative energy systems), as well as better information sharing to assess future needs of individual communities/countries.

The first-ever meeting of the Committee on Disaster Risk Reduction of the UN Economic and Social Commission for Asia and the Pacific (ESCAP) was held March 25-27, 2009, gathering more than 200 delegates including ministers and senior officials from 25 countries of the most disaster-prone region, to discuss the creation of Disaster Risk Reduction strategies. The Asia-Pacific region accounts for 42% of the world's natural disasters, and 65% of their victims. Noeleen Heyzer, UN Under-Secretary-General and ESCAP Executive Secretary, announced that ESCAP would establish a regional platform for sharing information among disaster risk management authorities. ESCAP will also produce the Asia-Pacific Disaster Report, which will synthesize information from member States, provide assessment of the disaster risk reduction in the region and identify future priorities and trends.

The UN Human Settlements Programme (UN-HABITAT) launched the Cities and Climate Change Initiative (CCCI) at a conference titled "Cities and Climate Change," on March 17 in Oslo, Norway. The initiative focuses on mitigation and adaptation to climate change impacts on human settlements within the framework of urban governance, decentralization, strengthening local authorities, and environmental planning and management. The conference also marked the launch of pilot projects to help Maputo in Mozambique, Kampala in Uganda, Sorsogon City in the Philippines, and Esmeraldas in Ecuador to adapt to climate change by redesigning infrastructure. The results of the deliberations will be forwarded to the Copenhagen climate change conference in December 2009. (March 2009) Ref. 1194

The Ecosystems and Livelihoods Adaptation Network (ELAN) is being created as a platform for sharing information globally and to be a resource linking scientists with managers and decision-makers to help some of the most vulnerable ecosystems and societies cope with the impacts of global climate change. It is a collaboration between the International Union for the Conservation of Nature and WWF International.

Although about \$18 billion were pledged by the world's richest countries to help poorer ones adapt to climate change, less than \$1 billion has been disbursed. The Global Environment Facility distributed \$760 million over the past three years, but about 33% of that went to China, India, and Brazil, while the 49 poorest countries received less than \$100 million.

At the Pacific ICT Ministerial Forum, "Connecting the Unconnected," in Nukualofa, Tonga, from 17-20 February 2009, organized by the International Telecommunication Union, 13 ministers from Pacific Island Countries issued a joint communiqué calling for, *inter alia*: greater coordination among partners to minimize overlap and maximize the impact of investments in ICT development projects; the rapid implementation of regional connectivity initiatives; reinforced efforts to build human capacity in ICT; and making full use of ICTs for early warning and response systems to improve disaster preparedness. (February 2009) Ref. 1195

The Least Developed Countries Fund, established under the UNFCCC and managed by the Global Environment Facility to help the poorest countries implement urgent projects to adapt to climate change, might need \$1 billion, said Boni Biagini, who runs the fund. So far, only \$172 million was pledged to the fund. Nevertheless, the Central Emergency Response Fund, set up in 2006 to help in case of natural and man-made disasters, has surpassed its annual target, reaching \$452.5 million, with some of the 101 contributing nations significantly increasing their donations for 2009, announced the UN Office for the Coordination of Humanitarian Affairs. Meanwhile, at the Poznan climate change conference, it was agreed that the board of the Kyoto Protocol's Adaptation Fund would have the legal capacity to grant developing countries direct access to about \$60 million to help them cope with the effects of global warming. However, the suggestion by some delegates to increase from 2% to 3% the share of proceeds from the Clean Development Mechanism that finances the Adaptation Fund was rejected. The UN estimates that \$86 billion per year might be needed by 2015 for poor countries to adapt to global warming, while some aid groups are calling for at least \$50 billion.

At the Third Asian Ministerial Conference on Disaster Risk Reduction held in Kuala Lumpur, Malaysia, government officials from more than 40 Asian countries discussed partnerships and regional cooperation for disaster preparedness and early warning systems. The Asia-Pacific region is the most populous and also most affected by disasters in terms of human and economic impacts, according to the UN International Strategy for Disaster Reduction. Greater investment in disaster risk reduction is crucial for the region's development and to reduce relief costs, since studies show that \$1 invested in disaster preparedness saves between \$4 and \$7 in humanitarian relief and reconstruction costs after a disaster happens.

The UN Disaster Assessment and Coordination (UNDAC) organized disaster-awareness training programs in Russia for members of the Commonwealth of Independent States and in the Middle East. In 2009 it will do so in the West African region. All countries, which join the system, must receive the training. Since its inception in 1993, UNDAC has deployed 183 missions to assist countries affected by disasters. (December 2008) Ref. 1196]

Indonesia launched a sophisticated new tsunami warning system that runs a computer-simulated model and can predict waves' arrival times and heights, enabling fast emergency measures. Although it will take some more years to cover all the coastal regions, the construction of the system is ahead of the 2010 completion target and was able to predict the tidal wave that struck the Sumatran coast in September.

An 'adaptation scan' developed by Tauw and BuildDesk of the Netherlands could help policymakers assess the effects of climate change in their respective areas. It operates using complex combinations of two databases—one with effects and the other with measures, and generates several direct and indirect possible consequences.

Preparations of coastal communities for addressing possible natural disasters are increasing across the globe. The UK has commissioned a study on towns vulnerable to flooding. California is starting a series of adaptation efforts including moving a highway farther inland and constructing flood-resistant buildings. An Alaska village is planning to move their entire community due to rising sea levels. The coasts of New Jersey and New York City have to prepare to be radically altered by 2100. The Netherlands is considering a proposal to build islands off the coast like barrier reefs to deal with rising waters. Australia and Indonesia are in talks to create a center to prepare the region to deal with natural disasters. The coasts of Bangladesh, and of Gujarat in India, are already changing and, as a result, some families are

moving. The EU pledged to provide technical and financial assistance to Pacific nations affected by climate change.

The sixteenth Asia-Pacific Economic Cooperation (APEC) forum adopted a declaration to enhance cooperation for improving risk reduction, preparedness, and management to fight climate change, including building domestic disaster management capabilities. (November 2008) Ref. 1197

“The UN estimates that all but one of its emergency appeals for humanitarian aid in 2007 were climate related,” notes the *Climate Change and International Security* report.

The Kyoto Protocol’s Adaptation Fund Board held its inaugural meeting in Bonn, Germany, on March 28, 2008. The Fund will finance concrete adaptation projects and programs in developing countries. The fund now estimated at about \$58.4 million is expected to increase to \$80-300 million over 2008-2012. The finance source is a 2% levy of the Clean Development Mechanism, so it is “not reliant on donor funding or overseas development assistance. This is the climate regime beginning to become self-financing,” noted Yvo de Boer, Executive Secretary of the UN Framework Convention on Climate Change.

The Caribbean states agreed to set up a joint tsunami early warning center by 2010. The center will relay information from national geological institutes across the region. Barbados, Puerto Rico, and Venezuela were named as possible hosts of the center, which would have a \$250,000 annual budget funded by national governments, France, the U.S., and UNESCO. (March 2008) Ref. 1198

Scientists are increasing efforts to assess the ‘hot spots’ that will be most affected by climate change in order to orient policy making and businesses to help those areas to adapt and cope with new challenges. Investors are already funding projects ranging from new agriculture practices and flood defense systems to renewable energy sources. In Australia, where drought might become the rule and fresh water is already scarce, nearly every major coastal city has a desalination plant, with some, like Perth, with almost all fresh water coming from the ocean, and Melbourne and Sydney soon to desalinate 20%. The energy required by desalination will be mostly green.

Over half of the Republic of Maldives' 200 inhabited islands are eroding at an alarming rate, in some cases forcing relocation of entire island communities. Adaptation actions began already, by raising a massive seawall made of concrete tetrapods that surrounds the entire capital of Malé, and even constructing new artificial, taller islands, such as Hulhumalé. (January 2008) Ref. 1199

“It is now recognized that mitigation alone is unlikely to fully address, in a reasonable time, the challenges that human-induced climate change is likely to bring and that, therefore, much greater attention needs to be given to adaptation to climate change,” said WMO Secretary-General Michel Jarraud, addressing the UN Climate Change Conference in Bali, Indonesia.

Small island states called for help with adaptation programs. Grenada mentioned that the two devastating hurricanes over the last seven years caused damage that amounted to 200% of the country’s GDP. Maldives is spending considerable sums on adaptation efforts, which include building 14 ‘safe islands.’

The Bali roadmap includes, as key issues for the upcoming negotiations, taking action to adapt to the negative consequences of climate change—such as droughts and floods; developing ways to reduce greenhouse gas emissions; finding ways to deploy climate-friendly technology;

and financing adaptation and mitigation measures.

At the "Emergency Preparedness and Response Workshop" organized by the UN Office for the Coordination of Humanitarian Affairs (OCHA) in Johannesburg, eight South African and Indian Ocean nations—the Comoros, Madagascar, Malawi, Mozambique, Namibia, Zambia, Zimbabwe and South Africa—decided to enhance regional cooperation for emergency response in case of natural disasters. The draft Declaration of Intent stipulates cooperation for improved information sharing, establishing regional rapid response teams, and developing measures for free movement of emergency personnel and relief materials in the region.

The first international symposium on public weather services, organized by the WMO has brought together about 120 experts to prepare a road map for improving communities' protection from natural disasters and adaptation to climate change. The discussions covered issues from weather information gathering and dissemination by national meteorological and hydrological services, to use of weather forecasts and reaction in case of emergencies. The symposium was held in Geneva, 3- 5 December 2007.

The UN International Telecommunications Union three-day global forum on "Effective Use of Telecommunications/ICT for Disaster Management: Saving Lives" held in Geneva, launched the ITU Framework for Cooperation in Emergencies (IFCE), which outlines actions helping government and relief agencies to improve disaster preparedness, early warning, and response by using telecommunications resources.

The Convention on Biological Diversity, launched a new adaptation website <http://adaptation.cbd.int> to help governments and agencies to include biodiversity considerations in their adaptation planning. (December 2007) Ref. 1200

The *Fourth Assessment Report (AR4) Summary for Policymakers* by the International Panel for Climate Change is a comprehensive scientific assessment of world climate, dedicated to support and encourage policy negotiations and action. It states with "very high confidence" that post-industrial human activities have warming effects, and with "high confidence" that although the impact of global warming may be "abrupt and irreversible", adequate adaptation and mitigation policies "can significantly reduce the risks of climate change." It projects that in 2090-2099 relative to 1980-1999, temperature rise could range between 0.3°C and 6.4°C, and sea level rise up to 0.59m—not including important factors such as changes in ice flow. The regions most affected by climate change are the Arctic, Africa, the small islands, and the highly populated Asian and African megadeltas.

The Synthesis Report addresses: 1. Observed changes in climate and their effects (highlighting observations of increases in global temperatures, melting of snow and ice, rising sea level, and health implications); 2. Causes of change (the likely role of anthropogenic warming); 3. Projected climate change and its impacts (different near and long term scenarios depending on climate policies, and examples of some impacts on systems, sectors, and regions) 4. Adaptation and mitigation options (with examples for several sectors of adaptation option/strategy, policies and measures, technologies, constraints and opportunities); and 5. Long-term perspective (key vulnerabilities, risks and threats, as well as scientific and socio-economic aspects relevant to adaptation and mitigation).

The report underlines that "A wide variety of policies and instruments are available to governments to create the incentives for mitigation action. Their applicability depends on national circumstances and sectoral context." The AR4 was released in Valencia, Spain, on November 17, 2007 and the key findings will be discussed at the December UN Climate Change

Conference in Bali. (November 2007) Ref. 1201

Change in cultivation patterns due to climate change, population growth, increasing oil prices, expansion of biofuels, instability of financial markets, and other economic factors highly affect agricultural commodity prices. Large price fluctuations of agricultural products can have a destabilizing effect on countries' economies, hindering poverty reduction efforts, potentially even leading to civil rebellion and political instability. The IPCC estimates that in some African countries, yields from rain-fed agriculture would be reduced by 50% due to climate change. According to the UN Food and Agriculture Organization (FAO) *Food Outlook* report, prices are rising considerably for nearly all major food and feed commodities. Another FAO report, *The State of Food and Agriculture 2007*, presents a comprehensive assessment of the world's food situation, including projections up to 2050. 'Part II - World and Regional Review: a longer term perspective' highlights the challenges posed to food security by population growth, rapid economic development, increasing demand for biofuels, and climate change. However, FAO's projections are optimistic, estimating the number of well-nourished people in developing countries to rise from 3.9 billion in 1999–2001 (83% of the population) to 6.2 billion (93%) in 2030, and to 7.2 billion (96%) by 2050. (November 2007) Ref. 1202

Asia, being one of the continents most affected by climate change, is increasing its efforts for adaptation and disaster management. The UN University launched a 14-week pilot program to help Asian countries in flood risk assessment and planning for and managing floods. A Japanese initiative using satellite data to provide disaster information in Asia could extend its coverage to other developing countries. The Sentinel Asia project, a Japanese initiative using satellite data to provide disaster information in Asia will be expanded to cover more end users in Asia and could be extended to other developing countries in Africa and Latin America. China also offers its expertise and technology for disaster forecasting and management to other developing countries. (October 2007) Ref. 1203

The 2007 droughts in parts of southern Africa reduced maize production by about 40% to 60%. A workshop of over 140 experts on Adaptation Planning and Strategies organized by the UNFCCC and FAO in Rome underlined the long-term implications of abnormal changes in air temperature and rainfall and the increasing frequency and intensity of drought and floods, mainly on the developing nations. Due to the melting of Himalayan glaciers, the Pakistani government established a high-level committee and a study center to study adaptation strategies, including developing efficient water management systems, raising mass awareness campaigns, and changing cropping patterns. (September 2007) Ref. 1204

Tackling climate change in the next quarter-century will require major changes to patterns of investment and financial flows, according to the report *Investment and financial flows relevant to the development of effective and appropriate international response to Climate Change* by the UN Framework Convention on Climate Change. (August 2007) Ref. 1205

### **Better Disaster Planning to Avoid Environmental Catastrophes**

Hurricane Katrina along the U.S. Gulf Coast has introduced a new term, "toxic gumbo", into the environmental vocabulary, referring to the liquid/sludge produced when storms cause flood



waters to overrun populated areas, especially industrial tracts, picking up from storage facilities a hazardous mix of all sorts of chemicals, both end-products and precursors. As the flood recedes, it may deposit this nasty brew over an entire region, including wetlands, and/or carry it into previously unaffected waters. Katrina produced environmental damage and pollution of this kind on an unprecedented scale outside of full-scale war. President Bush has suggested a greater role for the military in post-national disaster management.

On the other side of the Atlantic, spurred by floods and fires in many places around the continent, the European Commission passed a resolution calling for better disaster planning coordination among its members.

The Asian Conference on Disaster Reduction held in Beijing, aims to assess disaster reduction progress across Asia and build a platform for cooperation on early warning, disaster prevention, reduction, and response in Asia.

UN Secretary-General Kofi Annan, reviewing the statistics of 2004 natural disasters, called for more emphasis on actions to prevent and react to natural disasters, "because their incidence and severity is increasing due to climate change, environmental degradation, inappropriate development patterns and inadequate mitigation and preparedness systems." (September 2005) Ref. 1206

#### **New Flood Center to Develop Warning Systems**

Professor Witold Krajewski of the University of Iowa has been named director of the new Iowa Flood Center, which has at the top of its agenda the development of prototype flood warning and forecasting systems to mitigate the effects of future floods. What the engineers and scientists learn is expected to enhance their overall understanding of floods and improve the accuracy of flood warning systems. (September 2009) Ref. 1207

#### **OSCE Workshop on Environmental Risks and Security in Earthquake Areas**

The Organization for Security and Co-operation in Europe (OSCE) held an international workshop on environmental risks and security in earthquake-prone areas, as part of the preparations for the World Conference on Disaster Reduction to be held in January in Kobe. More than 250 participants from 52 countries addressed such issues as raising public awareness, education and training on social consequences of earthquakes, preparedness, and risk and disaster reduction. Ambassador Vladimir Pryakhin, Head of the OSCE Office in Yerevan said that these issues are "closely linked with the provision of national security to the country and the region." (November 2004) Ref. 1208

#### **Indigenous Peoples Demand More Involvement in Environmental Policies**

Climate change was the special focus of the UN Permanent Forum on Indigenous Issues, held in New York, April 21-May 2, 2008. The approximately 3,300 delegates representing the 370 million indigenous people from around the world stressed that indigenous peoples should be included in the international debate on climate change. The Forum suggested that a working group on local adaptation measures and traditional knowledge of indigenous peoples be established, since they can provide important insights for designing and implementing sustainable mitigation and adaptation strategies. (May 2008) Ref. 1209

**UN and Governments of Latin America and the Caribbean Met to Improve Disaster Anticipation and Response System**

The First Regional Meeting on Enhancing International Humanitarian Partnerships for Latin America and the Caribbean was held in Mexico City, September 10-11, hosted by the Government of Mexico in collaboration with the Government of Canada and the United Nations Office for the Coordination of Humanitarian Affairs (OCHA). Participants explored how to improve disaster preparedness and response information and coordination systems among national and regional governments and relief organizations. As a first step, it is “essential to establish the basic compatibility of national response systems with the international system, tools and mechanisms,” said John Holmes, Under-Secretary-General for Humanitarian Affairs and UN Emergency Relief Coordinator. The next regional meeting will be held in Brazil, in 2009. (September 2008) Ref. 1210

**UK Calls for Worldwide Action for Addressing Global Warming**

The British government is intensifying its call for immediate worldwide consensus and action for addressing global warming, which would include the economically booming China and India, even if it would take decades to see the results. The government's chief scientist, Sir David King, warned that, even by the most optimistic forecasts, carbon dioxide levels are set to double those of the pre-industrial era, leading to a three-degree centigrade rise in temperature, jeopardizing eco-systems, raising sea levels and flooding coastal areas, and causing the hunger of 400 million people. The Blair government claims that Britain will exceed the Kyoto Protocol target of 12.5% emissions reductions by 2012, but not its own goal of 20% reduction by 2010, in spite of the plans for stricter emission regulations introduced last month. (April 2006) Ref. 1211

**UN Framework Convention on Climate Change Conference**

About 6,000 scientists, decision-makers, and activists attended the Tenth Session of the Conference of Parties (COP 10) of the UN Framework Convention on Climate Change (to which is attached the Kyoto Protocol) held in Buenos Aires, 6-17 December 2004. The conference discussed ways to reduce global warming and its effects. It also discussed post-Kyoto policy plans. Although no specific actions and/or regulations were adopted, progress was achieved on the issue of mitigation and adaptation to possible effects of climate change. The Buenos Aires Programme of Work on Adaptation and Response Measures adopted by the conference includes further scientific assessments of vulnerabilities and options for adaptation, expert papers on various aspects of climate change risks, and recommendations for sustainable development planning. A seminar of governmental experts is planned for next May in Bonn to continue discussions on the issue. (December 2004) Ref. 1212

**A Sample of Counter Global Warming Activists around the World**

Unless major actions to reduce greenhouse gases are taken worldwide, parts of Australia could become uninhabitable, warned participants at the recent International Climate Change Taskforce meeting. An Australian court has ordered that an expert planning panel assess the greenhouse gas pollution consequences before any extension of the Hazelwood power station in the Australian State of Victoria begins. Environmentalists petitioned that sites in Belize, Nepal and Peru be considered for UNESCO's World Heritage in Danger List in order to be protected from the effects of climate change. China and the European Commission of the European Union announced a five year, €42.9 million energy and environment program in Beijing to improve

energy efficiency in China and combat climate change. Britain and Germany, whose greenhouse gas reductions are among the biggest in the world, are enhancing their fight against global warming through a new partnership backed by leading industrialists, businessmen, and scientists. A range of innovative recommendations for environment-friendly industry will be presented to the countries' leaders. The importance of the event was highlighted by its opening by Her Majesty Queen Elizabeth II during her State Visit to Germany. (November 2004) Ref. 1213

### **Nordic Countries Suggest Actions to Cope with Global Warming**

*Conservation of Nordic Nature in a Changing Climate* is a report commissioned by the Nordic Council of Ministers to analyze global warming causes and to address strategies concerning the Nordic Countries' abilities to cope with climate change effects. Experts from environmental research institutes in the five-country region affirm that climate changes are mainly caused by humans and urge the region's governments to take joint action against global warming as well as to design strategies to deal with more extreme weather patterns. The report identifies some concrete strategies and tools for adaptation to climate change effects—such as management and administration aspects, including some regarding “natures’ goods and services.” (October 2005) Ref. 1214

### **EU Climate Change Policy**

The European Commission launched a six-month public debate on approaches for adapting to climate change. Citizens, Parliaments, Member States and international partners will contribute views along the lines set by the Green Paper “Adapting to Climate Change in Europe - Options for EU Action” launched in June 2007 [see last month’s report item on Climate Change]. The results, available at the beginning of 2008, will be considered in policymaking and setting priorities for developing a EU adaptation strategy by the end of 2008.

Meantime, UK Foreign Secretary, David Miliband, listed climate change among the UK Foreign Office’s ten ‘strategic priorities’, on a par with consequences of extremism, radicalization, and conflict. He noted that climate change might become the “new *raison d’être*” for the EU, as “one of the greatest threats to our future prosperity and security... Creating an Environmental Union is as big a challenge in the 21<sup>st</sup> century as peace in Europe was in the 1950s” he said. (July 2007) Ref. 1215

### **European Adaptability to Climate Change is Questioned**

A June 15, 2006 report for the Director General for the Environment of the European Commission explores the secondary and tertiary social impacts of climate change and finds that: 1) indirect effects may be more important than the direct effects of climate change (ripple effects of changes in agricultural cycles and changing demands); 2) impacts are likely to be uneven across sectors and communities; and 3) national preparations may not have sufficiently considered the difficulties of those in marginal areas or conditions. (June 2006) Ref. 1216

### **Asia-Pacific to Increase Responses to Climate Change**

Anticipating that Asia and the Pacific could be one of the regions most severely affected by climate change, a two-day meeting organized by the UN and other international agencies focused on identifying strategies, business models, and financial frameworks to reduce the impact of climate changes and promote clean energy while pursuing economic growth. Recommendations were made by government policymakers, business leaders, academics, and representatives of

NGOs from across the region. Meanwhile, Australia's opposition Labor Party announced that it would give its poorer neighbors \$US132 million to address impacts of climate change. (July 2007) Ref.1217

### **East Asia and Climate Change**

The spotlight of the latest *East Asia Update* report by the World Bank, "Climate Change and East Asia—Challenges and Opportunities" warns that climate change is likely to significantly affect economies in the Asia-Pacific region, threatening the coastal area and jeopardizing the region's economic growth. Rising sea levels, more intense storms and greater extremes of droughts and floods will threaten the livelihoods of millions of poor and cause mass migration. Another report, *State of the Environment in Asia and the Pacific 2005* by the UN Economic and Social Commission for Asia and the Pacific (UNESCAP), is assessing the implications of the region's rapid economic growth, revealing that present patterns are unsustainable and urges adoption of "green" policies and standards. Along the same lines, experts and policy-makers attending the "Asia-Pacific Dialogue on Innovative Options for Non-Annex I Countries Participation for Climate Change Action" held in Bangkok, discussed strategies for the regions' developing countries to reduce greenhouse gas emissions in the framework of the Clean Development Mechanism (CDM). The meeting was co-organized by the Institute for Global Environmental Strategies (IGES) and UNESCAP. Little progress has been made, because many developing countries are worried that binding targets to reduce greenhouse gas emissions would jeopardize their economic growth. (April 2006) Ref. 1218

### **International Early Warning Programme to Begin Operations**

The First Advisory Group Meeting of the International Early Warning Programme (IEWP) was held March 26-27, at the UN Campus in Bonn, Germany. Relevant representatives from 20 specialized UN agencies attended the meeting to set a framework for the program's operations, discussing the best strategies to help mitigate the impact of natural disasters—from earthquakes, tsunamis and hurricanes to floods and wildfires—and to decide how the early warning system could be implemented worldwide. The outcomes of the meeting were not yet available at the time of this writing. [See also *Tsunami Warning and Mitigation System in the Indian Ocean*, and other related items in previous environmental security reports.] (March 2007) Ref.1219

### **Indian Ocean Tsunami Warning System**

#### Asian Tsunami Triggers Global Early Warning System

If a system like the Tsunami Warning System in the Pacific, headquartered in Hawaii, existed for the Indian Ocean, many lives would have been saved this December. This realization will lead to international agreements to create a Tsunami early warning system in the Indian Ocean (and possibly the Atlantic, leading to a global system). The Governments of Japan, India, and Australia announced that they will create such a system headquartered in India. This will be a top priority for the World Conference on Disaster Reduction to be held in Kobe, Japan January 18-22, 2005. [See also item above *Natural Disasters Raise the Environment on the Global Security Agenda*] The establishment of globally connected early warning for natural disasters seems inevitable. (December 2004) Ref. 1221

### Indian Ocean Tsunami Warning System Declared Operational, but Local Coordination still Lacking

At the end of June, UNESCO announced that the Indian Ocean tsunami warning system, coordinated by its Intergovernmental Oceanographic Commission, is on schedule to become operational for the entire region by the end of July. A network of 26 national information centers will allow countries to receive and distribute warnings of potential tsunamis. However, the tsunami that struck Indonesia on July 17th, caused by an earthquake off the south coast of Java, killed more than 500 people. Although the wave hit the coast 40 minutes after the quake was detected, no warning was issued to the population. [See also *Tsunami Warning and Mitigation System in the Indian Ocean* in December 2005, and other related items in previous environmental security reports.] (July 2006) Ref. 1222

### Regional Governance Key for Tsunami Early Warning and Recovery

The first Network of Regional Governments for Sustainable Development Summit was held at Lake Toba, Indonesia, March 10-12, 2005, under the theme “Global Partnership on Rehabilitation and Reconstruction of Post-Disaster Settlements.” The Lake Toba Call declaration summarizes the agreements reached by the participants, mainly focusing on creating partnerships at the regional level within the UN system for disaster early warning systems and post-disaster rehabilitation, and to guarantee that the local governments could work properly in a network of regional governments to ensure sustainable development not only at local, but also at regional and international levels. (March 2005) Ref. 1223

### Tsunami Warning and Mitigation System in the Indian Ocean

One year after the December 2004 Indian Ocean tsunami, a *Consolidated Report for Countries Affected by the 26 December 2004 Tsunami* was released that addresses capacity building requirements at regional, national, and community levels in 16 countries. It identifies the achievements, gaps, and specific actions still needed and the responsible authorities for those actions for building an effective warning and mitigation system for the Indian Ocean countries. The World Meteorological Organization (WMO) announced that a telecommunications network to provide a tsunami early warning system in the Indian Ocean is on track for completion by the middle of 2006. However, as of December 2005, there is no agreement on the establishment of a single alert center and the countries that have been conferring are going ahead with plans for purely national systems. [See also *Indian Ocean Tsunami Early Warning System to be Operational by the End of 2005* in August 2005, and *Tsunami Triggers an Early Warning System for Indian Ocean and Beyond* in January 2005 environmental security reports.] (December 2005) Ref. 1224

### Tsunami Triggers an Early Warning System for Indian Ocean and Beyond

The Tsunami Warning System in the Indian Ocean, followed by a global one, topped the discussions of the World Conference on Disaster Reduction held in Kobe, Japan, January 18-22, 2005. [See also items *Tsunami Triggers an Early Warning System for Indian Ocean* of December 2004, and *Natural Disasters Raise the Environment on the Global Security Agenda* of October 2004 environmental security report.] The tsunami warning system for the Indian Ocean should be launched by June 2006 with the rest of the world to follow a year later, said Koichiro Matsuura, head of UNESCO. UNEP's Executive Director Klaus Toepfer stressed that such a system should be extended to all forms of natural and man-made disasters, including climate change. Grassroots groups were unhappy with the conference's outcomes, as it failed to set

concrete plans of action and targets with political commitment and measures to hold nations accountable for their pledges. Germany plans to hold an international conference later this year on how to enhance early warning systems and limit the damage from natural disasters. It has already hosted two disaster early warning conferences in 1998 and 2003. The EU is considering setting up an international reaction force made up of about 5,000 experts identified by national governments, trained together and placed under central co-ordination in an emergency, with rapid reaction teams in different disaster situations. (January 2005) Ref.1225

### **UN Tsunami Early Warning Systems Extended to Mediterranean, Northeast Atlantic**

As part of a global tsunami warning and mitigation system, UNESCO's Intergovernmental Oceanographic Commission (IOC) launched the plans for a system for the North-Eastern Atlantic Ocean, Mediterranean and connected seas. At the first meeting of the new system's Intergovernmental Coordination Group, experts from 23 Mediterranean and Northeast Atlantic countries identified the key technical needs for the system and adopted an action plan for 2006-2007 with the aim of having an initial operational system in place by December 2007. Beyond those in the Pacific and Indian Oceans, planning is underway for one in the Caribbean. [See also *Indian Ocean Tsunami Early Warning System to be Operational by the End of 2005* in August 2005, and *Tsunami Triggers an Early Warning System for Indian Ocean and Beyond* in January 2005 environmental security reports.] (November 2005) Ref.1226

### **China to Launch Climate Adaptation Program**

China is preparing to launch its first four-year comprehensive national program to address the effects of climate change on China. The program, to be launched in two months, will outline goals for reducing emissions of greenhouse gases and developing green technologies, and mitigation measures to address the implications of global warming on China's food production and on coastal cities. A comprehensive report, produced by six Chinese academic and government organizations, warns that because of continuous temperature rise, China's grain production might be reduced by up to 37% in the second half of this century, and water scarcity increase considerably due to rapidly melting glaciers. (February 2007) Ref.1227

### **U.S. Climate Change Science Program Progress Assessment**

*Evaluating Progress of the U.S. Climate Change Science Program: Methods and Preliminary Results* by the National Research Council acknowledges advancements made by the CCSP in documenting and understanding global changes, but finds that more work is needed concerning regional impacts, human vulnerabilities, and mitigation and adaptation options, as well as improving communication with stakeholders and decision makers at all levels. Lack of adequate high-quality data from satellites—crucial to the advancement of climate change science—is identified as the single greatest threat to the future success of CCSP. (September 2007) Ref.1228

### **Calls for recommitment on ten-year anniversary of U.N. Framework Convention on Climate Change**

Marking the ten-year anniversary of the U.N. Framework Convention on Climate Change, U.N. Environment Program Executive Director Klaus Toepfer called for rapid ratification of the Kyoto Protocol that is the framework for how nations should reduce their greenhouse gas emissions to meet the convention's objective of "stabilization of greenhouse gas concentrations." U.N. Secretary General Kofi Annan hailed the rise of wind energy use, hybrid vehicles and other

green policies but called for even more efforts since atmospheric concentration of carbon dioxide has increased 5 percent in the decade since the convention (not the Kyoto Protocol) entered into force. He also called on those countries that have not yet ratified the protocol to do so, pointing mainly to Russia. (March 2004) Ref.1229

### **Conference on Resilience Concepts for Large-Scale Disasters**

Applications of chaos theory, self-organization, wisdom of the crowds, and other concepts of how to achieve unity of effort in conditions where there is no unity of command in humanitarian assistance and disaster management associated with large-scale social crisis and global change will be discussed at the U.S. Resilience Summit 2008 to be held at the Cosmos Club, 2121 Massachusetts Ave, N.W., Washington, D.C. October 23rd. The meeting is intended to lead to an international summit in 2009; however, some UN and other international participation is expected. According to Michael D. McDonald, President, Global Health Initiatives, Inc. and coordinator for the Resilience Summit, lessons will be drawn from disasters such as Hurricanes Katrina and Ike, the Pakistani earthquake, the Indian Ocean Basin Tsunami, and Cyclone Nargis. Anticipating needs for emerging situations such as in the Philippines, North Korea, Darfur, Somalia, Zimbabwe, Eritrea, Northern Baja California, Nigeria, Mexico City, and US inner cities will also be explored. (September 2008) Ref. 1230

## **OTHER POTENTIAL NATURAL DISASTERS**

### **NASA Scientist Warns of Possible Severe Solar EMPs in 2013**

Dr Richard Fisher, the director of NASA's Heliophysics Division, has warned in an interview that the coincidence of the sun's magnetic energy and sunspot cycles in 2013 could produce devastating electromagnetic pulses (EMPs), disabling large portions of the electricity grid. The National Academy of Sciences made a similar forecast two years ago. (June 2010) Ref. 1231

### **Solar Storm Could Wipe Out Power Grid**

A recent article in New Scientist, sparked by a report from the National Academies, calls attention to the grave danger to the electronic environment posed by a very large "coronal mass ejection" – a solar storm, one of which, although admittedly extremely rare (the worst one so far was in 1859), could effectively destroy the electricity grid over a large section of the US. Magnetospheric effects from the coronal plasma ball would induce large DC currents in the high-voltage grid, melting transformers and leading to a national disaster of unimaginable proportions. (April 2009) Ref. 1232

### **Experts Call For Global Network to Prevent Asteroid Disasters**

The report Asteroid Threats: A Call for Global Response by the Association of Space Explorers presented for consideration by the UN calls for an international contingency plan to counter threats from Near Earth Objects (NEO), such as an asteroid impact on the Earth. It points out that although a possible collision is predictable up to 15 years in advance, developing the technology needed to divert an incoming asteroid may require international cooperation. The UN Committee on the Peaceful Uses of Outer Space will debate the report at its 2009 session to be held in June 2009. (November 2008) Ref. 1233]

## CLIMATE CHANGE COMPUTER MODELING AND SCENARIOS

An International Conference on Post-Kyoto Climate Change Mitigation Modeling gathered about 450 people — experts in modeling as well as students — to introduce developments of greenhouse gas reduction modeling and foster international cooperation and networking for improving GHG reduction analysis models. It was agreed that the models should factor in new developments in technical innovation, changes in lifestyle, and energy security and energy systems.

Military and security experts participating at a conference organized by the Scripps Institution of Oceanography's new Center for Environment and National Security agreed that the Defense Department has to negotiate directly with climate modelers to get the future forecasts it needs. NOAA's next-generation climate models are expected to incorporate knowledge of the social sciences, agriculture, and marine ecosystems, and highlight not only potential changes, but also which might be the plausible consequences. It was also highlighted that there is a gap between the way scientific data is presented and the real needs of the defense organizations. (June 2010) Ref. 1235

A new scenario developed by Climate Analytics to the request of Greenpeace Switzerland is forecasting global warming by considering the Swiss climate policy model at world level and linearly extending the policy trend up to 2020 to 2100. By these assumptions, global emissions peak at 60 Gt CO<sub>2</sub> in the 2050s, and drop below 50 Gt CO<sub>2</sub> by 2100. The best-estimate global warming in this scenario is 1°C by 2020, 1.8°C by 2050 and 3°C above pre-industrial by 2100. (December 2009) Ref. 1236

The World Wide Fund for Nature (WWF) report *Climate Solutions II* warns that the world has only five years to switch to low-carbon reindustrialization and avoid the point of no return estimated to be in 2014. The report considers two scenarios of emission cuts by 2050 relative to 1990 levels: one of 63% cuts, and another of 80%. It finds that clean, low-carbon industries would need to grow at least 22% a year for the 63% reduction scenario to be achieved, and at least 24% a year for the 80% reduction scenario to be achieved. According to the report, the estimated short-term investment to achieve these goals is between \$7 trillion and \$17 trillion. (October 2009) Ref. 1237

Prof Dirk Helbing of the Swiss Federal Institute of Technology in Zurich has outlined a plan for a "Living Earth Simulator" that would use economic, environmental, and health data to create a model of the entire planet in real time. The project would gather detailed data about the planet and human activities, use it to simulate the behavior of whole political, social, and economic systems, and then make predictions to prevent crises from occurring. He also envisions 'situation rooms' from which global leaders could manage crises as they were going on. (May 2010) Ref. 1238

New projections by the World Meteorological Organization for tropical cyclones until the end of the century show that although there will be fewer storms in number, they will be stronger and carrying more rain, therefore more damaging. Overall strength of storms measured in wind speed would rise by 2-11%; an 11% increase in wind speed translates to roughly a 60% increase in damage. Another study, analyzing only the Atlantic hurricane basin, predicts double the



number of category 4 and 5 hurricanes, and a 28% increase in damage near the U.S.

Simulation models developed by Keith Cherkauer, affiliated with the Purdue Climate Change Research Center and the Center for the Environment in Discovery Park, show that Indiana, Illinois, Wisconsin and Michigan could receive 28% more precipitation by the year 2070, with most of it in winter and spring, while summer and fall seasons could be drier. He used three different scenarios based on different amounts of carbon emissions. The results also showed that by 2077, in the four states, winters could be 2.7°F to 5.4°F warmer and summers 3.6°F to 10.8°F warmer than today. Using the Variable Infiltration Capacity Model—which simulates how precipitation moves through land surface environments—he predicted stream flow for six rivers: the Chippewa, Wisconsin, Illinois, Wabash, Grand, and Rock Rivers. (February 2010) Ref. 1239

Scientists from NOAA, combining three models into one tool, were able to simulate with higher accuracy storms' evolution and categories across the Atlantic. They found that by the end of the century, although storms will in general decrease in number, they will be more powerful; category 4 (210-249 kilometers per hour) and category 5 (over 250 kilometers per hour) will double in frequency. The hardest hit will be Haiti and the Dominican Republic, the Bahamas and the northeastern coast of the U.S. These results corroborate results of other climate models. (January 2010) Ref. 1240

A newly revised NASA model trying to address the complexities of atmospheric chemistry, suggests that some greenhouse gases have considerably stronger warming effects than previously estimated. When the hydroxyl-consuming effect is factored in, methane's planet-warming potential is about 28 times more than that of CO<sub>2</sub> (compared to 25 times shown by previous studies), while carbon monoxide's greenhouse warming potential rises from 2.2 times to 3.3 times that of CO<sub>2</sub>. It further finds that their greenhouse effect increases even further if their inhibiting influence on the formation of planet-cooling clouds is incorporated into the model. The new finding, published in the October 29 *Science*, reveals the difficulty of making long-term climate predictions under various emissions scenarios. However, the model can help policymakers better assess the potential climatic effects of specific types of emissions and design reduction targets accordingly.

Recent discoveries reveal that it took only six months to plunge Europe into the last ice age. The research, conducted by William Patterson from the University of Saskatchewan in Saskatoon, Canada, using mud deposits from Lough Monreagh lake in western Ireland, shows that 12,800 years ago, most probably due to a sudden slowdown of the Gulf Stream, the northern hemisphere was plunged into a mini-ice age that lasted for 1,300 years. Professor Tim Lenton from the University of East Anglia notes, "In the period from 65,000 to 10,000 years ago there were periods of abrupt warming and cooling roughly every 1,500 years, when the temperature in Greenland might fall or rise by 10°C (18°F) in a decade." (November 2009) Ref. 1241

Climate-Rapid Overview and Decision Support Simulator (C-ROADS) is a new climate change model, developed by the Sustainability Institute, aiming to help policymakers assess the greenhouse gas emissions implications of their strategies. The forecasts show that unless all nations take dramatic steps to reduce greenhouse gas emissions, temperature and sea level rises will be unacceptably high by the end of the century.

Scientists participating at the conference Climate Forcing of Geological and

Geomorphological Hazards, September 15-17, 2009, outlined evidence that global warming could cause geological disturbances, which can result in earthquakes, tsunamis, avalanches, and volcanic eruptions. Although linking earth's sensitivity to climate is only emerging and more data is needed to build predictive climate models linking the two systems, the evidence is there, say scientists. (September 2009) Ref. 1242

A computer model developed by the Australian Bureau of Meteorology and the Commonwealth Scientific and Industrial Research Organisation has confirmed for the first time that there is a link between southeast Australia's changed weather patterns—decline in rainfall (drought)—and rising levels of greenhouse gases, aerosols, and ozone depletion. (August 2009) Ref. 1243

For the first time, researchers have constructed a model that combines the impact on global temperature of four factors: human influences such as CO<sub>2</sub> and aerosol emissions; heating from the sun; volcanic activity; and the El Niño southern oscillation. The analysis shows that the relative stability in global temperatures in the last seven years is due primarily to a decline in incoming sunlight associated with the 11-year solar cycle, and a weak El Niño, which therefore masked the real warming effects caused by CO<sub>2</sub> and other greenhouse gases. The research was carried out by Judith Lean, of the US Naval Research Laboratory, and David Rind, of NASA's Goddard Institute for Space Studies and will be published in *Geophysical Research Letters*. (July 2009) Ref. 1244

MIT Integrated Global Systems Model, a comprehensive computer simulation including global economic activity and climate processes, involving 400 runs with slight variations of parameters, revealed—compared to 2000, a median probability of surface warming of 5.2°C (9.4°F) by 2100, with a 90% probability of 3.5°-7.4°C (6.3°-13.3°F). A 2003 median projection was a warming of 2.4°C (4.3°F). However, the estimates might be understatement, as they don't include positive feedbacks from phenomena like methane release as consequence of arctic permafrost melting. The model was run and illustrated for situations with and without “policy change” for curbing greenhouse gas emissions. (May 2009) Ref. 1245

A computer model by the Institute of Mechanical Engineers in Britain shows that over the next 40 years, even if CO<sub>2</sub> emissions continue to grow at the current rate (1.9% annual average), global temperatures will still rise 2°C relative to the pre-industrial age. The computer model also predicts that by the end of the first decade of the 22<sup>nd</sup> century, atmospheric CO<sub>2</sub> would be 4 times the pre-industrial level—even with a decreasing rate of emissions, and by 3000 almost all of Greenland's ice would be melted and Atlantic ocean circulation would be fundamentally changed. (February 2009) Ref. 1246

Four models by the Met Office Hadley Centre on climate projections show the possible range of temperature rise by 2100 as a function of actions in greenhouse gas emissions. While all models show that some global warming by the end of the century is inevitable because of the CO<sub>2</sub> already in the atmosphere, they outline the direct dependency of temperatures rise on actions to cut emissions. The most optimistic scenario shows global temperature rise of 2–2.8°C with the condition that actions start in 2010 and emissions decrease 47% by 2050 at a sustained rate of 3% per year. In the worst-case (no action) scenario, temperatures could rise by 5.5–7.1°C,

with significant and irreversible impacts. The two middle-case scenarios, based on slow emissions reductions, show possible temperature rises of 2.9–3.8°C in the case of actions starting in 2010, and 4–5.2°C if action is delayed until 2030. (December 2008) Ref. 1247

The Center for a New American Security gathered some 40 climate scientists and experts in security, environmental policy, and business from Asia, Europe and the U.S. for a “war game” involving global warming. Four teams, representing China, Europe, India, and the U.S., had to negotiate the best deal for their team, in the case of a scenario set in 2015. The climate simulation up to 2100, based on the worst-case scenario proposed by the IPCC, was provided by the Oak Ridge National Laboratory in Tennessee. The three-day exercise confirmed the difficulties of such negotiations and might have pinpointed some specific aspects that should be considered in real situations.

The new NCAR Front Range Flash Flood Prediction System being tested by the National Center for Atmospheric Research (NCAR) in Boulder CO provides advance notice of potentially deadly flash floods. According to the announcement, the system integrates real-time weather information with datasets about hydrology and terrain. These datasets incorporate information about land surface conditions, such as terrain slope, soil composition and surface vegetation. They also include information on stream flow and channel conditions. The goal of the system is to furnish a 30-minute or longer warning of a flood.

New computer modeling shows that changes of the Atlantic Thermohaline Circulation (ATHC) due to melting glaciers and sea ice could influence the sea surface temperature changes in the Gulf of Guinea, thus possibly causing African Monsoon failures, resulting in up to 60% rainfall reduction and intensifying drought. The effect is estimated to be felt in less than a decade, with more drastic consequences predicted for the 25-35 years after the onset of increased freshwater additions to the ocean resulting in a rapidly weakened ATHC. The authors suggest monitoring the ATHC’s changes and effects on the climate in the tropical Atlantic. (July-August 2008) Ref. 1248

Climate scientists and modelers warn that climate change forecasting abilities are still relatively weak and that some of those considered in policymaking—such as the IPCC assessments—are highly debatable, being too conservative and not taking into account the latest research.

Climate modelers from around the world met at the World Modelling Summit for Climate Prediction, held in Reading (UK), May 6-9, 2008, to try to improve forecasting abilities, including measures that will allow a better understanding of how the climate will be affected locally as well as globally. At the end of the four-day summit, scientists made the case for a climate-prediction project on the scale of the Human Genome Project. A key component of this scheme would be a world climate research facility with computer power far beyond that currently used in the field. (May 2008) Ref. 1249

A group of climate scientists from NASA and Columbia University Earth Institute found that climate change is “close to critical tipping points, with potentially dangerous consequences for the planet.” In a related interview, Dr. James Hansen of NASA said that the point of no return might be reached as soon as in 10 years, if world governments fail to curb GHG emissions. He also noted that the IPCC report underestimated sea level rise, which, he warns, might reach 1-2 meters by the end of the century, if West Antarctic and Greenland melting are factored in. The

*Dangerous human-made interference with climate: a GISS modelE Study* outlines two scenarios: ‘business-as-usual’, which shows disastrous consequences, and an ‘alternative scenario’ assuming controlled GHG emissions generating more moderate effects. (June 2007) Ref.1250

Global warming will increase the risk of natural disasters over the next two centuries, even if harmful emissions were cut now, warn climate scientists from the University of Bristol's Department of Earth Sciences. Compiling data from more than 52 climate models looking at the impact of greenhouse gas emissions, the researchers calculated the risks induced by climate change to the world's key ecosystems based on levels of warming (less than 2°C (3.6°F) to over 3°C (5.4°F)) and for each group assessed the probability of changes in forest cover, the frequency of wildfires, and changes to freshwater supplies over the next 200 years. The findings are expected to be used to explore measures to reduce hazards as much as possible. (August 2006) Ref.1251

A new study, *Global temperature change*, by a group of scientists, reveals that global surface temperature has increased approx.0.2°C per decade in the past 30 years, and the world is the warmest it has been in the last 12,000 years. Scientists estimate that pollution from human activity, combined with the loss of snow and ice cover, will accelerate future temperature increase. Also, since warming is not uniform around the globe, the likelihood of strong El Niños and other harsh weather phenomena increases. A global temperature rise of approx. 1°C might represent a threshold with “dangerous” consequences, as sea levels rise and species become extinct. (September 2006) Ref.1252

Strong correlation between global warming and severe storms is also revealed by a study based on more than 80 simulations using 22 sophisticated computer models of the climate system. The simulations show with 84% probability that for the period 1906-2005, human activity—mainly greenhouse gas emissions—are responsible for about two-thirds of the temperature increases in hurricane formation regions of the Atlantic and Pacific Oceans. The research team that produced the study includes 19 hurricane and climate scientists from ten research centers. (September 2006) Ref.1253

A new index developed by scientists of the Swiss Federal Institute of Technology in Zurich, allows mapping the different ways that climate change will affect different parts of the world. This is the first map to show how global warming combined with natural variations in the climate would affect our planet, highlighting the frequency of extreme climate events—such as heat waves and floods—by 2100 compared with the late 20th century. It is intended to “help policy-makers gain a quick overview of the scientific facts without getting lost in the detail,” says Michèle Bättig, member of the team. (January 2007) Ref.1254

New research and models by the National Center for Atmospheric Research and the University of Colorado's National Snow and Ice Data Center found that the Arctic could be seasonally free of sea ice by 2020, 30 years sooner than predicted by the IPCC report. In addition to all the consequences for the ecosystem and the Nordic inhabitants, this might accelerate even more global warming, as reflection of the sun’s heat and light will be strongly diminished. (May 2007) Ref.1255

New computer climate models reveal Earth's limits of CO<sub>2</sub> intake. The computer climate models developed by scientists from Berkeley Atmospheric Sciences Center, Woods Hole Oceanographic Institution, and the National Center for Atmospheric Research (NCAR) in Boulder, Colorado indicate that CO<sub>2</sub> absorption by land and oceans can not keep up with the current trends of increasing fossil fuel emissions, accelerating climate warming after the critical point is reached. The process is increased by drought and other phenomena already present. The paper explaining the findings, *Evolution of carbon sinks in a changing climate* was published in the Proceedings of the National Academy of Sciences (PNAS) of August 9, 2005.

Another computer model, also developed by scientists at the National Center for Atmospheric Research, simulates Earth's climate at the time of the greatest mass extinction in history, at the end of the Permian Era. It reveals that an abrupt and dramatic rise in atmospheric levels of CO<sub>2</sub> triggered the extinction of an estimated 90-95% of all marine species, and about 70% of all terrestrial species. "The results demonstrate how rapidly rising temperatures in the atmosphere can affect ocean circulation, cutting off oxygen to lower depths and extinguishing most life," says NCAR scientist and lead author, Jeffrey Kiehl. (August 2005) Ref. 1256

Results of state-of-the-art climate models by Lawrence Livermore National Laboratory are consistent with new observational estimates of temperature data obtained from satellites and weather balloons, providing compelling evidence that the tropical troposphere is warming since 1979. Human activity is considered as one important cause of the warming. [See also *New Developments on Climate Change* of January 2005 environmental security report.] (August 2005) Ref.1257

## **C. Protecting the Environment Due to Its Inherent Moral Value**

WWF and the Global Footprint Network report that humanity's impact on the planet has more than tripled since 1961 and that Earth's resources are being used faster than they can be replaced by nature. If present trends continue, by 2050 humanity will demand twice as much as the planet can supply. The Millennium Ecosystem Assessment reported that 60% of Earth's vital ecosystem services are being degraded or used unsustainably.

There are more than 700 MEAs. The focus of international negotiations is switching from designing new treaties to reinforcing existing ones and strengthening international environmental governance. Evaluation mechanisms of the effectiveness of these agreements are improving. Nevertheless, noncompliance with international treaties and lack of cooperation with international organs, as well as deadlock in many international treaty-related negotiations, continue to be an international concern.

The 2007 UNEP Governing Council adopted decisions on issues related to strengthening international environmental governance (including the draft Environment Watch Strategy Vision 2020 and coordination and synergies among multilateral environmental agreements) and improving the assessment of the world environmental situation and mitigation actions.

### **ENVIRONMENTAL SECURITY-RELATED INTERNATIONAL REGULATIONS THAT HAVE BEEN COMING INTO FORCE SINCE AUGUST 2002**

#### **Access to Information and Liability**

##### **Rotterdam Convention on the Prior Informed Consent (PIC)**

*Rotterdam Convention (PIC) entered into force on February 24, 2004*

The Rotterdam Convention on the Prior Informed Consent (PIC) stipulates that export of a chemical covered by the Convention can take place only with the prior informed consent of the importing country and requires labeling and information on potential health and environmental effects; entered into force on February 24, 2004. (February 2004) Ref1259

##### **Protocol on Strategic Environmental Assessment (SEA)**

*Protocol to the UNECE Convention on Environmental Impact Assessment in a Transboundary Context*

The SEA is a Protocol to the Convention on Environmental Impact Assessment in a Transboundary Context that will require its parties to include public participation in environmental impact analysis of all major projects prior to implementation, and requires that a response be given to that public participation. The protocol will enter into force when 16 signatories ratify (May 2003). Ref.1260

*Meeting of parties to the Convention held 1-4 June 2004*

Meeting of the signatories to the SEA protocol was held 1-4th June 2004 in Cavtat (Croatia). At

the time of this writing, the final documents were not yet available. Updates will be available on UNECE website at: <http://www.unece.org/env/eia/cavtat.htm>

### **Aarhus Convention on Access to Information Public Participation in Decisionmaking and Access to Justice in Environmental Matters.**

#### *Full Application of the Aarhus Convention*

On 22 October 2003, the European Commission put forward three new legislative proposals towards a full application of the Aarhus Convention. These proposals cover those aspects of the Convention that were not dealt with earlier: 1) directive on access to justice on environmental matters; 2) regulation on the application of the Aarhus principles to the EU institutions and bodies; and 3) decision on conclusion by the EU of the Aarhus Convention, which would allow the EU to ratify the convention. The Aarhus Convention deals with access to information, public participation in decision-making and access to justice in environmental matters in order to implement its provisions into EU law. (October 2003) Ref.1261

#### *Network of Environment Centres in Central Asia*

The resolution adopted at the third regional seminar on the implementation of the Aarhus Convention in Central Asia calls for the set up of a new network of Aarhus Resource centers in five Central Asian states. The centers will raise environmental awareness and provide the general public with access to information. The network will improve the mechanism for implementing the Convention and help governments and civil society in the region to collaborate on decisions regarding environmental policy. (February 2004) Ref.1262

### **Kiev Protocol to Aarhus Convention Enters into Force in October 2009**

The Kiev Protocol on Pollutant Release and Transfer Registers to the UNECE Aarhus Convention (Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters) will enter into force on October 8, 2009, 90 days after receiving its 16th ratification (France, on July 10, 2009.) The Kiev Protocol is a legally binding international instrument among European countries regulating information on pollutants' release and transfer, with the objectives of enhancing public access to information, assessing progress and priority areas for pollution reduction, and monitoring compliance with certain international agreements. It requires facilities to report annually on the amounts of certain pollutants they release to the environment or transfer to other facilities. The EU-27 countries are expected to release their first annual reports on the pollutants covered by the Protocol on September 30, 2009. (July 2009) Ref.1263

### **European Environmental Liability Directive Came Into Force**

The Environmental Liability Directive establishes a comprehensive framework on liability for damage to the environment, based on the "polluter pays" principle. It aims to ensure that the financial liability for environmental damage prevention or remediation falls on the polluters who caused it, rather than on the taxpayers. Operators are financially responsible for ensuring that they have preventive or remedial measures. When the environmental situation involves more than one member state, then they must cooperate on the necessary preventive or remedial actions. The Directive was adopted in April 2004 and member states were supposed to bring into force the appropriate laws and regulations by April 30, 2007. [See also *European Union Polluter Pays Law*] (April 2007) Ref. 1264

**EU Polluter Pays Bill**

The final draft, approved by the European Parliament on March 31, 2004 would hold Member States responsible for ensuring that environmental damage is either prevented by taking appropriate measures or effectively remedied by restoring the previous situation if damage has already been done. (April and February 2004) Ref. 1265

**Air Pollution****Geneva Convention, Protocol on Persistent Organic Pollutants (POPs)**

*Geneva Convention on Long-range Transboundary Air Pollution, Protocol on Persistent Organic Pollutants (POPs) entered into force on October 23*

The Protocol on Persistent Organic Pollutants (POPs), the sixth protocol to take effect under the Geneva Convention on Long-range Transboundary Air Pollution of the U. N. Economic Commission for Europe (UNECE), has the ultimate goal of eliminating any discharges, emissions and losses of 16 POPs; entered into force in October 2003. (August-September 2003) Ref. 1267

**Gothenburg Protocol on Air Pollution Entered into Force in May 2005**

The Protocol to Abate Acidification, Eutrophication and Ground-level Ozone entered into force on 17 May 2005. The Protocol was originally adopted on 30 November 1999 in Gothenburg (Sweden) and signed by 31 countries. It is the eighth to take effect under the Convention on Long-range Transboundary Air Pollution of the United Nations Economic Commission for Europe (UNECE). The Protocol sets targets for emission cuts for sulphur dioxide, nitrogen oxides, volatile organic compounds (VOCs), and ammonia, and sets limit values for specific emission sources (e.g. combustion plants, electricity production, dry cleaning, cars and lorries) and requires best available techniques to be used to keep emissions down. (May 2005)

*Changes to Gothenburg Protocol—the Convention on Long-range Transboundary Air Pollution*  
U.S. ratification brought the Gothenburg Protocol to Abate Acidification, Eutrophication and Ground-level Ozone to just two ratifications away from its entry into force. This eighth Protocol to the Convention on Long-range Transboundary Air Pollution (LRTAP) of the United Nations Economic Commission for Europe (UNECE) sets emission ceilings for 2010 for four pollutants: sulphur, NO<sub>x</sub>, VOCs, and ammonia, regulating emissions by sources (e.g. combustion plant, electricity production, dry cleaning, cars and trucks), and requiring the use of best available techniques to keep emissions down. In the meantime, an expert group is conducting work on fine particles; the results might lead to either amendment of the Gothenburg Protocol or a new protocol specifically on fine particles.

Two new persistent organic pollutants (POPs) may be considered for addition to the Protocol on POPs, pentabromodiphenyl ether (PBDE) and perfluorooctane sulphonate (PFOS).

As the 1979 Convention presently covers just Europe, the U.S., and Canada, efforts will increase to extend it towards the east, involving East European, Caucasian and Central Asian countries. (December 2004) Ref. 1268



**EU New Directive on Air Pollution**

A new air quality directive approved by the Environment Council is fixing an annual concentration limit for fine dust particles (known as PM2.5) to 25 micrograms per cubic meter averaged over a year, with effect from 1 January 2015 and will require Member States to reduce people's exposure to this group of particles by 20% between 2010 and 2019. The new directive would not change existing air quality standards for other pollutants but would give Member States more flexibility in meeting some of these in zones where they face difficulties. [See also *EU Thematic Strategy on Air Pollution for the CAFE Programme* in September 2005, and *The European Union Environmental Initiatives* in January 2005 environmental security reports.] (October 2006) Ref. 1269

**EPA Proposes Tougher Air-Quality Rules**

The EPA tougher National Ambient Air Quality Standards proposal sets a primary standard for ground-level ozone at no more than 0.060 to 0.070 parts per million (measured over eight hours), to be phased in over the next two decades (extended for regions with highest smog pollution). A secondary smog standard is proposed to protect the environment, especially plants and trees. [Related item: *EPA Warnings on Various Potential Health Hazards* in October 2009 environmental security report.] (January 2010) Ref. 1270

**UN Economic Commission for Europe Adopts Electric and Hybrid Vehicle Regulations**

The UN Economic Commission for Europe (UNECE) adopted the first international technical regulation on safety for fully electric and hybrid cars, within the 1958 UNECE framework. The Regulation will ensure that cars with a high voltage electric power train, such as hybrid and fully electric vehicles, are as safe as conventional cars. These standards on manufacturing and marketing are expected to increase sales and will apply not only in the EU, but in a number of other markets, such as South Korea, Japan, and Russia. Mutual recognition of approvals among contracting parties of the 1958 agreement will be possible as soon as the Regulation is applied. (March 2010) Ref. 1271

**Spain Promotes European Common Strategy on Electric Cars**

A February 9th meeting of EU industry ministers focused on plans to establish a common strategy for electric cars. Spain, the strongest promoter of the plan, suggests that the electric car be included in EU's 2020 agenda and is pushing the European Commission to adopt a common strategy. Germany also supports the idea. Nevertheless, environmental-protection NGOs warn that unless developed in concordance with "smart" power grids, large-scale use of electric cars could be counterproductive to reducing CO<sub>2</sub> emissions. [Related item: *European Climate and Energy Package Formally Adopted* in April 2009 environmental security report.] (February 2010) Ref. 1272

**EU Airline Carbon Trading to Start in 2011—a Year Earlier than Planned**

The European Parliament's Environment Committee voted to include aviation in Europe's emissions trading scheme from 2011—a year earlier than planned. Airlines should bid for at least 25% of pollution permits. Members of the European Parliament want to set CO<sub>2</sub> emissions cap at 90% of the levels between 2004 and 2006 rather than 100%, with the cap lowered in subsequent years from 2013. [See also *New European Environmental Regulations* in December 2007 and

*Europe to Propose Emissions Targets for All Flights to/from or within Europe* in November 2006 environmental security reports.] (May 2008) Ref.1273

Provisional Agreement for Including Aviation in the Emission Trading Scheme from 2012

The EU lawmakers reached agreement with Member States to include aviation in the greenhouse gas emissions trading scheme from 2012. The airlines will have to cut emissions by 3% in the first year, and by 5% from 2013 onwards, paying for 15% of their permits to pollute. Presently, aviation generates an estimated 3% of EU CO<sub>2</sub> emissions, but air traffic is expected to double by 2020. [See also *EU Airline Carbon Trading to Start in 2011—a Year Earlier than Planned* in May 2008 and other similar items in previous environmental security reports.] (June 2008) Ref.1274

**ASEAN Agreement on Transboundary Haze Pollution**

*ASEAN Haze Agreement to Enter into Force 25 November, 2003*

The ASEAN Agreement on Transboundary Haze Pollution will enter into force on 25 November, 2003. This follows the deposit of the sixth instrument of ratification by the Government of Thailand with the Secretary General of ASEAN on 26 September, 2003. This agreement is the first such regional arrangement in the world that binds a group of contiguous states to tackle transboundary haze pollution resulting from land and forest fires. The Agreement contains provisions on monitoring, assessment and prevention, technical cooperation and scientific research, mechanisms for coordination, lines of communication, and simplified customs and immigration procedures for disaster relief. The Agreement provides for the establishment of an ASEAN Coordinating Centre for Transboundary Haze Pollution Control to undertake the various activities required under the Agreement. (September 2003) Ref.1275

*Indonesia urged to quickly ratify ASEAN Agreement on Trans-boundary Pollution*

INDONESIA advised others not to assign blame to it for the recurring haze while Malaysia urged the nation to quickly ratify the ASEAN Agreement on Trans-boundary Pollution to help arrest the problem. (June 2004) Ref.1276

**Europe to Reduce Fluorinated Gas Emissions**

In August 2003 the European Commission adopted a proposal to regulate emissions of fluorinated greenhouse gases (F-gases) used in refrigeration and air conditioning systems. The main elements of the proposal are provisions to improve the containment of these gases, better reporting, specific restrictions on marketing and use of F-gases in certain applications, and a phase-out of HFC-134a in car air conditioning systems (March 2004) Ref. 1277

EU Committee Proposes Banning Fluorinated Gases

The European Parliament has voted to ban the use of fluorinated gases (F-gases) in certain products, including shoes, and car air conditioning systems. This is a much watered-down regulation compared to previous plans. The committee proposes to regulate the F-gases on an environmental basis and not on an internal market basis, which avoids countries having to adopt environmental standards higher than those of the EU's, thereby making themselves subject to trade sanctions. [See also *EU Environment Ministers Propose post-Kyoto Protocol Climate Policies* in October 2004 and *Europe to Reduce Fluorinated Gas Emission* in March 2004 environmental security reports.] (October 2005) Ref. 1278

**European Parliament Passed the Fine Particles Air Quality Directive**

The European Parliament approved the text of a new directive on ambient air quality and cleaner air for Europe. The new legislation replaces and updates five existing laws and for the first time sets binding standards and target dates for fine particles PM<sub>2.5</sub> (particulate matter that is 2.5 micrometers or smaller in size). EU States will have to reduce exposure levels in their urban areas to PM<sub>2.5</sub> by an average of 20% by 2020 compared to 2010 levels, and bring them below 20 micrograms/m<sup>3</sup> by 2015, while keeping the 25 micrograms/m<sup>3</sup> levels throughout their countries. Member States will have two years to adopt the necessary national laws after the directive's entry into force. [See also *EU New Directive on Air Pollution* in October 2006 environmental security report.] (December 2007) Ref.1279

**Aquatic Environment****Freshwater****EU to Introduce New Regulations to Combat Surface Waters Pollution**

The European Commission has proposed new rules regulating the amount of chemicals and toxic substances seeping into the continent's surface waters. The new regulation will apply to the 25-nation bloc, and would set new limits on the concentration levels of 41 hazardous chemicals in rivers, lakes and coastal waters. The directive, if approved by member states and the European Parliament, would require EU nations to "achieve the proposed limits for all priority substances by 2015 and cease discharges and emission of priority hazardous substances into water by 2025," says the Commission statement. (July 2006) Ref.1282

**European Parliament Approves New Water Quality Standards Directive**

The European Parliament approved the new directive on water environmental quality standards to harmonize quality standards across the EU and thereby better protect surface waters (rivers, lakes and coastal waters) against pollution from a range of 33 priority chemicals. . The new directive is the final major piece of legislation in the Water Framework Directive and replaces five existing directives, simplifying water-related reporting within the newly created Water Information System for Europe. Member States have until December 2009 to comply. [See also *EU to Introduce New Regulations to Combat Surface Waters Pollution* in July 2006 environmental security report.] (June 2008) Ref.1283

**Protocol on Shared Watercourse Systems**

Indian Water Diversion from 37 Himalayan rivers to be completed by 2016 affects neighboring Bangladesh, Nepal, and Bhutan, who depend upon these rivers for 85% of their drinking water. India has been planning to divert water from 37 Himalayan rivers to drier areas of the country. A report on this irrigation scheme is due by 2006, with construction to commence shortly thereafter and be completed by 2016. However, diversion of these rivers affects neighboring Bangladesh, Nepal, and Bhutan, who depend upon these rivers for 85% of their drinking water. Flooding during the monsoon season is likely to increase as a result of this diversion. Salinity would affect agricultural lands. The mangrove forests of the Bangladeshi deltas, which are a World Heritage site, would suffer from the lack of fresh water influx. Bangladesh is protesting through

diplomatic channels. About 40% of humanity lives in the 260 major international water basins shared by two or more countries; hence, one can expect an increasing need for bi- and multi-lateral treaties to prevent conflict. (August-September 2003) Ref. 1284

### **Draft European Transboundary Guidance on Water and Adaptation to Climate Change**

The Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention) of the UN Economic Commission for Europe (UNECE) is preparing a draft Guidance on water and adaptation to climate change, the first of its kind looking at adaptation from a transboundary perspective. The Guidance will cover impacts of climate change on water quantity and quality, assessment of risks, and addressing vulnerability and adaptation strategies in the UNECE region and beyond. The draft Guidance will be submitted to the fifth session of the Meeting of the Parties to the Water Convention, to be held November 10–12, 2009 in Geneva. (September 2009) 1285

### UNECE Guidance on Water and Adaptation to Climate Change

The fifth meeting of the parties to the United Nations Economic Commission for Europe (UNECE) Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention) was held November 10-12, 2009 in Geneva. It adopted the Guidance on Water and Adaptation to Climate Change to help address the impacts of climate change on transboundary freshwater. The Guidance provides an overview of multilateral agreements related to water issues, and an interdisciplinary methodology on how to develop and implement an adaptation strategy in a transboundary context, as well as recommendations to decisionmakers and water managers on how to assess impacts of climate change on water quantity and quality, perform risk and vulnerability assessments, and design and implement appropriate adaptation strategies. It also contains about 40 case studies. (November 2009) Ref. 1286

### **EPA Issues New Regulations on Water Pollution from Construction**

The Environmental Protection Agency has issued a final rule to be phased in over four years to help reduce water pollution from construction sites. Builders must use best management practices to ensure that construction activity does not pollute nearby bodies of water; and, for larger projects, they must also monitor discharges and ensure they comply with specific limits. (November 2009) Ref. 1287

## **Marine Environment**

### **UN General Assembly adopts Resolutions on Marine Protection**

The UN General Assembly concluded its debate on oceans and the law of the sea by adopting three resolutions: one entitled “Oceans and the Law of the Sea” (resolution A/57/L.48/Rev.1) on compliance of shipping vessels with conservation measures; and the other two on protecting the marine environment and harmful fishing practices. The Assembly also decided to establish a UN process for global reporting and monitoring of the marine environment by 2004. The Secretary-General would be invited to establish an effective, transparent and regular inter-agency coordination mechanism on oceans and coastal issues within the UN. (December 2002) Ref.: 1289

**“Roving” Marine Protected Areas as Climate Change Affects Migration**

Climate change affects weather patterns, ocean currents, and temperatures, which affect ecosystems and animals' migration; hence, areas set aside for wildlife protection may have to change as well. None of the over 4,500 marine protected areas worldwide have been designed factoring in climate change, say experts. Hence, scientists are speculating about possibilities of drawing “roving” protected areas as a function of changing conditions. Although technical advancements facilitate the task of identifying ecosystem changes, the issues of governance might be a greater challenge. The current 0.7% of the world's oceans being designated as protected is far from the 20% to 30% by 2012 goal declared at the 5th World Parks Congress in 2003. [See also *Marine Protection to Increase* in June 2008 and other similar items in previous environmental security reports.] (March 2009) Ref. 1290]

**IMO Sets New Limits on Ship Fuel Pollution**

The International Maritime Organization has agreed on severe new limits on ship fuel pollutants, especially sulphur (sulfur). The restrictions are to be implemented by 2015, and will impose a change in sulphur limits in special Sulphur Emission Control Areas (SECA) to 0.1% from the current 1.5%. The set of SECAs, now including only Baltic and North Sea areas, is likely to be expanded to other coastal regions in the world. (May 2008) Ref. 1291

**Tougher Global Limits Imposed on Air Pollution from Large Ships**

The Marine Environment Protection Committee (MEPC) of the IMO adopted regulations to reduce harmful air emissions from large ships. The revised MARPOL Annex VI Regulations for the Prevention of Air Pollution from Ships sets progressive reduction in emissions of sulphur oxide (SO<sub>x</sub>), nitrogen oxide (NO<sub>x</sub>), and particulate matter from ships. By 2020, ships will be required to use fuel with no more than 5,000 ppm sulfur, a 90% reduction from today's global cap. The revised Annex VI, and the associated NO<sub>x</sub> Technical Code, will enter into force on July 1st, 2010, under the tacit acceptance amendment procedure. MARPOL Annex VI entered into force in May 2005 and has, so far, been ratified by 53 countries, representing 82 % of the gross tonnage of the world's merchant shipping fleet. [See also *Concerns over Maritime Air Pollution Increase* in February 2008 environmental security report.] (October 2008) Ref. 1292

**Work Plan for Reducing Greenhouse Gas Emissions from Ships**

The Marine Environment Protection (MEP) Committee of the International Maritime Organization (IMO) agreed to an interim package and a work plan aiming to reduce greenhouse-gas emissions from shipping. The procedures do not set any CO<sub>2</sub> reduction rates, and include only voluntary technical and operational measures to reduce emissions. The measures have a trial status until the MEPC 60th session, to be held in March 2010, when they will be adapted as necessary. The Second IMO study on GHG emissions estimates that the shipping industry was responsible for 3.3% of the 2007 global emissions, and, if no global policies are adopted to regulate shipping emissions, by 2050 they might increase by 150% to 250% compared to 2007 levels. However, implementing technical and operational measures could increase efficiency and reduce emissions by 25% to 75% below the current levels. (July 2009) Ref. 1293

**UN Treaty on Maritime Goods Transportation Opened for Signature**

The new UNCITRAL Convention on Contracts for the International Carriage of Goods Wholly

or Partly by Sea, known as the “Rotterdam Rules”, provides a legal framework governing the international carriage of goods by sea and industry practices. 90% of world trade travels in part by ocean transport. The Convention sets clear global rules for rights and obligations, liability and redress of all parties involved in shipping goods by sea. Adopted by the General Assembly in December 2008, the Rotterdam Rules opened for signature on September 23, 2009 and need 20 ratifications for entry into force. To date, it already has 20 signatories (including the U.S.) representing over 25% of current world trade volume. (October 2009) Ref. 1294

### **IMO Adopts New Convention on Ships' Ballast Water**

The International Convention for the Control and Management of Ships' Ballast Water and Sediments adopted by the International Maritime Organization (IMO) aims “to prevent the potentially devastating effects of the spread of harmful aquatic organisms carried by ships' ballast water.” The Convention will enter into force 12 months after ratification by 30 States, representing 35% of world merchant shipping tonnage. (February 2004) Ref. 1295

### Ratification began for the International Convention for the Control and Management of Ships' Ballast Water and Sediments

Australia is the first country to sign the international agreement regulating ships' ballast water, adopted in February 2004 by the UN International Maritime Organization (IMO), and began the ratification procedures. The International Convention for the Control and Management of Ships' Ballast Water and Sediments stipulates a series of measures aiming to prevent potential marine hazards caused by aquatic organisms carried by ships' ballast water. It will come into force 12 months after ratification by 30 countries, representing 35% of world merchant shipping tonnage. [See also *IMO Adopts New Convention on Ships' Ballast Water* in the February 2004 environmental security monthly scanning report.] (June 2005) Ref. 1296

### **The Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter entered into force on March 24, 2006**

The 1996 Protocol to the 1972 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Convention) entered into force on March 24, 2006. The Protocol is a comprehensive and restrictive set of regulations regarding dumping of wastes at sea. The new rules prohibit dumping of any materials except for those on an approved list. The 1972 Convention permitted dumping of wastes at sea, except for those materials on a banned list. This is the first international maritime treaty regulating storage of wastes in the seabed, as well as the abandonment or toppling of offshore installations, and it includes the “polluter pays” principle. Although the Protocol's dumping provisions do not cover internal waters, Parties to the Protocol have the option to apply its rules to their internal waters if they wish (Article 7). The Protocol also has linkages with other international environmental agreements that have been developed since 1972; for instance, the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal. The U.S. is a Party to the 1997 London Convention, but is not a Contracting Party to the 1996 Protocol. (March 2006) Ref. 1297

### **New International Agreement on Recycling of Ships**

The International Convention for the Safe and Environmentally Sound Recycling of Ships was adopted at the International Convention held in Hong Kong, May 11-15, 2009. The new Convention covers all phases of a ship's life and operation, from design to dismantling in an

environmentally and safe manner, and the establishment of an enforcement mechanism. It also requires all vessels to maintain records of hazardous materials, for workers to be equipped with protective gear, and for recycling centers to have disposal procedures for hazardous materials. The Convention will be open for signature from September 1, 2009 to August 31, 2010 and for accession thereafter; it will enter into force 24 months after ratification by 15 States representing 40% of world merchant shipping by gross tonnage. (May 2009) Ref. 1298

### **EU Integrated Maritime Policy**

The European Commission has adopted an Integrated Maritime Policy for the EU. The new policy will build on Europe's strengths in marine research, technology, and innovation, as well as space technology, for ensuring maximum environmental sustainability. [See also *Political Agreement Reached on the European Marine Strategy Directive* in December 2006, *Europe to Harmonize Marine Pollution Legislation* in July 2005, and *International Maritime Organization wants global rather than many different local or regional rules* of January 2003 environmental security reports.] (October 2007) Ref. 1299

### **European Directive on Ship-Source Pollution Became Effective on April 1, 2007**

Directive 2005/35 on ship-source pollution and the introduction of penalties for infringements became effective April 1, 2007 across all 27 EU member states. The Directive introduces application of criminal penalties for gross negligence or illegal discharges of polluting substances at sea. It came into force in October 1, 2005 with implementation on March 1, 2007, and the EU member states were obligated to incorporate it into their national laws by March 31, 2007. Note: by 2011, the International Maritime Organization will require all ships to be equipped with a voyage data recorder, similar to the black box on an aircraft. This will greatly help the new directive's enforcement. [See also *Political Agreement Reached on the European Marine Strategy Directive*, *Europe to Harmonize Marine Pollution Legislation*, and *International Maritime Organization (IMO) wants global rather than many different local or regional rules*] (April 2007) Ref. 1300

### **European Parliament Passed the Marine Strategy Directive**

The European Parliament approved the text of the Marine Strategy Directive that calls for the establishment of marine regions and sub-regions to be managed by Member States on a coherent and coordinated ecosystem-based approach and for ensuring that the marine strategies affecting the regions are coherent and coordinated. Member States are to assess the status of their region's marine environment, set objectives, and establish targets and programs by 2015 to attain good environmental status by 2020 and establishment of marine protected areas. [See also *Political Agreement Reached on the European Marine Strategy Directive* in December 2006 and other similar items in previous environmental security reports.] (December 2007) Ref. 1301

### **EU Waste Shipment Legislation Came into Force in July 2007**

The EU legislation on transboundary shipments of waste adopted in 2006 came into effect July 12, 2007. The regulation establishes a legal framework to ensure that waste is properly handled from the time it is shipped to the time it is disposed of or recovered at destination, and bans the export and/or disposal of hazardous waste to certain countries. The new law replaces the 1993 waste shipment regulation, stipulating a more clear and simplified framework, as well as more severe enforcement measures. [See also *EU to Increase Environmental Regulations Enforcement*

in October 2006, *Toxic Waste Disposal of Global Growing Concern* in September 2006, and other related items in previous environmental security reports.] (July 2007) Ref.1302

### **Anti-Fouling Systems on Ships Convention to Enter into Force in September 2008**

The International Convention on the Control of Harmful Anti-Fouling Systems on Ships (AFS Convention) will enter into force on September 17, 2008 (12 months after fulfilling the criteria for entry-into-force.) The AFS Convention bans the use of organotin compounds on ships' hulls or external surfaces, requires the application of an isolating coating for ships already carrying such compounds, and establishes a mechanism to assess other anti-fouling systems to prevent the use of potentially harmful substances in these systems. The Convention will apply to all ships and floating units operating under the flag of a Party to the Convention and/or entering the port, shipyard, or offshore terminal of a Party. (September 2007) Ref.1303

### **Single-hull Oil Tanker Phase-out Entered into Force**

Single-hull oil tanker phase-out—implementation of MARPOL Annex I regulations 13G and 13H—entered into force on April 5, 2005 for all States Party to the MARPOL Convention. (April 2005) Ref. 1304

#### **UN Maritime Agency to Accelerate Phase-Out Of Single-Hull Tankers**

The amendments to the International Convention for the Prevention of Pollution from Ships are expected to enter into force in April 2005. (December 2003) Ref1305

### **Proposals to the EU to cut sulfur emissions from ships**

The European Union released a legislative proposal intended to reduce ships' sulfur emissions, going beyond the global maritime norms. The high sulfur fuel used by ships is responsible for sulfur dioxide emissions that contribute to acid rain, which can pollute waterways and damage forests and crops. Although the shipping industry is contesting the proposal as contravening the International Law of the Sea, the green groups consider that the targets to cut ship sulfur emissions should be as high as 80% by 2010. So far the EU is only willing to look at cuts around 10%. (February 2003) Ref.: 1306

### **Oil Spill Fines Increase—effective March 2005**

Oil pollution damage compensation under the 1992 Civil Liability Convention will be substantially enhanced with the entry into force of the Supplementary Fund for Compensation for Oil Pollution Damage at the beginning of March 2005. Under the new Protocol, payments for an oil spill will be raised and capped at 750 million Special Drawing Rights (about \$1.152 billion). Meantime, the EU agreed on stronger measures against ships polluting European waters. Each EU country would be allowed to charge a minimum penalty for marine pollution. The fines are between 150,000 and 300,000 euros (about \$398,500) for less serious cases, and between 750,000 and 1.5 million euros for more serious cases, although member states may set higher fines if they want. The new rule is pending approval by the European Parliament. The EU ambassadors will also seek agreement for proposing that ships' captains' personal liability be included in international maritime conventions. (December 2004) Ref. 1307

### **Political Agreement Reached on the European Marine Strategy Directive**

The European Environment Council reached political agreement on the framework directive for EU action on marine environment policy. The Marine Strategy Directive aims to ensure that all



EU marine waters are environmentally healthy by 2021 and it is the main component of the Thematic Strategy on the Protection and Conservation of the Marine Environment, which was adopted in October 2005. The Strategy is based on regional assessment of the marine situation, exchange of information, and design of policies to improve ecosystem conservation or rehabilitation, as well as pollution reduction and clean-up. [See also *New EU Environmental Strategies* in September 2005, *Europe to Harmonize Marine Pollution Legislation* in July 2005, *The European Union Environmental Initiatives* in January 2005, and *International Maritime Organization (IMO) wants global rather than many different local or regional rules* of January 2003 environmental security monthly reports.] (December 2006) Ref. 1308

### **European Parliament Resolution to Protect Whales From Sonar**

The European Parliament has passed a resolution calling on its 25 member states to halt the deployment of high-intensity active naval sonars until a global assessment of their cumulative environmental impact on marine mammals, fish and other marine life has been completed. The resolution also asks the European Commission to conduct an assessment study of current practices and their impact in European waters. The issue is expected to be on the agenda of two upcoming events: the second meeting of the Parties to a European regional cetacean conservation treaty November 9 to 12 that will vote on a resolution on the harmful effects of military sonar on marine life, and the final stakeholders meeting on the EU Marine Strategy, November 10-12. [See also items *Research Confirms Military and Industry Sonar Harms Whales*, and *US military waived in respecting environmental law* under ‘Other New Technologies Potential Implications’ further in this report.] (October 2004) Ref. 1309

### **Commercial Whaling Ban Strengthened by International Whaling Commission (IWC)**

Delegates to the IWC meeting adopted a resolution to keep the moratorium banning commercial whaling in effect, despite Japan’s lobbying for its suspension. Conservation organizations and anti-whaling countries argue that Japan’s lethal “scientific research on whales,” violates international regulations for whales’ protection. Japan threatens to leave the IWC and form another organization to deal with regulations on whale-related issues. (June 2007) Ref. 1310

### **Shipwrecks Removal Treaty Received First Signature**

The Nairobi International Convention on the Removal of Wrecks adopted in May 2007 provides an international legal framework to deal with shipwrecks presenting possible safety and/or environmental hazards. According to the International Maritime Organization, the number of abandoned shipwrecks worldwide is estimated to be 1,300, and the threat they represent has been increasing. The convention provides the legal basis for States to remove the wrecks, or have them removed, and have the registered owner liable for costs incurred. The Convention is open for signature until November 18, 2008, thereafter being open for ratification, accession or acceptance; it will enter into force 12 months after the date it receives ten ratifications (or accessions or acceptances). (March 2008) Ref. 1311

### **South-west Pacific Islands Might “Localize” environment-protection legislation**

In contrast to the preceding item, in the southwestern Pacific ecosystem-based management of coastal areas might become very much decentralized. "The island nations of the south-western Pacific are considering allowing citizens to reclaim legal control of their local seas, in the hope they can use their traditional knowledge, customs and laws to protect fish stocks and

biodiversity,” says a *New Scientist* article. In this plan, villages will own the seas immediately adjacent to them, and can set up environment-protecting restrictions for them, with the legal backing of the central government. (April 2004) Ref. 1312

### **Marine Protection to Increase**

The International Whaling Commission 2008 Scientific Committee report reveals alarming results that the number of ocean dead zones has grown to 400, from only 44 areas reported in 1995. UNEP says that man-made activities such as use of fertilizers, and sewage and other pollutants, combined with the impact of climate change, have led to the doubling of the number of oxygen-deficient dead zones every decade since the 1960s. Meantime, New Zealand put forward a new Exclusive Economic Zone Environmental Effects Bill, expected to be introduced by late August, which will apply to environmental effects of currently unregulated activities in the EEZ. [See also *International Conference and Assessments Find Rising Ocean Pollution* in October 2006 and other similar items in previous environmental security reports.] (June 2008) Ref. 1313

### **Maritime Protected Areas**

#### UN Convention on the Protection of the Underwater Cultural Heritage will Enter into Force in January 2009

The Convention on the Protection of the Underwater Cultural Heritage will enter into force on January 2, 2009, three months after 20 States ratified it. “This represents an essential addition to UNESCO’s standard-setting apparatus” declared Koïchiro Matsuura, Director-General of UNESCO. The Convention aims to curb the destruction of underwater cultural heritage and its Annex details the rules for activities directed at underwater sites. (October 2008) Ref. 1314

#### New Marine Protected Areas Proposed

New proposals aim to protect critical marine ecosystems and whale and dolphin habitats in several Mediterranean Sea areas and the Black Sea from excessive fishing, intense shipping traffic, and maritime pollution. The proposed areas include: the entire Alborán Sea and Straits of Gibraltar; the Strait of Sicily; the Amvrakikos Gulf (NW Greece); two Black Sea areas; and seven other Mediterranean areas—5 in Greece, 2 in Italy. The proposals will be put forward to the 20-country parties Agreement on the Conservation of the Black Sea, Mediterranean Sea and contiguous Atlantic area (ACCOBAMS) by its Scientific Committee at the Meeting of the Parties to be held in Croatia, in October. Meanwhile, the Spanish Navy has asked ships to slow to 15 knots and sail “in a maximum state of vigilance” to avoid colliding with whales in the Strait of Gibraltar. [Note: The state of World Fisheries and Aquaculture 2006 report released this month by FAO warns that several species of fish in high seas outside of national jurisdictions are in danger.]

The World Wildlife Fund (WWF) launched a campaign for creating a network of conservation areas in the Southern Ocean by 2012, to protect it against unsustainable fishing, marine pollution, and effects of climate change. WWF will put forward the Southern Ocean protection proposal at the next Antarctic Treaty Consultative meeting, to be held from 30 April to 11 May 2007 in New Delhi, India. [Note: see item Website for Marine Protected Areas and Cetaceans’ Sanctuaries further in this report] (March 2007) Ref. 1315

Roadmap for Establishing the Global System of Marine Protected Areas

Establishing a Marine Protected Areas network by the year 2012 was proposed at the First International Marine Protected Areas Congress held in October 2005. *Establishing Networks of Marine Protected Areas – Making It Happen* is a roadmap for helping to meet that goal. Launched at the World Conservation Union (IUCN) Marine Protected Area Summit in Washington, DC, April 11, 2007, it was published by the National Oceanic and Atmospheric Administration, in collaboration with the IUCN World Commission on Protected Areas, the Great Barrier Reef Marine Park Authority, the World Wildlife Fund–Australia, and The Nature Conservancy. [See also *Network of Marine Protection Areas to be Adopted by 2012, Marine Environment Needs More Protection, Stronger Regulations to Protect Ocean Marine Environments.*] (April 2007) Ref.1316

New Pacific Marine Protected Area Is World’s Largest

Kiribati has established the Phoenix Islands Protected Area, covering 410,500 square kilometers in the central Pacific. A representative of the New England Aquarium, which is advising the Kiribati government, stated, “The new boundary includes extensive seamount and deep-sea habitat, tuna spawning grounds and as yet un-surveyed submerged reef systems.” (February 2008) Ref.1317

Mandatory Area to be Avoided in New Zealand—established by IMO

The New Zealand Maritime Safety Authority has successfully petitioned the International Maritime Organization (IMO) to have the area around the Poor Knights Islands designated as a “Mandatory Area to be Avoided” (MAA). The Poor Knights area became the first place on the planet to be protected by the new IMO classification, which was created to protect ecologically fragile areas. As a consequence, ships longer than 45 meters (148 feet) must stay at least 5.5 miles (8.8 kilometers) east of the Poor Knights, starting December 1, 2004. (May 2004) Ref. 1318

Stronger Guidelines for UN Fish Stocks Agreement

Delegates attending a preparatory meeting for the review of the UN Agreement for Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, agreed on guidelines to strengthen the treaty in order to better manage the world’s fish stocks. The guidelines will serve to: evaluate the adequacy and implementation status of the Agreement, assess what new political commitments are needed, establish new regional management organizations, and strengthen international cooperation. The “Fish Agreement” entered into force in December 2001; the review conference will be held in New York, May 22–26, 2006. (March 2006) Ref. 1319

**IMO establishes first “Mandatory Area to be Avoided” in New Zealand**

The New Zealand Maritime Safety Authority has successfully petitioned the International Maritime Organization (IMO) to have the area around the Poor Knights Islands designated as a “Mandatory Area to be Avoided” (MAA). The Poor Knights area became the first place on the planet to be protected by the new IMO classification, which was created to protect ecologically fragile areas. As a consequence, ships longer than 45 meters (148 feet) must stay at least 5.5 miles (8.8 kilometers) east of the Poor Knights starting December 1, 2004. (May 2004) Ref.1320

**World Database on Marine Protected Areas**

The World Database on Marine Protected Areas is a new online system designed to provide up-to-date information on marine protected areas and marine and coastal ecosystems. It is a tool that would help decision-makers, conservation organizations, and communities around the world to enforce marine protected areas conservation and management. Note: marine protected areas represent less than 1% of earth's surface, while terrestrial protected areas are about 12%. [Items on similar issues in previous environmental security reports: "*Roving*" *Marine Protected Areas as Climate Change Affects Migration* in March 2008.] (June 2009) Ref. 1321

**France Creates 90-mile Mediterranean Ecological Zone**

The French National Assembly has approved a law creating a 90-mile ecological zone to protect the country's Mediterranean coastline, with the primary objective of stopping ships from dumping dirty ballast water in the designated zone. Offenders face fines up to \$600,000 and up to four years in jail.

The law was approved just days after the European Union agreed to ban single-hull oil tankers from its ports. The ban will enter into force once the European Parliament approves it. Single-hull oil tankers older than 23 years would be immediately banned from the EU, while more modern ones would be phased out in stages up to 2015. The EU is pushing for the ban to be adopted by the International Maritime Organization (IMO) by the end of the year. (April 2003) Ref.: 1322

**Micronesian Nations Sign Coral Reef Protection Document**

The presidents of Palau, Micronesia, and the Marshall Islands became the first heads of state to sign the International Declaration of Reef Rights, created by the Reef Check Foundation to raise awareness about the value of coral reefs and how to protect them. 2008 is the International Year of the Reef. (September 2007) Ref. 1323

**Coral Triangle May Get Regional Protection**

The six Asian countries (Indonesia, Malaysia, the Philippines, Papua New Guinea, the Solomon Islands and East Timor) that border the "Coral Triangle" have been discussing measures for additional safeguarding of that fragile region against pollution and other hazards. The US has pledged nearly \$40 million to support these efforts. (October 2008) Ref. 1324

**Biological Diversity and Safety****Cartagena Protocol on Biosafety***The First Meeting of the Conference of the Parties to the Cartagena Protocol on Biosafety*

The first meeting of the Parties (COP MOP 1) adopted procedures and mechanisms to implement and promote compliance with the Protocol aiming to protect biological diversity from the potential risks that may be posed by living modified organisms (LMOs), commonly referred to as genetically modified organisms (GMOs). (February 2004) Ref. 1326

*Cartagena Protocol on Biosafety Enters Into Force*

The Cartagena Protocol on Biosafety requires exporters to provide the importer complete relevant information and documentation pertaining to genetically modified organisms; entered into force in September 2003. (August-September 2003) Ref. 1327

The EU Executive Commission also adopted new legislation that requires each variety of genetically modified organisms used in food and animal feed to be assigned a unique code so products containing these GMOs can be accurately labeled and traced when they get on the market. (January 2004) Ref 1328

### **Convention on Biological Diversity and the Cartagena Protocol**

The third Meeting of the Parties to the Cartagena Protocol on Biosafety (COP/MOP-3) was held from 13-17 March 2006, in Curitiba, Brazil, preceding the eighth meeting of the Conference of the Parties to the Convention on Biological Diversity (CBD COP-8) held 20–31 March. COP/MOP-3 adopted 18 decisions ranging from requirements for handling, transport, packaging and identification of living modified organisms (LMOs) to capacity building and funding. The most important achievement was the adoption of the documentation requirements for LMO shipments for food, feed and processing (LMO-FFPs).

The Conference of the Parties to the Convention on Biological Diversity (CBD COP-8) focused on concrete actions and policies to achieve the 2010 biodiversity target. *Global Biodiversity Outlook 2*, by the secretariat of the UN CBD, released at the opening of the Conference, reveals that human activity might be the cause of the worst extinction since the dinosaurs' era. Some notable outcomes of the CBD COP-8 include:

- call to use zoning schemes, special management areas, and policies to preserve endangered species
- designation of several new protected areas
- rejection of lifting the moratorium on terminator seeds
- set of measures and objectives for the protection and sustainable use of the vulnerable biodiversity of islands, and another on arid lands
- new initiatives to raise awareness globally on the consequences of the biodiversity loss
- an alliance among the world's top research centers and agencies specializing in biodiversity to cooperate with the UN CBD to reduce the rate of loss of biodiversity by 2010
- Conservation of Biodiversity Rich Sacred Natural Sites initiative
- a 2010 Biodiversity Forum with preparations to begin this year

The ninth Conference of Parties will be held in 2008, in Germany. The Convention on Biological Diversity has 188 Parties (168 Signatures), and the Cartagena Protocol on Biosafety has 132 Parties (103 Signatures). The United States is not Party to any of them. (March 2006) Ref. 1329

### UN Convention on Biological Diversity 7th Conference of the Parties (COP 7) reaffirmed governments' engagement to establish a worldwide network of protected areas by setting rigorous targets to reduce loss of biological diversity

UN Convention on Biological Diversity 7th Conference of the Parties (COP 7) held in Kuala Lumpur, 9-20 February 2004 and attended by some 2,000 participants, including 80 ministers, reaffirmed governments' engagement to establish a worldwide network of protected areas (on land by 2010 and in the world's oceans by 2012 including parts of the high seas, which fall outside national jurisdictions), by setting rigorous targets to reduce loss of biological diversity. The delegates decided to adopt a more quantitative approach to help monitor the extinction rates and meet the targets and sub-targets. Using measurable indicators, governments will be able to

more accurately measure progress or regress on the set-up targets.

The proposal was formulated at the January 2004 meeting in Madrid by environmental officials from Europe, Russia, and Central Asia. COP 8 will be held in Brazil in 2006. (January and February 2004) Ref.1330

#### New Mechanisms for Enforcing Biosafety and Biological Diversity Treaties

The focus of the fourth Meeting of the Parties to the Cartagena Protocol on Biosafety (COP/MOP 4), held from 12-16 May 2008 in Bonn, Germany, was on enforcement measures. It adopted 18 decisions on issues related to: the Biosafety Clearing-House; identification and handling of living modified organisms; notification requirements; risk assessment and risk management; and monitoring and reporting. The timetable and framework were set for a liability and redress regime concerning potential damage caused by the movements of genetically modified organisms, which will be further discussed at the next meeting of the parties to take place in October 2010, in Nagoya, Japan. An ad hoc technical expert group was mandated to consider risk assessment and risk management issues. The *Rules, Procedures and Mechanisms Applicable to Processes under the Cartagena Protocol on Biosafety* was also published at this meeting. The Ninth Meeting of the Parties to the Convention on Biological Diversity followed, May 19-30, 2008, also in Bonn, Germany, assessing mechanisms to reduce loss of biodiversity. The CBD COP 9 adopted the “Bonn roadmap” that addresses issues concerning an international regime on access and benefit-sharing; a mechanism for assessing marine areas in need of protection; a resolution on biodiversity and climate change, including language cautioning against ocean fertilization; and an agreement on biofuels. [See also *International Biodiversity Meetings Make Decisions and Tougher Systems to Control GMO Suggested* in March 2006 environmental security report.] (May 2008) Ref.1331

#### **International Body to Monitor Biodiversity Destruction**

The Intergovernmental Science Policy Platform on Biodiversity and Ecosystem Services (IPBES) will be an international body to monitor and curb the destruction of biodiversity. It is modeled on the Intergovernmental Panel on Climate Change (IPCC), which helped raise climate change on the international and national agendas and trigger changes. The establishment of the new body was agreed to by governments meeting in Busan, South Korea, and has to be approved by the UN General Assembly’s 65th session, which opens in September, and then presented for endorsement by environment ministers attending the UNEP Governing Council/Global Ministerial scheduled to be held in February 2011, in Nairobi, Kenya. [Related item: *New Mechanisms for Enforcing Biosafety and Biological Diversity Treaties* in May 2008 environmental security report.]

Meantime, UNEP released the first issue in its new Policy Series on Ecosystem Management, “Integrated Solutions for Biodiversity, Climate Change and Poverty.” It highlights, inter alia, the importance of biodiversity in adaptation to climate change and the need for a new strategy to increase engagement of business leaders to improve biodiversity protection. (June 2010) Ref. 1332

#### **Plant Genetic Resources for Food and Agriculture—FAO International Treaty—Entered into Force in June 2004**

The FAO’s International Treaty on Plant Genetic Resources for Food and Agriculture entered into force on 29 June 2004. Countries can now share breeding material from several countries

without the need for bilateral agreements for each country. An international fund will be established by payments from those who commercialize plants bred with material from the Multilateral System created by the treaty. The fund will be used to help developing countries improve general conservation, sustainable use of plant genetic resources, and gene bank conservation. It is expected to increase agricultural genetic diversity, which has been reduced considerably; and hence, play a crucial role in the conservation and sustainable use of plant genetic resources increasing food security. (June 2004) Ref. 1333

### **Intensified Efforts Needed to Save Biodiversity**

The International Conference on Biodiversity, Science and Governance hosted by UNESCO in Paris, 24-28 January 2005, concluded that strong science and effective governance mechanisms, strategies, and concrete actions to curb the current trend of biodiversity loss are needed by the 2010 target date set at the 2001 World Summit on Sustainable Development. With more than 7,000 animal species and 60,000 plant species threatened, some scientists estimate that the current rate of extinction is a thousand times greater than at any other time in the course of human history. Biological diversity is the basis of environmental viability for all life support. (January 2005) Ref. 1334

### **Protected Sites and Species**

#### New Strategy of UNESCO World Heritage Committee for Heritage Sites and Climate Change

UNESCO's World Heritage Committee is registering protected sites threatened by climate change. These sites will be monitored and actions will be suggested to prevent their damage from climate change. A policy document on the impact of climate change on World Heritage properties will be presented to the World Heritage Committee in 2007. Created in 1972, UNESCO's World Heritage List covers 812 sites around the world. Located in 137 countries, 628 of the World Heritage sites are cultural, 160 are natural and 24 are mixed. [See also *New Protected Ecological Sites* in July 2005, *Nine New Hotspots Added to World's Protected Areas* in February 2005, *Intensified Efforts Needed to Save Biodiversity* in January 2005, and related items on UNESCO World Heritage Sites in November and June 2004, and October 2003 environmental security monthly reports.] (July 2006) Ref. 486

#### UNESCO Added 23 New Reserve Sites in 18 Countries

UNESCO added 23 new sites in 18 countries to the World Network of Biosphere Reserves that are managed on sustainable development principles to reduce biodiversity loss. Three countries join the global network—El Salvador, Qatar, and the United Arab Emirates. The new additions include 2 sites in each: Argentina, Canada, China, El Salvador, and Portugal, and 1 site in each: Australia, Chile, Costa Rica, Ecuador, Lebanon, Mexico, Federated States of Micronesia, Mongolia, Qatar, South Africa, Spain, United Arab Emirates, and Viet Nam. UNESCO's Man and the Biosphere (MAB) network now comprises 529 sites in 105 countries. [See also *New Sites Added to World's Protected Biosphere Reserves* in October 2006 and others on the same issue in previous environmental security reports.] (September 2007) Ref. 1336

#### New UNESCO World Heritage Sites

The UNESCO World Heritage Committee began its 10-day session on June 28, 2004 in Suzhou,

China. It is expected that 48 new sites (33 cultural and 8 natural sites) will be added this year to the list of UNESCO World Heritage. (June 2004) Ref. 1337

#### New Sites Added to World's Protected Biosphere Reserves

UNESCO added 25 new sites to the UN global network of protected biosphere reserves that are managed on sustainable development principles. The new additions include 18 sites in Mexico, three in Spain, one trans-boundary site shared between Spain and Morocco, and one in each of the Russian Federation, Viet Nam, and Malawi. UNESCO's network Man and the Biosphere (MAB) Programme now comprises 507 reserves in 102 countries. [See also *New Protected Ecological Sites* in July 2005 and other previous environmental security reports.] (October 2006) Ref. 1338

#### Nineteen new Biosphere Reserves Added to UNESCO's MAB Network

The International Coordinating Council of UNESCO's Man and the Biosphere (MAB) Programme have added 19 new sites in 13 countries to UNESCO's World Network of Biosphere Reserves. The MAB Network now consists of 459 sites in 97 countries. The biosphere reserves are places recognized for promoting development in the service of both socio-economic development and biodiversity conservation. (November 2004) Ref. 1339

#### UN Ecological Reserves Network Adds 22 New Sites

The World Network of Biosphere Reserves, under the Man and the Biosphere (MAB) Programme of UNESCO, added 23 ecosystems to its list, for a total of 482 sites in 102 countries. At these reserves, communities promote sustainable development while also conserving biodiversity. The community members also contribute to governance, management, research, education, training and monitoring at the sites.

[See also *Nine New Hotspots Added to World's Protected Areas* in February 2005, *Intensified Efforts Needed to Save Biodiversity* in January 2005, and related items on UNESCO World Heritage Sites in November and June 2004, and October 2003 environmental security monthly reports.] (July 2005) Ref. 1340

#### Nine New Hotspots Added to World's Protected Areas

The new report by Conservation International, *Hotspots Revisited*, the result of a four-year project by nearly 400 ecologists, reveals nine more crisis areas for biodiversity. The 34 identified 'hotspots' harbor half of the world's plant species, three-quarters of the most threatened mammals, birds, and amphibians, and 42% of land vertebrates. The new website launched by Conservation International ([www.biodiversityhotspots.org](http://www.biodiversityhotspots.org)) features complete and updated information on the 'hotspots' around the world. (February 2005) Ref. 1341

#### First species selected to be protected under a NAFTA Commission

NAFTA's Commission for Environmental Cooperation (CEC) announced the first three wildlife species to be safeguarded under a new trinational effort to protect species of common conservation concern in North America: the leatherback turtle, humpback whale and pink-footed shearwater (bird). The North American Conservation Action Plans are designed to "establish a common conservation approach across the continent to reduce threats, share expertise and provide key information to the public and wildlife officers." The final action plans for a common approach among authorities in Mexico, United States, and Canada to protect the three species will be presented for public comment this fall. (March 2004) Ref. 1342



### Europe Declares Thousands of Protected Natural Sites

The European Commission adopted a list of more than 7,000 nature sites in the Atlantic and Continental regions of the EU to become part of NATURA 2000, the network of protected sites with the objective of halting the decline of biodiversity by 2010. (December 2004) Ref. 1343

### Proposal for a Network of Protected Natural Areas

At the January 2004 meeting in Madrid, environmental officials from Europe, Russia, and Central Asia formulated a common proposal aiming to stop global biodiversity decline by 2010. The proposal considers developing a network of protected natural areas—by 2010 on land and 2012 at sea, including parts of the high seas, which fall outside national jurisdictions. The Proposal was presented at the meeting of the Conference of the Parties to the Convention on Biological Diversity (COP 7) in Kuala Lumpur, Malaysia 9-20 February. (January 2004) Ref. 1344

### New Ecological Network Has Environmental Implications

The National Science Foundation announced the formation of a Design Consortium and Project Office for the National Ecological Observatory Network (NEON), field and lab instrumentation deployed across the United States and integrated via a cutting-edge information network into a continent-wide research platform designed to answer scientific questions at regional and continental scales to enable ecological forecasting. According to an NSF scientist, "It will ... [bring] together ecologists, engineers, social, physical, computer, and earth scientists—to investigate ecological phenomena that span large geographical areas and long periods of time." NEON is important because of the significant role of ecological monitoring and evaluation in monitoring the state of the environment as it is protected by domestic law and international agreements. (September 2004) Ref. 1345

### **World Parks Congress adopts Conservation Accord**

The Durban Action Plan and Durban Accord adopted at the 5th World Parks Congress in Durban, South Africa stipulates new commitments and policy guidance for protected areas worldwide. Among the 32 specific recommendations are: establishing a global system of protected areas linking surrounding landscapes and seascapes by 2012; and the development of a credible global estimate of funding needs by 2006 to improve the management of the world's 100,000 protected areas.

Also at the congress, West African countries (Cape Verde, Gambia, Guinea, Guinea-Bissau, Mauritania and Senegal, as well as 50 organizations) announced their participation in the Regional Program for Conservation of Coastal and Marine Resources, a new integrated network of protected marine areas to address rapidly declining fishing stocks. (August-September 2003) Ref. 1346

### **International Year of Deserts and Desertification—2006**

The UN has declared 2006 the International Year of Deserts and Desertification to help raise global public awareness of the threat that advancing deserts and desertification represent to humanity, and consequently to increase efforts to explore ways to cope, counter, or even reverse these phenomena. "...desertification has been seen as a threat to human security," notes UN

Convention to Combat Desertification Executive Secretary, Hama Arba Diallo. The southern progression of the Sahara increases famine and migration, escalating conflicts across Africa. December 2006 is the 10th anniversary of the UN Convention to Combat Desertification with 191 states parties. (January 2006) Ref. 1347

## **Chemicals and other Hazardous Compounds**

### **Montreal Protocol**

#### **First Extraordinary Meeting of the Parties to the Montreal Protocol Gives One-Year Extension to Ban on Methyl Bromide to 11 Developed Countries**

Among the parties to the Montreal Protocol, eleven industrialized countries have been granted "critical use exemptions" on the use of the pesticide and fumigant methyl bromide. The exemptions give users of methyl bromide a one-year extension to adopt cost-effective substitutes for this ozone-destroying substance. The 1987 Montreal Protocol requires the signatory states to phase out the use of nearly 100 chemicals that damage the ozone layer. (March 2004) Ref. 1349

#### **Ozone Continues to Thin over Antarctica Casting Doubt on Success of the Montreal Protocol**

The World Meteorological Organization estimates that the ozone hole over Antarctica this year is 8% larger than its peak in 2007 and it might take another 50 years to completely recover. Nevertheless, without the Montreal Protocol, the impact at the polar regions would have been more significant, shows the "world avoided" computer model, which considers only chlorine changes, all the other variables being constant. [See also *Call for Expanding Montreal Protocol on Ozone-Depleting Substances* in September 2007, and other similar items on this issue in previous environmental security reports.] (September 2008) Ref. 1350

#### **Powerful Greenhouse Gas HFCs Might be banned under the Montreal Protocol**

Although hydrofluorocarbons (HFCs) are not ozone-depleting chemicals, their use and commercialization might be banned under the Montreal Protocol. Experts and policy makers increasingly call for HFCs' phaseout due to their global warming potential hundreds or even thousands of times greater than CO<sub>2</sub>. Countries, like the Federated States of Micronesia, threatened by global warming, are advocating for a 90% HFC phaseout by 2030. The issue is expected to be discussed at the next meeting of the States Party to the Montreal Protocol, to be held November 4-8 in Port Ghalib, Egypt. (August 2009) Ref. 1351

#### **North American Proposal to Phase Down HFC's**

The EPA has announced that Canada and Mexico have joined the US in proposing to expand the scope of the Montreal Protocol on Substances that Deplete the Ozone Layer. The proposal would phase down hydrofluorocarbons (HFCs), which are a significant and rapidly growing contributor to climate change, and lists four possible substitute refrigerants. Note: previous proposals were opposed by China, India, and several Arab countries; see relevant item: *New Decisions Adopted for Strengthening the Montreal Protocol* in November 2009 environmental security report. (May 2010) Ref. 1352

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**Rotterdam Convention on PIC for Certain Hazardous Chemicals and Pesticides in International Trade to be Expanded**

The first Conference of the Parties to Rotterdam Convention on Prior Informed Consent (PIC) Procedure for Certain Hazardous Chemicals and Pesticides in International Trade was held in Geneva, 20-24 September 2004. The delegates approved 14 new hazardous substances to be added to the initial 27 substances already on the UN-backed treaty list. The conference also established a Chemical Review Committee to assess future proposals to add new chemicals and pesticides to the PIC list, as well as finalize other administrative procedures necessary for good operations. The fourteen new additions are: binapacryl; toxaphene; ethylene dichloride; ethylene oxide; monocrotophos; DNOC and its salts; dustable powder containing a combination of benomyl at or above 7 per cent, carbofuran at or above 10 per cent and thiram at or above 15 per cent; amosite, actinolite, anthophyllite and tremolite asbestos; tetraethyl lead and tetramethyl lead; parathion; and chrysotile asbestos. (September 2004) Ref. 1353

**Two New Pesticides Added to the Rotterdam Convention on the Prior Informed Consent (PIC) Watch List**

Endosulfan and azinphos-methyl were added to the Rotterdam Convention on the Prior Informed Consent (PIC) Procedure for Certain Hazardous Chemicals and Pesticides in International Trade watch list by the Chemical Review Committee. Endosulfan is a persistent organic pollutant (POP), while azinphos-methyl is derived from nerve agents developed during World War II. Both pesticides have been linked to reproductive and developmental damage in humans and animals. (March 2010) Ref. 1354

**Global Classification and Labeling System For Chemicals***A New Global Classification And Labeling System For Chemicals (GHS)*

After a decade of negotiations the UN Committee of Experts on the Transport of Dangerous Goods and the Globally Harmonized System of Classification and Labeling of Chemicals adopted a new global system on chemical safety in Geneva. The Globally Harmonized System for the Labeling and Classification of Chemicals (GHS) includes measures on proper management, hazard classification and pictogram labeling of chemicals. The GHS adds to the harmonized classification and labeling already in place for the transportation sector application to the workplace and consumer sectors.

The Committee is a UN Economic and Social Council (ECOSOC) subsidiary body and operates through the UN Economic Commission for Europe. The mandate for this work was adopted under Agenda 21 at the 1992 UN Conference on Environment and Development, and the Plan of Implementation was adopted on 4 September 2002 at the World Summit on Sustainable Development in Johannesburg. Countries are encouraged to have the new system fully operational by 2008. A UN publication of the GHS text will be available in 2003. (December 2002) Ref 1355

**Intergovernmental Forum on Chemical Safety becomes part of the International Conference on Chemicals Management**

The Intergovernmental Forum on Chemical Safety will be integrated into the International Conference on Chemicals Management (ICCM) as an advisory body providing an open, transparent and inclusive forum for addressing new and emerging issues related to sound chemicals management. The decision was taken at the sixth session of the IFCS, held in Dakar,

Senegal, September 15-19, 2008. The Forum also considered nanotechnology issues, decided to include manufactured nanomaterials on its agenda, and discussed (without reaching consensus) international transport of lead and cadmium via trade. [See also *Call for Global Ban on Lead-based Paints* in October 2007, *Call for Reinforcements to Chemical Safety* in September 2006, and other related items in previous environmental security scanning reports.] (September 2008) Ref. 1356

## **REACH Program**

*European Chemicals Agency created under the Registration, Evaluation, Authorization, and Restriction of Chemicals (REACH) program*

On 31 October 2003, the European Commission submitted to the European Parliament a proposal for the establishment of the Registration, Evaluation, Authorization, and Restriction of Chemicals (REACH) program. One of the most important elements in the proposed regulation is the establishment of a European Chemicals Agency. The European Commission itself will establish guidelines for the enforcement of the REACH program. (January 2004, May, August and April 2003, and November 2002) Ref. 1358

### REACH Entered into Force on June 1, 2007

The EU chemicals law, Registration, Evaluation, Authorization and Restrictions of Chemicals (REACH) entered into force on June 1. The law's managerial body, the European Chemicals Agency (ECHA) in Helsinki, officially began its operations. REACH is regulating the manufacturing, marketing, import, and use of all chemicals in the EU through a single system. The chemicals have to be registered over the next 11 years with the ECHA. REACH will significantly improve protection of human health and the environment while encouraging innovation and keeping the EU's chemical industry competitive. "[REACH] is the most progressive chemicals legislation in the world," said EU Environment Commissioner Stavros Dimas. (June 2007) Ref. 1359

### REACH, Europe's Chemical Regulations to Enter into Force on June 1, 2007

The REACH regulation (Registration, Evaluation, Authorization and Restriction of Chemicals) was approved by the European Parliament and the European Commission and will enter into force on June 1, 2007. REACH is regulating the manufacturing, marketing, import, and use of some 30,000 chemicals and is replacing 40 existing pieces of legislation, thus creating a single system for all chemicals in the European Union. The chemicals have to be registered over the next 11 years with the new European Chemicals Agency (ECHA) in Helsinki, which will be responsible for management of the new requirements. [See also *International Controversies over REACH in June 2006*, *Integration of Chemical Regulations (REACH) Approved by European Council in December 2005*, and other related items in previous environmental security reports.] (December 2006) Ref. 1360

### EU to Add Carbon and Graphite to REACH Program

Carbon and graphite were deleted from the list of exemptions (Annex IV) of the EU's Registration, Evaluation, Authorization and Restrictions of Chemicals (REACH) regulation, due to possible health hazards when they are used in nano-sized form (as in carbon nanotubes).

Therefore, companies producing, using, or trading with carbon and graphite now on have to comply with the REACH requirements. REACH entered into force on June 1, 2007 and its administrative office, the European Chemicals Agency, was inaugurated in Helsinki on June 3, 2008. [See also *New Study Raises Asbestos-type Health Worries for Nanotubes* in May 2008 environmental security report.] (June 2008) Ref.1361

#### EU Updates the REACH System, and WEEE and RoHS Directives

The EU Member States agreed to align EU legislation on classification, labeling and packaging of substances and mixtures to the UN Globally Harmonized System, as part of a global effort to protect humans and the environment from hazardous effects of chemicals. The new regulation will complement the EU REACH system, which is already in force.

The European Commission proposed a revision of the Waste Electric and Electronic Equipment (WEEE) directives and restrictions on: the use of certain hazardous substances in electrical and electronic equipment (RoHS) for greater coherence with other EU regulations (such as the labeling system, the waste framework, and REACH), easier implementation and enforcement, and higher but more flexible targets. Concerning the WEEE directive, the current collection target of 4 kg per person per year would be replaced by a mandatory collection target equal to 65% of the average weight of electrical and electronic equipment placed on the market over the two previous years in each Member State. [See also *EC Enforces Compliance of National Legislation with EU Environmental Regulations* in October 2007 and other related items in previous environmental security reports.] (December 2008) Ref. 1362]

#### REACH Draft Voted by the European Parliament

The draft REACH (Registration, Evaluation and Authorization of Chemicals) regulation passed the European Parliament on November 17<sup>th</sup>. Since just fewer than 300 out of more than 1,000 proposed amendments survived, the result pleased neither industrialists, nor environmentalists and the lobbying continues intensely on what might be one of the EU's most important pieces of legislation so far. As it stands now, the priority for screening potentially hazardous substances would be set by volume rather than by risk measures—as was the original plan. The British EU presidency is pushing to pass the regulation by the end of the year. However, that depends on the vote of the EU Council of Ministers due to meet on December 19<sup>th</sup>. If the Parliament's amendments are not accepted, then the bill might be sent back for a second reading and the debate would go on. [See also *The REACH Debate Continues* and other related listed items in October 2005 environmental security report.] (November 2005) Ref. 1363

#### The REACH Debate Continues

The full assembly vote on REACH (Registration, Evaluation and Authorisation of Chemicals), a regulation designed to reduce the impacts of hazardous chemicals on public health and the environment, is scheduled for November. However, the debate continues among different European parliamentary committees, industry lobbying groups, and environmental groups. The environment committee, which has the lead role in shepherding REACH, supported changes that would ease requirements for companies that deal with listed hazardous substances in volumes of 1-10 tonnes annually; but, would keep the registration rules for those handling over 10 tonnes annually, while another parliamentary committee recommended just requiring companies to replace hazardous substances with safe ones when substitutes are available. The European Eco-Forum pleads for strengthening REACH and extending it to the rest of the pan-European region,

a suggestion that they want to include on the agenda of the Belgrade 2007 "Environment For Europe" Conference. [See also REACH Closer to Finale in August 2005, The REACH Program Closer to Entry Into Force in March 2005, Leading Cancer Specialists call for REACH Strengthening in May 2004, and EU Chemical Policy Reforms in January 2004 environmental security reports.] (October 2005) Ref. 1364

#### REACH Closer to Finale

The drafting of the Registration, Evaluation and Authorization of Chemicals (REACH) legislation is in its final phases as it moves through committees in the European Parliament. The vote on it is scheduled for November. REACH provides a legal framework for controlling hazardous chemicals, requiring manufacturers and importers to register the physical, chemical and toxicological properties of substances with a central EU database, provide lifecycle safety and environmental risks information, and eventually get a special authorization for those of high concern. Britain, which holds the EU's rotating presidency, hopes that agreement on the program will be reached by the end of the year. [See also *The REACH Program Closer to Entry Into Force* in March 2005, *Leading Cancer Specialists call for REACH Strengthening* in May 2004, and *EU Chemical Policy Reforms* in January 2004 environmental security reports.] (August 2005) Ref. 1365

#### International controversies over REACH

Thirteen of the EU's top trading partners, including the United States, Australia and Japan, urged the EU to reconsider some of the harsh terms of its REACH (Registration, Evaluation and Authorisation of Chemicals) bill, since they are hard to implement and thus might hurt trade. REACH would require that the properties of about 30,000 chemicals produced or imported in the EU be registered with a central agency, while those of highest concern, like carcinogens, would require further testing and authorization. REACH is expected to get a second reading in the European Parliament later this year. [See also *Integration of Chemical Regulations (REACH) Approved by European Council* in December 2005, *The REACH Program Closer to Entry into Force in March 2005*, and other related items in previous environmental security reports.] Ref. 1366

#### REACH Program Closer to Entry into Force

The Registration, Evaluation and Authorization of Chemicals (REACH) legislation for controlling hazardous chemicals is likely to enter into effect in 2006 or shortly thereafter. It has already passed the legislative process, but the EU Commission has to approve it, and some modifications are possible. Manufacturers, importers and users who exceed the established threshold of 1,000 metric tons/yr will have to provide physical, chemical and toxicological data. Lifecycle safety and environmental risks for specific uses will have to be provided. "High concern" and "very high concern" are designations for chemicals that will need 1) tight management or possible substitution or 2) "are carcinogenic, mutagenic, or toxic to reproduction (CMRs); persistent, bio-accumulative and toxic (PBTs); very persistent and very bio-accumulative (vPvBs); persistent organic pollutants (POPs); or have equivalent properties", respectively. Owing to the EU's large trade volume, impacts of this legislation will be worldwide. Provision is made for an agency to securely handle proprietary information. Some 30,000 chemicals are expected to be controlled by this legislation/policy. Full registration of a given chemical must be completed within three years of final enactment of REACH, or

manufacture, importation and use will have to cease. As with the U.S. Toxic Substances Control Act, REACH supplements the Rotterdam Convention. (March 2005) Ref. and Related items 1367

#### Leading Cancer Specialists call for REACH Strengthening

At a colloquium organized by the French Association for Research on Treatments Against Cancer at UNESCO Headquarters, a transatlantic group of leading cancer specialists presented scientific evidence on the necessity of strengthening the Registration, Evaluation and Authorization of Chemicals (REACH) policy, in order to better control carcinogenic chemicals. The participant experts stated that REACH was much weakened under the pressure of the chemicals industry from both sides of the Atlantic. Corinne LePage, a French lawyer, wants to “advance the idea that polluting is a crime against humanity.” (May 2004) Ref. 1368

#### **EU Restrictions on Nanofoods Expected to Pass in July 2010**

The Committee on Environment, Health and Consumer Protection of the European Parliament has voted (42-2-3) in favor of excluding products containing nanoparticles from the EU list of novel foods allowed on the market. The action also included a declaration that food produced from nanotechnology processes must undergo risk assessment before being approved for use and must be labeled on packaging. A final plenary vote on the measure is expected to take place in the European Parliament in July. (June 2010) Ref. 1369

#### **Canada Increases Chemicals Control**

Ontario has joined Quebec in enacting restrictions on the use of pesticides and is going further by prohibiting the sale and cosmetic use of more than 80 ingredients and 250 products. Other provinces are considering similar measures. Ontario also proposed the Toxics Reduction Act, 2009, aiming to reduce the use of toxic and hazardous substances in manufacturing and industrial operations. If enacted, the directive will bring Ontario manufacturing into compliance with the EU REACH regulations. [See also *Canada Extends Toxic Substances Lists* in March 2009 and *New Chemicals Considered for Toxic Lists* in January 2009 environmental security reports.] (April 2009) Ref. 1370

#### **Agreement on International Carriage of Dangerous Goods by Inland Waterways (ADN) Closer to Entry into Force**

The European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways (ADN) is two ratifications away for entering into force. The ADN aims to set up high-level safety standards for the entire European Inland Waterways Network by a main legal text and regulations concerning the international carriage of dangerous goods by inland waterways; and effective prevention of pollution resulting from accidents or incidents during the carriage; while facilitating transport operations and promoting international trade in chemicals. (March 2006) Ref. 1371

#### **Protocol on Heavy Metals**

The Protocol on Heavy Metals entered into force on 29 December 2003

The Protocol on Heavy Metals has as objective to control emissions of man-made heavy metals (cadmium, lead, and mercury) that are harmful to health and the environment. The protocol entered into force in December 2003. (October 2003) Ref. 1372

**Ban on Mercury**EU Legislation Banning Mercury Exports in Effect in 2011

Legislation banning all exports of mercury from the European Union takes effect in March 2011. The EU is the world's biggest exporter, responsible for about 25% of the global mercury supply. The export ban is part of the EU's strategy for reducing the global supply of mercury and thereby addressing mercury pollution globally. [See also *Progress on Global Mercury Ban* in February 2007 and other previous environmental security reports on this issue.] (October 2008) Ref. 1373

Preparations for a Legally Binding Global Instrument on Mercury Advance

The First Meeting of the Intergovernmental Negotiating Committee to Prepare a Global Legally Binding Instrument on Mercury was held from June 7-11, 2010 in Stockholm, Sweden, attended by over 400 participants, representing governments, UN agencies, and intergovernmental and non-governmental organizations. This first meeting consisted of initial exchanges of views on key elements of a convention, with the most important outcome being the request to the Secretariat for significant intersessional work, including the "elements of a comprehensive and suitable approach" to a legally binding instrument, which will be a basis for negotiations at the next meeting to be held January 24-28, 2011, in Chiba, Japan. (June 2010) Ref. 1374

UNEP Governing Council/Global Ministerial Forum 2007 Makes Progress on Global Mercury Ban

The negotiations for a global ban of mercury progressed at the GC-24/GMEF (UNEP Governing Council/Global Ministerial Forum). Although a legally binding treaty imposing clear targets on cutting mercury use worldwide was not adopted, it was agreed that over the next two years an ad hoc open-ended working group will study the options for enhanced voluntary measures and international legal instruments to phase out mercury use. The group will provide a progress report to GCSS-10/GMEF, and a final report to GC-25/GMEF, which will make a decision on the matter. (February 2007) Ref. 1375

EU Seeking Global Mercury Ban

Health and environmental NGOs launched on January 10, 2007, the campaign "Stay Healthy, Stop Mercury" calling on the EU to promote global control on mercury pollution. The EU is expected to raise the global mercury ban issue at next month's UN Global Ministerial Environment Forum to be held in Nairobi, Kenya, February 5-9. (January 2007) Ref. 1376

Europe Proposes Ban on Mercury Exports

The European Commission has proposed legislation to ban all European Union exports of mercury starting in 2011, and the European Parliament has drafted a measure that would forbid its use in non-electrical measuring devices, with the exception of barometers and antique instruments. [See also *Mercury Instruments May Be Banned in EU* in February 2006, *EU Sets 2011 Deadline to Ban Mercury Exports* in June 2005, and *Governments Call for Global Assessment and Control of Mercury Pollution* in February 2005 environmental security reports.] (November 2006) Ref. 1377



### Mercury Instruments May Be Banned in EU

The European Commission has proposed a ban on the use of mercury in new fever and room thermometers, barometers and blood pressure gauges because of the serious risk the heavy metal poses to human health. The proposition will go for further debate to the European Parliament and European Ministers. Specialized applications, in particular medical measuring devices, where adequate substitutes may not be available, would not be subject to the restriction. [See also *Recycling Regulations in the EU* in August 2005, *EU Sets 2011 Deadline to Ban Mercury Exports* in June 2005, and *Governments Call for Global Assessment and Control of Mercury Pollution* in February 2005 environmental security reports.] (February 2006) Ref. 1378

### EU Sets 2011 Deadline to Ban Mercury Exports

EU Environment ministers decided to ban mercury exports by 2011. Europe is the world largest mercury exporter, supplying about one-third of global demand. It also proposed the phase-out of mercury in some products such as thermometers, and improved global efforts on mercury waste management. [See also *Governments Call for Global Assessment and Control of Mercury Pollution* in February 2005 environmental security report.] (June 2005) Ref. 1379

As part of the effort towards a legally binding treaty to control mercury pollution, environment ministers attending UNEP's 23rd Governing Council and Global Ministerial Environment Forum in Nairobi, Kenya, requested UNEP to conduct a study on the amounts of mercury being traded and supplied around the world. The EU called for a clear framework with bans and deadlines, but the Governing Council was not ready to go that far at this time and decided instead on a partnership formula. The first pilot partnership projects should begin by September. The program will be reviewed in two years and assessed to determine whether further action (including a legally binding treaty) is needed. Similar global assessments were suggested for cadmium and lead to better understand the health and environment effects of these heavy metals and establish whether global action is needed to address them. [See also *Senators Urge U.S. Support for Global Mercury Treaty* of October 2004, *EU Parliamentary Committee Moves to Strengthen Air Pollution Laws* of January 2004, and *UN Protocol to Restrict Heavy Metal Emissions in Europe Came Into Force* in December 2003 environmental security reports.]

Note: the EU Executive Commission recently proposed a ban on mercury exports by 2011. Europe is the world's largest supplier of mercury. (February 2005) Ref. 1380

### *Senators Urge U.S. Support for Global Mercury Treaty*

A bipartisan group of seven Senators introduced a resolution urging the U.S. to collaborate with international partners to prepare a comprehensive strategy for reducing global mercury pollution and mercury use. The Senators introducing the proposal include: Mark Dayton (D-MINN), Jim Jeffords (I-VT), Lincoln Chafee (R-RI), Paul Sarbanes (D-MD), Joe Lieberman (D-CT), Patrick Leahy (D-VT), and Frank Lautenberg (D-NJ). They suggest starting international negotiations for a binding international agreement to limit mercury use, trade, mining, and pollution, to be considered at the next UNEP Governing Council meeting in February 2005. (October 2004) Ref. 1381

### **EU to Ban the use of Cadmium in Batteries**

As part of its effort for reducing environmental pollution from heavy metals, the EU has decided to ban the use of cadmium in consumer batteries. Cordless power tools, medical equipment, emergency lighting, and alarm systems are exempted so far, but in 2008 when the law will be

reviewed, the European Commission might propose a complete ban—as previously suggested by such countries as Sweden and Denmark. The environmental ministers also set collection targets for portable batteries. After adapting their national legislation to the new EU regulations, in the first four years, 25% of all used batteries should be collected on their territories; while after eight years the rate rises to 45%. The new legislation is awaiting European Parliament approval. (December 2004) Ref. 1382

### **France Bans 30 Pesticide Components**

As of February 2008, France banned the sale of 1,500 pesticides containing any of 30 chemicals deemed hazardous, planning to gradually phase out a total of 53 phytosanitary substances. (February 2008) Ref. 1383

### **Increasing BPA Restrictions**

France has adopted legislation banning baby bottles containing bisphenol A (BPA), although the opposition parties demanded a larger spectrum ban. Some other European countries, as well as Canada, have regulations restricting or requiring precautionary use of BPA. In view of an upcoming assessment by the European Food Safety Authority (Efsa), to be published in July, a group of experts (40 organizations and 19 academics) endorsed a letter supporting Efsa's decision to review a larger number of studies addressing potential hazards of BPA use in consumer products, including non-industry-funded papers. Over 130 studies conducted in the past ten years revealed that even low levels of BPA could cause serious health problems. [Related item: *Concerns Increasing for BPA Bans and Phthalates* in October 2008 environmental; security report.] (June 2010) Ref. 1384

### **Restrictions on Plastic Bags Expanding**

More than 40 jurisdictions around the world have imposed or are considering restrictions or taxes on plastic bags. China is outlawing plastic bags from all public transportation, prohibits their free distribution at shopping points, bans the production and use of ultra-thin (less than 0.025 mm) non-biodegradable plastic bags, and will establish new criteria for the production of plastic bags. Firms not complying will face penalties. The new regulation will come into effect on June 1, 2008. Similar regulations were introduced in Bangladesh, Uganda, and South Africa. The Australian Federal Environment Minister announced intentions to phase out plastic bags by the end of the year and, according to UNEP, the problem is also on the agenda of almost every African country. [See also *Plastic Bags Taxed and/or Banned* in October 2005 environmental security report.] (January 2008) Ref. 1385

#### Plastic Bags Taxed and/or Banned

Several jurisdictions, including Ireland, Taiwan, Bangladesh, and some Indian states are banning or taxing the use of plastic bags because of their potential as litter, their role in clogging flood control channels, and their threat to wildlife. Maharashtra blames them for floods that killed more than a thousand people. (September 2005) Ref. 1386

#### India to Enact Regulation Curbing Plastic Bags Use

India's regulation to curb plastic bags gets increased enforcement by the decision of the city of Delhi to outlaw the, "use, storage and sale", of all polyethylene bags, and apply severe penalties for non-compliance. The law is effective immediately, and applies to customers and retailers

alike, but the first target is manufacturers, to restrict availability. India thus joins other countries that have introduced similar regulations. (January 2009) Ref. 1387

## **Forests Management**

### **United Nations Agreement to Protect the World's Forests Adopted**

Although not a legally binding document, the agreement on international forest policy and cooperation is an important instrument for sustainable forest management. By setting international standards for forest management, the agreement is expected to advance international cooperation on forest conservation, improve forest products trade, and develop national policies that would reduce deforestation, prevent forest degradation, and improve the living standard of all forest-dependent peoples. The agreement was adopted at the United Nations Forum on Forests, following 15 years of negotiations and debates on whether a treaty or an agreement is needed for improving the world's forests management. A voluntary global financing mechanism for forest management is supposed to be adopted by 2009. (May 2007) Ref. 1389

### **UN General Assembly Adopts Global Forest Agreement**

The “Non-Legally Binding Instrument on All Types of Forests” adopted by the UN General Assembly on December 17, 2007 sets the political framework and standards for sustainable forest management and monitoring to stabilize climate change and protect biodiversity and ecosystems. The agreement suggests mechanisms for systematic monitoring and reporting at the national level, as well as means for international collaboration, ranging from funding developing countries for reducing deforestation, to technology transfer and capacity building for forest management. Although not binding, the forests agreement is an important political instrument to improve nations' forest management. (December 2007) Ref. 1390

### **Sustainable Forest Management Raised on Global Political Agenda**

The XII World Forestry Congress (held once every five years) was hosted by the UN Food and Agriculture Organization (FAO) at the end of September, in Quebec City and attended by more than 4,000 participants from 140 countries. For the first time, the Congress addressed humans' dependency on the forest, stating that worldwide, some 1.6 billion people rely on forests for their livelihoods and therefore underlined the importance of reinstating forest issues higher on the political agenda. The “Final Statement: Forests, Source of Life” listed principles, objectives, and strategies including the formulation and enforcement of legislation that relates to sustainable forest management. The FAO is responsible for monitoring, assessing and reporting on progress on the implementation of the conclusions of the Congress. It must also present a progress report to the XIII World Forestry Congress to take place in 2009. It is likely that international forest-related agreements with national implications for legislation will emerge to better secure sustainable forest management. (October 2003) Ref. 1391

### **Call for Legally Binding Agreement for Forests' Conservation**

UN Forum on Forests 5th Session, held 16–27 May 2005, reviewed the effectiveness of the International Arrangement on Forests and determined that better international regulations, management mechanisms, and long-term political commitments are needed to improve forest

conservation. Several officials called for a legally binding instrument and quantifiable targets eventually linked to the Millennium Development Goals. [These goals will be reviewed for possible modification at the UN General Assembly meeting in September 2005.] The delegates failed to reach agreement on future international arrangements and improving international regulations on forests. The next UNFF is planned for February 13, 2006.

During the Forum, the World Wildlife Federation and the World Bank renewed their World Bank/WWF Alliance for Forest Conservation and Sustainable Use and announced their new forest protection goal to cut global deforestation 10% by 2010. (May 2005) Ref. 1392

#### Deforestation Not Yet Adequately Addressed by International Regulations

The UN Convention on Biological Diversity held a five-day meeting in Rome, Italy, to discuss how agricultural and forest biodiversity are affected by climate change. A focus was on mangrove: according to scientists, 20% of mangrove forests have been lost, and economic and environmental damages should be addressed. Mangroves' destruction could cause biodiversity loss in tropical areas, increase CO<sub>2</sub> emissions, and destroy people's livelihoods. There are no strategies yet to deal with the situation, although scientists warn that if not addressed now, in the next ten years the crisis could get out of control. Along the same lines, African forestry protection organizations and the Food and Agricultural Organization (FAO) held a meeting on specific climate change issues, discussing strategies to find the best compromise between humans' interests, food crops, deforestation, and wildlife. Environmental degradation and loss of livelihood due to deforestation are underlying and/or multiplier causes of conflict, mainly in already fragile states or conflict-torn regions. (February 2008) Ref. 1393

#### **Sixth UN Forum on Forests Agrees to Multi-Year Work Plan**

The two-week UN Forum on Forests held in New York, February 13–24, assessed the issues of management, conservation, and sustainable development of all forests worldwide. The focus was on re-assessing the International Agreements on Forests (IAF), and the establishment of an international legally binding instrument (LBI), promoted by members such as Canada and China; however, countries like Brazil emphasized voluntary measures. The accord on the LBI will be concluded and adopted next year, at the Seventh UN Forum on Forests. Agreement was reached on a multi-year program of work, including more substantial progress on reporting. Most speakers highlighted that besides the forests' ecological role, their management has important security implications, since the livelihood of millions of people depends on forests. (February 2006) Ref. 1394

#### **International Alliance of Forest Peoples**

The International Alliance of Forest Peoples was established by the participants in the Peoples of the Forest and Climate Change workshop held in Manaus, Brazil. The scope of the Alliance is to improve international collaboration to guarantee the respect of forest people's rights to land and natural resources and to their traditional livelihoods, facilitate their adaptation to climate change, and improve their participation in the mechanisms for the reduction of emissions from deforestation and forest degradation. The Declaration was signed by 11 countries: Brazil, Ecuador, Colombia, Costa Rica, Guyana, French Guyana, Paraguay, Nicaragua, Venezuela, Suriname, and Panama. Delegations from Africa (Democratic Republic of the Congo) and Asia (Indonesia) and observers from the UN and NGOs from Brazil, England and the U.S. also attended the meeting. (April 2008) Ref. 1395

**Rights of Forest Peoples Need to Be Observed in Anti-deforestation Efforts**

Research from the Rights and Resources Initiative, announced at the Rights, Forests and Climate Change conference in Oslo, has now shown that the financial costs of setting up legal rights for forest-dwelling peoples are around \$3.35 per hectare compared with the estimated costs for elements of the UN-proposed Reduced Emissions from Deforestation and Forest Degradation (REDD) program (\$800 to \$3500 per hectare each year for the next 22 years), but can make a large difference in the efforts aimed at reducing deforestation. Ignoring these rights can cause serious problems for the efforts, and full advantage should be taken of those peoples' well-informed help in protecting what is, after all, their environment. The IUCN's World Conservation Congress also endorsed the REDD "as long as it remains just and equitable." (October 2008) Ref. 1396

**African Rain Forest Protection—International Treaty signed in February 2005**

At the Second Summit of Heads of State and Government of Central Africa on the Conservation and Sustainable Management of the Central African Forest Ecosystems, on February 5th, Central African countries signed a landmark regional conservation treaty, establishing cross-border partnerships to help save the world's second largest rain forest. The treaty will make it easier for countries to jointly track and combat poachers, manage funds for training and conservation, and harmonize laws in different countries that regulate logging. In his message, Secretary-General Kofi Annan stressed the linkage between forest ecosystems and security in the region. (February 2005) Ref. 1397

**Greenhouse Gas Emissions****Kyoto Protocol Came into Force in February 2005**

The UN Kyoto Protocol to the 1992 UN Framework Convention on Climate Change (UNFCCC) came into force on February 16, 2005. Under the Protocol, the industrialized Member States are bound to reduce their combined greenhouse gas emissions that contribute to global warming by at least 5% under 1990 levels by 2012. The six major greenhouse gases covered by the Protocol are: carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF<sub>6</sub>). So far the Protocol was ratified by 128 states. Plans for post-Kyoto climate change policies and strategies have already begun. A "G8 Plus" group (including key developing industrial countries China, India and Brazil) could emerge to advance Kyoto by helping emerging industrial nations to develop "clean" technologies based on G8 scientific advances. (February 2005) Ref. 1398

**Carbon Trading Scheme****Clean Development Mechanism (CDM) successful**

The UNFCCC Secretariat Director considers the Kyoto Protocol's Clean Development Mechanism (CDM) successful so far, with some 645 CDM projects being registered in 44 countries, covering a wide range of sectors. At the same time, he cautioned that serious negotiations on a post-2012 regime would only be launched at the Bali conference, and not concluded there, given experience with the Kyoto Protocol, which took two years to negotiate and

another two to ratify and bring into force.

Australia's government is developing a carbon emissions reduction plan that would recommend a trading scheme built on the six-nation Asia-Pacific Partnership on Clean Development and Climate (which includes Australia, China, India, Japan, South Korea, and the U.S.) The proposal is planned to be put forward at the 2007 Summit of the Asia-Pacific Economic Cooperation to be held in Sydney, in September. (May 2007) Ref. 1399

#### Countries Contemplating Tougher Regulations for Mandatory Emission Targets

In light of last month's report, *The Economics of Climate Change*, the UK announced its intention to introduce new "green" measures to reduce carbon emission, including the Climate Change Bill—to reduce CO<sub>2</sub> emissions by 60% by 2050, and to strengthen official monitoring and reporting. The UK also proposes to set an emissions reduction target of 30% by 2020, and at least 60% by 2050 Europe-wide. Australians polled would favor ratification of the Kyoto Protocol and more stringent reductions, and its government advocates an Asia-wide emissions trading system as part of a planned "new-Kyoto" pact and would invest US\$46.5 million into the world's biggest carbon capture and storage system. [Note: A proposal to allow Clean Development Mechanism (CDM) funds to be used for carbon capture and storage (CCS) projects was deferred by the Climate Change Conference on grounds that the technology is not yet mature.] Japan cannot meet its obligations under the Kyoto Protocol unless it imposes mandatory emission targets on industry and increases spending for carbon credits using Kyoto tools such as the Clean Development Mechanism. [See also *UK Proposes Individual Carbon Trading* in July 2006, *Possible Tougher European Carbon Limits* in May 2006, and other related items in previous environmental security reports.] (November 2006) Ref. 1400

#### UK Proposes Individual Carbon Trading

The UK Minister of the Environment has proposed a plan for individual carbon-trading procedures. Under the proposal, all UK citizens would be allocated a certain annual amount of carbon credits that will be reduced each time they purchase non-renewable energy. The points will be stored on an electronic card and those who did not use their full allocation would be able to sell their surplus carbon points into a central bank, while those who run out of points will be charged additionally at the point of sale for the equivalent of the missing points. To reduce total UK emissions, the overall number of points would be reduced each year. Details and the place for launching the pilot project should be announced shortly. If the new UK carbon-trading scheme proves feasible and efficient, it is likely that it will be emulated in other (if not all) EU countries and possibly even other regions of the world strongly committed to reducing their carbon emissions. [See also *Possible Tougher European Carbon Limits* in May 2006 and other related items in previous environmental security reports.] (July 2006) Ref. 1401

#### **EU Greenhouse Gas Emission Trading Scheme (EU ETS)**

European Union (EU) Directive 2003/87/EC entered into force on 25 October 2003 to implement carbon dioxide allowance trading, which became formally active on January 1, 2005. Over-the-counter allowance trading had begun even before January 1, though formal markets will not be established until later in Spring 2005. Approximately 12,000 industrial plants and energy producers in the EU had to begin monitoring and reducing CO<sub>2</sub> emissions to meet limits set for 2005 and 2007. The EU has agreed under the Kyoto Protocol to reduce emissions by 8% compared to 1990 levels. Entities exceeding their assigned limits must either find methods to

reduce them or to buy unused allowances from entities that are operating under their own limits. Plans for four nations have not been approved so far: Czech Republic, Greece, Italy and Poland. The EU Commission is empowered to accept or reject all or parts of any nation's plan. Transportation emissions are not included in the requirements, but could be added at some later time. (January 2005) Ref. 1402

### **World's Mayors Sign Municipal Version of the Kyoto Protocol**

Mayors from 70 of the world's largest cities signed the Urban Environmental Accords aiming to tackle global warming by implementing ecologically sustainable policies. The agreement specifies 21 actions that mayors should implement to improve their cities' environment, covering the domains of energy; waste; urban design; urban nature; transportation; environmental health; and water. It is expected that at least three actions will be implemented each year until World Environment Day 2012. The "Green Cities" event occurred in San Francisco, June 1-5, 2005. (June 2005) Ref. 1403

### **Australia Cuts Sulfur Content in Transport Fuels**

As part of the government's strategy to dramatically reduce urban air pollution, Australia introduced tough new fuel standards by reducing sulfur in unleaded gasoline and in diesel over the next five years. The new standards are estimated to save A\$3.4 billion in hospital and medical costs by 2020. (July 2004) Ref. 1404

## **Energy**

### **International Renewable Energy Agency Statute Enters into Force on 8 July 2010**

The International Renewable Energy Agency (IRENA) Statute has received its 25th ratification and therefore IRENA will become a full-fledged international organization on 8 July 2010. Helen Pelosse, IRENA Interim Director General, underlined that IRENA's ratification process was the fastest ever for such a process. IRENA's objective is to promote a swift transition towards sustainable use of renewable energy. By the end of June 2010, a total of 144 countries and the European Union have signed IRENA's mandate, and 26 countries have ratified it. [Related item: *New International Renewable Energy Agency Opens in January*, in December 2008 environmental security report] (June 2010) Ref. 1405

## **Health (pandemics)**

### **World Health Assembly adopts new International Health Regulations**

The new International Health Regulations adopted by the World Health Organization's annual assembly on May 23, 2005, will increase security against global epidemics of deadly diseases by improving national and international capacity for preventing and responding to disease outbreaks. The new regulations include comprehensive assessment, reporting, and response standards mandatory for each country and to be implemented within a specific timeframe; operational mechanisms; increased collaboration between countries' health offices and with the WHO; and a better coordinated international reporting and response system. The regulations stipulate the increased roles of countries and WHO in identifying, preventing, and responding to public health emergencies of international concern. WHO should be quickly informed of any

outbreak of four diseases—SARS, bird flu, smallpox and polio—as well as any outbreaks of “potential international public health concern” from known or unknown causes or sources. The new regulations will formally come into force two years after approved by the Assembly. (May 2005) Ref. 1407

### **United Nations Upgrades Early Warning System for Health and Terror Alerts**

The United Nations launched the Global Public Health Intelligence Network II (GPHIN II), an upgrade of the GPHIN emergency-preparedness system designed to alert national health agencies to imminent health and terror emergencies. This Internet-based "early warning" system will gather and disseminate preliminary reports of public health threats on a continuous basis to the WHO and public health officials worldwide, helping early detection of potential public health threats including infectious disease outbreaks around the world, whether they are naturally occurring or the result of an act of bioterrorism. The program was developed by Canada's Ministry of Health with support from Nuclear Threat Initiative's Global Health and Security Initiative. (November 2004) Ref. 1408

### **EU New Law to Control Bird Flu Epidemics**

The European Commission adopted a draft Directive for a law to control bird flu viruses. The new legislation will require EU states to introduce and reinforce surveillance and control measures against low pathogenicity viruses, in order to prevent mutation into a more harmful strain, mostly one that would be transmissible between humans. The new law is expected to enter into force January 1, 2007, replacing the existing one. (April 2005) Ref. 1409

## **Mountains**

### **Carpathian Convention Comes Into Force**

The Carpathian Convention came into force on January 4, 2006. Although covering just seven European countries (the Czech Republic, Hungary, the Slovak Republic, Ukraine, Poland, Romania, and Serbia and Montenegro, out of which just the first four are States parties), the Convention has considerable global importance, being seen by other regions as an example to follow. There are already requests for UNEP to expand the Convention to adjacent regions, as well as to consider designing similar treaties for other mountain regions of the world. [See also *Fifth Environment for Europe Ministerial Conference* in May 2003, and *Carpathian Mountain office of the United Nations Environment Programme* in July 2004 environmental security reports.] (January 2006) Ref. 1411

### **The Framework Convention on the Protection and Sustainable Development of the Carpathians**

The Framework Convention on the Protection and Sustainable Development of the Carpathians intends to be a mechanism of preserving the Carpathians while benefiting isolated mountain communities. (May 2003) Ref. 1412

### **Prospective International Agreements for Mountain Regions**

The Bishkek Global Mountain Summit (BGMS) was held in Bishkek, Kyrgyzstan, 29 October – 1 November 2002, as the final event of the International Year of Mountains. No proposals for specific treaties or agreements are included in the Draft BGMS Platform, whose final version



will be the principal output document from the Summit. However, in preparation for the Summit, a series of Thematic Papers were prepared, one of which was "Prospective International Agreements for Mountain Regions", by Wolfgang E. Burhenne, International Council of Environmental Law, Bonn.

"Prospective International Agreements for Mountain Regions" reveals that there is no legally binding global agreement that specifically addresses mountains-related issues. The document suggests the development of international legal instruments for mountain regions, and presents a checklist and some factors that should be considered in eventual regional mountain ecosystem agreements. The paper also applies outside of the specific "mountain" context and might be used in drafting future treaties for protection of specialized regions or ecosystems. (October 2002) Ref.1413

## **Waste Management**

### **Waste Reduction and Recycling Regulations and Laws Spreading Around the World**

Australia's Department of the Environment, Water, Heritage and the Arts released the draft "National Waste Policy Framework—Less Waste More Resources," aiming to reduce waste by increasing its use as a resource. In the U.S., the city of San Francisco is the latest community to enact a compulsory composting/recycling law, joining a growing worldwide group of jurisdictions having such regulations. [Previous related items: *European Union to Consider Regulations for Curbing Biowaste* in June 2009, and *EU New Strategy on Waste Recycling in December 2005* environmental security reports.] (July 2009) Ref. 1415

### **Waste Export Regulations Revised and Tightened**

The 'Green' list of the Waste Shipment Regulation, which controls the movement of non-hazardous recyclable waste within, into, or out of the EU, has been updated to better protect the non-OECD countries against receiving from wealthier nations materials they do not want or cannot process in an environmentally sound way. The Revised Green List Regulation 1418/2007 came into effect on 18 December 2007 with a transition period of 60 days for certain wastes and countries. The complementary changes to the UK Transfrontier Shipment of Waste Regulations will come into effect on 5 February. [See also *EU Waste Shipment Legislation Came into Force* in July 2007 and other related items in previous environmental security reports.] (January 2008) Ref.1416

### **E-waste Management Directive Came into Effect on August 13, 2005**

The EC directive for e-waste management, Waste Electronic and Electrical Equipment (WEEE), has come into effect, requiring that all 25 EU member states comply with the electrical and electronic appliances disposal framework in order to minimize the impacts of this kind of waste on the environment. Among other stipulations, the directive requires that all such devices manufactured in the EU bear a label requiring mandatory recycling. The related directive on the Restriction of the use of certain Hazardous Substances (RoHS) in electrical and electronic equipment was also updated, setting maximum concentration values for some substances that were previously supposed to be completely banned in manufacture after July 1, 2006: lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) or polybrominated

diphenyl ethers (PBDE). [See also *Two E-waste laws entered into force in the European Union* of February 2003, and *E-waste Directives to be Enforced in the UK* of July 2005 environmental security reports.] (August 2005) Ref. 1417

### **EC's WEEE Directive Goes into Effect in UK in July 2007**

The European Commission's Waste Electrical and Electronic Equipment (WEEE) Directive entered into effect in the United Kingdom on July 1, 2007, after having been effective in the rest of Europe since August 2005. The WEEE Directive is a framework concerning electrical and electronic appliances disposal in order to minimize impacts of this kind of waste on the environment. Among other stipulations, the directive requires that all such devices manufactured in the EU bear a label requiring mandatory recycling. [See also *E-waste Management Directive Came into Effect on August 13, 2005* in August 2005 environmental security report] (July 2007) Ref.1418

### **EU New Strategy on Waste Recycling**

The European Commission proposed a new strategy on the prevention and recycling of waste, part of the seven thematic strategies considered under the EU's Sixth Environmental Action Programme (6EAP). The new strategy includes consolidating and updating existing legislation (including the 1975 Waste Framework Directive) and minimizing waste by using it as a resource. It will set recycling standards and will include an obligation for all 25 member states to develop national waste prevention programs. The new regulations and a first set of standards for waste recycling are expected to enter into force in 2008. National governments will then have three years to finalize their own waste action programs. [See also *New EU Environmental Strategies* in the September 2005, and *Recycling Regulations in the EU* in August 2005 environmental security reports.] (December 2005) Ref. 1419

### **EU Batteries Directive Entered into Force**

The EU Batteries Directive entered fully into force across the EU on September 26, 2008. It requires waste batteries to be properly collected and recycled by producers and users. [See also *Waste Management Policies* in June 2008 and other related items in previous environmental security reports.] (October 2008) Ref.1420

### **China Issues Electronic Waste Rules**

The Chinese State Environmental Protection Administration has issued new rules to require manufacturers, retailers and users to take responsibility for electronic waste. The rules are partly inspired by China's thriving (and illegal) industry of importing electronic waste and scavenging it in occupationally unsafe small or family workshops. [See also *Global Environmentally Sound E-waste Disposal System is Needed* in November 2005 environmental security report.] (August 2006) Ref. 1421

### **India Further Loosens Already Lax Rules on Waste Importing**

Illegal waste shipping to India might worsen due to new amendments made by the Ministry of Environment and Forests to the Hazardous Wastes Rules. While previous rules allowed only 'recyclers' to bring in certain waste, the new amendments will also allow 'traders' to do so, making control and enforcement potentially more difficult. This could be an additional factor increasing India's pollution; threatening its already precarious environment, health conditions, and falling water tables. [Related items: *Hazardous Waste Disposal of Increasing Concern* in

September 2009 and other previous environmental security reports.] (April 2010) Ref. 1422

### **Weapons-related**

#### **UN Convention against Nuclear Terrorism**

The International Convention for the Suppression of Acts of Nuclear Terrorism was adopted by the General Assembly on April 13, 2005 and will be open for signature on 14 September at the high-level plenary meeting scheduled for the 60th session of the UN General Assembly. The Convention creates an enforced legal framework to counter nuclear terrorism. It will provide for a definition of acts of nuclear terrorism, and covers nuclear safety, crisis and post-crisis situations in accordance with the International Atomic Energy Agency (IAEA) standards. Under its provisions, States are supposed to cooperate by sharing information and assisting each other in preventing terrorist attacks, and the alleged offenders must be prosecuted or extradited. (April 2005) Ref. 1424

#### **Nuclear Terrorism Convention Signed by 82 Countries at the UN Summit**

The International Convention for the Suppression of Acts of Nuclear Terrorism was signed by 82 countries at the UN Summit, beginning with Russia, the U.S., and France. The Convention, proposed by Russia in 1998, was adopted by the UN General Assembly in April 2005. [See also *UN Convention Against Nuclear Terrorism* in April 2005 environmental security report]

Note: The newly released statistics of the IAEA's Illicit Trafficking Database (ITDB) show a substantial increase in illicit trafficking and unauthorized activities with nuclear and other radioactive materials in 2003-2004. Although the majority of the incidents showed no evidence of criminal activity, the Agency warns of the danger that these materials could be used for malicious purposes, like 'dirty bombs.' [See also *UN Agency to Intensify Tracking of Illicit Nuclear Trafficking* issue in the September 2004 environmental security report.] (September 2005)] Ref. 1425

#### **Chemical Weapon Disposal Continues to Pose Threat**

Although no treaty currently requires the recovery of chemical weapons munitions, interest on the part of governments is increasing with respect to how to minimize the hazard and mitigate any significant release of chemical agents into the waters surrounding dumping areas. Since the UN has been consistent in recent years in its interest in long-term and widespread contamination issues, it is reasonable to expect international agreements to address this issue. (January 2004) Ref. 1426

#### **Preventing Terrorist Access to Weapons of Mass Destruction—UN resolution**

The UN Security Council unanimously adopted on April 28, 2004 a binding resolution criminalizing the production and/or acquisition of weapons of mass destruction by non-state actors. The Council decided that "all States...shall adopt and enforce appropriate effective laws which prohibit any non-State actor to manufacture, acquire, possess, develop, transport, transfer or use nuclear, chemical or biological weapons and their means of delivery, in particular for terrorist purposes, as well as attempts to engage in any of the foregoing activities, participate in them as an accomplice, assist or finance them." Being considered under Chapter VII of the UN

Charter, the resolution is enforceable by the Security Council through tribunals, embargoes, or military force after all peaceful means of persuading delinquent Member States have been exhausted. However, during the debate, it was underlined that the Council would have to get separate approval for the means of enforcement. During the next two years a committee designated by the Security Council will monitor the implementation of the resolution and within six months all States are expected to present reports on their efforts to execute the provisions. (April 2004) Ref. 1427

### **Sweden Initiates New Commission to Cooperate with the UN to Reduce Proliferation of Weapons of Mass Destruction**

The Weapons of Mass Destruction Commission will provide “proposals on how to make progress in non-proliferation and disarmament of weapons of mass destruction, and on how to minimize the risk of these weapons falling into the hands of terrorists.” The same day, the U.S. proposed a draft U.N. resolution that would criminalize WMD proliferation and ban their transfer to individuals or organizations. (December 2003) Ref.1428

### **New European Union Law Controls Radioactive Sources**

The new European Union Law that controls radioactive sources was adopted on December 22, 2003. The law sets out requirements that ensure control over every present and past high activity radioactive source in Europe. (December 2003) Ref.1429

### **OSCE document on Stockpiles of Conventional Ammunition is a politically binding international instrument that addresses risks arising from ammunition stockpiles**

Foreign Ministers of 55 countries endorsed the OSCE Document on *Stockpiles of Conventional Ammunition*. It is a politically binding international instrument that addresses risks arising from surplus stockpiles of all categories of conventional ammunition, explosive material and detonating devices, stock surpluses that can cause environmental problems and hazards to populations. (December 2003) Ref.1430

### **Protocol on Prohibitions or Restrictions on the Use and Transfer of Mines Other Than Anti-Personnel Mines (MOTAPM)**

Another protocol under negotiation being considered for submission to the next Meeting of the States Parties to the Convention is the Protocol on Prohibitions or Restrictions on the Use and Transfer of Mines Other Than Anti-Personnel Mines (MOTAPM). (November 2003) Ref.1431

### **Protocol V on Explosive Remnants of War (ERW) of the Convention on Certain Conventional Weapons came into force on 12 November 2006**

Protocol V on Explosive Remnants of War (ERW) of the Convention on Certain Conventional Weapons came into force on 12 November 2006, almost three years after it was adopted. The Protocol stipulates that Parties should take “remedial measures to mark and clear, remove or destroy unexploded ordnance or abandoned explosive ordnance” as early as possible after hostilities have ended, whether they control the territory or not, by cooperating directly or indirectly with all parties involved through quick and accurate information exchange. The Protocol is not retroactive, covering only wars occurring after its entry into force. As of the end of November, there were 27 States Parties to the Protocol. The Portfolio of Mine Action Projects 2007 found that 26 out of 29 war-ravaged countries or territories surveyed are beleaguered with

the lurking remnants of cluster bombs and other explosives. In 2007, the focus of the Projects will be on unexploded ordnance, aiming to deal with the aftermath of conflicts that took place before Protocol V entered into force. (November 2006) Ref. 1432

## **PROPOSED TREATIES AND/OR CHANGES TO EXISTING ONES**

### **Air Pollution**

#### **Seventh Conference Of The Parties To The Vienna Convention For The Protection Of The Ozone Layer and Seventeenth Meeting Of The Parties To The Montreal Protocol On Substances That Deplete The Ozone Layer**

The 7th Meeting of the Conference of the Parties to the Vienna Convention for the Protection of the Ozone Layer and the 17th Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer (COP-7/MOP-17) took place in Dakar, Senegal, from 12-16 December 2005. Over 400 representatives from governments, UN agencies, intergovernmental and NGOs, academia, industry, and the agricultural sector participated. More than 50 decisions were adopted on a wide range of issues concerning phaseout of ozone-depleting substances, budgets, target years, and reducing illegal trafficking in CFCs (chlorofluorocarbons) and other substances. Under the Protocol, developing countries have until 2010 to phase out CFCs and halons, and until 2015 to phase out methyl bromide. (The CFC phaseout year for developed countries was 1996.) Even if all targets of the Montreal Protocol are achieved, the ozone layer will not fully recover until 2065, according to research presented at the conference. This is 15 years later than initially estimated. A new report “Safeguarding the Ozone Layer and the Global Climate System” of the Protocol’s Technology and Economics Assessment Panel and the Intergovernmental Panel on Climate Change demonstrated the interlinkages between ozone and global warming. Parties also agreed to defer until 2006 consideration of a U.S. proposal on multi-year exemptions for methyl bromide, and a European Community (EC) proposal for an amendment to the Protocol that would include an expedited procedure for adding new chemicals. The Eighteenth Meeting of The Parties To The Montreal Protocol: MOP-18 is scheduled to take place in late 2006. [See also *First Extraordinary Meeting of the Parties to the Montreal Protocol Gives One Year Extension to Ban on Methyl Bromide to 11 Developed Countries* in March 2004 environmental security report.] (December 2005) Ref. 1435

#### **Call for Expanding Montreal Protocol on Ozone-Depleting Substances**

On the 20th anniversary of the Montreal Protocol to curb the release of harmful substances into the atmosphere, 191 signatories of the Protocol gathered in Montreal to celebrate this highly successful international treaty and to discuss its expansion. Delegates agreed to accelerate the freeze and phase-out of hydrochlorofluorocarbons (HCFCs)— chemical compounds used in refrigeration systems and air conditioners, and which accelerate both ozone layer damage and climate change. They agreed to halt the production of HCFCs in 2013 and pull forward their elimination by ten years from the previous scheduled phase-out of 2030 for developed countries, and 2040 for developing ones. The United Nations meteorological agency revealed that greenhouse gases could aggravate ozone loss and slow recovery. The theme of this year’s Ozone Day (September 16) was “Celebrating 20 years of progress in 2007”. [See also *2007—The International Year of the Ozone Layer* in January 2007, *Ozone Hole Worst Ever Recorded* (under

Climate Change item) in October 2006, and other similar items in previous environmental security reports.] (September 2007) Ref. 1436

### **EU Thematic Strategy on Air Pollution for the CAFE Programme**

Under the EU's Sixth Environmental Action Programme (6EAP), as part of the Clean Air for Europe (CAFE) strategy, the European Commission proposed the Thematic Strategy on Air Pollution. The Strategy, which aims to improve human and ecosystem health, covers most major air pollutants, with accent on airborne particulates known as PM2.5 and ground-level ozone pollution, and sets a cap on concentrations in the most polluted areas. It aims by 2020 to cut the annual number of premature deaths from air pollution-related diseases by almost 40% from the 2000 level. The strategy also proposes changes to the current regulation system by merging existing legal instruments into a single Ambient Air Quality Directive (that would cut by 50% the existing legal texts) and improving reporting requirements. The proposed legislation still has to be approved by member states and the European Parliament. The other six Thematic Strategies that the Commission will present over the next few months cover Soil protection; Sustainable use of pesticides; Protect and conserve the marine environment; Waste prevention and recycling; Sustainable use of natural resources; and Urban environment. [See also *The European Union Environmental Initiatives* in January 2005 environmental security report] (September 2005) Ref. 1437

### **Vehicle Emissions in Europe**

Emissions from sport utility vehicles and vehicles powered by diesel engines are at the core of vehicle emissions control efforts in Europe. Italy, France, and the UK have already implemented or indicated intent to implement local policies to discourage or ban the use of such vehicles. The health impact of emissions from such vehicles is the source of this emerging policy debate. (July 2004) Ref. 1438

### European Commission Proposed Binding Legislation for Vehicle Emissions Cuts

The European Commission proposed binding legislation to cap CO<sub>2</sub> emissions from some new passenger cars to 120g/km by 2012. In this way, European carmakers will have to reduce the fleet average CO<sub>2</sub> emissions of new vehicles to 130g/km by 2012 through cleaner engines, while the remaining 10g/km would be reduced by improved fuel-efficiency, increased biofuels use, and better traffic management (presently cars count for 12% of the EU's total CO<sub>2</sub> emissions at an average of around 160g/km). The regulation will be enforced by penalties starting in 2012 at €20 per extra gram of CO<sub>2</sub>, increasing gradually to €5 in 2015. The legislation has to be approved by member states. [See also *EU Commission to Propose Binding Cuts on Car Emissions* in February 2007 and *New European Energy Policy Developments* in March 2006 environmental security reports.]

Similarly, the Euro VI proposal for heavy motor vehicles establishes a reduction of 80% in nitrogen oxides and 66% in particulate matter emissions compared to the current Euro V limits. After approval by the European Parliament and the Council of Ministers, the new regulation is expected to enter into force in 2013. (December 2007) Ref. 1439

### **Trans-boundary Pollution Regulations Need Better Enforcement**

A joint lawsuit by Canada and the U.S. against U.S. coal-burning power plants brought back on the agenda the danger that air pollution generated in any one part of the world poses to other

countries and regions. Although regulations exist, their effectiveness is hindered by insufficient adherence or lack of successful enforcement. Better detection and tracking of pollution, global information sharing, and an increasingly informed and active civil society, might change this situation. “Review of compliance by the Parties with their obligations under the Protocols to the Convention” is one of this year’s work plan objectives of the Air Pollution Convention. [See also *Study Proposes an International Air Pollution Treaty and Protocol to Control Heavy Metals to Enter into Force* in October 2003 and *EU Parliamentary Committee Moves to Strengthen Air Pollution Laws* in January 2004 environmental security reports.] Ref.1440

### **Clean Air for Europe Initiative to Limit Air Pollution**

Clean Air for Europe (CAFE) is an integrated action plan prepared by the EC to further improve the quality of the air for Europeans. An EU Directive of 1999 set limits for some air pollutants, including particulate matter (PM10 - airborne particles with a diameter of 10 micrometers or less), nitrogen dioxide, sulphur dioxide and lead. The limits are to be met by 1 January 2005, with the exception of nitrogen dioxide, which is 2010. The CAFE is the next step, and the Commission is expected to adopt it by mid-2005. European citizens were invited to comment by the end of January about the quality of the air they breathe and suggest measures to improve it. (January 2005) Ref.1441

### **2007—The International Year of the Ozone Layer**

The year 2007 is designated The International Year of the Ozone Layer, marking the 20th anniversary of the signing of the Montreal Protocol. Since its entry into force, January 1, 1989, the Montreal Protocol has undergone five revisions, the last one in 1999. “Perhaps the single most successful international agreement to date” (as noted by Kofi Annan, former UN Secretary-General), the treaty is widely adopted and implemented. Nevertheless, due to the accumulative effect, the ozone hole was the largest recorded last September. The next meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer will be hosted by Canada in Montreal, September 17-21, 2007. (January 2007) Ref.1442

## **Aquatic Environment**

### **A New Step Toward Preventing Water Wars**

Falling water tables around the world increase the likelihood that abuse of international groundwater aquifers will cause conflicts. The International Law Commission adopted draft articles for the first international framework convention on transboundary groundwater aquifers. The articles cover issues related to utilization of transboundary aquifers; activities that have or are likely to have an impact on aquifers; and measures for the protection, preservation, and management of transboundary aquifers. The draft articles create a framework and set of principles for further negotiations to eventually create a binding convention. The articles are compatible with but independent from the UN Convention on the Non-Navigational Uses of International Watercourses (UN Watercourses Convention), and hence, not dependent upon its ratification. The UN Watercourses Convention was adopted in 1997 (with only China, Turkey, and Burundi voting against) and has 16 of the 35 required ratifications to go into force. At the 2008 World Water Week held in Stockholm, the WWF called upon states to support the

Convention's entry into force as a way to prevent future possible conflicts due to competition over water resources. (July-August 2008) Ref 1444]

### **Draft Agreement for Management of International Aquifers**

The draft Convention on Transboundary Aquifers aims to create a framework for proper management and exploitation of underground water resources, calling on States to cooperate on aquifers' use and to prevent and control their pollution. Aquifers contain 100 times the volume of surface fresh water, but are largely not covered by international regulations despite their transboundary conditions, and their great environmental, social, economic and strategic importance. The new Convention would apply to 96% of the planet's freshwater resources. It was prepared by the UN International Law Commission and experts from UNESCO's International Hydrological Programme, and submitted to the UN General Assembly on October 27, 2008. The same day, UNESCO published the first detailed map of 273 underground transboundary aquifers, including information about the water's quality and rate of replenishment. (October 2008) Ref. 1445

## **Marine Environment**

### **Could large-scale ocean zoning prevent conflicts?**

Increasing numbers of environmental lawyers and environmentalists believe that future conflicts could be prevented by large-scale ocean zoning for oil, fishing and wind farms, as well as that there is an immediate need for regulations to protect the oceans' natural resources. "We're now able to do on the open ocean what we once did on our western frontier—eradicate the wildlife, extract the minerals and alter or pollute the habitat," says David Helvarg, president of the Blue Frontier Campaign. Many variations of coastal zoning have been established around the world, which may one day lead to new large-scale ocean zoning within a more comprehensive integrated planning mechanism for local, regional and international standards and regulations for 'pro-active rather than re-active' ocean management. (March 2005) Ref. 1447

### **Increased Protection Needed for the Marine Environment**

The East Asian Seas region has some of the world's highest concentrations of shipping and fishing vessel activity, accounting for 50% of global fisheries production and 80% of global aquaculture production. The UNEP report "The East Asian Seas State of the Marine Environment" warns that the coastal habitats and ecosystems are experiencing stress due to pollution, alien invasive species and other factors, which could negatively impact the region's economy. Nearly 75% of the region's population depends directly or indirectly on coastal areas, and 80% of the region's GDP is linked to coastal natural resources. Already, 40% of coral reefs and 50% of mangrove swamps have been lost. Coral reefs generate an estimated \$112.5 billion and mangrove habitats \$5.1 billion annually. Unless adequate environmental regulations are adopted and marine environment factored into economic planning, increasing poverty might add to social unrest and migration.

According to a study by researchers at Carnegie Institution published in the journal *Nature Geoscience*, the current rate of ocean acidification is up to 10 times faster than 55 million years ago—the last time deep oceans were so acidic. The main cause is considered to be the rapidly



rising concentration of CO<sub>2</sub> in the atmosphere. Scientists warn that if present trends continue, some marine life is threatened with extinction, while coral reefs will begin to disintegrate before the end of the century. Coral bleaching is already damaging many reefs worldwide.

(February 2010) Ref. 1448

### **Proliferation of Sensors in and on Oceans Requires an International Legal Framework, but Might Affect Freedom to Conduct Ocean Research**

The Argo Project is an array of 3,255 (as of March 23, 2010) free-floating seawater quality monitoring devices supported by 46 nations. It operates in the framework of WMO (World Meteorological Organization) Integrated Global Observing Systems since 2007, and contributes to the Global Earth Observation System of Systems (GEOSS) with Guidelines adopted in June 2008. There are controversies over information collection systems and sometimes violations of exclusive economic zones. The results of these controversies might determine the evolution of the debate among scientists and diplomats over freedom of conducting oceanic research.

Deploying new technologies on the high seas is sometimes seen as conflicting with regulations protecting coastal states' sovereign rights. The 43rd session of the Intergovernmental Oceanographic Commission Executive Council meeting in June is expected to address issues of relevance to the "soft-law guidelines or codes of conduct" and the legal regulations affecting the scientific work of several environmental early warning systems. (April 2010) Ref. 1449

### **Better Planning Needed for Maritime, Especially Coastal, Areas**

Dr. Jane Lubchenco, head of the U.S. National Oceanic & Atmospheric Administration (NOAA), has called for better planning for use of ocean waters, especially along coasts, citing the myriad, and often conflicting activities that are putting pressure on that environment.

A team led by marine ecologists at the National Center for Ecological Analysis and Synthesis (NCEAS) at the University of California, Santa Barbara produced a composite map of the status of West Coast marine ecosystems, plotting the location and intensity of 25 human-derived sources of ecological stress. This provides important information on the impact of the activities and their sustainability or potential relocation. The effort represents a methodological refinement of an earlier globally oriented assessment. [Related item: *World Database on Marine Protected Areas* in June 2009 environmental security report.] (July 2009) Ref. 1450

### **Factors to Consider in Establishing and Operating Marine Protected Areas**

Although the number of marine protected areas increased over the past years, the world is still far from the commitment that by 2012, 10%-30% of waters will be protected. Scientists now warn that in order for the protection to be efficient, marine protected areas, which currently limit fishing in 1.6% of the waters claimed by countries, need to be located in the right spots.

(March 2010) Ref. 1451

### **International Conference and Assessments Find Rising Ocean Pollution**

The Second Intergovernmental Review (IGR-2) meeting of the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA) attended by over 700 participants from some 115 countries was held in Beijing, October 16-20. The delegates assessed progress so far and the main issues concerning ocean pollution, and addressed the actions needed for the next period 2007-2011. Although no legally binding instruments were adopted, "soft law" timetables and measures offering more flexibility and adaptability to

countries' and regions' specifics were discussed. New scientific estimates released at the meeting reveal that due to pollution, the number of marine 'dead zones' or low oxygenated areas may have reached 200, threatening fish stocks and the livelihood of people who depend on fisheries. And, an estimated 16% of the world's coral reefs suffered up to 90% mortality. UNEP new report, *The State of the Marine Environment: Trends and Processes*, is a comprehensive assessment of pollution evolution and trends, warning of critical areas and suggesting recommendations to improve control and reduce contamination caused mainly by discharge of untreated wastewater. The report also notes that the number of coastal dead zones has doubled every decade since 1960, and that coastal ecosystems will be further endangered by rising populations in those areas. Highly populated East Asia discharges 90% of its untreated sewage into water. The Beijing Declaration on Furthering the Implementation of the GPA will be submitted for endorsement to the next UNEP Governing Council/Global Ministerial Environment Forum in February 2007. (October 2006) Ref.1452

### **Marine Biodiversity Protection Regulations Need Improvement**

Greenpeace and 17 countries have asked Japan to "cease all its lethal scientific research on whales," that seems to violate international regulations for whales' protection. Japan's scientific research on whales caused the death of a significant number of protected species. In the first weeks of January, Greenpeace and Japanese whaling fleets have twice come into collision. Greenpeace and the Sea Shepherd Conservation Society are trying to raise international awareness to increase pressure upon Japan to stop its whaling operations. Although the Sea Shepherd Conservation Society, which was pursuing Japanese whaling operators, has said that Japan's whaling operations have been in violation of many international laws, no reprimands have been issued. It takes 75% of the International Whaling Commission's 66 members to support and make substantive changes to the International Convention for the Regulation of Whaling.

A similar case was brought forward to the UN Law of the Sea Tribunal in the case of Chile v. European Commission on the conservation of swordfish. Both parties submitted the case to the Tribunal at the international level for clarification of several aspects pertaining to marine biodiversity protection. The Tribunal extended the deadline on the proceedings until January 1, 2008. (January 2006) Ref.1453

### **Tougher Law of the Sea Regulations Suggested for Marine Genetic Resources**

The UN Open-ended Informal Consultation Process on Oceans and the Law of the Sea produced some recommendations for improving the management and protection of marine genetic resources, including designing enforceable regulations along with liabilities and responsibilities related to marine genetic resources; increasing protection of the marine environment from the effects of man-made factors; and encouraging collaborative research, access and use of marine resources in areas beyond national jurisdiction. Although the UN Convention on the Law of the Sea is recognized as the legal framework for all activities in the oceans and seas, there is disagreement on how the Convention applies to marine genetic resources in areas outside national jurisdictions. The G-77 group of developing countries and China consider marine genetic resources "common heritage of mankind"; while Japan, the U.S. and some other developed countries argue that they fall under the provisions relating to the high seas. The debate will continue in 2008 at the UN Ad Hoc Open-ended Informal Working Group on issues relating to the conservation and sustainable use of marine biological diversity beyond areas of national jurisdiction. (July 2007) Ref.1454

**Shipping to Face New Regulations to Reduce Air Pollution**

Concerns over air pollution by marine navigation are rising and, similarly to the aviation industry, it is likely that the shipping industry will one day be held responsible and asked to act on its GHG emissions. Given the industry's global extent, global regulations are needed and expected. The International Maritime Organization (IMO) launched in July a comprehensive study to assess the shipping industry's contribution to CO<sub>2</sub>, sulfur dioxide, toxic nitrous oxide, and particulate emissions, and the impacts on air quality. Results are expected by the end of this year. Along the same lines, the theme of World Maritime Day 2007 was "IMO's response to current environmental challenges" in order to enhance awareness of the industry's environmental impact, and trigger compelling action.

Note: This month, Friends of the Earth sued the U.S. EPA in federal district court for failing to meet the April 2007 deadline to regulate air pollution from large ships. Meanwhile, the Marine Vessel Emissions Act of 2007—that would require cleaner fuels and engines in all ocean-going vessels calling at U.S. ports—was introduced in the Senate (SB 1499) and the House of Representatives (HR 2548). (September 2007) Ref.1455

**Concerns over Maritime Air Pollution Increase**

A new report by the International Maritime Organization reveals that emissions from shipping are rising rapidly; annual CO<sub>2</sub> emission from the world shipping industry reached 1.12 billion tonnes in 2007, representing about 4.5% of global CO<sub>2</sub> emission—three times higher than previously thought—and by 2020 is expected to rise by 30%, making shipping responsible for nearly 6% of global emissions. Sulphur dioxide emissions from ships now stand at 16.2m tonnes a year and are expected to increase by 40%, to 22.7m tonnes by 2020. Nevertheless, emissions from shipping are difficult to regulate by international treaties, due to the complexity of attributing them to individual states. The International Maritime Organization is now assessing regulation proposals and the Sub-Committee on Bulk Liquids and Gases submitted draft amendments to the International Convention for the Prevention of Pollution from Ships (MARPOL) Annex VI and amendments to the Emission of Nitrogen Oxides from Marine Diesel Engines Technical Code. If approved by the Marine Environment Protection Committee (which meets at the end of March) the amendments could enter into force in March 2010 (or on a date to be decided.) The EPA put forward to the IMO a proposal that vessels be required to switch to cleaner fuel or use clean-up technology to reduce toxic grit from emissions when they are closer to shore, and it hopes that it would be adopted as an international regulation by 2011. EPA also plans to issue its own rules in 2009. Designing more efficient ships, reducing speed, and using higher quality fuel might be some of the easiest and fastest measures for reducing emissions. (February 2008) Ref.1456

**U.S. and Canada to Control Air Emissions from Ships**

The U.S. and Canada have proposed that the International Maritime Organization create a North American Emission Control Area around their coastlines, extending out 200 nautical miles in the jurisdictions of the United States and Canada. In order to comply with the new standards, ships should use fuel with a maximum of 1,000 parts per million sulfur beginning in 2015, and new ships should use advanced emission control technologies beginning in 2016. The proposal is part of a comprehensive EPA program to address harmful emissions from ships under the National Clean Diesel Campaign and the Clean Ports Program, in an effort to protect the population from

harmful emissions. The IMO is expected to begin reviewing the proposal in July, with expected approval in 2010. [See also *Tougher Global Limits Imposed on Air Pollution from Large Ships* in October 2008 environmental security report.] (April 2009) Ref. 1457

#### EPA Plan for Reducing Ship Emissions

The U.S. Environmental Protection Agency is working on plans to reduce harmful emissions from ships, primarily nitrogen oxides (NOx) and particulate matter (PM). The organization is proposing to use the Clean Air Act to set engine and fuel standards for U.S.-flagged ships to bring them in line with international standards. When fully implemented, the coordinated effort would reduce NOx emissions by 80% and PM emissions by 85%. Meantime, California air-quality regulators have begun enforcing emission rules on ships within 24 miles of the coast. (July 2009) Ref. 1458

#### **London Convention Might be Expanded to Include Ocean-based Geoengineering**

Parties to the London Convention on dumping of wastes at sea unanimously decided that a more cautious approach is needed concerning ocean-based geoengineering, which is scientifically unjustified and should be internationally regulated. A coalition of civil society groups suggested that an international process should begin, “to put all geoengineering technologies under intergovernmental oversight.” Thus, other international regulations—such as the UN Convention on Biological Diversity—might also be expanded. The Jeddah Declaration adopted on November 1st by the ninth global meeting of the Regional Seas Conventions and Action Plans also highlights the importance of a healthy marine environment to human security. [See also *Tougher Law of the Sea Regulations Suggested for Marine Genetic Resources* in July 2007, *The Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter Enters Into Force* in March 2006, *Accelerating Synthetic Biology Applications Need Better Monitoring and Regulation* in July 2007 and other previous environmental security reports on similar issues.] (November 2007) Ref. 1459

#### **Deep Seas and Open Oceans Need Urgent Conservation Actions**

*Ecosystems and Biodiversity in Deep Waters and High Seas*, a joint UNEP and World Conservation Union (IUCN) report, calls for urgent measures to conserve the world’s entire marine environment—including areas beyond national jurisdictions. More than 90% of the planet’s living biomass is found in oceans and seas, and is jeopardized by human activity, according to the report. Present institutions and conservation efforts are primarily focusing on coastal waters where, until recently, most human activity, like fishing and industrial exploration, took place. As these activities extend beyond those limits, so should the conservation measures. Given that over 60% of the marine world and its rich biodiversity are beyond the limits of national jurisdictions, international guidelines, rules and actions are needed to protect this ecosystem critical to the very existence of life on the planet. (June 2006) Ref. 1460

#### **Ocean/Sea ‘Dead Zones’ was focus of UNEP Governing Council/Global Ministerial Environment Forum**

'Environmental Dimension of Water, Sanitation and Human Settlements' was the focus of the 8th Special Session of the UNEP Governing Council and Global Ministerial Environment Forum attended by representatives of 158 nations, in Jeju, South Korea, from 29 to 31 March 2004. At the time of writing of this report the outcomes of the Forum were not yet available. The first

discussions were mostly committed to the nearly 150 oxygen-starved or “dead zones” in the world’s oceans and seas, highlighting that, although yet unknown, the consequences associated with these oxygen-depleted areas are predicted to be significant on a global scale. Excess of nitrogen from agricultural fertilizers, vehicle fumes, factory emissions, and wastes are the causes of the dead zones where marine creatures do not have enough oxygen to survive. “What is clear is that unless urgent action is taken to tackle the sources of the problem, it is likely to escalate rapidly,” said former UNEP Executive Director Klaus Toepfer.

The Forum also launched the *Global Environment Outlook Year Book 2003*, the first yearbook in the annual series associated with UNEP’s flagship report, *Global Environment Outlook (GEO)*. The report highlights major global and regional environmental events and achievements during 2003; has a chapter dedicated to freshwater in its role in achieving the Millennium Goals; ‘Emerging Challenges - New Findings’; raises awareness on emerging issues and new scientific research that ‘may assist society in recognizing and better understanding emerging environmental issues and help decision makers in designing adequate responses’ (<http://www.unep.org/geo/yearbook/086.htm>); and features GEO indicators for some of the key global and regional environmental issues and trends identified in GEO reports (including Ratification of Selected Agreements: <http://www.unep.org/geo/yearbook/110.htm>.) (March 2004) Ref. 1461

### **Improved Cooperation among International Organizations to Fight Marine Pollution**

The fight against marine pollution gained strength with the signing of a Memorandum of Understanding between the Secretariat of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, and the UNEP Regional Seas Programme. The effort is designed to implement environmentally sound management of hazardous wastes in order to prevent coastal and marine pollution. It is based on collaboration of the 13 Basel Convention Regional Centres (BCRCs) with the various Regional Seas Programmes, and reciprocal technical and legal training support. [The Basel Convention regulates the movement of hazardous waste; it covers toxic, poisonous, explosive, corrosive, flammable, ecotoxic, and infectious wastes that are being moved from one country to another.]

IMO Secretary-General Efthimios E. Mitropoulos and the European Commissioner responsible for the environment, Stavros Dimas, also had a meeting this month focusing on better collaboration between the two organizations to enhance marine environmental protection from pollution from ships and related activities. They agreed on the need for ratification, by as many States as possible, of the newest IMO conventions such as the Ballast Water Management Convention and the Convention on Anti-fouling Systems, to enable them to come into force soon.

The amendments to the MARPOL Convention—including the revised phase-out schedule for single-hull tankers and a new regulation on the carriage of heavy grades of oil—will enter into force on April 5, 2005; and, on May 19, 2005, Annex VI of MARPOL on regulations for the prevention of air pollution from ships will be effective. (March 2005) Ref. 1462

### **Could large-scale ocean zoning prevent conflicts?**

Increasing numbers of environmental lawyers and environmentalists believe that future conflicts could be prevented by large-scale ocean zoning for oil, fishing and wind farms, as well as that there is an immediate need for regulations to protect the oceans’ natural resources. “We’re now able to do on the open ocean what we once did on our western frontier—eradicate the wildlife,

extract the minerals and alter or pollute the habitat,” says David Helvarg, president of the Blue Frontier Campaign. Many variations of coastal zoning have been established around the world, which may one day lead to new large-scale ocean zoning within a more comprehensive integrated planning mechanism for local, regional and international standards and regulations for ‘pro-active rather than re-active’ ocean management. (March 2005) Ref.1463

### **Maritime Worker Security**

The necessary ratifications have been received for the Seafarers’ Identity Documents Convention (Revised) (ILO-185) to go into force on 9 February 2005. ILO-185 will set international standards for seafarer identification documents (“SID”) that will provide reliable, positively verifiable, and internationally recognized identification and be acceptable in lieu of a visa for purposes of shore leave. This agreement will ease the enforcement of treaties for protection of the maritime environment against attack. (August 2004) Ref.1464

### **U.S. Commission on Ocean Policy Emphasizes Ecosystem-Based Management**

A preliminary report by the U.S. Commission on Ocean Policy released on April 20, 2004 recommends changing the current fragmented system for managing oceans and coastal areas to an ecosystem-based management approach. For a new, coordinated, and comprehensive national ocean policy within the federal government, the Commission proposes a three-phase plan, and establishing a National Ocean Council (NOC) within the Executive Office of the President. (April 2004) Ref.1465

### **Europe to Harmonize Marine Pollution Legislation**

Regulations on marine pollution from ships will be harmonized for all 25 EU member states. The new Directive, considers pollution discharging from ships in coastal waters or the high seas a crime, whether by intention or by negligence. The European Council of Ministers was expected to adopt legislation this month that defines both marine pollution crimes and harmonizes the level of penalties. However, these were not yet adopted at the time of this writing. Penalties for these crimes will be much higher than current fines. Enforcement will be through countries’ collaboration in identifying pollution cases and synergies among enforcement authorities, including national coast guards and criminal justice organizations. (July 2005) Ref. 1466

### **Europe looks to Maritime Rules after tanker spill**

The breakup of the oil tanker "Prestige" spilling over a million gallons of oil into the ocean and polluting 124 miles of the Spanish coast prompted the European Commission to place the issue of oil tankers in EU waters on the agenda for the Maritime Transport Council Meeting on December 6. Until the oil tankers’ design, navigation, and maintenance improves, and regulations about sea routes change, such disasters are expected to continue. In cooperation with the International Maritime Organization the World Wildlife Fund has suggested a series of steps including the designation of particularly sensitive and vulnerable sea areas, tanker design, improved maintenance and inspection of all vessels, and limited routes for the ships carrying dangerous and toxic material. It is reasonable to expect that some of these recommendations will find their way into future international treaties. (November 2002) Ref.:1467

### **International Maritime Organization (IMO) and EU collaborate on oil spill prevention**

Following the shipwreck of the oil tanker “Prestige” off the coast of Spain in November last

year, recommendations for new regulations regarding oil tankers may become part of future international treaties. Leaders of the European Union (EU) and the International Maritime Organization (IMO) met on March 5 and agreed that the IMO should lead in establishing new measures concerning maritime safety while the EU would play a supporting role. The IMO has published a list of 66 ships that could be banned from EU waters. Meanwhile, the EU will propose to the IMO measures for phasing out single-hulled tankers. (March 2003) Ref.: 1468

### **Transport Canada Proposes New Vessel Operation Regulations**

The Canadian Ministry of Transport, Infrastructure and Communities is proposing Vessel Operation Restriction Regulations as part of the Canada Shipping Act 2001 (CSA 2001), which came into effect on July 1, 2007. The new regulation will replace the existing Boating Restriction Regulations and includes restrictions on boating activities and navigation in Canadian waters as to type or speed of vessels, mode of propulsion and engine power, and access by vessels to specific areas. A 60-day comments period began on August 18, 2007, after the publication of the proposed regulations in the Canada Gazette. After consideration of all comments received, Transport Canada will finalize the regulations and publish them in the Canada Gazette, Part II, at which time they will come into effect. (August 2007) Ref. 1469

### **EPA Plan for Reducing Ship Emissions**

The U.S. Environmental Protection Agency is working on plans to reduce harmful emissions from ships, primarily nitrogen oxides (NOx) and particulate matter (PM). The organization is proposing to use the Clean Air Act to set engine and fuel standards for U.S.-flagged ships to bring them in line with international standards. When fully implemented, the coordinated effort would reduce NOx emissions by 80% and PM emissions by 85%. Meantime, California air-quality regulators have begun enforcing emission rules on ships within 24 miles of the coast. (July 2009) Ref. 1470

### **The U.S. Might Ratify the Law of the Sea**

This month [November 2004] marked the tenth anniversary of the entry into force of the Law of the Sea. There are indications that the U.S. Senate is now ready to agree to the U.S. ratifying the law in order to keep its important place at the table of negotiations. (November 2004) Ref. 1471

### **Malacca Straits Need Increased Protection from Various Security Threats**

The Malacca Strait, one of the most important shipping lanes in the world, faces many challenges, including piracy, terrorists' attacks and environmental degradation. If terrorists were to sink a ship at the shallowest part of the strait, no ship could pass through, and all traffic would be blocked. At the same time, increased traffic volumes add pressures to the ecosystem of the straits. In an address jointly hosted by the embassy of Malaysia and the Institute of Foreign Affairs and National Security, the Hon Dato' Sri Najib Tun Abdul Razak, Deputy Prime Minister of Malaysia, urged the need for united efforts by all users of the straits to address these challenges. (March 2007) Ref. 1472

### **Network of Marine Educators Formed to Protect Pacific**

According to Environmental News Network, the International Pacific Marine Educators Conference (IPMEC), held 15-18 January 2007, in Honolulu, "has resulted in the establishment of a Pacific network of marine educators designed to ensure the health of the Pacific and the

communities that depend upon it. The network aims to facilitate real action in marine education and highlight the need for ocean stewardship across the Pacific." (February 2007) Ref. 1473

### **Website for Marine Protected Areas and Cetaceans' Sanctuaries**

A new website, cetaceanhabitat.org, sponsored by the Whale and Dolphin Conservation Society, provides comprehensive information on the nearly 600 proposed and existing marine protected areas and sanctuaries for cetaceans. It has summaries and links to international treaties on MPAs; definitions of key MPA terms; updated news on proposals for new MPAs, and other related resources. (March 2007) Ref. 1474

### **Network of Marine Protection Areas to be Adopted by 2012**

The establishment of a network of marine parks to protect the world's oceans from growing pollution and marine environment devastation was proposed at the First International Marine Protected Areas Congress held in Geelong, Australia 23-28 October 2005. In the Conference opening speech, Achim Steiner, director-general of the World Conservation Union (IUCN) emphasized that although there is rising concern and scientific evidence about marine environmental degradation, less than one percent of it is under protection today. He suggested establishing a system of Marine Protected Areas (MPAs) as decided at the 2002 World Summit on Sustainable Development. The MPAs would be designed by 2008 through collaboration of all concerned parties—international organizations, sovereign states, fishery organizations, and conservationists, for adoption by world governments by 2012. [See also *Marine Protection Issues* in the March 2005 environmental security scanning report.] (October 2005) Ref. 1475

### **New Baltic Sea Action Plan Based on Ecosystem Approach**

The kick-off Stakeholder Conference of the Helsinki Commission approved the first steps in drafting the Baltic Sea Action Plan (BSAP) to protect and restore the Baltic Sea marine environment. The Plan includes intergovernmental cooperation among the countries bordering the sea—Denmark, Estonia, the European Community, Finland, Germany, Latvia, Lithuania, Poland, Russia and Sweden. The BSAP will be part of the new EU Marine Strategy for a healthy marine environment. "The BSAP will apply the ecosystem-based approach to management of the Baltic Sea. In setting a definition of 'good ecological status' for the Baltic Sea, as well as specific environmental targets and necessary measures, the BSAP will be instrumental to the successful implementation of the [EU Marine] Strategy in the region," said Peter Gammeltoft, Head of the Water and Marine Unit in the Directorate General for Environment at the European Commission. The Plan is expected to be adopted in late 2007. (March 2006) Ref. 1476

### **Baltic Ministers Recommend Additions to Baltic Sea Action Plan**

The meeting of the environment ministers of the Nordic countries (Denmark, Finland, Iceland, Norway, and Sweden), held in Finland at the end of August, focused on the condition of the Baltic, the Nordic countries' actions on climate change, and the future of international environment management (including the Nordic initiative to strengthen UNEP.) The ministers called for tangible measures to protect the Baltic Sea (e.g., a ceiling on emissions of nutrients) and their inclusion in the Baltic Sea Action Plan (BSAP) due to be approved by the Baltic nations environment ministers at the meeting of the Helsinki Commission for the Protection of the Baltic Sea Environment (HELCOM) to be held on November 15, in Krakow, Poland. (September 2007) Ref. 1477



**Whales' Protection Efforts Increasing**

Transport Canada, Environment Canada, and a group of marine mammal researchers submitted a proposal to the IMO calling for diversion of large vessels in the Roseway Basin (southwest of Nova Scotia) to protect the endangered North Atlantic right whale. Several right whales are killed annually by collisions with large ships. The ban would prohibit shipping traffic in a 1,780 square kilometer area around Roseway Basin. Also to protect the North Atlantic right whale, the U.S. Fisheries Service proposed speed limits on the east coast. Similarly, a petition by the U.S. Center for Biological Diversity calls upon the National Marine Fisheries Service to protect endangered blue whales by setting a speed limit of 10 knots in the Santa Barbara Channel (California) for vessels 65 feet or larger while whales are in the area. (September 2007) Ref. 1478

The U.S. National Marine Fisheries Service has released its recovery plan for Puget Sound's endangered killer whales. The plan covers about 2500 square miles, including the waters around the San Juan Islands, the Strait of Juan de Fuca and all of Puget Sound. One of its aspects includes assessing and improving vessel traffic guidelines in and around protected areas.

Japan continues its whaling in waters off a section of Antarctica that Australia declared a whale sanctuary and over which it claims sovereignty. In January, an Australian Federal Court declared that whaling in the sanctuary was illegal and should stop. Australia's new Prime Minister, Kevin Rudd, also calls for an end to whaling and New Zealand Prime Minister Helen Clark warned that photos of the Japanese whaling fleet revealing their location would be published if they entered New Zealand's Antarctic waters.

A Pew Whale Symposium, entitled "A change in climate for whales," was held at UNU Headquarters in Tokyo, Japan, January 30-31, 2008, as a prelude to an intersessional meeting on strengthening the International Whaling Commission, to be held March 6-8, 2008, in London. [See also *Shipping Regulations for Protecting Whales* in September 2007, *New Marine Protected Areas Proposed* in March 2007, *Commercial Whaling Ban Strengthened by International Whaling Commission (IWC)* in June 2007, and other items on similar issues in previous monthly reports.] (January 2008) Ref. 1479

**Scientists Say Dolphins Should Be Treated As 'Non-Human Persons'**

New study of dolphins' behavior, backed up by anatomic research, has led scientists to declare dolphins second to humans in intelligence and suggesting that they should be treated as "non-human persons". [Related item: *Greenhouse Gas Emissions Increase Ocean Noise Pollution* in December 2009 environmental security report.] (January 2010) Ref. 1480

**Coalition Urges UN to Consider Legislation to Curb Harmful Ocean Sounds**

The Ocean Noise Coalition urges the international community to pass regulations to curb harmful sound waves used by the oil and gas industry, and navies to detect submarines. Marine scientists state that there is increased evidence that these sounds are harmful to whales, dolphins and other marine life. The Coalition aimed to convince delegates from 148 nations to take action on the issue during their forthcoming consultations on oceans and marine law. [See also *Scientific Models Could Help Navy Avoid Whales During Sonar Tests* in February 2005, *European Parliament Resolution to Protect Whales From Sonar* in October 2004, and *Research Confirms Military and Industry Sonar Harms Whales* of July 2004 environmental security reports.] (June 2005) Ref. 1481

**Measures Needed to Quiet Underwater Noise**

The UNEP Convention on Migratory Species conference held in Rome noted that human activities are making the marine environment noisier, as well as more acidic. The report *Ocean Noise: Turn it Down* by the International Fund for Animal Welfare states that low frequency underwater noise has doubled every 10 years over the past 50 years, and the number of ships has tripled and is expected to double again by 2025. An alliance of wildlife groups warned that this is disturbing marine mammals that use sound to communicate and navigate and called upon governments to adopt regulations that impose quieter off-shore equipment and ship engines and less intrusive sonar technologies by navies. The EU submitted a draft resolution suggesting a wide range of measures, including noise protection areas, better monitoring of noise levels, databases with noise origins, and a set of guidelines for better managing noise sources.

In the meantime, a three-year lawsuit against the U.S. Navy by environmental groups concerning the Navy's use of sonar in oceans has been settled in a California court, requiring more extended research on the effects of sonar on whales and other marine mammals. (Note: this is a separate case from the November 2008 U.S. Supreme Court ruling that lifts restrictions on the Navy's use of sonar off the coast of California.) [See also *U.S. Supreme Court Rules in Favor of Navy in Sonar Case* in November 2008 and other previous environmental security reports on this issue.] (December 2008) Ref. 1482

**UNU Report Urges the Need For a New Treaty on Deep-Sea Research**

A new international treaty is needed to regulate the search for new products from species in deep international waters, the Institute for Advanced Studies of the United Nations University warns in a report. Compounds found in marine organisms can be used in medicines, and commercial exploration lured by potential profits threatens unique deep-sea ecosystem. The report urges the need for a new treaty to regulate exploitation so that benefits from the research are shared fairly and helps humanity as a whole. [See also *Could large-scale ocean zoning prevent conflicts?* of March 2005 environmental security monthly report.] (June 2005) Ref. 1483

**Greenpeace Calls for Oceans Natural Reserves**

A new report by Greenpeace, *Roadmap to Recovery: A global network of marine reserves*, is a comprehensive assessment of the present status of the high seas and threats to them, suggesting that 40% of the world's oceans should be declared natural reserves and protected in the same way as land areas are (according to UN data, at present just 0.6% of the oceans are protected compared with 12% of the world's land). The report outlines a global marine reserve network for the high seas, documenting why it is needed, investigating candidate sites for protection, and indicating some principles of marine reserve networking, as well as suggesting implementation strategies. (March 2006) Ref. 1484

**Plastic Threats to the Marine Environment**

Researchers are increasingly warning of the long-term threat from plastic waste to the marine environment as studies confirm the risks from hidden contamination. While most attention is focused on dangers that visible items of plastic waste pose to wildlife, new researches investigate the impact of underwater microscopic plastic fragments on tiny marine organisms. Researchers note that all continents experience plastic contamination and plastic particles could represent as much as one-quarter of the total weight of sandy material samples gathered on shorelines at the high tide mark. [See also *The Protocol to the Convention on the Prevention of Marine Pollution*

by *Dumping of Wastes and Other Matter* Enters into Force in March 2006 and other previous environmental security reports on similar issues.] (March 2008) Ref. 1485

### **Growing Marine Litter Increasingly Threatens Marine Ecosystems**

Plastic debris, along with rubbish and other waste, are littering the marine environment worldwide, revealed *Marine Litter: A Global Challenge*, a report launched on World Oceans Day by UNEP and Ocean Conservancy, analyzing 12 major regional marine ecosystems around the world. Studies indicate that plastic content rose considerably in ocean animals from North Sea fulmars, to Northeast Atlantic plankton. UNEP suggests several strategies to curb marine litter, including improved waste management, shipping and port regulations on waste discharge, a modified system of fines for ocean dumping, improved ship dismantling, and a ban on thin film plastic bags. Out of the 12 regional seas included in the report—Baltic Sea, Black Sea, Caspian Sea, East Asian seas, East African seas, Mediterranean, Northeast Atlantic, Northwest Pacific, Red Sea and Gulf of Aden, South Asian seas, South Pacific, and Wider Caribbean—the East Asian Seas seem to be in the worst situation. [Items on similar issues in previous environmental security reports: *Microplastics Recognized as Environmental Threat to Oceans* in November 2008, and *International Conference and Assessments Find Rising Ocean Pollution* in October 2006.] (June 2009) Ref. 1486

## **BIOLOGICAL DIVERSITY AND SAFETY**

### **Biodiversity**

#### **New Measures to Continue the Fight against Biodiversity Loss**

The summit of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) decided to include several reptiles and amphibians in its endangered species trade list—some species of iguanas, an entire genus of tree frogs from Central America, and Kaiser’s newt salamander from Iran. In the meantime, the EU, admitting to have missed the target of stopping biodiversity loss by the end of 2010, decided to set two new targets: a mid-term one that all species loss within the EU be ended by 2020, and a long-term target to protect and restore all ecosystems by 2050 to prevent future losses. (March 2010) Ref. 1487

#### **Recommendations for Strengthening the Convention on Biological Diversity**

The 14th meeting of the Convention on Biological Diversity’s Subsidiary Body on Scientific, Technical and Technological Advice and the 3rd meeting of the CBD Working Group on Review of Implementation of the Convention adopted several recommendations to be considered by the Convention’s review conference to be held in October 2010, in Nagoya, Japan. The recommendations include a Strategic Plan for the period 2011-2020 to halt (or reduce the rate of) biodiversity loss (although some argue that 2050 would be a more realistic timeline.) Debates continue on the legal nature and institutional aspects of a possible biodiversity technology initiative, as well as the role of intellectual property rights in technology transfer. It was also agreed that the COP invite the UN General Assembly to consider declaring 2011-2020 the United Nations Decade on Biodiversity. (May 2010) Ref. 1488

#### **International Year of Biodiversity is 2010 and Convention on Biological Diversity COP10**

**to Meet in Japan This Year**

The year 2010 is designated as the International Year of Biodiversity by the United Nations. A panoply of events is planned to take place around the world for raising awareness and generating public pressure on leaders to develop new mechanisms to curb loss of the world's species due to human activity (estimated by some experts at 1,000 times more than natural evolution). Scientists and officials agree that methods are needed to price the impact of decisions on biodiversity and set policies that will help create a better balance. The international community is expected to agree on some post-2010 goals on biodiversity at the COP10 of the Convention on Biological Diversity to be held October 18-29, in Nagoya, Japan. (January 2010) Ref. 1489

**Biosafety****Cartagena Protocol on Biosafety—Second Working Group on Liability and Redress**

The second meeting of the international working group on liability and redress in the context of the Cartagena Protocol on Biosafety, held February 20–24, 2006 in Montreal, Canada, discussed the issues of damage caused by trans-boundary movements of living modified organisms and further considered options available for liability and redress. Specific talks focused on options for elements of rules and procedures as referred to in Article 27 - Liability and Redress. The discussions included definition of damage, effectiveness criteria, functional scope, clear rules on burden of proof and standing, and rules and procedure on compensation beyond national jurisdiction. Although no agreement was reached on any of the substantive issues, the final report acknowledges progress in mapping out the issues and in articulating their underlying legal rationales. There are presently 132 Parties to the Cartagena Protocol on Biosafety; the U.S. is neither Party, nor signatory. [See also *The First Meeting of the Conference of the Parties to the Cartagena Protocol on Biosafety (COP MOP 1)* in February 2004 environmental security report] (February 2006) Ref. 1490

The second meeting of the Friends of the Co-Chairs on liability and redress in the context of the Cartagena Protocol on Biosafety, held February 8-12, 2010, in Putrajaya, Malaysia, focused on international rules and procedures for damage resulting from transboundary movements of living modified organisms (LMOs), including a supplementary protocol on liability and redress, civil liability, and capacity-building measures. Although not concluding a supplementary protocol, significant progress was made on several of the most contentious issues, including the elaboration of a legally binding provision on civil liability. Outstanding issues include language, terminology, and financial security. The first drafts of the supplementary protocol include a provision for exemptions in case of acts of God or force majeure, and war or civil unrest, and parties' right to provide other exemptions or mitigations in their domestic law, as necessary. The negotiations will continue in June 2010, so that the supplementary protocol can be adopted at the 5th meeting of the Conference of the Parties (COP/MOP5) to the Biosafety Protocol, to be held in October 2010 in Nagoya, Japan. Reviews, if necessary, would be at five years (after its coming into force.) Note: UNEP Year Book 2010 remarks that biodiversity changes due to human activities in the past 50 years were the most significant in human history. The IUCN Red List shows that 17,291 species out of 47,677 assessed are under threat: 21% of mammals, 70% of plants, 37% of freshwater fish, 35% of invertebrates, 30% of amphibians, and 12% of birds. (February 2010) Ref. 1491

**Biological Weapons Convention (BWC) Meeting Improves International Resilience Systems to Address Infectious Disease and BioWeapons**

About 500 participants from 95 countries, UN organizations such as WHO, FAO and the World Organization for Animal Health (OIE), regional disease surveillance organizations, academic institutions, NGOs, and corporations participated in the 2009 Meeting of Experts from States Parties to the Biological Weapons Convention in Geneva, August 24-28. The meeting focused on international cooperation for fighting infectious diseases, while also discussing peaceful uses of advances in bioscience and the establishment of mechanisms for promoting the implementation of the Convention's Article X on scientific and technological cooperation related to "bacteriological (biological) agents and toxins for peaceful purposes." The results of the meeting will be considered for the Meeting of States Parties, to be held December 7-11, 2009. Although in force since 1975, the treaty has no verification or compliance monitoring provisions or organization. According to the report *Ensuring Compliance With the Biological Weapons Convention*, some biodefense research might violate member-states commitments to the BWC. Along the same lines, *New Approaches to Biological Risk Assessment*, published by the British Royal Society and the International Council for the Life Sciences, calls for a harmonized international and inter-sectoral system to assess the "full spectrum" of bio-threats—ranging from naturally occurring diseases to accidental or intentional misuse of biological materials. The report acknowledges the difficulties generated by the variety of hazards and the limited data available on some threats. Reportedly, a meeting at the White House on August 13 represented the first in a series of meetings with biological experts for strengthening the strategy on bioterrorism, including inputs for the BWC and its 2011 review conference. (August 2009) Ref. 1492

**No Enforcement Mechanism Proposed for Strengthening the Bioweapons Treaty Due to "rapidly changing nature" of the threat**

The 2009 Meeting of States Parties to the Biological Weapons Convention was held in Geneva, December 7–11, with focus on promoting capacity-building in the areas of disease surveillance, detection, diagnosis, and containment of infectious diseases. The new National Strategy for Countering Biological Threats presented by the U.S., although a comprehensive document designed to strengthen the Convention, doesn't propose any international monitoring or enforcement system. A binding treaty on verification "would not be able to keep pace with the rapidly changing nature of the biological weapons threat," noted Undersecretary of State Ellen Tauscher. (December 2009) Ref. 1493

**Genetic Patenting and GMO Face New Challenges**

A National Research Council study on the impacts of GM crops on economic and environmental security found that at least nine species of weeds in the U.S. have developed resistance to glyphosate since the introduction of GM crops in 1996. Glyphosate is a major component in commercial herbicides and GM crops are designed to tolerate it. Insufficiently diverse farming practices and excessive reliance on a single technology could undermine the economic and environmental benefits of GMOs use. In the U.S., GM crops account for more than 80% of soybeans, corn, and cotton.

The first U.S. federal ruling declaring patents on genes invalid concerns the BRCA 1 and 2 genes (related to breast and ovarian cancers), and was made on the grounds that it is "a valuable

scientific achievement ... but ...not ...something for which they are entitled to a patent”. Approximately 2,000 human genes (20% of the human genome) are currently covered by patents, including those associated with certain degenerative disorders and cancers. The ruling may have broad implications for the validity of gene patents in general, including patents on GMOs. (April 2010) Ref. 1494

### **Synthetic Biology and Calls for Global Regulations**

#### ETC Report Warns of the Threat of Synthetic Biology and Calls for Global Regulations

An ETC Group report, *Extreme Genetic Engineering; An Introduction to Synthetic Biology*, covers five major areas of research in synthetic biology: making minimal microbes; assembly line DNA; building artificial cells from the bottom up; and pathway engineering and expanding earth’s genetic system. The report looks at implications for trade, a synthetic energy agenda, intellectual property, the politics of biodiversity, and it warns, “today’s synbio industry has made the work of bioweaponers a whole lot easier.” It looks at ‘synthetic governance’ and gives some recommendations including the need for establishing an international body to monitor and assess societal impacts of emerging technologies—including synthetic biology—to facilitate coordinated global action, and the fact that “building blocks of life” shouldn’t be privatized. The ETC Group presented the report and its recommendations at the World Social Forum held in Nairobi, Kenya, January 20-25.

Note: In September 2006, the European Commission 6th Framework Programme, NEST–New and Emerging Science and Technology published the report *Synbiology: An Analysis of Synthetic Biology Research in Europe and North America*, which is a synthesis of “1100 papers connected to the Synthetic Biology field in peer-reviewed journals published since 1990.” (January 2007) Ref. 1495

#### Computer-Designed Genome Creates First “Artificial Cell”

Researchers at the J. Craig Venter Institute announced the successful construction of the bacterial cell *Mycoplasma mycoides* JCVI-syn1.0, the first synthetic cell designed in a computer and self-replicating, controlled only by the synthetic genome. Since the applications could vary from great improvements to the human condition to new forms of bioweapons, President Obama assigned the Presidential Commission for the Study of Bioethical Issues to assess the potential opportunities as well as risks (such as environmental and security) triggered by the new achievement. Meanwhile, the FBI Biological Sciences Outreach Program launched an initiative aimed at educating scientists on the potential security threats posed by synthetic biology.

[Related item: *New Technologies Need New Regulations Systems* in March 2009 and other items on this issue in previous environmental security reports.] (May 2010) ) Ref. 1496

#### New EU Body Recommended for Assessing Human Enhancement

Advances in biological technologies to increase human capabilities are accelerating. These are expected to have profound implications for the future of civilization and what it means to be human. Future schisms between those who are enhanced or favor enhancement vs. those who are not enhanced or oppose human enhancement are possible. Frameworks to understand, monitor, and regulate such advances are lacking. A European Parliament-requested study on these issues recommended improved public understanding and establishment of a European body for

monitoring human enhancement technologies (HET) within and outside Europe in order to develop a normative framework that would guide the formulation of EU policies. (July 2009) Ref. 1497]

#### Dangers Increase from “Amateur” Genetic Engineering; the Biological Weapons Convention to be Updated

Scientists from the Vanderbilt Medical Center and the University of North Carolina at Chapel Hill have used genetic engineering techniques to produce a new SARS-like virus affecting bats and transmittable to mice, in order to study such transferences. Some scientists believe these kinds of experiments might trigger new biosecurity problems. “Garage” bioengineering development (“synthetic biology”) could be done by amateur scientists. The required knowledge is now widely available and affordable equipment is easy to obtain. So far no instances of terrorists exploiting this field have been reported. Another possibility is the accidental release of harmful new organisms into the environment by well-intentioned amateur experimenters. In the meantime, the annual session of States parties to the Biological Weapons Convention reiterated the need to improve biosafety and biosecurity, increase awareness, and develop codes of conduct for preventing the misuse of bioscience and biotechnology research. The Convention may be updated at the next review conference to be held in 2011 to cover potential new threats. After the meeting, Russia announced that it backs a legally binding mechanism for enforcing the Biological Weapons Convention. [See also *ETC Report Warns of the Threat of Synthetic Biology and Calls for Global Regulations* in January 2007 and other items in previous environmental security reports on this theme.] (December 2008) Ref. 1498

#### Research Labs Safety Questioned

The World Health Organization is investigating allegations that the influenza H1N1 (swine flu) virus might have arisen and been released into the environment as an accidental happening at a biological research laboratory or vaccine production facility. However, the U.S. Centers for Disease Control and Prevention is skeptical. Meantime, a Canadian researcher was caught at the border trying to smuggle 22 vials with genetic material linked to the Ebola virus from Winnipeg's National Microbiology Laboratory into the U.S. [See also *Dangers Increase from “Amateur” Genetic Engineering; the Biological Weapons Convention to be Updated* in December 2008 and other items in previous environmental security reports on this theme.] (May 2009) Ref. 1499

#### International agreement needed to insure laboratory bio-safety and uniformity in biosafety standards and application or compliance requirements

Although the fastest and most extensive medical coordination in history - lead by the World Health Organization - stopped human-to-human spread of SARS, an additional approach will be needed to make sure it does not return. Two new cases (one in Singapore in September and the other in Taiwan in December) have been traced to laboratory practices, which may have caused the infections. Hence, lack of global standards, monitoring, and enforcement, could prove a new source of health threats. Although many laboratory biosafety standards exist, there is no international treaty governing their usage. The US CDC (Centers for Disease Control and Prevention) and NIH (National Institutes of Health) publish the Biosafety in Microbiological and Biomedical Laboratories (BMBL) manual, which is generally considered to be the international “gold standard”. Even the WHO (World Health Organization) Laboratory Biosafety Manual

follows many of the BMBL standards. While many countries use these biosafety standards, there is no uniformity of application or compliance requirement. (Unlike in the nuclear and chemical sectors that regulate the use and transport of radioactive and hazardous materials in the US, the BMBL standards are considered advisory, not regulatory, standards.) (December 2003) Ref. 1500

#### International Gene Synthesis Consortium Created for Increasing Biosecurity

Five companies that represent about 80% of global gene synthesis capacity have formed the International Gene Synthesis Consortium for increasing the security of their products, preventing misuse of gene synthesis technology, and helping to prevent bioterrorism and the use of manufactured DNA sequences in producing lethal disease agents. The Consortium's "Harmonized Screening Protocol for Gene Sequence & Customer Screening to Promote Biosecurity" creates a framework for safe use of synthetic genes covering aspects related to: screening of transactions and customers, record keeping, and regulatory compliance. In the meantime, the International Association of Synthetic Biology finalized the Code of Conduct for Best Practices in Gene Synthesis, and the World Intellectual Property Organization (WIPO) held a 'Symposium on Future Challenges of International Law: The Way Forward in Patenting Biotechnology' on November 25, 2009, to address the challenging interface between biotechnology, intellectual property rights, and international trade (the outcomes were not yet available at the time of this writing.) (November 2009) Ref. 1501

#### Insecticide Ingredient Deet May Be a Neurotoxin

Deet (N,N-diethyl-3-methylbenzamide, aka N,N-diethyl-meta-toluamide) might be a toxin to the human central nervous system, as revealed by new research by a team of scientists led by Vincent Corbel from the Institut de Recherche pour le Développement in Montpellier, France and Bruno Lapied from the University of Angers. According to Science Daily, "Researchers say that more investigations are urgently needed to confirm or dismiss any potential neurotoxicity to humans, especially when deet-based repellents are used in combination with other neurotoxic insecticides." (August 2009) Ref. 1502

#### The Woodrow Wilson International Center Opens Synthetic Biology Project

Genomic pioneer Craig Venter has said that we will write genetic code to create artificial biology, as we wrote computer code to create software. Synthetic biology holds great promise but also may create unintended consequences and a new weapons source for bioterrorists of the future. The Woodrow Wilson International Center for Scholars launched the Synthetic Biology Project in January within the Center's Foresight and Governance Project to "foster informed public and policy discourse concerning synthetic biology" by providing "independent, rigorous analysis that can inform critical decisions affecting the research, commercialization and use of synthetic biology." Some experts estimate that by 2015 a fifth of the chemical industry could be dependent on synthetic biology. A Wilson Center panel exploring unresolved synthetic biology ethical questions remarked that, although threats related to synthetic biology are not different from those related to most sciences, regulations are lagging, opening the possibility for misuse. Hence, they suggested that the problem to be addressed is to get policy and commercial organizations to adopt ethical criteria, standards, and policies. (January 2009) Ref. 1503



### U.S. Should Launch a New Biology Initiative

*A New Biology for the 21st Century: Ensuring the United States Leads the Coming Biology Revolution*, a report from the National Research Council, assessing the state of use of recent advances in biology, concludes that the design, manipulation, and prediction of complex biological systems needed for practical applications are “well beyond current capabilities.” To accelerate the implementation process, the report recommends a National New Biology Initiative, with an interagency and interdisciplinary approach and a timeline of at least ten years and funding in addition to current research budgets. The report underlines that the initiative could also be used to address environmental issues by making it possible to monitor ecosystems and diagnose and repair ecosystem damage. (October 2009) Ref. 1504

### Biotechnology Risk in Africa

Advancing developments in biosciences in Africa raise the risks of their potential misuse, thus increasing the need to develop adequate mechanisms for preventing the development and spread of biological weapons. For raising awareness on biosecurity issues and discussing the development of strategies that would encourage biotechnology research without jeopardizing security, a series of workshops were held—notably in Kenya and Uganda, two emerging biotech nations that are not yet properly engaged in international biosecurity policy deliberations. It was emphasized that Africa has to develop its own strategy, adapted to its own specific needs and conditions to reduce the risk of misuse, as well as to mitigate the damage to African scientific development in case of the use of biotechnology for harmful purposes. Africa should also develop a stronger position on regulatory issues and get more engaged in international negotiations related to biosecurity. [See also *ETC Report Warns of the Threat of Synthetic Biology* and *Calls for Global Regulations* in January 2007 and other environmental security reports on the same issue.] (August 2007) Ref. 1505

### Bioviolence: Preventing Biological Terror and Crime

*Bioviolence: Preventing Biological Terror and Crime*, by Barry Kellman is a very well written and documented analysis of the increasing threat of bioterrorism. He argues that the international community is not prepared to counter these dangers, and makes many recommendations that are carefully explained, including strengthening international law. (October 2007) Ref. 1506

### Middle East Biosecurity Assessment

Experts from more than 30 countries from the Middle East, Europe, and Asia addressed biosecurity-related issues in the Middle East and produced an initial assessment of the region’s biological defense capabilities. The three-day ‘Seminar for the Life Sciences and Policy Communities in the Gulf and Middle East and North Africa (MENA),’ held November 12-14 in Abu Dhabi, was organized by the International Council for the Life Sciences in collaboration with the Environment Agency of Abu Dhabi. It examined biological risks and threats in the conditions of the region’s growing biotechnology capabilities and its special security vulnerability. The issue was addressed in its whole complexity from possible causes, to necessary security measures, as well as preparedness in case of natural outbreak, accidental release of laboratory pathogens, or bioterrorism. Participants agreed that international collaboration and developing global standards and codes of conduct are essential in order to address biological risks and threats. An experts’ panel will continue working on Middle East biosecurity issues, and eventually a regional training center for specialists will be created. [See

also *ETC Report Warns of the Threat of Synthetic Biology and Calls for Global Regulations* in January 2007 and other items in previous environmental security reports on this theme.] (November 2007) Ref. 1507

### **Call for Reinforcements to Chemical Safety**

At the Fifth Session of the Intergovernmental Forum on Chemical Safety, held 25-29 September 2006 at Budapest, Hungary, policymakers and experts reinforced the need for applying the precautionary principle in the context of chemical safety; extending globally the regulations on heavy metals; and tackling the widening gaps among countries in following chemical safety policies. Prior to the Session, a side event was held on health and environmental concerns associated with heavy metals and global needs for further action. [See *also Stockholm Convention Updates* in November 2005, *First Conference of the Parties to Rotterdam Convention* in September 2004, *New Strategy for International Chemicals Management Launched* in November 2003, and other related items in previous environmental security scanning reports.] (September 2006) Ref. 1508

### First Simultaneous ExCOPs for Improving MEAs' Synergies and Coordination

As part of the UN's effort to improve coordination, reduce overlaps, and improve enforcement of multilateral environmental agreements, the first simultaneous extraordinary meetings of the Conferences of the Parties to the Basel (control of transboundary movement of hazardous waste), Rotterdam (prior informed consent for certain hazardous chemicals), and Stockholm (on POPs) Conventions, will be held February 22-26, 2010, in Bali, Indonesia, in coordination with the UNEP 11th Governing Council/Global Ministerial Environment Forum. The Synergies Oversight Team, composed of the Executive Secretaries of the three Conventions and representatives of UNEP and FAO, is coordinating the preparation of the simultaneous ExCOPs, while also assessing synergies in a strategic and long-term perspective. In a preamble to the conference, UNEP and FAO have launched a website that presents updated information on the ExCOPs: <http://excops.unep.ch>. Incidentally, the Basel Convention Committee has recently released a practical guide on national reporting by parties to the Basel Convention. [Related item: *UNEP Governing Council/Global Ministerial Forum Makes Progress on Global Environmental Governance* in February 2007 environmental security report.] (October 2009) Ref. 1509

The first simultaneous extraordinary meeting of the Conferences of the Parties to the Basel, Rotterdam, and Stockholm Conventions (ExCOPs) to foster synergies among the three main conventions addressing hazardous chemicals and waste was held in Bali, Indonesia, February 22-24, 2010. The synchronization includes all main aspects, ranging from joint activities, management, and services, to budget cycles and audits, as well as a review mechanism and follow-up work on enhancing coordination and cooperation among the three conventions. The negotiations' results are stipulated in the omnibus decision simultaneously adopted at the final plenary by the COPs of all three Conventions. This could be a test case for improved global environmental governance by increasing coherence in decisionmaking and monitoring at international, regional, and national levels. Reform of the international system of environmental governance was further discussed as a key theme at the 11th Special Session of the UNEP Governing Council/Global Ministerial Environment Forum (GCSS-11/GMEF), held February

24–26 (the outcomes were not yet available at the time of this writing.) [Related item: *UNEP Governing Council/Global Ministerial Forum Makes Progress on Global Environmental Governance* in February 2007 environmental security report.] (February 2010) Ref. 1510

#### Chemical Weapons Convention Annual Conference

The ninth annual Conference of the States Parties to the Chemical Weapons Convention (CWC) was held in The Hague, from 29 November to 3 December 2004, to re-enforce efforts to eliminate chemical weapons and their production facilities. Although this was the largest meeting thus far and countries representing 90% of the world's chemical industry are States Party to the Convention, some States of concern remain outside its control. An interesting precedent was created when Libya's request was approved to convert chemical weapons production facilities into a pharmaceuticals plant to produce low-cost treatments for AIDS/HIV, malaria and tuberculosis for the African market. The Chinese representative called on Japan to get rid of the chemical weapons it left in China during World War II. She noted that 2000 Chinese casualties were caused by these weapons since the end of the War, underlining the need to make the Convention more effective and timely for the destruction of such weapons, as well as creating the relevant facilities for preventing chemical weapons proliferation and acts of chemical terrorism. (December 2004) Ref. 1511

#### **Chemicals Management to Address Emerging Technologies-related Issues**

The Secretariat of Strategic Approach to International Chemicals Management (SAICM) released an update on current emerging policy issues related to: nanotechnologies and manufactured nanomaterials, hazardous substances within the life cycle of electrical and electronic products, chemicals in products, and lead in paint. These were adopted by Resolution II/4 at the second session of the International Conference on Chemicals Management. SAICM, in collaboration with OECD and the UN Institute for Training and Research (UNITAR), will organize during 2010 a series of regional informative workshops on potential applications and risks associated with nanotechnologies and nanomaterials, as well as capacity assessment, and awareness building. Submissions for emerging policy issues are welcome and would be considered at the next Conference, scheduled for June 2012. (September 2009) Ref. 1512

#### The EU's Chemical Regulatory Regime might be adjusted to Include Nanomaterials

The Institute for Health and Consumer Protection of the European Commission's Joint Research Centre (JRC) awarded two contracts to a consortium led by SAFENANO (Institute of Occupational Medicine) for the development of specific advice on the assessment of nanomaterials under REACH (the EU's Regulation on Registration, Evaluation, Authorization and Restriction of Chemicals). The two projects, REACH-NanoInfo (aka RIP-oN2), and REACH-NanoHazEx (RIP-oN3), address the REACH information requirements on intrinsic properties of nanomaterials, and the processes for undertaking exposure assessments and conducting hazard and risk characterization for nanomaterials within the REACH context. The work will be carried out in consultation with a range of stakeholders and will be used by the EC to support further developments in REACH Guidance on Information Requirements and Chemical Safety Assessment. Along the same lines, *Nanomaterials under REACH* report by the Netherlands' National Institute for Public Health and the Environment (RIVM) indicates that REACH doesn't adequately cover nanomaterials and points out the differences in risk assessment requirements between nano- and macro-sized materials. [Related item: *EU to Add*

*Carbon and Graphite to REACH Program* in the June 2008 environmental security report.] (January 2010) Ref. 1513

#### Comments Solicited on Proposed UN Nanotech Safety Report

According to Meridian Nanotechnology and Development News, "The United Nations' (UN) Strategic Approach to International Chemicals Management (SAICM), a policy framework to promote chemical safety around the world, has developed an outline for a report focusing on nanotechnologies and manufactured nanomaterials including, in particular, issues of relevance to developing countries and countries with economies in transition... Comments are invited and may be submitted until May 1, 2010. The final report will be submitted at the first meeting of the Open ended Working Group, in 2011, and at the third session of the International Conference on Chemicals Management." (March 2010) Ref. 1514

#### **New International Strategy for Chemicals Management and 9th Special Session of the UNEP Governing Council**

The International Conference on Chemicals Management (ICCM) focused on safe handling of chemicals in order to minimize adverse effects on human health and the environment by improving the production, trade, transportation, and storage of chemicals worldwide. The large number of chemicals already on the market, and the expected 80% growth over the next 15 years, has made it impractical to deal with separate regulations for individual compounds or groups of chemicals. As a result, the Conference adopted the Strategic Approach for International Chemicals Management (SAICM), a voluntary and comprehensive framework of measures pertaining to risk assessment, labeling, and stockpiling of chemicals, as well as handling of obsolete products. It also covers capacity building and staff training—primarily in the developing countries—in chemicals safety issues such as spills and accidents. UNEP will house the SAICM secretariat. The conference was held in Dubai, United Arab Emirates, from 4-6 February 2006, prior to the 9th Special Session of the UNEP Governing Council and Global Ministerial Environment Forum, which formally approved the SAICM.

The 9th Special Session of the Governing Council and Global Ministerial Environment Forum discussed strengthening international environmental governance, including transforming UNEP into a United Nations Environment Organization (UNEO) and the proposal to introduce universal membership of the Governing Council. No agreement was reached, but negotiations are expected at the next meeting. Other issues included environmental aspects of energy, tourism, and chemicals; assessment, monitoring and early warning; and revitalization of the Environmental Management Group. (February 2006) Ref. 1515

#### **Micro-reactors Challenge Chemical Weapons Convention Effectiveness**

A paper by Tuan Nguyen of the Lawrence Livermore National Laboratory calls attention to the erosion in effectiveness of the Chemical Weapons Convention caused by the advent of micro-reactors in the chemical industry. These devices, with sizes from a credit card to a notebook, replace large batch reaction vessels and make it much more difficult to monitor and verify compliance with the Chemical Weapons Convention. Hydrogen cyanide, phosgene, and methyl isocyanate have already been produced using this system, according to Nguyen. He also points out that chemical weapon precursors could be synthesized rather than purchased, making it more difficult to track down and discover the preparation of chemical weapons. (August 2005) Ref.1516

**New Strategic Approach to International Chemicals Management (SAICM) launched to address the widening gap among countries in following chemical safety policies**

The Strategic Approach to International Chemicals Management (SAICM) was launched at the first session of the Preparatory Committee (PrepCom1) that took place in Bangkok, Thailand. The delegates discussed potential issues to be addressed by the SAICM, and its relation to existing chemicals-related agreements and debated whether or not the SAICM should be just a political statement and not encompass legally binding agreements. Other issues discussed included: monitoring of progress; prioritization of issues; dissemination of information; the precautionary approach/principle; corporate liability and accountability; and the role of science in risk assessments. It was generally agreed that the SAICM's objectives should be linked to the World Summit on Sustainable Development (WSSD) target for 2020 and that it should address the widening gap among countries in following chemical safety policies. (November 2003) Ref.1517

**Stockholm Convention on POPs to be expanded**Stockholm Convention came into Force May 17, 2004

Stockholm Convention on POPs Came Into Force on May 17, 2004. It is a global treaty calling on governments to replace existing POPs and prevent the development of new POPs. Nine new chemicals were added in 2009 to the originally 12 POPs banned by the Convention. The Convention came into force on May 17, 2004. (May 2004, February 2004) Ref1518

Stockholm Convention Updated with Nine New Chemicals

The 4th Conference of the Parties (COP4) to the Stockholm Convention on Persistent Organic Pollutants (POPs) held May 4-8, 2009, in Geneva, adopted 33 decisions including: listing nine new chemicals for elimination (in addition to the 12 already listed); implementation plans; and improved evaluation mechanisms. No agreement was reached on non-compliance mechanisms, with further discussion to be continued at COP5. Of the nine new chemicals listed under the Convention, some are banned with no exemptions for production or use: alphaHCH, beta hexachlorocyclohexane, HBB, chlordecone, and pentachlorobenzene (PeCB), while others have some specific exemptions: perfluorooctane sulfonic acid (PFOS), tetrabromodiphenyl ether and pentabromodiphenyl ether (c-pentaBDE), hexabromodiphenyl ether and heptabromodiphenyl ether (C-octaBDE), and Lindane. Exceptional use of DDT was approved in the fight against malaria until effective alternatives are found. [See also *New Compounds Considered under the Stockholm and Rotterdam Conventions* in October 2008.] (May 2009) Ref. 1519

New Chemicals Proposed to be Added to Stockholm Convention on POPs

The Punta del Este meeting of the parties to the Stockholm Convention on Persistent Organic Pollutants (POPs) established a POPs Review Committee that will be responsible for evaluating additional chemicals that can be added to the current list of 12. Four candidate chemicals were given to the Committee, whose first meeting will be held in Geneva later this year, with its recommendations forwarded to future annual meetings of the Conference of the Parties to the Convention. The four candidates for phaseout are: the flame retardant pentabromodiphenyl; the hexachlorocyclohexanes, including the pesticide lindane; the pesticide chlordecone; and the flame retardant hexabromobiphenyl. (May 2005)

*The First Meeting of the Conference of the Parties to the Stockholm Convention on Persistent Organic Pollutants (POPs)* will be held in Punta del Este, Uruguay from 2-6 May, 2005 and is

anticipated to be attended by 800 government officials and observers from 130 countries. The Conference is expected to establish a process for evaluating future POPs candidates to add to the list, and to discuss best policies and strategies for implementing the Convention's requirements with Guidelines on Best Available Techniques and Environmental Practices. (April 2005) Ref. 1520

#### New Compounds Considered under the Stockholm and Rotterdam Conventions

Several more persistent organic pollutants may be banned or restricted under the Stockholm Convention. In addition to five substances already short-listed in 2007, the fourth meeting of the Persistent Organic Pollutants Review Committee (COP-4) approved four chemicals to be listed under Annexes A, B, or C: commercial octabromodiphenyl ether (c-octaBDE), pentachlorobenzene (PeCB), and alpha- and beta-hexachlorocyclohexane (alphaHCH and betaHCH), and suggested further evaluation for endosulfan and hexabromocyclododecane (HBCD) to be listed under the Convention. (October 2008) Ref. 1521

#### Stockholm Convention on Persistent Organic Pollutants (POPs) First Meeting of the Conference of the Parties

The 2001 Stockholm Convention banning the most dangerous Persistent Organic Pollutants (POPs) came into force on May 17, 2004. The UN-backed treaty is banning hazardous pesticides, dioxins and polychlorinated biphenyls (PCBs), as part of the UN effort to eliminate the worst health-threatening pollutants. The twelve POPs covered so far by the Convention are: aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, mirex, toxaphene, polychlorinated biphenols (PCBs), hexachlorobenzene, dioxins and furans. Many experts consider the "dirty dozen" list too short. The first Conference of the Parties to the Convention (COP 1) to be held in Punta del Este, Uruguay, in early 2005 will establish a committee for evaluating other potential chemicals and pesticides to be added to the list. The COP will also finalize guidelines for promoting "best environmental practices" and "best available techniques" that can reduce or eliminate releases of the most toxic POPs. (May 2004)

#### EU Ratified the Stockholm Convention and Proposes new POPs to be banned

EU ratified the Stockholm Convention that bans the use of POPs. The treaty entered into force on May 17, 2004. So far it has been ratified by 83 countries, among them 13 EU member states. As Party to the Treaty, the European Commission says that it has already prepared a list of nine additional POPs to propose to be banned under the Convention. (November 2004) Ref. 1522

The European Union has proposed banning additional chemicals beyond those found on the Stockholm Convention's list. The chemicals include: hexachlorobutadiene, octabromodiphenyl ether, pentachlorobenzene, polychlorinated naphthalenes, short-chained chlorinated paraffins, pentabromodiphenyl ether, chlordecone, hexabromobifenyl, and hexachlorocyclohexane. (August 2004) Ref. 1523

#### Stockholm Convention on POPs Adopts Evaluation but not Non-compliance Mechanisms

The third meeting of the Conference of the Parties (COP-3) to the Stockholm Convention on Persistent Organic Pollutants (POPs) occurred April 30-May 4, 2007, in Dakar, Senegal, with over 450 participants representing more than 180 governments and international and non-governmental organizations. Twenty-two decisions were adopted, including: measures to reduce or eliminate releases from wastes (integration with the Basel Convention for developing a

framework for environmentally sound waste disposal); guidelines on best available techniques and draft guidance on best environmental practices; improving the reporting system; evaluation of implementation effectiveness through the Global Monitoring Programme (establishing a coordination group formed of three representatives from each of the five UN regions); technical assistance; and non-compliance (negotiations to continue and mechanisms to be considered for COP-4). COP-4 will be held May 4-8, 2009, in Geneva, Switzerland. (May 2007) Ref. 1524

#### Stockholm Convention to be Updated

The first meeting of the Persistent Organic Pollutants Review Committee (POPRC), held in Geneva on 7-11 November 2005, determined that all five chemicals proposed for inclusion in the Convention (pentabromodiphenyl ether, chlordecone, hexabromobiphenyl, lindane, and PFOS) fulfilled the screening criteria as stipulated in Annex D of the Convention and also adopted a draft outline of the risk profile for the new POP candidates. The first meeting of the Expert Group on Best Available Techniques and Best Environmental Practices to comply with the Stockholm Convention will be held in Geneva, Switzerland, 28 November–2 December 2005. [See also *Sweden Calls for World Ban on PFOS Chemical* in June 2005, *New Chemicals Proposed to be Added to Stockholm Convention on POPs* in May 2005, and *Stockholm Convention on Persistent Organic Pollutants (POPs) First Meeting of the Conference of the Parties* in the April 2005 environmental security scanning reports.]

This month India has ratified the Stockholm Convention, considerably increasing environmental protection in that economically fast-growing Asian country. (November 2005) Ref. 1525

#### Sweden Calls for World Ban on PFOS Chemical

Sweden proposes a global ban on perfluorooctane sulfonate (PFOS), a chemical used by a number of industries including semiconductor makers, and which might be harmful to human and animal health. Sweden would propose the ban under the Stockholm Convention. Sweden hopes that if the approval of the regulation takes a long time, the scientific evidence will convince countries to take independent advance actions to phase out PFOS. [See also *Stockholm Convention on Persistent Organic Pollutants (POPs) First Meeting of the Conference of the Parties* in the April 2005, and 8.2 *New Chemicals Proposed to be Added to Stockholm Convention on POPs* in May 2005 environmental security scanning reports.] (June 2005) Ref. 1526

#### Stockholm Convention Meeting to Look at Concrete Actions and Policies

The Second Meeting of the Conference of the Parties to the Stockholm Convention (COP 2) on Persistent Organic Pollutants (POPs) will be held in Geneva, May 1–5, 2006. Representatives of Parties to the Convention will review progress and discuss specific activities, policies, and investments at the national and community levels that would help POPs reduction. The conference agenda includes: strengthening of a global monitoring network to track the levels of POPs in the environment; technical assistance; non-compliance; liability; and the redress of issues. Presently there are 12 POPs covered by the Convention and more chemicals are under technical review and expected to be added to the list in coming years. [See also *Stockholm Convention Updates* in November 2005 and other previous environmental security scanning reports.] Note: we will report on the COP-2 outcomes in the May environmental security scanning report. (April 2006) Ref. 1527

### Stockholm Convention on Persistent Organic Pollutants Is Succeeding in Europe

A recent study has evaluated the effectiveness of the Convention on Long-range Transboundary Air Pollution (LRTAP) in the UN Economic Commission for Europe countries, excluding Canada and the US. The research revealed that many persistent organic pollutants (POPs) decreased considerably and will continue to decrease as the LRTAP POP protocol is becoming fully implemented by all countries. These results are significant for the global Stockholm Convention on Persistent Organic Pollutants and for developing a global monitoring plan for POPs. The study also included preliminary assessments for eight “candidate” POPs (Hexachlorobutadiene (HBU); Pentabromodiphenyl ether (PBDE); Pentachlorobenzene (PCBe); Polychlorinated naftalenes (PCN); Pentachlorophenol (PCP); Endosulfan, Dicofol; and short chain chlorinated paraffins (SCCPs)) which could be added to the POP list in the future. [See also *Stockholm Convention on POPs Adopts Evaluation but not Non-compliance Mechanisms* in May 2007, *New Chemicals Proposed to be Added to Stockholm Convention on POPs* in 2005, and other related items in previous environmental security scanning reports.] (February 2008) Ref. 1528

### **Asian Countries to Adapt their Chemicals Regulatory Systems to EU REACH System**

China, Japan, and Korea have set the broad framework for adapting their chemicals regulatory systems to the EU REACH (Registration, Evaluation, Authorization and Restriction of Chemical substances) system. So far, they have only introduced REACH in the top legal structure, but during 2009–2010, their governments will issue additional regulations on issues such as chemical exposure, risk assessment, classification of chemicals, and collection of hazard data. Venues used for policy coordination include: the Tripartite Environmental Ministers Meeting; the Chemical Dialogue; the UN Strategic Approach to International Chemical Management, and the Globally Harmonized System on Classification and Labeling of Chemicals. The “REACHing Asia Continued” report examines the differences between the Asian chemicals regulatory system (specifically China, Japan and Korea) and the EU REACH system and outlines national frameworks covering, inter alia: pollutant release and transfer register; import and export restrictions; occupational exposure limits and protection; and chemical restrictions in products/compositions. (October 2009) Ref. 1529

### **New Chemicals Considered for Toxic Lists**

Health Canada and Environment Canada are recommending adding diethyl sulphate to the country’s list of toxic substances. The compound is used in the production of fabric softeners, flocculants, pharmaceuticals, fragrances, and dyes. Various foreign jurisdictions, including the European Commission, consider it a possible carcinogen. The agencies also designated butane and isobutane for further assessment.

Concerns over the use of formaldehyde in pressed-wood products are getting increased attention. California issued new rules on these products, and the EPA published an Advance Notice of Proposed Rulemaking.

An investigation by CDC is underway to determine if antimony in fire-resistant clothing is posing a health risk. The issue was triggered by complaints in the Boca Raton FL Fire Dept.

The European Parliament voted to prohibit around 22 substances used in pesticides due to their potential health hazards. Two separate bills address the issue: one banning the very hazardous substances from pesticides and another considering use reduction of all pesticides. Three transborder geographical regions within the EU—rather than countries—can rule on the



use of specific products, while countries can ban a product because of specific environment or agricultural circumstances. (January 2009) Ref. 1530

### **New Substances Identified as Harmful to Human Health and the Environment**

California has identified 30 new chemicals with detrimental effects to human health, ranging from gasoline additives, to industrial solvents, chemicals used to manufacture plastics, adhesives and other materials, and byproducts of water disinfection using chlorine.

The Kenyan Parliament is considering a ban on Furadan, a highly toxic pesticide widely available in Kenya, but already banned in the U.S. and Europe.

A study of a weed-killer by scientists at the Institute of Biology of the University of Caen in France has added evidence to the finding that an “inert” ingredient in a product may have toxic effects outweighing any attributed to the principal ingredient(s) in the material. In their research, polyethoxylated tallowamine (POEA), a surfactant, was shown to be more lethal to certain human cells than the product’s active ingredient, glyphosate. (June 2009) Ref. 1531

### **U.S. to Revise the Toxic Substances Control Act**

The overhaul of the U.S. 1976 Toxic Substances Control Act (TSCA) will require prioritizing tens of thousands of chemicals currently on the market. While there is agreement that the focus should be on the highest-priority chemicals based on potential health risks, the industry prefers using existing data, while environmentalists call for a risk-based standard focused on chemical regulation rather than product regulation. (October 2009) Ref. 1532

### **Toxic Substances Control Act Up for Revision**

The Safe Chemicals Act of 2010 has been introduced in Congress to replace the Toxic Substances Control Act of 1976. The new law would include size, size distribution, shape, and surface structure in the definition of a chemical’s “substance characteristic”, raising the question of the effect new provisions would have on products containing nanomaterials. (June 2010) Ref. 1533

### **U.S. New Measures on Chemicals Safety**

The U.S. Environmental Protection Agency has created a ‘Chemicals of Concern’ list and adopted additional measures for reducing risks posed by compounds raising serious potential health or environmental concerns: phthalates and polybrominated diphenyl ethers (PBDEs) were added to the list; risk-reduction actions should begin for several phthalates, short-chain chlorinated paraffins, and perfluorinated chemicals; and the three-year DecaBDE phaseout will be reinforced. [Related item: *New Chemicals Considered for Toxic Lists* in January 2009 environmental security report.]

The U.S. Congress is proposing to update the 34-year-old federal Toxic Substances Control Act (TSCA), requiring more thorough testing for chemicals. In the preamble to the debate, the Safer Chemicals, Healthy Families coalition released a report which notes that since 1976, when the federal TSCA became law, the EPA has required testing on only 200 of the 83,000 chemicals in common use and issued regulations for only five, while 60,000 chemicals received approval without preliminary government testing. Highlighting the health and cost issues associated with toxic chemicals, it estimates that the new regulations would reduce the incidence of chronic diseases by 0.1% and direct health care costs by \$5 billion a year in the U.S. [Related item: *U.S.*

to Revise the Toxic Substances Control Act in October 2009 environmental security report.] (January 2010) Ref. 1534

### **California Proposes Reducing the Level of Chromium 6 in Water**

The California Office of Environmental Health Hazard Assessment has proposed a “public health goal” of 0.06 ppb of hexavalent chromium (Cr 6) for the state’s drinking water. The current state and national standards for total Cr compounds are 50 ppb and 100 ppb, respectively. (EPA is reevaluating the latter.) The new California value was set as a result of a recent federal study setting a threshold of one cancer among every one million people exposed for a lifetime. After public comments, the California Department of Public Health will adopt a regulation setting a maximum allowable level for water supplies based on the health goal but also considering economic and technological factors. [Related item: *New Substances Identified as Harmful to Human Health and the Environment* in June 2009 environmental security report.] (January 2010) Ref. 1535

### **Canada Extends Toxic Substances Lists**

Health Canada declared four chemicals with varied uses to be toxic to human health (but not toxic to the environment): 2-(2-Methoxyethoxy) ethanol (DEGME); 2-Methoxyethanol acetate (2-MEA); 2-methoxy-1-propanol; and C.I. Pigment Red 3. Actions to manage related hazards have been proposed or are under study. In January the government declared two types of siloxanes, D4 and D5, as toxic to the environment. Health and Environment Canada also determined that pigments yellow 34 and red 103, thiourea, isoprene, and oxirane were toxic to human health, and that 2,4,6-tri-tert-butylphenol or TTBP is an environmental toxin. (March 2009) Ref. 1536

### **Toxic Compound Detected in Chlorinated Tap Water**

Xing-Fang Li and a team of scientists at the University of Alberta have discovered minute amounts (a few ng/l) of one of the toxic dichloroquinone compounds in chlorinated tap water. It is suspected that these compounds may pose a risk of bladder cancer. (December 2009) Ref. 1537

### **Environmental Effects from Flame Retardant Manufacturing Impurities**

A research team from Canada’s National Laboratory for Environmental Testing has found that environmental pollution associated with the flame retardant Dechlorane Plus comes not only from that compound but from impurities introduced during its manufacture. (December 2009) Ref. 1538

### **Ultrathin Solar Panels Could End Up On the EU list of Hazardous Materials, Due to Cadmium Content**

The ultrathin photovoltaic panels, favored over the conventional crystalline models because they are more versatile, contain cadmium telluride for converting light to electricity. Since cadmium is banned from most products in Europe, rather than amending the law, the EU is expected to propose a way of pressuring solar companies to come up with alternatives to cadmium telluride, e.g., by requiring them to apply for four-year, renewable grace periods. A French government report concluded that risks to human health from cadmium exposure during normal operation of the panels were negligible. One of the largest U.S. panel manufacturers has set up a voluntary

system that would be funded in advance to recycle and reuse 95% of the cadmium and tellurium in its modules sold worldwide. (November 2009) Ref. 1539

### **Building Contaminants Linked to Parking Lots with Coal Tar Sealant**

Scientists at the U.S. Geological Survey have published a paper linking high concentrations of the contaminants polycyclic aromatic hydrocarbons (PAHs) in house dust to coal tar sealants used on parking lots. PAHs are an environmental hazard because several are probable human carcinogens. [Related item: *Study Shows Nanotube Manufacture May Pollute Environment* in August 2007 environmental security report.] (January 2010) Ref. 1540

### **Organophosphate Flame Retardants May Pose Health Risk**

New findings indicate that house pollution from organophosphate flame retardants (widely used as replacements for the now banned polybrominated diphenylethers (PBDEs)) may present a health risk, inducing altered hormone levels and declined semen quality in men. (February 2010) Ref. 1541

### **New Evidence on Silver Toxicity**

Researchers of the Dept. of Pharmacology and Cancer Biology at Duke University Medical Center conducted a study whose results, "...provide evidence that silver has the potential to kill developing nerve cells and is even more potent than currently known neurotoxicants."... Effects varied widely with test conditions, making interpretation difficult. [Related items: *UK Defra Committee Report on Nanosilver and Industry Silver Nanotech Group Opposes "New Material" Designation* in December 2009, and *Petition Filed for EPA to Regulate Nanosilver* in November 2009 environmental security reports.] (January 2010) Ref.1542

### **EU to Ban the use of Cadmium in Batteries**

As part of its effort for reducing environmental pollution from heavy metals, the EU has decided to ban the use of cadmium in consumer batteries. Cordless power tools, medical equipment, emergency lighting, and alarm systems are exempted so far, but in 2008 when the law will be reviewed, the European Commission might propose a complete ban—as previously suggested by such countries as Sweden and Denmark. The environmental ministers also set collection targets for portable batteries. After adapting their national legislation to the new EU regulations, in the first four years, 25% of all used batteries should be collected on their territories; while after eight years the rate rises to 45%. The new legislation is awaiting European Parliament approval. (December 2004) Ref. 1543

### **Call for Global Ban on Lead-based Paints**

Scientists are calling for international regulations to ensure that paints have lower than critical lead levels, with the ultimate goal of eliminating all lead from paint. The call comes as a result of a study on consumer paint lead levels in Africa, conducted by a multinational team of environmental and occupational health researchers. Note: The Budapest Statement on Mercury, Lead and Cadmium adopted at the fifth session of the Intergovernmental Forum on Chemical Safety held in September 2006 invites the UNEP GC "to give high priority to considering [...] measures, as appropriate, on lead and cadmium, by assessing the need for further action and considering a range of options, including the possibility of establishing a legally binding instrument." (October 2007) Ref.1544

**WHO Project to Minimize Risks of Radon**

The World Health Organization (WHO) is launching the International Radon Project to help countries reduce the health risks associated with radon gas. Radon, a radioactive gas emanating from soil, is estimated to be the cause of 6–15% of lung cancer cases. The first phase of the project is designed to run for three years, 2005–07. It will assess risk levels, and exposure measurements and guidelines. It will also increase public and political awareness about the consequences of exposure to radon. It will also identify and promote effective strategies and policies useful to countries for mitigating health impacts of radon. Radon is present worldwide, in air and water, but its concentration is highly dependent on the content of uranium in soil. (June 2005) Ref. 1545

**Reactive Nitrogen Beginning To Be Recognized As Environmental Hazard**

Two papers in the May 16 issue of *Science* discuss the problem of excessive reactive nitrogen in the environment. According to Univ. of Virginia environmental sciences professor James Galloway, “We are accumulating reactive nitrogen in the environment at alarming rates, and this may prove to be as serious as putting carbon dioxide in the atmosphere.” Atmospheric nitrogen can appear as nitric acid in water and vegetation or can contribute to the greenhouse effect. The International Nitrogen Initiative ([www.initrogen.org](http://www.initrogen.org)) has been established to serve as a center for efforts to cope with this problem. [See also *New Predictions for the Atmosphere by 2030* in October 2006 environmental security report.] (May 2008) Ref. 1546

**Methyl Bromide a Continuing International Concern**

The Green Party in New Zealand is calling for an immediate halt to methyl bromide fumigation at Wellington's port, after it was learned that the ozone-destroying chemical, regulated under the Montreal Protocol, was being used in the heart of the city. This action, together with the coming into force in January of Indonesia's ban on its import, is likely to increase international attention to the hazards it presents and support for adherence to the Protocol. [See also *Call for Expanding Montreal Protocol on Ozone-Depleting Substances* in September 2007, and other similar items on this issue in previous environmental security reports.] (February 2008) Ref. 1547

**Possible Risk with Bisphenol A Receiving Increased Attention**

Opinions continue to be divided on the environmental danger posed by bisphenol A, a chemical widely used to harden plastics. The NIH National Toxicology Program issued a controversial preliminary report citing minimal risk to adults, but another panel, led by Prof. Fred vom Saal of the Univ. of Missouri, expressed “a very high level of concern”, according to one of its members. An EPA spokeswoman has conceded that its 14-year-old safe level for the chemical is out of date, and says the agency is now studying it. Various studies around the world have not yet produced a clear indictment of the compound as a serious environmental hazard. (December 2007) Ref. 1548

**Questions on Bisphenol A Risk Raised Again**

The Canadian health ministry is said to be ready to declare BPA a dangerous substance, and the US National Toxicology Program, part of the National Institutes of Health, has expressed concern over its effects on the very young. [See also *Possible Risk with Bisphenol A Receiving Increased Attention* in December 2007 environmental security report] (April 2008) Ref. 1549

### Concerns Increasing for BPA Bans and Phthalates

Canada has announced it would ban the use of bisphenol-A (BPA) in baby bottles, and the U.S. Safeway grocery chain will stop selling plastic baby bottles made with BPA. The U.S. National Toxicology Program and the FDA Science Board have recently indicated concern over the health safety of the chemical. Similarly, phthalates, used in a wide variety of products, are also beginning to be subjected to scrutiny for their effect on the genital development of male fetuses. (October 2008) Ref.1550

### **Vanishing Supply of World's Helium Calls for Conservation**

The world's largest reserve of helium may be depleted in as short a time as eight years, experts say; they also point out that the gas is non-renewable and irreplaceable. It has a number of applications in science and technology, and in industry, e.g., nuclear magnetic resonance, mass spectroscopy, welding, fiber optics and computer microchip production. Helium is found in some natural gas reservoirs, and Russia may be a future supplier. Its separation from the atmosphere is prohibitively expensive. (January 2008) Ref.1551

### **Canadian Chemical Plan May Go beyond REACH as Environmentalists Get New Political Support**

The Canadian government has launched a plan to regulate the use of chemicals harmful to human health and the environment. Although the initial plan targets only 200 chemicals for regulation over the next four years, more could be added to eventually go beyond initiatives in Europe and the U.S. The Canadian efforts to strengthen such environmental policies will be improved by election of Stéphane Dion (former Environmental Minister) this month as the Liberal Opposition Leader. Sources report a rising environmental tide among the public. Previous negotiations for regulations mostly related to climate change, but pollutants are also expected to be revived as the Conservatives' efforts in the environment arena are strongly criticized by the other parties, citizens, and the international community. [Note: This month, the Secretariat of the Commission for Environmental Cooperation (CEC, NAFTA's "environmental arm") issued a determination requesting a response from Canada to a submission asserting that Canada is failing to effectively enforce the federal Species at Risk Act.] (December 2006) Ref.1552

### Canada Prepares to Ban More Chemicals

The government of Canada announced that it is preparing to issue a ban on a number of chemicals in common use in various applications, because of possible harm to human health or the environment. The 11 chemicals include vinyl acetate, ethylene oxide, thiourea, isoprene, and cyclohexasiloxanes. Industry has 60 days to offer countervailing evidence. [See also *Questions on Bisphenol A Risk Raised Again* in April 2008 environmental security report.] (May 2008) Ref.1553

### **Bottled Water Becomes Target of Environmentalists**

Organizations around the world are becoming active in opposing the now rapidly increasing use of bottled water, and regulations and restrictions are beginning to be applied to its distribution. Shipping bottled water across the Atlantic and Pacific by oil-propelled ships does seem odd. One estimate puts the annual fossil fuel footprint of bottled water consumption in the United States at over 50 million barrels of oil equivalent—enough to run 3 million cars for one year. Beginning

January 1, 2008 the city government of San Francisco has banned its departments and agencies from purchasing bottled water, and St. Louis is considering the same ban for its city employees in early 2008. With increased discourse around bottled water, it is likely that some international directives will be adopted to regulate its trade and distribution. (December 2007) Ref. 1554

### **Insecticide Ingredient Deet May Be a Neurotoxin**

Deet (N,N-diethyl-3-methylbenzamide, aka N,N-diethyl-meta-toluamide) might be a toxin to the human central nervous system, as revealed by new research by a team of scientists led by Vincent Corbel from the Institut de Recherche pour le Développement in Montpellier, France and Bruno Lapied from the University of Angers. According to Science Daily, “Researchers say that more investigations are urgently needed to confirm or dismiss any potential neurotoxicity to humans, especially when deet-based repellents are used in combination with other neurotoxic insecticides.” (August 2009) Ref. 1555

## **Greenhouse Gas Emissions**

### **Post-Kyoto Protocol and Post Copenhagen Negotiations**

#### **Including Security Implications of Climate Change on the Copenhagen Agenda**

The second conference “Climate Change & Security at Copenhagen: New Thinking on the Atlantic Contribution to Success” to be held October 7-8, 2009 in Brussels, will focus on the security aspects of climate change and trans-Atlantic co-operation, as inputs for the Copenhagen conference. (August 2009) Ref. 1557

### **Post-Copenhagen Negotiations**

The Bonn Climate Change Talks took place between May 31 and June 11, 2010 in Bonn, Germany, attended by approximately 2,900 participants, representing governments, intergovernmental and non-governmental organizations, academia, the private sector and the media. Critics say that not much was achieved for advancing the negotiations for the next phase. The request of the Alliance of Small Island States (AOSIS) and many other parties for a technical paper by the Secretariat on options for limiting global average temperature increase to 1.5°C and 2°C from pre-industrial levels, was opposed by Saudi Arabia, Oman, Kuwait and Qatar. The final text of the meeting mentions that industrialized countries should aim to cut greenhouse gases 25-40% by 2020 but it does not set a year when that comparison should start (scientists say the base line should be 1990, while the United States has argued for 2005.)

Meantime, the IEA reports that fossil fuel consumption subsidies amounted to \$557 billion in 2008, a considerable increase from \$342 billion in 2007. Considering a baseline in which subsidy rates remain unchanged, IEA forecasts and models indicate that phaseout between 2011 and 2020 would need to: cut primary global energy demand by 5.8% by 2020; cut global oil demand by 6.5 mb/d in 2020, predominately in the transport sector; reduce CO<sub>2</sub> emissions by 6.9% by 2020 – or 2.4 GT of CO<sub>2</sub>. It notes that both the Copenhagen Accord and the G20 subsidies are important to meet warming targets. If the Copenhagen Accord pledges were fully implemented, then emissions would be reduced by 70% of what is needed to be on track to meet the 2°C target by 2020. Additionally, if the G20 subsidy commitment were to be fully

implemented, it would reduce emissions by more than 30% of what is needed to be on track to meet the 2°C target by 2020. (June 2010) Ref. 1559

The second round of negotiations under the UN Framework Convention on Climate Change began in Bonn, Germany, on May 31 and is scheduled to conclude on June 11. The meeting brings together representatives from 182 countries. A report by the U.S. Energy Information Administration estimates that world energy consumption would rise 49% by 2035, to 739 quadrillion BTU in 2035 from 495 quadrillion BTU in 2007, led by developing nations such as China and India, whose part of total world energy consumption will grow from about 20% to 30% over the projection period, while the U.S. share would fall from 21% to about 16% over the same period. (May 2010) Ref. 1560

The first round of UN climate change negotiations since the Copenhagen conference was held in Bonn, April 9-11, 2010, with the main objective to agree on the organization and methods of work for 2010. More than 1,700 delegates attended from 175 countries. In order to advance the negotiations towards a treaty in Mexico, it was decided that, in addition to the negotiating sessions already scheduled for 2010, two additional meetings would be held of at least one week each, to take place between the 32<sup>nd</sup> session of the United Nations Framework Convention on Climate Change (UNFCCC or FCCC) Convention subsidiary bodies—May 31-June 11, 2010, and the UN Climate Change Conference in Mexico— November 29-December 10, 2010.

In an effort to get developing countries on board for an international global warming deal, the U.S. State Department announced that countries opposing the Copenhagen accord will be denied climate change assistance from the promised \$30 billion climate aid fund. (April 2010) Ref. 1561

On March 9, 2010, China and India formally announced at the UN Framework Convention on Climate Change that they agree to be listed as parties to the Copenhagen accord. India specifically stipulates that the accord is not legally binding, but serves as a negotiating framework for a post-Kyoto treaty. There is increased agreement that it is unlikely that a treaty will be signed at the Mexico meeting in 2010, but rather hopes for it to happen at the December 2011 meeting to be held in South Africa. (March 2010) Ref. 1562

The United Nations Framework Convention on Climate Change (UNFCCC) publishes the Copenhagen Accord climate pledges. A total of 55 countries have submitted by February 1<sup>st</sup> their plans to curb greenhouse gas emissions by 2020, as set at the Copenhagen climate conference in December 2009. Together, these countries account for 78% of the global emissions from energy use. China and India pledged to reduce the growth rate of their emissions by up to 45% and 25%, respectively, compared to 2005 levels. The U.S. pledged to cut its absolute carbon emissions by about 17% below 2005 levels. The EU maintains its pledged 20% cut below 1990 levels and 30% if other nations deepen their reductions. Nevertheless, the Climate Interactive team says that if current proposals would be fully implemented, the average global temperature would still rise by approximately 3.9°C (7.0°F) by 2100, exceeding the 2°C goal.

To advance negotiations for a binding treaty, an extra session of UN climate talks will be held April 9-11, at the Bonn-based UN Climate Change Secretariat, prior to the session scheduled in Bonn for May 31-June 11. Similarly, the UNEP information note “How Close Are

We to the Two Degree Limit?” says that the chances of keeping global temperature rise below 2°C are 50/50. The report says that the annual global greenhouse gas emissions should not exceed 40 to 48.3 metric Gigatons (Gt) of equivalent CO<sub>2</sub> in 2020 and should peak sometime between 2015 and 2021, while based on the pledges, the expected emissions for 2020 range between 48.8 and 51.2 GT. Global emissions should then further fall 48%-72% by 2050. (February 2010) Ref. 1563

States that signed the Copenhagen accord agreed to announce (by end-January 2010) their official CO<sub>2</sub> emissions reduction commitments. The EU decided to maintain its commitment of 20% greenhouse gas emissions reduction by 2020 compared to 1990 levels, and 30% if other powers make comparable pledges. Australia announced that it will cut greenhouse gas emissions by 5% of 2000 levels by 2020 unconditionally, and 15% to 25%, depending on other countries' commitments.

The environment ministers of the BASIC countries (Brazil, South Africa, India, and China) met on January 24 to discuss cooperation in future climate negotiations and decided to adhere to the agreements made in the Copenhagen Accord regarding the submission of their emission reduction actions. Cooperation among these countries may shape future climate change negotiations and influence the adoption of a binding climate agreement. The next round of climate talks is scheduled for November 29, 2010, with pre-conference negotiations slated to take place May 31 to June 11, 2010. (January 2010) Ref. 1564

“Copenhagen Accord” Brokered by President Obama at UN Climate Change Conference Is a Step Forward in Negotiations—Next Stop Mexico

The UN Conference on Climate Change in Copenhagen was attended by over 100 heads of state and government, representatives of 193 nations, and between 40,000 and 100,000 people from around the world came to participate in side events. The December 7–18, 2009 set of conferences and meetings resulted in a non-binding 12-paragraph Copenhagen Accord that calls for international cooperation to limit atmospheric CO<sub>2</sub> to 450 parts per million to make sure global warming does not rise more than 2°C, that developed and developing nations set carbon reduction targets that are internationally verifiable, that developed countries provide funds approaching USD 30 billion for the period 2010 to 2012 for developing countries with balanced allocation between adaptation and mitigation, and that developed countries mobilize USD 100 billion a year by 2020 to address the needs of developing countries. However, the original objective was not achieved: to adopt a treaty that would extend or replace the 1997 Kyoto Protocol in order to reduce greenhouse gas emissions and address global climate change.

The Conference and the numerous side-events generated an extraordinary wealth of information regarding challenges and potential strategies for addressing global climate change and set the stage for further negotiations. The next round of climate talks is scheduled for November 2010 in Mexico.

Note: Some scientists warn that lack of clear targets and commitments might raise CO<sub>2</sub> concentrations to around 700 parts per million (compared to 450 ppm that scientists consider the limit for keeping global warming below 2°C), meaning a potential warming by 3.5°C by 2100. The International Energy Agency estimates that about \$10.5 trillion in additional investment is needed by 2030 for setting the world on the path to low-carbon development. (December 2009) Ref. 1565



## Post-Kyoto Protocol Negotiations

The final round of negotiations before the Climate Summit to be held in Copenhagen took place November 2-6, 2009, in Barcelona, Spain. Despite some progress, concluding a legally binding instrument in Copenhagen remains uncertain. While some suggest that a new mandate might be needed to continue negotiations and possibly reach a global climate pact in 2010, new hopes emerged when Britain suggested the creation of a Copenhagen launch fund for helping poorer states deal with climate change-related challenges. The fund, to begin in 2010, would reach \$10 billion per year by 2012. Britain already pledged £800 million (\$1.3 billion). The Committee of African Heads of State and Government on Climate Change (Committee of Ten) mandated to speak on behalf of Africa expressed that Africa expects the agreement to stipulate clear measures for providing Africa technology and capacity-building to “resolve the present climatic crises and spare the continent from catastrophes.” The vulnerable island states also ask for funds and concessions to deal with rising sea level consequences. At the same time, new targets were announced by the world’s largest GHG emitters: U.S. intends to reduce its GHG emissions “in the range of” 17% below 2005 levels by 2020 and 83% by 2050, while China plans to reduce its CO<sub>2</sub> intensity — emissions per unit of GDP — by 40–45% by 2020, compared to 2005 levels. The EU already announced its 20/20/20 policy cutting emissions by 20% (30% if other industrialized states follow suit) by 2020 compared to 1990 levels. Brazil, the fourth-biggest GHG contributor, offered a reduction of 36-39% based on its projected economic output in 2020. India is also expected to make some announcement soon. (November 2009) Ref. 1567

The deadlock in negotiations for a UN climate treaty continues. The Bangkok talks (held September 28 to October 9, 2009) ended with deep divisions between developing and developed countries and the length of the text still to be processed remains considerable. “Satisfactory” progress is reported as being achieved on issues such as adaptation, technology, and capacity building. The negotiations will resume in Barcelona, November 2-7, which should produce a report to the 15th Conference of the Parties (COP 15) to be held in Copenhagen, Denmark, December 7-18, 2009. Many speculate that a legally binding document is unlikely to be agreed upon in December, and a new deadline might be set in 2010.

Meantime, regional and national efforts continue. Europe offers to cut its greenhouse gas emissions by up to 95% by 2050 and by 30% by 2020 if a deal is reached at Copenhagen. The U.S. Senate Environment and Public Works Committee is advancing on climate-change legislation, to be submitted at the beginning of November, that aims to reduce 2005-level greenhouse gases emissions of U.S. industry by 20% by 2020. (October 2009) Ref. 1568

Some 100 heads of State and Government attended the UN climate change summit one day before the opening of the UN General Assembly’s 64<sup>th</sup> session (September 23<sup>rd</sup>). Japan’s prime minister-elect pledged to cut greenhouse gas emissions by 25% in the next 10 years from 1990 levels. The Climate Change Summit of the Alliance of Small Island States, held on September 21st, adopted the AOSIS Climate Change Declaration, which calls on “urgent progress towards a fair and meaningful Copenhagen outcome.” Along the same lines, the G-20 summit agreed on actions such as phaseout over the medium term of inefficient fossil fuel subsidies, which would reduce greenhouse gas emissions by 10% by 2050. In view of almost stalled negotiations for a

climate change treaty, French President Nicolas Sarkozy proposed that the leaders of the major industrialized nations hold an extraordinary summit ahead of the December climate conference. The next post-Kyoto treaty negotiations are taking place in Bangkok, Thailand, September 28–October 9, 2009. (September 2009) Ref. 1569

An intersessional consultation, as part of ongoing negotiations for a post-Kyoto Protocol, was held in Bonn, August 10-14, 2009, attended by approximately 2,400 participants. One of the focal points was to revise and consolidate the nearly 200-page long text and prepare for negotiations at coming meetings. Vulnerable states call for a 1.5°C (2.7°F) temperature rise ceiling by the end of the century, meaning that rich nations should cut greenhouse gases by at least 45% below 1990 levels by 2020. However, average cuts promised so far by the rich total just 10% to 16%. The next negotiations will be held in Bangkok, Thailand from September 28 to October 9, and Barcelona, November 2–6. Other related meetings (before Bangkok) are the UN High-Level Event on Climate Change, and the G-20 meeting in Pittsburgh, Pennsylvania.

China announced that its CO<sub>2</sub> emissions will start falling by 2050, said Su Wei, director-general of the climate change department at the country's National Development and Reform Commission. This sets the first officially announced timeframe. The current five-year plan to 2010 stipulates a target of reducing energy intensity by 20%, and the next five-year plan is expected to include tougher targets. Nevertheless, it is not clear if China will agree to some emissions cap ahead of the Copenhagen climate meeting. (August 2009) Ref. 1570

At the G8 Summit held in L'Aquila, Italy, the U.S. joined Europe in seeking to keep average temperatures from rising more than 2°C (3.8° F) above their pre-industrial levels. Rajendra Pachauri, Chair of the IPCC, noted that the agreement doesn't consider the IPCC's recommendation that in order to achieve the 2°C goal, emissions should peak by 2015. Nevertheless, the accord is a positive sign toward a post-Kyoto treaty to be negotiated in December.

In the meantime, the G2 — U.S. and China — signed an agreement that engages the two countries in more cooperation on climate change, energy, and the environment. Although not setting firm goals or targets, it reiterated support for a ten-year cooperation and sets the stage for a new climate change policy dialogue. (July 2009) Ref. 1571

The second round of preliminary negotiations for a UN climate treaty revealed that developed countries are unlikely to cut emissions between 25% and 40% from 1990 levels by 2020, Japan, U.S., and Canada being among the ones that are hindering negotiations, due to tough resistance from industry at home. Hence, a 15% target seems more realistic. However, the Association of Small Island States is pushing for a 45% reduction in greenhouse gas emissions by 2020. The African Ministerial Conference on the Environment adopted the Nairobi Declaration on climate at a week-long special session, to be put forward at the Copenhagen negotiations. Some argue that the "G2" of China and America determines the global post-Kyoto agenda.

Meantime, the U.S. Congress passed the American Clean Energy and Security Act of 2009, which gives stronger power to the U.S. at the Copenhagen negotiations. The bill sets a framework for reducing greenhouse gases in the U.S. by 17% below 2005 levels by 2020, and 83% by 2050. The bill sets a CO<sub>2</sub> cap-and-trade system—scheduled to begin in 2012, requires at least 20% renewable electricity production by 2020, and allocates billions of dollars to new

energy-efficient and low-carbon projects.

During the climate change preparation conference in Bonn emissions trading and emissions credits systems were also discussed. Nevertheless, experts and environmental groups are increasingly opposing the carbon credits market, as a source of pollution in developing countries. (June 2009) Ref. 1572

The text for a new treaty on the reduction of greenhouse gas emissions to be negotiated at the December meeting in Copenhagen was posted online. The 53-page negotiating text includes four sections: “A shared vision for long-term cooperative action; Enhanced action on adaptation; Enhanced action on mitigation; Chapter IV: Enhanced action on financing, technology and capacity-building.” The next talks on the negotiating text will be held in Bonn, June 1-12. (May 2009) Ref. 1573

The first of three sessions preparing for the Copenhagen conference, held March 29-April 8 in Bonn, Germany, was attended by more than 2,000 delegates from government, business and industry, environmental organizations, and research institutions. While progress was made on many issues, mainly related to technology cooperation between industrialized and developing countries and deforestation, the deadlock concerning rapidly developing countries—such as India and China—in mandatory reductions framework continues. Meantime, an alliance of 43 island states, backed by more than a dozen nations from Africa and Latin America, urged developed countries to cut greenhouse emissions by at least 45% below 1990 levels by 2020, and by at least 95% below 1990 levels by 2050. Countries have the opportunity to provide input to the draft for the negotiating text ahead of the next round of talks to be held in June. (April 2009) Ref. 1574

An International Scientific Congress on Climate Change: Global Risks, Challenges & Decisions was held in preparation for the December conference. The outcomes will be published in a full synthesis report June 2009. However, there are concerns that the richness of new information might increase policy-makers’ confusion about setting priorities and targets. Scientists tend to agree that the widely accepted 2°C (3.6°F) warming target might not be enough to prevent some of the worst impacts of climate change.

India announced that it intends to resist accepting legally binding greenhouse gases emissions cuts at the negotiations for the new post-Kyoto treaty. (March 2009) Ref. 1575

The EU proposes that richer countries cut greenhouse gas emissions by 30% by 2020, and that developing countries (except the poorest) cut emissions to 15%-30% below “business as usual” levels. The proposal suggests setting up a carbon market for richer countries by 2015 and that poorer countries be included five years later. The proposal will be submitted for member states’ approval at a summit in March. An important shortfall is the lack of budget.

The McKinsey report *Pathways to a low carbon economy* addresses the feasibility and conditions to keep global warming within the 2°C limit. The report finds that it is possible to reduce GHG emissions “to stay on track until 2030” but immediate action and a strong policy framework are needed. Any delay might result in missing the 2°C limit.

At the World Economic Forum, BP Chief Executive Tony Hayward said that the world should establish a price for carbon emissions.

Delegates attending the Ministerial Conference on Transport held January 14-16, 2009, in

Tokyo, called on the International Maritime Organization and International Civil Aviation Organization to prepare by the end of the year “a package of appropriate mechanisms for reducing emissions,” from the aviation and shipping sectors. (January 2009) Ref. 1576

Over 11,000 participants from 190 nations attended the conference held in Poznan, Poland, December 1-12, 2008 to advance negotiations for a post-2012 climate change regime.. Despite little progress on filling in the gap between rich countries’ rhetoric and real commitments for addressing climate change (partly due to the global financial conditions), procedural decisions were made and there were commitments from governments for negotiating an effective new UN climate treaty and response to climate change to be agreed at the Copenhagen meeting in December 2009. A first draft of the text would be presented at a UNFCCC conference to be held in June 2009, in Bonn. Also, UN Secretary-General Ban Ki-moon said that he is considering convening a summit focused on climate change at the time of the General Assembly in September 2009. While a few industrialized countries openly undermined progress, most developing countries came with clear and constructive proposals. Progress was made in the area of technology transfer with the endorsement of the Poznan Strategic Programme on Technology Transfer that aims to increase investments for mitigation and adaptation technologies in developing countries and in reducing greenhouse gas emissions from deforestation and forest degradation.

Hans Joachim Schellnhuber, head of the Potsdam Institute for Research on Global Warming Effects and adviser to German Chancellor Angela Merkel on climate-change issues, says that in order to avoid a disastrous climate change, global CO<sub>2</sub> emissions would need to be reduced 50% by 2050, meaning an 80%–90% decrease for industrial countries. (December 2008) Ref. 1577

In the preamble to the Poznan meeting to be held December 1-12 as part of negotiations for a post-2012 treaty, the UN released an analysis of greenhouse gas emissions, showing that of 40 industrialized countries that have greenhouse gas reporting obligations under the Kyoto Protocol 16 are on target, and 20 countries—including Canada, Germany, Ireland, Italy, Japan, New Zealand and Spain--are lagging. However, it notes, “the biggest recent increase in emissions of industrialized countries has come from economies in transition, which have seen a rise of 7.4% in greenhouse gas emissions within the 2000 to 2006 time-frame.” The report did not include large emerging economies like those of India and China.

Australia said that it will advocate that rich developed countries—such as Singapore and South Korea—be also included in any binding targets.

The “Algiers Declaration” by Africa’s 53 countries calls for the development of a common vision and to act as a bloc in the negotiations for the new global warming treaty. (November 2008) Ref. 1578

The WWF report *Climate Change: faster, stronger, sooner* calls on the EU to adopt an emission reduction target of at least 30% below 1990 levels by 2020 (compared to the present 20% target) in the EU territory, rather than by overseas offsetting. It also suggests stronger EU leadership at the international level for a post-2012 climate treaty and increased EU funding for developing countries to address climate change and adaptation.

Japan drafted a new post-Kyoto protocol to be submitted in December at the 14<sup>th</sup> Conference of the Parties to U.N. Framework Convention on Climate Change (COP14) (October 2008) Ref. 1579

The *Climate Change Review* by Professor Ross Garnaut, commissioned by Australia's government, assesses what should be targets for cutting CO<sub>2</sub> emissions by the greatest emitting countries to respond to climate change. The report recommends the following targets: for Australia 80% for 2050 with a 10% interim by 2020; same for Canada; for the U.S. 81%, for Japan 75%, and the EU 69%. If considering emissions per capita, China should cut only 4%. The Australian Federal Treasury will release its emissions trading scheme economic model in October, while emissions trading legislation is expected to be introduced by the end of the year. (September 200) Ref. 1580

The third UN climate talks for a post-2012 treaty took place August 21-27 in Accra, Ghana, attended by about 1,600 delegates from some 160 nations. Progress was made on focus-issues such as strategies for slowing deforestation in developing nations, and considering a sectoral approach for greenhouse gas reduction targets. Rich countries insisted on a differentiation of approach and obligations of developing nations to greenhouse gas emissions based on their economic strength, pointing out that some developing nations such as Singapore, Argentina and some OPEC states have grown richer than some developed nations which have to comply with greenhouse gas emissions cut obligations. Rapidly industrializing countries have refused to accept the overall reduction targets that would be imposed on the rich nations, but progress was made in developing nations accepting targets for specific, highly polluting industries such as cement, steel, and aluminum. The conclusions will be compiled for further discussion at COP 14 in December 2008, in Poznan, Poland.

Some nations outside the Kyoto framework want to set binding targets for emissions and act as a bridge between the developing and developed nations. For example, South Korea wants to announce in 2009 its 2020 greenhouse gases targets. Japan announced plans to reduce total carbon emissions by up to 80% by 2050. In order to engage consumers in the "CO<sub>2</sub> reduction revolution," carbon footprint labels will be put on most products' packaging. (July-August 2008) Ref. 1581

The theme for World Environment Day 2008 was "Kick the Habit: Towards a Low Carbon Economy", recognizing the need for a strategy to reduce greenhouse gas emissions from fossil fuel.

The group of 16 nations accounting for about 80% of the world's CO<sub>2</sub> and other greenhouse gas emissions—G8 plus Australia, Brazil, China, India, Indonesia, Mexico, South Korea and South Africa—attending the Major Economies Meeting held in Seoul, failed to agree on clear targets to cut greenhouse gas emissions. The draft agreement mentions rather generic "deep cuts" based on the "ambitious" scenario outlined by the IPCC (although its target of 50% reduction by 2050 is not mentioned in the draft statement.) The statement is expected to be adopted at the July G8 summit to be held in Japan. Nevertheless, Yvo de Boer, head of the UN Framework Convention on Climate Change expressed hope and the urgency that the Japan G8 summit set clear emission targets for a post-2012 treaty.

The EIA *International Energy Outlook 2008* looks at energy trends up to the year 2030, estimating global energy consumption will grow by 50% with 85% of that in non-OECD states. CO<sub>2</sub> emissions will likely increase by 51% (1.7% annually), with non-OECD states expected to exceed OECD members' emissions by 72% in 2030.

Meantime, James Hansen of NASA warned again that the world has passed the "dangerous level" for greenhouse gases in the atmosphere and should cut to 1988 levels. He said "This is the

last chance,” to avoid “changes such as mass extinction, ecosystem collapse and dramatic sea level rises.”

The German government approved a climate package—focusing mainly on the transport and construction sectors—designed to help reach by 2020 the target of reducing CO<sub>2</sub> emissions by 49% compared to 1990 levels. (June 2008) Ref. 1582

Scientists at the Mauna Loa observatory in Hawaii found that the levels of CO<sub>2</sub> are at least 34% higher than pre-Industrial Revolution levels and near the suspected climate-tipping point of 400 ppm. They note that the rise was 2.14 ppm in 2007, while from 1970 to 2000 the concentration rose by an average of about 1.5 ppm each year.

“Present global mean CO<sub>2</sub>, 385 ppm, is already in the dangerous zone” and “prompt policy changes” are needed, suggests the *Target Atmospheric CO<sub>2</sub>: Where Should Humanity Aim?* paper by a group of scientists led by Jim Hansen, director of the NASA Goddard Institute for Space Studies. Based on an analysis of paleoclimate data and ongoing climate change, the authors argue that CO<sub>2</sub> should be reduced to a maximum of 350 ppm in order to avoid reaching irreversible tipping points and maintain the Earth conditions supporting life as we know it. The main policy suggestions include increasing efforts to find energy sources beyond fossil fuels, and ending fossil fuel exploitation and use without adequate CO<sub>2</sub> capture and sequestration. The ultimate task is phaseout over the next 20-25 years of coal plants that are not equipped with carbon sequestration technology. The paper admits that establishing a clear time frame of climate change is difficult, since the models are still deficient. Nevertheless, it underlines the urgency of the situation and concludes that although the task of curbing man-made CO<sub>2</sub> emission is difficult, it is “feasible when compared with the efforts that went into World War II.”

The *State and Trends of the Carbon Market 2008* report of the World Bank shows that the global carbon market grew to \$64 billion in 2007, more than double the 2006 level. The European Union Emission Trading Scheme (EU ETS) also saw a doubling of both value and number of allowances transacted. (May 2008) Ref. 1583

#### Bali Roadmap Sets Framework for Post-Kyoto Negotiations

About 10,800 participants, including high-level delegations from 187 countries, attended the UN Climate Change Conference in Bali, Indonesia, December 3-15, 2007. The most significant result was the "Bali Action Plan", also called the Bali roadmap. It outlines a two-year agenda of negotiations for a post-2012 global climate regime to enter into force by 2013, but does not include emissions reduction targets, despite strong support by the EU and other countries. The roadmap calls for agreements by the end of 2009 at a major summit in Copenhagen. The agreement is to include both national and international mitigation and adaptation actions to address the effects of climate change, including methods to reduce greenhouse gas emissions, development and transfer of climate-friendly technologies, and financing and investment measures. Four major UNFCCC meetings to implement the Bali roadmap are planned for 2008.

Other results of the Bali Convention included the launch of the Kyoto Protocol’s Adaptation Fund to finance projects in developing countries; a Forest Carbon Partnership Facility, an addition of deforestation to a post-2012 treaty agenda; and other capacity-building, financial, administrative, and methodological issues. A consortium of mayors and local governments launched the World Mayors and Local Governments Climate Protection Agreement, with six commitments addressing climate change, including the reduction of carbon emissions by 60% to 80% worldwide by mid-century (cities account for 80% of humanity’s production of greenhouse

gases). (December 2007) Ref.1584

The report *From Bali to Poznan: New Issues, New Challenges* summarizes the discussions and outcomes of the conference with the same name held at the European Parliament in Brussels, December 18, 2007, convened by the Institute for Environmental Security in cooperation with other interested organizations. It assesses the impact of climate change on international security and sustainable development, a switch to solar energy as an alternative to fossil fuels, implications of illegal trade in natural resources, and the ways climate change influences European foreign policy. The report can be seen as background policy information for the next UNCCC to be held in Poznan in December 1-12, 2008. (May 2008) Ref.1585

The two-day GLOBE forum (Global Legislators Organization for a Balanced Environment) was organized as a preamble to the G8 summit to be held in July. It was attended by about 100 lawmakers from the Group of Eight industrial countries (Britain, the United States, France, Germany, Italy, Russia, Canada and Japan) and fast-developing nations (China, Brazil, India, South Africa and Mexico). The main subjects were: discussing a draft post-Kyoto Protocol treaty, the need for G8 countries to intensify efforts to meet the Kyoto targets, and strategies to help developing nations improve practices for reducing emissions.

UN Secretary-General Ban Ki-moon's message to the UNEP Global Ministerial Environment Forum called for a "decisive and deep regime for emissions reductions after 2012" and for the development of "financial incentives and mechanisms so markets can respond to the opportunities of a rising carbon price" under the guidance of the Bali road map. (February 2008) Ref.1586

The first meeting since the December Bali conference for negotiating a post-Kyoto climate change treaty is being held in Bangkok, March 31-April 4. It aims to move forward the Bali Roadmap. Key issues on the agenda include limiting greenhouse gas emissions, adaptation, mitigation, deployment of climate-friendly technologies, and financing. [Note: the meeting was ongoing at the time of this writing and the outcomes will be included in next month's report.] It is hoped that negotiations will be concluded next year at a major Copenhagen summit.

Humanity lost an important decade of actions to curb global warming, because of protracted negotiations, noted Robert Watson, now chief scientific adviser at the U.K. environment ministry, and former chairman of the UN Intergovernmental Panel on Climate Change. He emphasized the swift need for a new treaty that would set more ambitious long-term goals for reducing greenhouse gas emissions in order to limit temperature rise to 2°C by the end of the century. Mr. Watson considers that the targets for developed countries should be 80% rather than the projected 60%, while for developing countries the allowed rise should be 60% rather than a projected 140%. He underlined that such goals imply the implementation of a mixture of technologies and increased technology transfer. (March 2008) Ref.1587

The first session of the working groups for negotiating a post-Kyoto treaty to address greenhouse gas emissions reductions took place from March 31 to April 4, 2008 in Bangkok, Thailand. Delegates from 163 countries participated. The main outcome is a work plan to advance the Bali roadmap. Many delegates proposed workshops on issues they wanted to be addressed by the new treaty. Generally, the discussions went well, the main disagreement area being the Japanese proposal on a "sectoral approach" for greenhouse gas emissions targets based

on energy-efficiency standards by industry, and the concept of “measuring, reporting and verifying.” Seven more sessions will be held—three this year and four in 2009.

The next meeting will be held in June, in Bonn, addressing developing countries’ adaptation strategies and clean technology transfer. In-depth discussions of the Japanese proposal on greenhouse gas emissions and energy efficiency targets were postponed to the August meeting to be held in Ghana. China, India, and other developing countries strongly oppose the Japanese plan that would require developing countries to stabilize greenhouse gases over the next 10–15 years and cut them in half by 2050. Significant disagreements remain over demands from the U.S. and Japan for developing countries to accept binding targets as part of a pact to stabilize greenhouse gases in the next 10–15 years and cut them in half by 2050.

Aviation and shipping industries account for some 5%-8% of greenhouse gas emissions and are sectors not covered by the Kyoto Protocol, due to the difficulty in classifying them under individual nations. However, the European community estimates that emissions might grow by 32% from shipping and 90% from aviation. Therefore, Europe is advocating clear and meaningful greenhouse gas emission reduction targets for the two sectors. (April 2007) Ref. 1588

### Conferences, reports

The climate change talks organized by the UN Framework Convention on Climate Change in Vienna, Austria, agreed that a global approach is crucial in tackling climate change and its effects, and prepared the way for further negotiations for a post-Kyoto treaty to be discussed at the December summit in Bali. Climate change and post-Kyoto strategies are also expected to top the agenda of the Asia Pacific Economic Cooperation (APEC) summit to be held on September 8. Meanwhile, the secretariat of the UNFCCC released first results indicating that countries will meet criteria to begin trading in Kyoto emission allowances for 2008, the first year of the Treaty’s first commitment period. (August 2007) Ref. 1589

The UN’s “The Future in our Hands: Addressing the Leadership Challenge of Climate Change”, the largest-ever meeting of world leaders on climate change, was held on 24 September at the UN headquarters in New York, as a preamble to the UN high-level General Assembly, to set the stage for the December Bali negotiations on a post-Kyoto treaty to address climate change and GHG emissions. It addressed aspects related to adaptation, mitigation, technology, and financing. Participants agreed that a new treaty to address climate change was needed, and that the UNFCCC is the most appropriate forum to conduct the negotiations. Meanwhile, the number of lawsuits dealing with global warming is increasing around the world. Environmentalists are hoping to increase pressure on policymakers and companies to change to more environment-friendly and low-GHG emission policies. Initiatives such as the Carbon Disclosure Project (which sent letters to 2,400 large firms around the world) are demanding that corporations be more transparent and accountable in disclosing their GHG emissions and their activities’ impact on climate change. (September 2007) Ref. 1590

As a prelude to the December Bali summit, environment ministers from about 40 nations held an informal meeting in Indonesia, agreeing that the world must finalize a climate change treaty by 2009, to leave enough time for countries to ratify it before the Kyoto Treaty expires in 2012. Countries key for the negotiations were represented in the meeting—low-lying countries such as



the Maldives, OPEC such as Saudi Arabia, the U.S., Australia, China, and India. Also in preparation for the Bali Summit, in November the Government of Maldives will be hosting an international conference, “The Human Dimension of Global Climate Change,” with the theme “Recognizing environmental security as a fundamental human right,” said Maldives President, Maumoon Abdul Gayoom.

*Contributions to accelerating atmospheric CO<sub>2</sub> growth from economic activity, carbon intensity, and efficiency of natural sinks*, a study conducted by the Global Carbon Project in cooperation with other research institutions, reports that increase in atmospheric CO<sub>2</sub> is due to faster economic growth coupled with slowing improvements in carbon intensity, and decreasing efficiency of natural sinks in removing emissions from human activities. The paper says that 2006 CO<sub>2</sub> releases were 35% above the 1990 level. “The longer we delay reducing emissions, the more restorative capacity will be lost,” added CSIRO scientist Dr Mike Raupach, co-chair of the Global Carbon Project. (October 2007) Ref. 1591

The IPCC *Fourth Assessment Report (AR4) Summary for Policymakers* [see item above] is a fundamental document for policymakers in preparation for the UN Climate Change Conference to be held in Bali, Indonesia, 3 -14 December 2007.

The "Singapore Declaration on Climate Change, Energy and the Environment" adopted at the East Asia Summit attended by leaders of 16 Asian nations, including China and India, pledges action on climate change and declares support of the UN plan as the “core mechanism” for tackling global warming, and commits to support efforts to negotiate an effective post-2012 international arrangement under the United Nations Framework Convention on Climate Change (UNFCCC) process. The same position emerged from the Asia Southeast Asian Nations – European Union (ASEAN-EU) United Summit, where delegates acknowledged that “developing countries should also play their part [in GHG emissions reduction], supported by developed countries through positive incentives, including through a strengthened global carbon market.” Government representatives attending the Alliance of Small Island States (AOSIS) discussed collaboration on coping with the devastating effects that climate change has on their nations, and on advancing the international negotiations for a comprehensive post-Kyoto Treaty during ‘The Human Dimension of Global Climate Change’ conference with the theme ‘Recognizing environmental security as a fundamental human right’. The Maldives President, Maumoon Abdul Gayoom, reiterated the importance of recognizing “environmental protection as a fundamental human right” and announced that the Maldives will initiate a debate on the issue with the Human Rights Council. (November 2007) Ref. 1592

*Delivering Climate Security: International Security Responses to a Climate Changed World*, by Nick Mabey, published by Britain’s Royal United Services Institute for Defence and Security Studies, outlines a framework for climate security analysis and some of its implications for security policy, practice and institutional change. Noting that international response to climate security threats has been ‘slow and inadequate’, it recommends that nations integrate climate change into their security policy to prepare for worst-case scenarios. Otherwise, says the author, climate change might have security implications of “similar magnitude to the World Wars, but which will last for centuries.” (April 2007) Ref. 1593

#### UN Climate Change Conference Explores Post-Kyoto Regulations

The twelfth Conference of the Parties (COP 12) to the UN Framework Convention on Climate

Change and the second Meeting of the Parties to the Kyoto Protocol (COP/MOP 2), as well as some 130 related side events took place in Nairobi, Kenya, November 6-17, 2006, attended by over 5,900 participants, including 2,300 government officials. The foci were on the future of the Protocol and the Convention, and longer-term action to combat climate change and cope with its consequences. The meetings resulted in the adoption of 10 COP decisions and 11 COP/MOP decisions and in the approval of a number of conclusions by the subsidiary bodies, but no agreements were reached on post-Kyoto cuts or a negotiations timetable. However, the governments recognized that there is compelling scientific evidence for global warming and thus global emissions need to be reduced 50% by 2050. At the insistence of the European Union, a thorough examination of the Protocol will take place in 2008. Important achievements include: a) establishment of the Least Developed Countries (LDC) Fund, Special Climate Change Fund (SCCF), and Adaptation Fund; b) launch of the Ad Hoc Working Group on Annex I future commitments; c) the Dialogue on long-term cooperative action to address climate change by enhancing implementation of the Convention; and d) the assignment of high priority to adaptation activities, mainly in developing countries. It is expected that, at next year's meeting, to be held in Indonesia, governments will start full negotiations for deeper cuts in emissions to keep the rise in global temperatures below the critical 2°C level. (November 2006) Ref. 1594

#### Moves Forward on the Post-Kyoto Negotiations

The European Environment Council agreed to significantly accelerate global negotiations for a post-Kyoto framework to reduce greenhouse gas emissions. It is ready to assume leadership for completing global negotiations by the end of 2009. (December 2006) Ref. 1595

Leaders attending the recent Heiligendamm (Germany) G8 summit agreed to seek “substantial” cuts in greenhouse gas emissions, and to launch negotiations at the December 2007 UN Summit for eventually reaching agreement on a new—more inclusive—UN-led treaty by 2009. EU, Canada, and Japan supported a target of a cut to 50% of the 1990 emissions level by 2050. (June 2007) Ref. 436

Denmark began preparing for the 2009 UN climate summit that it will host. However, it admits that reaching a political agreement on a new global climate treaty to replace the current Kyoto Protocol will not be easy. (June 2007) Ref. 436

Ahead of the September Asia Pacific Economic Cooperation summit, Australia's Prime Minister John Howard is seeking to launch negotiations for an Asia-Pacific new climate agreement and to use the summit for including emerging high emitters as China and India in a post-Kyoto accord. (June 2007) Ref. 436

Norway plans to become the world's first “carbon neutral” country, by reducing its emissions to zero by 2050, or paying for equivalent reductions elsewhere. (June 2007) Ref. 436

The UN Secretary General will hold a special high-level meeting on climate change prior to the September Heads of State and Government summit. He called climate change the “defining issue of our era.” (June 2007) Ref. 436

### Possible Tougher Policies Concerning Climate Change

Environment ministers from around the world will meet next month (November 2006) in Nairobi, Kenya, for talks on post-Kyoto policies. Some want clearer timetables and frameworks on the next phase of greenhouse gases cuts. German Chancellor Angela Merkel wants to make addressing climate change a top priority on the agenda as she assumes the top position in both the G8 and the EU in 2007. She also wants to use Germany's presidency of the EU to push for the reduction of energy use, including bringing around the big greenhouse gases emitters that do not yet have adequate reduction policies. (October 2006) Ref. 1596

G20 climate summit advocates “clean technologies” Rather than targets to tackle climate change  
Energy and environment ministers attending the G20 climate summit in London advocated more implementation of “clean technologies” than use of targets to tackle climate change. The 'G20' represents the nations that emit the most greenhouse gases. Global warming induced by human activities appears also to be responsible for rising global ocean levels twice as fast today as they did 150 years ago, according to a Rutgers (the State University of New Jersey) study. The ocean has been rising almost two millimeters per year in the last 200 years compared to a steady one millimeter annually for the previous 5,000 years. See also further in this report item 6.2 *Climate Change Futures: Health, Ecological and Economic Dimensions*, a comprehensive report on the implications of climate change.

Note: The Eleventh Conference of the Parties (COP 11) to the UN Framework Convention on Climate Change and the first Meeting of the Parties (MOP 1) to the Kyoto Protocol, is currently going on, from 28 November to 9 December 2005 in Montreal, Canada. About 10,000 delegates from 189 nations are participating. The December environmental security report will report on the outcomes. (November 2005) Ref. 1597

### Post-Kyoto Strategies

#### *UN Meeting Fails to Agree on Post-Kyoto Strategy*

The UN meeting in Bonn trying to extend the spectrum of the Kyoto Protocol after 2012 failed to agree on an international post-Kyoto framework mainly because of EU-US disagreements and major emerging economies that are reluctant to curb their surging greenhouse gas emissions. This two-day seminar attended by delegates from 190 nations, was the first formal UN climate meeting since the Kyoto Protocol entered into force. The next negotiations will be at a meeting of environment ministers in Montreal, Canada, in December. (May 2005)

#### *Ambitious Post-Kyoto EU Emissions Goals*

EU environmental ministers seek to push for more ambitious EU emissions targets after the current Kyoto target period [see Kyoto Protocol], proposing a reduction of developed nations' greenhouse gases emissions of 15-30 percent by 2020 and 60-80 percent by 2050 relative to 1990. However, while keeping the 2020 target, the EU heads of state and government omitted the 2050 goal, with the provision to review it later in the light of future developments. The UN Secretary-General's UN reform report asks for a more inclusive international framework for mitigating climate change, and calls on all states for a better mobilization to develop tools for stabilizing greenhouse gas emissions beyond 2012, with broader participation by all major emitters. (March 2005)

#### *EU Environment Ministers Propose post-Kyoto Protocol Climate Policies*

Now that the Russian ratification will bring the Kyoto Protocol into force, the European environment ministers are planning to initiate talks within the UN on climate policies that would

follow after 2012 (when the Protocol's first commitment period ends). The next UN Climate Conference (COP10) will be this December in Buenos Aires and the European Council will meet next spring on its climate policy objectives. The EU's general climate objective is to pursue policies leading to temperatures that would not exceed pre-industrial levels by more than two degrees Celsius. Meanwhile, the European Environmental Ministers are planning to ban the more destructive fluorinated gases in certain products, which European Environment Commissioner Margot Wallström said "have huge global warming potential - in some cases almost 24,000 times that of carbon dioxide." The Ministers also plan to regulate leakage of these gases prior to their complete phase-out. They propose to ban the use of fluorinated gases in double-glazing, fire extinguishers, car tires and recreational items. There was also a call for concrete action to reduce emissions from international aviation and shipping industries. (October 2004) Ref. 1598

#### Second European Climate Change Program and post-Kyoto Negotiations

On Monday, 24 October, Environment Commissioner Stavros Dimas launched the second European Climate Change Program (ECCP II) at a stakeholder conference in Brussels. ECCP II will focus on strategies and technologies that would allow the EU to reduce its greenhouse gas emissions (including carbon capture and storage) and to adapt to the effects of climate change. Commissioner Dimas outlined the Commission's views on the further development of EU climate change policy including after 2012 and called on all states to adhere to the eventual post-Kyoto measures. He underlined EU commitment to initiate a process that will lead to international negotiations on a global climate change regime. Global negotiations for post-2012 strategies will take place at the UN Climate Change Conference (COP 11 and COP/MOP 1) to be held on November 28-December 9, 2005 in Montreal. [See also *UN Meeting Fails to Agree on Post-Kyoto Strategy* in May 2005 and other previous environmental security reports.] (October 2005) Ref. 1599

#### G8 Environmental Results Are Limited to Post-2012 Concerns

Although the Gleneagles meeting of the G8 industrialized nations did not generate measurable targets and timetables for tackling greenhouse gas emissions, the heads of government of the world's eight wealthiest nations agreed that "climate change is happening now, that human activity is contributing to it, and that it could affect every part of the globe." They also set the stage for dialogues for post-Kyoto regulations that would include the US and other high-emitting countries such as China and India. The dialogues are planned to start with a meeting in London in November to be organized by the British government. (July 2005) Ref. 1600

#### Montreal Conference on Climate Change Reached New Agreements (2005)

Thirty decisions were reached during the first Meeting of the Parties to the Kyoto Protocol (COP/MOP 1) that was held November 29 to December 9, 2005 in conjunction with the eleventh Conference of the Parties to the UN Framework Convention on Climate Change (COP 11), which reached 14 decisions. This package of decisions was named the "Montreal Action Plan" by Stéphane Dion, President of COP 11 and COP/MOP 1. The Plan is a "clear roadmap" for international cooperation to reduce greenhouse gas emissions and to develop approaches to cope with consequences of climate changes. It also has established a forum to find innovative solutions. The complete listing of these decisions is available at [Decisions adopted by COP11 and COP/MOP1](#). Some highlights include:

- The Marrakesh Accords were accepted at COP/MOP 1 as a “clear rulebook” of the Kyoto Protocol that sets the framework for the Protocol’s implementation and enforcement, including a system for an effective global carbon market. A complex compliance regime was accepted and members of the compliance committee were elected to strengthen Kyoto’s Parties’ accountability in meeting their emission reductions targets. A review for improving the Kyoto Protocol will be formally launched at next year’s UNFCCC meeting.
- There are two mechanisms for developed countries to earn greenhouse gas emission credits: 1) The Clean Development Mechanism gives developed countries emission credits for investing in sustainable development projects in developing countries. (Developed nations have pledged over \$13 billion for this mechanism to be expanded in 2006-07.); and 2) The Joint Implementation mechanism gives developed countries emission credits for investments in low greenhouse gas emissions projects in other developed countries (in particular in transition economies).
- Negotiations for new emissions reduction targets for developed countries in the post-Kyoto period (2013-2017) were approved to begin May 2006. This is to ensure that negotiations are concluded in time to avoid any gap between the first phase and the second phase beginning in 2013.
- A Five Year Plan of Action on Adaptation addresses concrete steps to identify climate change impacts and measures to adapt to it —mainly for developing countries. A one-year process to define how the Adaptation Fund will be managed and operated was approved.
- COP requested the Global Environmental Facility to consider adding carbon capture and storage technologies to those areas receiving financial support. International cooperation in developing, adopting, and transferring green technologies was a theme heard throughout the meetings.
- Agreement was achieved to launch a dialogue and series of workshops in 2006 on strategic approaches for long-term global cooperative action to address climate change that might result in a more inclusive UN climate pact (including the U.S. and China). The U.S. agreed to join talks in the future, as long as mandatory emissions targets were not on the agenda.

Approximately 2,800 government officials and 5,800 representatives of UN organizations, intergovernmental organizations and non-governmental organizations attended this comprehensive overview of the world’s state in addressing climate change, witnessed by 817 accredited members of the media. More than 120 ministers and other high-level government officials delivered statements, along with senior representatives of intergovernmental and non-governmental organizations, UN bodies and specialized agencies, and other relevant groups. The reports of 140 NGO “side” sessions can be found at <http://www.iisd.ca/climate/cop11/enbotts/>. (December 2005) Ref.1601

#### UN Meeting Fails to Agree on Post-Kyoto Strategy

The UN meeting in Bonn trying to extend the spectrum of the Kyoto Protocol after 2012 failed to agree on an international post-Kyoto framework mainly because of EU-US disagreements and

major emerging economies that are reluctant to curb their surging greenhouse gas emissions. This two-day seminar attended by delegates from 190 nations, was the first formal UN climate meeting since the Kyoto Protocol entered into force. The next negotiations will be at a meeting of environment ministers in Montreal, Canada, in December. [See also items *8.4 Ambitious Post-Kyoto EU Emissions Goals* in March 2005 and *7.1 Kyoto Protocol Came into Force on February 16, 2005* in February 2005 environmental security reports.]

A recent World Bank study shows that trade in carbon dioxide permits surged this year since the Kyoto Protocol came into force and as the EU launched its "cap and trade" scheme. (May 2005) Ref. 1602

### **Regulations Might be Needed for New Greenhouse Gases**

New findings show that some compounds developed to replace banned chemicals are powerful greenhouse gases contributing to global warming. The hydrofluorocarbons (HFCs) that replaced the ozone-depleting chlorofluorocarbons (CFCs) can be up to 10,000 times more powerful in climate-warming than CO<sub>2</sub>. And, with their use growing at 8.8% per year, they might represent up to a third of all greenhouse gas emissions by 2030–2040. The Obama administration is considering proposing HFCs phase-out by an amendment to the Montreal Protocol or by creating a new international agreement. Similarly, sulfuryl fluoride, a fumigant introduced to replace methyl bromide, is a heat-trapping gas 4,800 times stronger than CO<sub>2</sub>. Delegates at the Bonn climate change meeting targeted more than a dozen new synthetic compounds for inclusion in the post-Kyoto treaty as potent greenhouse gases. The list includes nitrogen trifluoride (NF<sub>3</sub>) — used for LCD televisions, computer circuits, and thin-film solar cells—estimated to be an about 17,000 times more potent greenhouse gas than CO<sub>2</sub>, and developed to replace perfluorocarbons (PFCs) covered by the Kyoto Protocol. (April 2009) Ref. 1603

### **Reducing GHG Emissions Using the Montreal Protocol and other Regulatory Systems**

Considering the need for “fast-action” to reduce greenhouse gas emissions and avoid abrupt climate changes, international ozone negotiators suggest the use of the Montreal Protocol and similar existent international regulations, by amending them to cover greenhouse gases, such as hydrofluorocarbons (HFCs), and black carbon particles and precursor gases. The subject is on the agenda of the 21st meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, to be held in Egypt, on November 4-8, 2009. Note: “fast-action” includes regulatory measures that can begin within 2–3 years, be substantially implemented in 5–10 years, and produce a climate response within decades. (October 2009) Ref. 1604

### New Decisions Adopted for Strengthening the Montreal Protocol

The 21st meeting of Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer (MOP21), held in Port Ghalib, Egypt, November 4-8, 2009, adopted 30 decisions, including examining alternatives to hydrochlorofluorocarbons (HCFCs), environmentally sound management of banks of the ozone depleting substance methyl bromide; and data and compliance issues. A North American proposal on phasing down hydrofluorocarbons (HFCs) was withdrawn after China, India, and several Arab countries disagreed with discussing HFCs under the Montreal Protocol. (November 2009) Ref. 1605

### Powerful Greenhouse Gas HFCs Might be banned under the Montreal Protocol

Although hydrofluorocarbons (HFCs) are not ozone-depleting chemicals, their use and

commercialization might be banned under the Montreal Protocol. Experts and policy makers increasingly call for HFCs' phaseout due to their global warming potential hundreds or even thousands of times greater than CO<sub>2</sub>. Countries, like the Federated States of Micronesia, threatened by global warming, are advocating for a 90% HFC phaseout by 2030. The issue is expected to be discussed at the next meeting of the States Party to the Montreal Protocol, to be held November 4-8 in Port Ghalib, Egypt. (August 2009) Ref. 1606

#### North American Proposal to Phase Down HFC's

The EPA has announced that Canada and Mexico have joined the US in proposing to expand the scope of the Montreal Protocol on Substances that Deplete the Ozone Layer. The proposal would phase down hydrofluorocarbons (HFCs), which are a significant and rapidly growing contributor to climate change, and lists four possible substitute refrigerants. Note: previous proposals were opposed by China, India, and several Arab countries; see relevant item: New Decisions Adopted for Strengthening the Montreal Protocol in November 2009 environmental security report. (May 2010) Ref. 1607

#### **Aviation and Shipping should be Subject to Emissions Cuts**

The EU is proposing to include the shipping industry in the Emission Trading Scheme from 2013. However, climate scientists argue that, given the rapid growth of emissions from international aviation and shipping, it is not enough that they are included in the carbon-trading scheme, but they should be subject to emissions cuts regulations. [See also *Aviation to be included in the ETS from 2012* in July-August 2008, *Shipping to Face New Regulations to Reduce Air Pollution* in September 2007.]

Meantime, local actions are increasing. In California, a "clean trucks" program put in place by local port authorities will begin operating 1 October, when all pre-1989 diesel rigs will be barred from entering the Los Angeles and Long Beach waterfront marine terminals. The restrictions will continue incrementally through 1 January 2012, when only trucks meeting federal 2007 emission standards will be allowed in. (September 2008) Ref. 1608

#### **Aviation to be included in the EU Emissions Trading System from 2012**

The European Parliament adopted legislation to include aviation in the EU Emissions Trading System starting January 1, 2012. The regulation applies to all flights starting and/or landing in Europe (including intercontinental flights) by EU and non-EU airlines. Exceptions apply to: flights for humanitarian purposes under a UN mandate; emergency flights; police, customs and military flights; research flights; and small airline companies producing low emissions. [See also *Provisional Agreement for Including Aviation in the Emission Trading Scheme from 2012* in June 2008 and other related items in previous environmental security reports.] (July-August 2008) Ref. 1609

#### Air Travel in the EU to Join the Carbon Emissions Trading System by 2011

The European Parliament voted to have EU internal and intercontinental flights join the bloc's carbon emissions trading system by 2011 and that the pollution cap be set at 90% of average emissions from the period 2004-2006. The bill will now be debated by member states. (November 2007) Ref. 1610

EC Strategy to Curb Greenhouse Gas Emissions from Air Travel*EU Advances the Inclusion of Airlines into the Emissions Trading System to 2010*

The EU criticized the recent 36th Assembly of the International Civil Aviation Organization for failing to adopt a framework to reduce greenhouse gas emissions from international aviation. In turn, EU lawmakers proposed to move ahead—to 2010—the inclusion of all airlines flying to, from, and within the EU into the Emission Trading Scheme. The original proposal suggested 2011 for the inter-EU flights and 2012 for international flights landing in or departing from the 27 EU countries. The European Parliament is expected to vote on the bill in November. [See also *Europe to Propose Emissions Targets for All Flights to/from or within Europe* in November 2006, and *EC Proposed Strategy to Curb Greenhouse Gas Emissions from Air Travel* in September 2005 environmental security reports.] (October 2007) Ref.1611

*Europe to Begin Penalizing Jet Pollution in 2011*

The European Commission is moving forward with its proposal for a directive to bring civil aviation into the EU Emissions Trading Scheme (EU ETS) by imposing extra charges on highly polluting carriers. The legally binding rules will apply to all flights within the EU starting in 2011, and from 2012 to foreign carriers landing and taking off from European airports. [See also *Europe to Propose Emissions Targets for All Flights To/From or Within Europe* in November 2006 and *EC Proposed Strategy to Curb Greenhouse Gas Emissions from Air Travel* in September 2005 environmental security reports.] (December 2006) Ref. 1612

*Europe to Propose Emissions Targets for All Flights To/From or Within Europe*

The European Commission is proposing to introduce a new policy that would impose emissions controls on all flights within and coming into Europe, seeking to strengthen pollution reduction regulations around the world. The proposal, expected to be presented around December 20, requires airlines to meet emissions targets starting January 1, 2011, for all flights within Europe and round-trips to the European Union from any other part of the world. The proposal also outlines a system and timeframe for airlines to buy carbon credits. [See also *EC Proposed Strategy to Curb Greenhouse Gas Emissions from Air Travel* in September 2005 environmental security report.] (November 2006) Ref. 1613

*Europe Considers Aviation Policies to Reduce Greenhouse Gases*

The European Parliament is increasing its discussions on the impact of aviation on climate change, considering introducing kerosene taxes, and having the industry join the Kyoto Protocol-induced obligations. The World Travel & Tourism Council opposes such measures, which—they say—do not take into consideration the larger picture of the challenges which need to be managed, including jobs, economic impact, and even a negative effect on pollution. (July 2006) Ref.. 1614

*EC Proposed Strategy to Curb Greenhouse Gas Emissions from Air Travel*

Considering the rapid increase of air travel and consequently its increased share in the overall EU greenhouse gas emissions undermining progress achieved through emission cuts in other areas of the economy, the EC proposed a strategy to tackle aviation emissions. It suggests bringing aircraft operators into the EU's Greenhouse Gas Emissions Trading Scheme (ETS), as an incentive for airlines to minimize their emissions. The new regulation would apply to all



flights departing from the EU, whether to another EU destination or not and all carriers (EU or non-EU) would be treated equally. (September 2005) Ref. 1615

### **Airline Group Supports Including Aviation in Global Emissions Trading Scheme**

An aviation group expressed support for a global emissions-trading scheme and hopes that their proposal will be included in the new post-Kyoto pact to fight climate change. The 43-point proposal covers all carbon pollution from the international aviation sector, suggesting a framework for allowances and the creation of a UN body for administering the system, and recommending that nations agree to a global cap on aviation emissions. The six-member group includes four of the world's top airlines (Air France/KLM, British Airways, Cathay Pacific, Virgin Atlantic), airport operator BAA, and the international NGO, The Climate Group. (April 2009) Ref. 1616

### **Draft International Standards for Measuring Greenhouse Gas Emissions for Cities**

The Draft International Standard for Determining Greenhouse Gas Emissions for Cities is setting a common framework for calculating the emission amounts of greenhouse gases: carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF<sub>6</sub>). The computation is done on a per capita basis, allowing comparison and analysis among cities. Measurements are now completed for more than 40 cities, with the aim of completing it for all world cities. The Draft was launched by UNEP, UN-HABITAT, and the World Bank. It is now open for public comment. (April 2010) ) Ref. 1617

## **National and Regional Initiatives**

### Ambitious Post-Kyoto EU Emissions Goals

EU environmental ministers seek to push for more ambitious EU emissions targets after the current Kyoto target period [see Kyoto Protocol], proposing a reduction of developed nations' greenhouse gases emissions of 15-30 percent by 2020 and 60-80 percent by 2050 relative to 1990. However, while keeping the 2020 target, the EU heads of state and government omitted the 2050 goal, with the provision to review it later in the light of future developments. The UN Secretary-General's UN reform report asks for a more inclusive international framework for mitigating climate change, and calls on all states for a better mobilization to develop tools for stabilizing greenhouse gas emissions beyond 2012, with broader participation by all major emitters. (March 2005) Ref. 1618

Japan is considering strengthening national regulations (such as introducing compulsory caps on greenhouse gas emissions and a domestic emissions trading scheme for the companies that resist reducing emissions). It is also expected to make tougher commitments in the post-Kyoto Protocol phase. (February 2008) Ref. 1619

The meeting of the environment ministers from the Group of Eight industrialized nations held in Kobe, Japan, concluded with an agreement on the long-term goal of cutting greenhouse gas emissions in half by 2050, but without any specific emissions reduction targets for 2020. (May 2008) Ref. 1620

China's CO<sub>2</sub> emissions grew much more than previous estimates, revealed a new analysis by

economists at the University of California. The Intergovernmental Panel on Climate Change estimated annual CO<sub>2</sub> increase in the region that includes China at 2.5%–5% for 2004–2010, while the new University of California analysis estimates a growth rate of at least 11% for the same time period. This finding reinforces beliefs that any climate change treaty should include mandatory emission targets for big emitter developing countries. (March 2008) Ref. 1621

The newly elected Australian government sponsored a 2020 summit during April 2008. One thousand selected invitees spent two days considering ten themes, including Australia's long-term role in the region. A detailed response to the summit is expected from the Government by the end of 2008. The new Australian government has taken a more aggressive approach to CO<sub>2</sub> emissions reduction and the 2020 summit held in April 2008 encouraged the government to further take a regional lead in this area. The government has committed Australia to a carbon-trading scheme by 2010.

Governors of 20 U.S. states signed the Governors' Declaration on Climate Change at the 2008 Conference on Climate Change held at Yale University. The Declaration is establishing a partnership between the states and the federal government to increase efforts to control and reduce greenhouse gas emissions. At the same meeting, Premier Jean Charest of Quebec, Canada, announced that Quebec is joining the Western Climate Initiative, which calls for a 15% reduction in greenhouse gas emissions below 2005 levels by 2020.

While negotiations for a post-2012 treaty continue, questions are growing about better enforcement mechanisms of the Kyoto Protocol to compel governments to respect their commitments. Change of government shouldn't allow policy changes relative to a country's international commitments and ratified regulations. Canada, Japan and some southern European countries are all well behind their targets. "The biggest concern comes from countries like Canada that have openly begun voicing doubts about whether they will comply or even care about complying," said Antonio Hill, from Oxfam. (April 2008) Ref. 1622

#### Meeting of Asia-Pacific Partnership on Clean Development and Climate

The Asia-Pacific Partnership on Clean Development and Climate, comprising Australia, U.S., Japan, India, South Korea, and China, a group accounting for about 50% of global greenhouse gas emissions, held its meeting on January 11-12 in Sydney. The Partnership is intended to be consistent with the countries' commitment under the UN Framework Convention on Climate Change and "complement, but not replace, the Kyoto Protocol." The six nations did not set any binding targets or regulations to cut greenhouse gases, but adopted a Charter that outlines the purposes, organization, functions, funding, and terms of the Partnership. The meeting also prepared the Partnership Work Plan that sets the framework of the partnership, based on collaboration among private, research and government organizations to accelerate the development and implementation of advanced clean and efficient technologies that would increase energy security and reduce greenhouse gases without hindering economic development. The eight public-private sector Task Forces established would be covering "(1) cleaner fossil energy; (2) renewable energy and distributed generation; (3) power generation and transmission; (4) steel; (5) aluminum; (6) cement; (7) coal mining; and (8) buildings and appliances." The task forces will submit plans by mid-2006. It was also proposed to establish an Asia-Pacific Energy Technology Co-operation Centre, for the "development and implementation of an energy audit program and its follow-up projects." (January 2006) Ref. 1623

### U.S., Australia, and Asia-Pacific Countries Coalition for Clean Development

The Asia-Pacific Partnership on Clean Development and Climate founded by the U.S., Australia, China, India, Japan, and the Republic of Korea, aims to address energy security, air pollution, and climate change issues based on cooperation in the development, implementation, and exchange of new, clean technologies. The joint Vision Statement was issued at the Association of Southeast Asian Nations' annual ministerial meetings in Vientiane, Laos. The six countries combined represent more than half of the world's economy, population, and energy use, and are responsible for half of the world's greenhouse gas emissions. This initiative is "a complement, not an alternative," to the 1992 United Nations Framework Convention on Climate Change and the 1997 Kyoto Protocol, said U.S. Deputy Secretary of State Robert Zoellick. (July 2005) Ref.1624

### **New Zealand Adopts Carbon Trading Scheme in 2009**

The New Zealand Parliament passed the Climate Change (Emissions Trading and Renewable Preference) Bill that will set up the country's first emissions trading scheme to help meet the country's obligations under the Kyoto Protocol. The carbon credits system begins in 2009 and is set by sectors. All industries in a sector will effectively set limits on the amount of emitted greenhouse gas, with those who surpass their ceilings having to buy credits from emitters that produced emissions below their ceiling. The phases of sector inclusion are: forestry from 2008; transport by 2009; stationary energy, such as coal-fired power stations by 2010; and agricultural waste by 2013. Australia's carbon trading scheme is set to begin by 2010. (September 2008) Ref.1625

### **EU Potential New Measures For Reducing CO<sub>2</sub> Emissions**

Following discussions of EU finance ministers concerning a carbon tax across the bloc to further reduce CO<sub>2</sub> emissions and fight climate change, the European Commission will probably make the formal proposal next year. Several EU member states already have such a tax, but a bloc-wide deal might be difficult, since taxation is a matter of national sovereignty and any change requires unanimity among the 27 member states.

To further reduce emissions from transportation vehicles, the European Commission proposed emissions limits for light trucks and vans (minibuses to be exempted). The proposal restricts light trucks and vans CO<sub>2</sub> emissions to 175 grams/kilometer driven (present EU average is around 200 grams.) This limit will be introduced gradually from 2014 to 2016, while by 2020 van makers would have to meet a 135 grams target or face fines. The draft legislation moves now to negotiations at the European Parliament and EU governments. [Related item: *European Climate and Energy Package Formally Adopted* in April 2009 environmental security report.] (October 2009 Ref. 1626)

### **France Proposes Carbon Tax Across EU and on Imports**

President Nicolas Sarkozy announced that France would propose a carbon tax across the EU, and carbon tariffs on products imported from countries with weaker environmental regulations. Nationally, a bill expected to be presented soon to the Parliament is proposing a progressive carbon tax similar to the income tax, taxing big polluters on their CO<sub>2</sub> emissions. The French government hopes the regulation will come into force on July 1, 2010, and be effective until the EU emissions permits scheme enters into force. [Related item: *EU Potential New Measures For Reducing CO<sub>2</sub> Emissions* in October 2009 environmental security report.] (January 2010)

Ref. 1627

### **British Group Outlines Plan for Zero Emissions by 2030**

The Centre of Alternative Technology (CAT) in Wales has outlined a series of measures that could be taken to bring UK emissions down to zero by 2030. They involve a combination of electrification, insulation, and a massive scaling up of offshore wind. (June 2010) Ref. 1628

### **China and U.S. Announce Climate Change Goals**

China announced it will reduce carbon emissions per unit of GDP by 40 to 45% of 2005 levels, by 2020. The U.S. announced its goal of reducing its emissions by 17% (regardless of emissions per unit of GDP) during this period, matching legislation passed by the U.S. House of Representatives. Both President Obama and Premier Wen will attend the Climate Change conference in Copenhagen in December along with more than 85 heads of state and government (confirmed as of November 30, 2009.) Premier Wen Jiabao has also hosted a group from developing countries including India and Brazil to create a technology transfer position from richer countries in exchange for developing countries' mitigation efforts. (November 2009) Ref. 1629

### **China Adopting Pollution Tax Systems**

Reportedly China formed a team of experts from several government agencies to study whether to impose an environmental tax on polluters to encourage emissions cuts. Deputy Minister for Environmental Protection Pan Yue was quoted as saying that the team is also assessing issues of compensation for environmental damage and creation of a trading system for polluting gases. There are no details of the proposed tax or when it might be introduced. China already introduced taxes aimed at emission reductions: in 2007 it cut export tax rebates for energy-intensive products, and in September 2008 it raised consumption taxes on large passenger vehicles. (September 2008) Ref. 1630

### **New Jersey Ports Pushing for Toxic Diesels Ban**

The New Jersey Port Authority is considering imposing a ban of some kind on polluting diesel trucks at the ports of Newark and Elizabeth, perhaps similar to the one already set up in Southern California. [See also *Aviation and Shipping should be Subject to Emissions Cuts* in September 2008 environmental security report.] (January 2009) Ref. 1631]

## **Energy Saving**

### **Ban on Incandescent Light Bulbs Expands**

As part of the plan to cut down on energy consumption and greenhouse gas emissions, the phase-out of incandescent bulbs expands. Canada is expected to introduce new regulations by the end of this year, requesting the phase-out of inefficient incandescent lighting in common uses be completed by 2012. Canada is the second country to introduce such a nationwide regulation, after Australia, where the ban is scheduled for 2009–10. [See also *Compact Fluorescent Light Bulbs (CFLs) May Surge to Fore, European Lamp Companies Push Compact Fluorescents, as Does the EU.*] (April 2007) Ref. 1632

**Compact Fluorescent Light Bulbs (CFLs) May Surge to Fore**

A bill to be introduced in the California legislature to ban the use of incandescent light bulbs by 2012, in favor of compact fluorescents, may presage a worldwide tendency in this direction. With global warming concerns burgeoning and CFLs using 75% less energy, this action by California (if it becomes law) could trigger similar measures around the world over the next few years. (February 2007) Ref.1633

**European Lamp Companies Push Compact Fluorescents, as Does the EU**

The European Lamp Companies Federation, whose members include the world's three largest light bulb manufacturers, has said they will push European consumers to switch to energy-saving compact fluorescent bulbs (CFLs). According to an AP dispatch, "The European Union is already encouraging its 27 member governments to promote the use of efficient lights on streets and in offices. The ELC Federation statement said its members 'urge the European Commission to adopt a similarly proactive approach to domestic lighting'." (March 2007) Ref.1634

**EU to Set Higher Targets for Cuts in Energy Consumption**

The European Parliament's Industry Committee approved a proposal for raising energy consumption cuts from the earlier target of 10% to 11.5% over the period 2006-2015. The new schedule is to cut 3% from 2006 to 2009, 4% from 2009 to 2012, and an additional 4.5% from 2012 to 2015. During the Brussels European Council Summit at the end of March, the EU heads of state and government reiterated the importance of implementing the Lisbon Strategy for growth, competitiveness and social cohesion in today's knowledge-based world, and addressed climate change and sustainable development. They also emphasized EU preparations for the September UN Summit and its substantial role in achieving the Millennium Development Goals. (April 2004) Ref.1635

**European Commission's New Low-carbon 20/20/20 by 2020 Energy Plan**

The European Commission has proposed a package of measures to reach its "20/20/20 by 2020" targets — produce 20% of its energy from renewable sources and increase energy efficiency by 20%, cut greenhouse gas emissions by 20% of 1990 levels (or 30% in case of a global accord), and considerably reduce reliance on energy imports. The detailed roadmap includes specific renewable energy and CO<sub>2</sub> emission targets for each EU member state; new rules for carbon sequestration; and an updated Emissions Trading System for fair greenhouse gas emissions cuts for different emitters, with the aim of gradually including all industries in the emissions auction scheme. The Commission's proposals have to be endorsed by the European Council and Parliament, with the final package expected to come into force by the end of 2009. The European Commission hopes that the plan will trigger strong momentum towards a global agreement. Meantime, the European Commission is also considering introducing a climate tax on imports from states failing to tackle greenhouse gas emissions, and toughening EU's emission trading system. [See also *EU Energy and Climate Change Policy* in March 2007 environmental security report.] (January 2008) Ref.1636

**NEW TECHNOLOGIES**

New Regulations Needed for Emerging Technologies

Geo-engineering Promises/Threatens

Nanotechnology (see Potential Health Threats of Some New Technologies)

Biotechnology (see synthetic biology at Biosafety section)

Computer technology and cyberspace

Space Technology

### **New Regulations Needed for Emerging Technologies**

#### **Report Suggests New Approach to Technology Assessment**

*Reinventing Technology Assessment: A 21st Century Model*, a report by the Woodrow Wilson International Center for Scholars, looks at closing the gap between the rhetoric of “engaging the public” in S&T debate and practice. It provides a comprehensive overview of participatory technology assessment (pTA) and applications in the EU and U.S., and recommends creation of “an institutional network that can integrate public engagement into future technology assessment activities.” (April 2010) Ref. 1638

#### **International Convention for the Evaluation of New Technologies needed**

ETC Group is collaborating with other partners to develop an International Convention for the Evaluation of New Technologies (ICENT), which it hopes to submit to the United Nations in 2004. ETC group expressed concern about the potential impacts that nanotechnology-based products might have on the environment and health, because these products are coming to market in the absence of government regulations and/or public discussion (October 2003) Ref.1639

#### **New Technologies Need New Regulations Systems**

The “New Life, Old Bottles: Regulating First-Generation Products of Synthetic Biology” report published by the Woodrow Wilson International Center for Scholars, addresses the relevance of existing regulatory systems in view of developments in synthetic biology specifically and emerging new technologies generally. It argues that the current regulatory framework might not be adequate to address the challenges associated with conditions and properties related to emerging technologies (such as nanotechnology and synthetic biology); and, therefore, new sets of regulations might be needed. While specifically investigating the U.S. system, the principles and analysis are valid globally. [See also *Dangers Increase from “Amateur” Genetic Engineering; the Biological Weapons Convention to be Updated* in December 2008, *The Woodrow Wilson International Center Opens Synthetic Biology Project* in January 2009, and other similar issues in previous environmental security reports.] (March 2009) Ref. 1640]

#### **New EU Body Recommended for Assessing Human Enhancement**

Advances in biological technologies to increase human capabilities are accelerating. These are expected to have profound implications for the future of civilization and what it means to be human. Future schisms between those who are enhanced or favor enhancement vs. those who are not enhanced or oppose human enhancement are possible. Frameworks to understand, monitor,

and regulate such advances are lacking. A European Parliament-requested study on these issues recommended improved public understanding and establishment of a European body for monitoring human enhancement technologies (HET) within and outside Europe in order to develop a normative framework that would guide the formulation of EU policies. (July 2009) Ref. 1641

### **Geo-engineering Promises/Threatens**

#### Geoengineering May Require International Environmental Regulations

Several national authorities are assessing the potential need for national or international regulations for safe development and use of geoengineering to address climate change and global warming. A committee in Britain's House of Commons began its assessment and is cooperating with the U.S. House Science and Technology Committee, which is also planning to begin hearings this year on scientific, engineering, ethical, economic, and governance aspects related to geoengineering. This March a group of scientists will meet in California to set guidelines for large-scale field tests of proposed geoengineering techniques—ranging from genetically modified trees to absorb CO<sub>2</sub>, to spewing sunlight-deflecting sulfate particles into the upper atmosphere. Some scientists argue that new environmental regulations should be established even before field tests begin, due to potentially large geographic effects of some geoengineering techniques. Others, while comparing geoengineering to nuclear weapons, which have been successfully managed through international agreements, point out the possibility of serious long-term risks, and propose an international annual research budget growing from \$10 million to \$1 billion by the end of 2020. (January 2010) Ref. 1642

#### International Framework Needed to Address Governance Gap over Geoengineering

A new report by the ETC group addresses the potential implications of geoengineering pointing out the urgent need for an international framework developed under the auspices of the UN to evaluate new technologies. (August 2009) Ref. 1643

#### UK and US Legislators Review Geoengineering Proposals

The US House of Representatives Committee on Science and Technology held a hearing to examine the scientific, engineering, ethical, economic, and governance aspects of geoengineering and intends to hold two or three more. The UK House of Commons Science and Technology Committee has plans for studying whether geoengineering would require new national or international regulations. The two groups plan a partnership, holding parallel hearings and sharing materials when they are publicly available. (November 2009) Ref. 1644

#### Royal Society Issues Major Geo-engineering Report

“Geoengineering the climate: science, governance and uncertainty” by the UK Royal Society is a comprehensive review of the main geo-engineering options. The 98-page document discusses carbon dioxide removal techniques, solar radiation management techniques, and governance. It also contains a large reference list and a complete glossary. (September 2009) Ref. 1645

## **Computer technology and cyberspace**

### **International Legal Frameworks Needed for Cybersecurity**

After land, sea, air, and space, cyberspace became the “fifth battlespace” on the agenda of security experts. The next ‘Pearl Harbor’ is likely to be a cyberattack, says CIA director Leon Panetta. The disruption of critical infrastructure such as water or electricity by cyberattacks in an IT-dependent world calls for exceptional strategies. “A new legal and policy framework is needed for addressing cybersecurity challenges”, noted Lt. General Keith A. Alexander, nominee to head the Pentagon’s new CyberCommand in testimony before the U.S. Congress, April 15, 2010. Some experts identify three levels of severity for cybersecurity: cybercrime, cyberespionage and reconnaissance, and cyber-leveraged war. There are documented massive cyberespionage schemes such as the one managed from China against several countries (including India and Pakistan). Additionally, electromagnetic pulses could be used for destroying critical infrastructure (see item *International Standards Needed to Reduce Hi-tech SIMAD Threats* in May 2009 environmental security report.)

Efforts to improve managing cyber-leveraged war, so that damage is contained and reduced, include NATO’s recent gathering of top cyber-minds to address the evolution of conflict in an Internet-dependent world, and National Security Agency and other cyber security experts’ participation in the Cyber Defense Exercise (CDX) hosted by Lockheed Martin - Greenbelt (for the eighth year). The European Commission will conduct a feasibility study for creating a body that would assess trends in cybercrime across the EU and facilitate harmonization of related legislation among the different legal systems of the 27 EU countries (while the EU states have yet to ratify the Convention on Cybercrime adopted in 2001). In the meantime, there are proposals to include in the WEEE directive (for waste electrical and electronic equipment) provisions to facilitate protection of data stored on discarded devices. (April 2010) Ref.. 1646

## **SPACE TECHNOLOGY**

### **Reconsidering the Rules for Space Security**

*Reconsidering the Rules for Space Security* by Nancy Gallagher and John D. Steinbruner reviews the current regulations that currently govern the use of space and the relevancy of the 1967 Outer Space Treaty. It argues that the U.S. should advance international negotiations based on the Treaty for developing new rules that explicitly address problems of space security, to specifically outlaw weaponization of space, and define the legitimate limits of space-based support for military missions. Some practical recommendations for successful negotiations include strategies for equitable distribution of the costs of compliance systems. (October 2009) Ref. 1647

### **European Space Agency First International Security Symposium**

On February 9-10, 2010, the European Space Agency will hold its First International Security Symposium to “share information on security approaches, challenges and evolution that international organizations face in the current geopolitical situation.” (January 2010) Ref. 1648

### **The Chaos Caused by the Volcanic Eruption in Iceland Revealed Lack of a Global Framework to Deal with Large-Scale Air Traffic Disturbances**

The total or partial closure of 313 European airports (75% of the European airport network) in



the period April 15-21 due to the ash cloud following the eruption of Iceland's Eyjafjallajokull volcano affected over 100,000 flights, 10 million passengers, and loss of €2.5 billion (\$3.31 billion). The concurrent decision-making chaos exposed the lack of an adequate international framework and coordination strategy to deal with such large-scale disruptions (natural or manmade). The event might lead to new EU agreements such as the “Single European Sky” project, establishment of a single air network management solution, harmonization of all aviation-related national regulations, and eventually the creation of a global response strategy. The number and scale of air traffic disruptions could increase due to a combination of increasing travel and the larger scale of unexpected natural (and/or manmade) events as climate change continues. (April 2010) Ref. 1649

### **Increasing Militarization of Space Might Require Outer Space Treaty Review**

The European Space Agency Ministerial meeting in The Hague, Netherlands held November 25–26 adopted a new European space policy, which increases ESA’s role in addressing climate change and global security, setting new objectives and budgets for the agency. The programs include: Earth Observation activities (including the second segment of the Global Monitoring for Environment and Security Space Component); the Meteosat 3rd generation and a novel Climate Change Initiative; continued improvement of the Galileo navigation satellite system; and start of a Space Situational Awareness programme to help protect European space systems against space debris and the influence of adverse space weather. [See also *Increased Use of Space Technology for Monitoring Environmental Events* in September 2008 and other related items in previous environmental security reports.]

The Space, Security and the Economy report by Economists for Peace and Security warns that the present U.S. space dominance policy threatens an arms race in space with possible devastating consequences for the economy and the growing scientific and commercial uses of space. The report calls for greater transparency in military space spending, and detailed information about government and commercial space activities. Along the same lines, the report *From Venus to Mars: the European Union’s steps towards the militarisation of space* by the Netherlands-based think-tank Transnational Institute argues that European and international trends to increasingly use space for military rather than civilian objectives might trigger a new arms race; and, therefore, the UN Outer Space Treaty might need to be reconsidered and broadened. (November 2008) Ref. 1650

### **Steps for an International Regime for Space Debris and Space Traffic Control System**

There is general agreement that some international regime should be developed to address the increasing problem of space debris, and space safety in general. After the 5th European Conference on Space Debris held in April at ESA’s Space Operations Centre in Darmstadt, Germany, a Congress of technical and legal experts was held in Montreal, focusing specifically on the legal aspects and guidelines for debris mitigation. The possibilities mentioned were a mechanism similar to the Missile Technology Control Regime, or the Limited Test Ban Treaty, along with an eventual international space traffic control system. The recommendations will be further discussed at the next workshop to be held at the University of Cologne in May 2010. Several nations such as Russia, France, Germany and Japan have some form of space surveillance capability, the best being the US Space Surveillance Network (SSN), which is capable of tracking objects larger than 5 cm (approx. 2 inches) orbiting in Low Earth Orbit. The DOD’s Commercial and Foreign Entities pilot program, which makes collision avoidance

information available to commercial space users, would become an operational program later this year.

In a related event, an asteroid missed the Earth by 48,000 miles—80% closer to the earth than the moon—and no one knew it was coming. If it had hit the earth, possibly 800 square miles would have been wiped out. “NASA’s Jet Propulsion Laboratory reported that on March 2, asteroid 2009 DD45 came within about 48,000 miles of Earth. In astronomical terms, that’s way too close for comfort. And yet during President Barack Obama’s most recent press conference, no reporter asked him about this just-missed catastrophe. The fact is, the world hardly noticed” and “Asteroid 2009 DD45 was estimated to be between 69 and 154 feet in diameter. An asteroid that size exploded over Siberia in 1908 and flattened more than 800 square miles of forest, killing everything in its path. No one had a clue that 2009 DD45 was out there or that it was basically on a years-in-the-making possible collision course with our planet. The need for the governments of the world to come together to formulate a plan?” (May 2009) Ref. 1651

### **International Satellite Collision Triggers Regulations Review**

The collision between a decommissioned Russian spacecraft and a commercially owned US satellite on February 10, 2009, triggered review of international regulations for operating near-Earth objects. According to some space scientists, the accident may have caused 700 pieces of space debris in an area where other satellites orbit, thus raising the likelihood of other collisions. Experts note that, considering the over 17,000 (and the number is increasing) man-made objects of size over 10 cm that orbit Earth, an advanced ability to monitor objects in orbit, such as a Space Situational Awareness (SSA) system might be needed. The UN Office for Outer Space Affairs called on all Member States and international organizations to help curb space debris by fully implementing the voluntary Space Debris Mitigation Guidelines of the UN Committee on the Peaceful Uses of Outer Space. The issue was also discussed at the recent 46th session of the Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space and an international response will be presented for consideration in 2010, at the Subcommittee’s 47th session. The 46th meeting also adopted the draft Safety Framework for Nuclear Power Source Applications In Outer Space, to be transmitted for consideration and agreement by the IAEA Commission on Safety Standards during its meeting to be held in Vienna, April 22-24, 2009. [See also *China’s ASAT Test Created Serious Long-Range Low-Earth Orbital Pollution* in February 2007, *Outer Space Policy* in November 2008 and other related items in previous environmental security reports.] (February 2009) Ref. 1652

### **China’s ASAT Test Created Serious Long-Range Low-Earth Orbital Pollution**

The January 11, 2007 Chinese anti-satellite (ASAT) test created tens of thousands of new pieces of space debris in low-earth orbit (LEO) with size greater than 1 cm—large enough to cause significant damage to a satellite they might hit. So far about 900 pieces greater than 5-10 cm have been cataloged as being created by the Chinese test. Even without the Chinese test, a NASA model shows that some heavily used parts of LEO already have such a high density of debris that collisions of objects at these altitudes will increase the number of debris fragments by 200% in two hundred years. The January additions make this situation worse, and multiple future tests or uses of such ASATs—especially against much larger satellites—could greatly increase the threat to satellites, the Space Station, space shuttles and other space craft as they travel through this polluted space. At high altitudes, where the atmosphere is very thin, this debris can stay in orbit for centuries, and so far there is no effective way to remove it. This is likely to steadily increase

space insurance costs and without major changes could eventually seriously limit access to space. This shows that one actor can affect future access to space for all. Currently 41 nations own satellites. Since there is no mechanism to address this pollution event, some kind of anti-ASAT debris creating treaty seems inevitable, possibly drafted by the Inter-Agency Space Debris Coordination Committee in Vienna. (February 2007) Ref. 1653

### **Rocket Launches Might Need Regulation to Safeguard Ozone Layer**

Scientists warn that rapid growth of space activity requiring more rocket launches might lead to dangerously high levels of ozone-destroying emissions and therefore recommend adopting international regulations for rocket launches. One option would be to include the space industry in the Montreal Protocol that bans use of chlorofluorocarbons (CFCs) in aerosol cans, refrigerants and air conditioners. “If left unregulated, rocket launches by the year 2050 could result in more ozone destruction than was ever realized by CFCs,” said a team member, Professor Darin Toohey of the Atmospheric and Oceanic Sciences Department at the University of Colorado, Boulder. [See also *Call for Expanding Montreal Protocol on Ozone-Depleting Substances* in September 2007 environmental security report.] (April 2009) Ref. 1654

## **NUCLEAR SAFETY**

### **Nuclear Nonproliferation Treaty Review Conference Adopted Document for Reducing Nuclear Threat**

The Nuclear Nonproliferation Treaty five-yearly review conference unanimously approved a final document setting out a number of measures to reduce nuclear risk, based on the three pillars of the treaty: disarmament, non-proliferation, and promoting peaceful atomic energy. It includes, inter alia, a commitment by the five nuclear powers to expedite nuclear disarmament efforts and reduce the role of atomic weapons in their military policies; a conference scheduled for 2012 on establishing a Middle East zone free of nuclear and other weapons of mass destruction; and resuming India and Pakistan peace talks in July. The conference took place May 3-28, 2010 at UN Headquarters in New York, attended by representatives of the accord’s 189 member nations. Meantime, Chad became the 100th nation ratifying the Additional Protocol giving IAEA enhanced access to information on its nuclear activity. (May 2010) Ref. 1656

### **Progress on the Nuclear-Test-Ban Treaty**

The 5th Conference on Facilitating the Entry into Force of the Comprehensive Nuclear-Test-Ban Treaty applauded progress made by the Treaty’s Preparatory Commission in preparing to establish the future CTBT Organization and the Treaty’s verification regime. It also called on the ten states of Annex 2 whose ratification is essential for the treaty’s entry into force to do so. These countries are China, U.S., Democratic People’s Republic of Korea, India, Pakistan, Egypt, Israel, Indonesia, Iran and Colombia. [See also *Call for Comprehensive Nuclear-Test-Ban Treaty Entry into Force* in September 2004 and other related items in previous environmental security reports.] (September 2007) Ref. 1657

### Review Conference of the Non-Proliferation Treaty

In spite of all the current discussions on different forms of nuclear threats, the Review Conference of the Nuclear Non-Proliferation Treaty (NPT) ended its month-long meeting

without adopting any significant decisions to improve the NPT and its mechanisms. The three working committees were organized on the main topics of the Treaty: disarmament, verification of safeguards on national nuclear programs, and the peaceful use of atomic energy. No consensus was achieved on any of them and the final document has no “recommendations” section. Yet, many delegates attested their nations’ continuous commitment to push for nuclear disarmament, entry into force of the Comprehensive Nuclear Test Ban Treaty, and other measures to promote nuclear safety. Ambassador Sérgio de Queiroz Duarte (Brazil), President of the Conference, acknowledged, however, that the ways in which the issues have been discussed, the interest of the delegations, the documents presented, and the debates were an important step forward and a great opportunity for the delegations to put forth their nations’ views on how to improve the system of the Treaty. Canadian Ambassador Paul Meyer suggested that annual conferences be held to accelerate progress of the negotiations. Among the positive outcomes of the Conference is the agreement on “indicators of noncompliance” and possible consequences for withdrawal from the treaty.

Meantime, addressing the “Mayors for Peace” conference, UN Secretary-General Kofi Annan called on the world’s mayors to revitalize their view for a global ban on nuclear weapons by 2020 and advance the organization’s Programme to Promote Solidarity of Cities toward the Total Abolition of Nuclear Weapons. (May 2005) Ref. 1658

#### Call for Comprehensive Nuclear-Test-Ban Treaty to Come into Force

At the recent CTBT ministerial meeting, the participants issued a joint statement calling on all non-signatory States, particularly the 12 whose ratification is mandatory for the treaty’s entry into force, to ratify the document. Representatives of Finland and Japan stressed that this is essential in view of the present threats to security emphasized by the use and proliferation of nuclear weapons technologies and knowledge that has not been adequately addressed. [See also following item *Comprehensive Test Ban Treaty Organization to be Restructured*] (September 2004) Ref. 1659

#### Comprehensive Test Ban Treaty Organization to be Restructured

The Comprehensive Test Ban Treaty (CTBT) Organization will undergo considerable restructuring over the next two years as it progresses from the buildup phase to testing and evaluation, and operation and maintenance. The recently released Report of the 22nd Session of the organization’s preparatory commission, held at the end of June 2004, offers some details of the plans. The CTBT will enter into force when 44 required states (Annex 2 States) ratify the treaty; thus far, 32 have ratified it. (July 2004) Ref. 1660

#### Advancements on Non-proliferation and Nuclear Disarmament

The 3rd conference of the preparatory committee for the May 2010 review of the Nuclear Non-Proliferation Treaty concluded successfully, agreeing on a president and agenda. Meanwhile, the international Conference on Disarmament agreed on a working plan that includes negotiation of a fissile material cutoff treaty; a ban on space-based weapons—proposed by Russia and China; and a comprehensive nuclear disarmament proposed by India and Pakistan.

The International Atomic Energy Agency is considering proposals for establishing an international center for production and distribution of civilian nuclear power plant fuel. The main proposals are from Russia, which offered to establish an international fuel enrichment station in Siberia, a German proposal that calls for an IAEA enrichment site on “internationalized soil;”

and from Kazakhstan, that offered hosting a nuclear fuel bank. (May 2009) Ref. 1661

### **Support for Total Ban on Nuclear Weapons Increases**

The new Strategic Arms Reduction Treaty (START) signed by the U.S. and Russia (together holding more than 90% of the world's nuclear weapons) requires each to reduce their strategic nuclear arsenal to 1,550 deployed warheads (from the present 2,200-weapon limit) and to 800 launchers within seven years. The Treaty will enter into force after being approved by the two countries' legislatures. Critics note that the treaty doesn't address the disposal of the nuclear material contained in the weapons. Also, the newly released U.S. Nuclear Posture Review aims to reduce the role of nuclear weapons in the U.S. national security strategy. A two-day nuclear security summit held in Washington DC, gathering leaders of 47 nations, addressed measures to secure vulnerable nuclear materials by 2014 and avoid nuclear terrorism.

Egypt plans to increase pressure for beginning negotiations before 2012 for establishing a nuclear weapon-free Middle East. The Malaysian Strategic Trade Bill vigorously enforces legislation concerning illicit trafficking of WMD materials or technology. Meanwhile, in India, the proposed law limiting the liability to foreign nuclear power companies in the event of an accident triggers worries over potential lax safety standards and nuclear disaster. [Related item: *Australia to Propose Panel to Advance Work for the NPT Review in 2010* in June 2008 and other similar items in previous environmental security reports.] (April 2010) Ref. 1662

Representatives of the Japanese and Republic of Korea parliaments held the first in a series of regional parliamentary dialogues for creating a Northeast Asian Nuclear Weapons-Free Zone. The joint declaration calls on the governments of the Republic of Korea and Japan to advance the proposal at the May 2010 Non-proliferation Treaty (NPT) Review Conference. The subject was also informally discussed by the Parliamentarians for Nuclear Non-proliferation and Disarmament (PNND) with UN Secretary-General Ban Ki-moon, and with government officials of Japan, Korea, and the United States. [Related item: *Entire Southern Hemisphere Covered by Nuclear-Free Zone Treaties* in August 2009 environmental security report.] In the meantime, Australia and Japan submitted a proposal for the NPT Review Conference containing 16 nuclear disarmament and nonproliferation measures for achieving a world without nuclear weapons and a successful outcome at the NPT review conference. (March 2010) Ref. 1663

The US/Russia negotiations for a legal framework to replace the Strategic Arms Reduction Treaty (START I), which expired on December 5, 2009, are expected to be restarted in mid-January 2010. Meantime, they pledged to continue working "in the spirit" of the 1991 pact. Reportedly, a major cause of the delay in concluding a new treaty is disagreement over compliance verification mechanisms. However, failure to reach agreement before the next Review conference might jeopardize nuclear non-proliferation advancements.

Meantime, the UN General Assembly, acting on the recommendation of its Disarmament and International Security Committee, adopted 16 texts in the nuclear weapons category, including a resolution naming August 29 as the international day against nuclear tests; beginning of negotiations in 2010 for a treaty for banning fissile material use for nuclear weapons; and a renewed determination towards the total global elimination of nuclear weapons (adopted by an overwhelming margin, with only India and North Korea voting against, and Bhutan, China,

Cuba, France, Iran, Israel, Myanmar and Pakistan abstaining).

The report “Eliminating Nuclear Threats: A Practical Agenda for Global Policymakers” by the International Commission on Nuclear Non-proliferation and Disarmament evaluates the threats and risks associated with the existing nuclear weapons, highlighting their potential use by accident, miscalculation or design, or falling into the hands of terrorist actors, and calls upon nations with nuclear arms to adopt a “no first use” stand, as well as a reduction of nuclear arsenal to 2,000 weapons by 2025, roughly 10% of today’s stockpile. The 230-page report compares nuclear weapons to climate change in terms of gravity, although underlining their much higher potential immediate impact. (December 2009) Ref. 1664

Marking the 40th anniversary of the nuclear Non-Proliferation Treaty, on July 1, 2008, members of the European Parliament launched a Parliamentary declaration in support of the Nuclear Weapons Convention and a move towards total elimination of nuclear arsenals. Meantime, Australia established the International Commission on Nuclear Non-Proliferation and Disarmament, the Seven Nation Initiative for nuclear disarmament got revived, and both U.S. presidential candidates supported the vision of a nuclear weapons-free world. [See also *Australia to Propose Panel to Advance Work for the NPT Review in 2010* in June 2008, *Non-Proliferation Treaty Deadlock Continues* in May 2008 and other related items in previous environmental security reports.] (July-August 2008) Ref. 1665

#### Australia to Propose Panel to Advance Work for the NPT Review in 2010

Australian Prime Minister Kevin Rudd announced plans to create an International Commission on Nuclear Nonproliferation and Disarmament to make constructive recommendation for the 2010 Nuclear Nonproliferation Treaty Review Conference. The commission would follow on the work of Australian-led 1996 Canberra Commission and Japan’s Tokyo Forum. The first report of the panel is supposed to be presented at a major international conference of experts in Australia late 2009. [See also *Non-Proliferation Treaty Deadlock Continues* in May 2008 and other similar items in previous environmental security reports.] Meantime, the intergovernmental Financial Action Task Force warns that the international community is failing to efficiently control financial transactions that help fund illegal production, technology transfer, and trade of chemical, biological and nuclear weapons. Free-trade zones and transshipment hubs in the Netherlands, Singapore and the UAE are specifically vulnerable sites. (June 2008) Ref. 1666

#### Revitalizing Nuclear Disarmament

‘The Challenge of Abolishing Nuclear Weapons’ conference discussed a variety of measures to eliminate the threat of nuclear weapons. Emphasis was on a Nuclear Weapons Convention, a draft of which (created by civil society organizations) was already submitted to the UN by Costa Rica. Along the same lines, nuclear experts attending the Pugwash 50th Anniversary workshop ‘Revitalizing Nuclear Disarmament’ discussed actions that both nuclear and non-nuclear states should take in order to further the goal of declaring nuclear weapons illegal and eliminating them entirely. (September 2007) Ref. 1667

#### Non-Proliferation Treaty Deadlock Continues

The second of three sessions of the Preparatory Committee for the 2010 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) was held from April 28 to May 9 at the UN Office at Geneva, Switzerland. Participation included delegates of

106 States parties, representatives of specialized international organizations, and of 64 NGOs. The main issues discussed included: nuclear non-proliferation, disarmament and international security; nuclear-weapon-free zones; nuclear safeguards; the peaceful use of nuclear energy; and the Middle East situation. No special agreements were reached. The third session will be held May 4-15, 2009, and the Review Conference will be April 26–May 21, 2010, both in New York. (May 2008) Ref. 1668

#### Nuclear Nonproliferation Treaty Stalemate Continues

No progress was achieved by the two-week annual session for preparing the 2010 NPT Review Conference. After having its work delayed for six days due to Iran's disagreement with the agenda, the conference ended with disputes over the session's final statement. Iran and other Nonaligned Movement nations criticized the statement as being too focused on compliance and not enough on the need for nuclear-weapon states to move toward disarmament. [See also *Review Conference of the Non-Proliferation Treaty, and Increasing Calls for Improved Management of Nuclear Materials and Nonproliferation*] Meanwhile, eight more nations joined the Global Initiative to Combat Nuclear Terrorism. Led by Russia and the U.S., this global effort was initiated in 2006, to improve security over nuclear materials and to deter nuclear smuggling. The group now includes 31 nations. The next meeting is scheduled to be held in June, in Kazakhstan. (May 2007) Ref. 1669

#### IAEA to Upgrade International Nuclear Event Scale

The International Atomic Energy Agency (IAEA) will upgrade the International Nuclear Event Scale (INES) system to enhance international safety by promptly informing the public on the scale of a nuclear or radiological incident. The improvements will make the system more versatile and informative, the terminology will be standardized, and issues related to sources and transportation of radioactive material will be better addressed. The INES was originally developed in the 1990s by the UN IAEA and the Nuclear Energy Agency of the OECD to consistently communicate the severity of reported nuclear and radiological events, with a scale ranging from 1 (anomaly) to 7 (major accident). The updated scale is expected to be issued at the end of 2008, after being reviewed by INES members. (September 2007) Ref. 1670

#### **IAEA Director's Recommendations to Improve Nuclear Safety**

At the IAEA's 51st annual General Conference held in Vienna, Director General Mohamed ElBaradei called on all countries to ratify the Amendment on the Physical Protection of Nuclear Material of the International Convention on the Suppression of Acts of Nuclear Terrorism, to strengthen the protection of nuclear materials and increase nuclear security. In the meantime, experts attending the scientific forum convened by the IAEA's 'Global Challenges and the Development of Atomic Energy: The Next 25 Years' noted that in view of the world's energy needs' likely to increase by 50% over the next 25 years, nuclear technology is expected to expand, increasing the risks associated with the spread of sensitive nuclear know-how, including enrichment and reprocessing technologies. [See also *Increasing Nuclear Safety and Security* in March 2006 and other related items in previous environmental security reports.] (September 2007) Ref. 1671

#### **IAEA Database Recorded 1,562 Nuclear Trafficking Incidents for the Period 1993–2008**

The International Atomic Energy Agency reports that in 2008, 119 events were added to the

agency's Illicit Trafficking Database. Fifteen of those were cases of illicit nuclear material possession or related incidents and 16 were cases involving the theft or loss of sensitive substances. Between 1993 and the end of 2008, the database had recorded 1,562 nuclear trafficking incidents, ranging from illicit disposal efforts to nuclear material of unknown provenance. As of the end of 2008, 103 IAEA member states participated in the reporting program. (August 2009) Ref. 1672

### **International Norms Led by IAEA Are Needed to Stop Smuggling of Nuclear Materials and Nuclear Proliferation**

During a Security for a New Century briefing at the U.S. Capitol, November 27, 2007, David Albright, President of the Institute for Science and International Security said that A.Q. Khan's nuclear smuggling network may be just the tip of an iceberg, and national systems of enforcement are dangerously inadequate. He recommended that the International Atomic Energy Agency lead the creation of new international norms for everything from export controls for nuclear-related materials to a determination of what is classified information about nuclear energy. He also said that corporations should not do business with any trading company unless they can show that the end user could not contribute to nuclear proliferation. Financial loss due to discovery that their materials ended up in illegal nuclear programs will be higher than the financial loss from not selling the products.

In a related development, Edit Herczog, Member of the European Parliament, declared at NATO's November 23, 2007 Advanced Research Workshop held in Budapest on "Energy and Environmental Challenges to Security" that the EURATOM treaty may need a new focus on such security issues as non-proliferation and radiation protection. The EURATOM treaty has never been amended since its establishment 50 years ago. [See also *Nuclear Safety in September 2007, Increasing Nuclear Safety and Security* in March 2006 and other related items in previous environmental security reports.] (November 2007) Ref. 1673

### Advancements in Setting the Agenda for the 2010 NPT Review

The first meeting of the International Commission on Nuclear Nonproliferation and Disarmament was held in Sydney, October 20-21, 2008. As stated in the press conference, the Commission is at an "idea-formulating stage, ... refining and defining the issues" and formulating the work plan. The framework of negotiations is based on the NPT three pillars: disarmament, non-proliferation, and peaceful use. The Commission was created to help set the agenda for the 2010 Nuclear Nonproliferation Treaty review conference. [See also Australia to Propose Panel to Advance Work for the NPT Review in 2010 in June 2008 and other similar items in previous environmental security reports.] (October 2008) Ref. 1674

### Importance of Nuclear Weapon Disarmament Reiterated by UN

Progress toward Nuclear Weapon Disarmament continued with the 27<sup>th</sup> edition of the UN Disarmament Yearbook released on September 5, 2003. The UN Secretary General stated that the total elimination of nuclear weapons must remain a top priority. (September 2003) Ref. 1675

### **Waste Management**

New types of wastes disposal/management need to be addressed.



**Toxic Waste Disposal of Global Growing Concern**

The scandal around the dumping of toxic waste at Abidjan, Ivory Coast has intensified the global debate concerning trade in waste and the adequacy of the Basel Convention. Some African and Asian countries became dumping grounds for hazardous waste, such as radioactive uranium waste, lead, cadmium, mercury, industrial and hospital chemicals, and the rising volume of electronic waste. Although the Basel Convention and its 1995 amendment ban dumping of toxic waste in countries without proper facilities for handling it, the process continues illegally in countries that are not party to the Convention. In addition to environmental and health consequences, a Senegalese ecologist points out the security aspect associated with illegal dumping since "the waste is often accepted by corrupt people or factions who want money to buy weapons". As a consequence of the Ivory Coast scandal, the Prime Minister dissolved his cabinet and elections are jeopardized in a country already tormented by conflicts. [See also *New Measures for Regulating E-waste* in August 2006, as well as *Basel Convention on Hazardous Wastes to be Made More Effective* in July 2005 and other related items in previous environmental security scanning reports.] (September 2006) Ref. 1677

**Hazardous Waste Disposal of Increasing Concern**

According to the European Environment Agency, paper, plastic, and metal trash exported from Europe rose tenfold from 1995 to 2007, with 20 million containers of waste now shipped each year; either legally or illegally. In 2008, the Netherlands returned 80 illegal shipments to their countries of origin. Hong Kong authorities say that about 100 containers of waste arrive daily from the US and Canada. Recently, Italian mafiosi confessed that they have been disposing of toxic waste by putting it onboard ships and then deliberately sinking the vessels. Participants in the first international E-Waste Summer School, in Eindhoven, Netherlands, September 6-11, recommended adopting global policies and standards for recycling electronic products to avoid illegal and harmful e-waste processing practices in developing countries. (September 2009) Ref. 1678

**Organized Crime Targets Electronic Waste Recycling**

A series of raids in the UK to enforce the EU's Waste Electrical and Electronic Equipment Directive (WEEE) revealed increased involvement of organized crime in illegal export of unrepairable electric and electronic equipment to developing countries, mostly in Africa. Organized crime is primarily interested in retrieving some valuable parts of those devices. Dumping as well as dismantling of electronic waste in developing countries in Africa and Asia represents a serious threat to human health and the environment. [Related items: *EC's WEEE Directive Goes into Effect in UK* in July 2007, *Waste Management Policies* in June 2008, and *Toxic Waste Disposal of Global Growing Concern* in September 2006 environmental security reports.] (July 2009) Ref. 1679

**Renewed Calls for Strengthening E-Waste Management Regulations**

According to a UNEP report "Recycling - from E-Waste to Resources," e-waste grows globally by 40 million metric tons a year and is expected to rise dramatically in the developing countries, which are vulnerable to illegal trafficking of hazardous waste unless regulations are strengthened and enforced. Computer waste in India alone is projected to grow by 500% by 2020

compared to 2007 levels. China, Brazil, and Mexico are also among the countries highly vulnerable to rising environmental damage and health problems from hazardous waste. Nevertheless, properly managed e-waste could represent business opportunities, by creating new jobs and income from recovering valuable materials, such as gold and copper. [Related items: *Hazardous Waste Disposal of Increasing Concern* in September 2009, *Organized Crime Targets Electronic Waste Recycling* in July 2009, and other previous environmental security reports.]

The European Commission is exploring creation of a new body dedicated to enforcing European waste regulations, as recommended by its recent “Study on the feasibility of the establishment of a Waste Implementation Agency”. In the EU, an estimated 2.6 billion metric tons of waste are generated each year, out of which about 90 million metric tons are classified as hazardous. A recent large-scale inspection involving 22 Member States and some neighboring countries found that around 19% of waste shipments were illegal, most destined to countries in Africa and Asia. [Related items: *Half of Transported European Hazardous Waste Could Be Illegal—How Much More Elsewhere?* in April 2008, *EU Updates the REACH System, and WEEE and RoHS Directives* in December 2008, and other previous environmental security reports.] (February 2010) Ref. 1680

#### UN University study calls for reducing electronic waste and hazards

*Computers and the Environment: Understanding and Managing their impacts*, a recent UNU study, presents the environmental impact of personal computers’ manufacturing and argues the efficiency of the present legislation on limitation of the use of some hazardous chemicals and electronic waste management. The report calls for a better understanding of the impacts and the necessity to take appropriate action worldwide to halt “the growth of high-tech trash (March 2004) Ref. 1681

#### **Global Environmentally Sound E-waste Disposal System is Needed**

Environmentally Sound Management (ESM) of Electronic and Electrical Wastes (e-waste) is a new program of action for the Asia-Pacific region aiming to achieve environmentally sound disposal of e-waste and to stop illegal trafficking of hazardous e-materials. The program is supported by UNEP Basel Convention Regional Centres in China, Indonesia, and the South Pacific (SPREP-Samoa) and focuses on capacity building at regional and national levels for best implementation of the Convention, assessment of the current situation and design of best strategies to cope with e-waste in the conditions of the region’s rapid development. At the program’s launch festivity, the need for developing an international e-waste recycling systems along with transparent information and monitoring mechanisms to ensure accountability was highlighted.

A new study, *The Digital Dump: Exporting Reuse and Abuse to Africa*, by the Basel Action Network, based in Seattle, reports that most of the computer equipment sent from the United States to developing countries as “aid” are not usable, creating environmental problems in already challenged places. Local sources say that the port of Lagos, Nigeria, receives 400,000 used computers a month, 75% of which are junk that must be disposed of, raising environmental issues. [See related items *Two E-waste laws entered into force in the European Union* of February 2003, and *E-waste Management Directive Came into Effect on August 13, 2005* of August 2005 environmental security reports.] (November 2005) Ref. 1682

**European Parliament Proposes Tougher Waste Management Strategy**

The European Parliament has voted for a tougher waste management strategy, which stipulates that EU production of waste should be stabilized at 2008 levels by 2012, and scaled back by 2020, requiring that 50% of municipal waste and 70% of industrial waste be recycled by 2020. Although the new directive would not impose firm obligations on member states it would establish a "general rule or guiding principle" influencing future waste management practices. EU member states have different waste management strategies and efficiency and are expected to fight the Parliament's proposal. [See also *EU New Strategy on Waste Recycling in December 2005*, *New EU Environmental Strategies in September 2005*, and *Recycling Regulations in the EU* in August 2005 environmental security reports.] (February 2007) Ref. 1683

EU Preparing New Directives on Waste Management and Water Quality

The EU Environment Council reached political agreement on revising the EU's waste legislation—combining three existing laws: the Waste Framework Directive, the Hazardous Waste Directive, and the Waste Oils Directive into a more clear but comprehensive new Directive—and on managing water quality by improving standards and control systems and limiting pollution from hazardous substances. (July 2007) Ref. 1684

EU Vote on Revision of Waste Directive

The European Parliament approved the revision of the waste framework directive, which is the basis of the EU waste management policy. The new directive will replace three others—Waste Framework Directive, the Hazardous Waste Directive and the Waste Oils Directive, setting clear definitions and waste management principles and creating a sound, harmonized legal framework for waste treatment. [See also *EU New Strategy on Waste Recycling in December 2005* and other similar items in previous environmental security reports.] (June 2008) Ref. 1685

**European Union to Consider Regulations for Curbing Biowaste**

The European Commission is conducting an assessment of the potential need for and impact of legislation for reducing biowaste and its environmental impacts. The new regulation should reinforce the EU Landfill Directive, including a large spectrum of measures, from prevention, handling, and treatment, to product labeling. However, important aspects will need to be elucidated, from definitions related to biowaste, to countries infrastructure differences. Biowaste in the EU is estimated to rise to 139 million tonnes yearly, representing an important source of greenhouse gas emissions and other pollution when deposited in landfills. The Commission should present the impact assessment of different policy options by the end of 2009, and the legislative proposal is expected to be adopted in 2010. (June 2009) Ref. 1686

European Commission to Strengthen Bio-Waste Management

The European Commission has published a strategy for improve bio-waste management and help meet the targets set by the Landfill Directive 1999/31/EC that requires Member States to reduce the amount of biodegradable waste that they landfill to 35% of 1995 levels by 2016. The Commission's strategy aims to reduce bio-waste environmental impact while also taking advantage of its potential as a renewable source of energy and recycled materials, as well as reducing the production of methane (a GHG 25 times more potent than CO<sub>2</sub>). The Commission estimates that bio-waste is accounting for 88 million tons of municipal waste each year in Europe, while about 2% of the EU's overall renewable energy target could be met if all bio-

waste was turned into energy. To support Member States, the EU will provide specific guidance, standards, and indicators for bio-waste prevention with possible future binding targets. (May 2010) Ref. 1687

### **Basel Convention Needs Revision and Update**

The 9<sup>th</sup> meeting of the Conference of the Parties to the Basel Convention (COP9) on the Control of Transboundary Movements of Hazardous Wastes and their Disposal took place June 23-27, in Bali, Indonesia. The focus was a stronger regulation on the export of hazardous waste, mainly electronics which litter poor nations. Despite support from the African delegates and the EU, the representatives from 170 countries to the conference decided against banning toxic waste exports, rather encouraging voluntary actions at national level using some new guidelines to create their own recycling laws. [See also *Half of Transported European Hazardous Waste Could Be Illegal—How Much More Elsewhere?* in April 2008, *UN E-Waste Forum and Basel Convention's Conference of Parties* in December 2006, and other related items in previous environmental security reports.] (June 2008) Ref. 1688

### **Basel Convention on Hazardous Wastes to be Made More Effective**

The Basel Convention on the Transboundary Movement of Hazardous Wastes and Their Disposal might be strengthened by new proposals prepared for the biannual ministerial conference to be held in late 2006. Issues on the Open Ended Working Group's agenda include used mobile phones, obsolete ships dismantling, furthering the ratification and implementation of the Protocol on Liability and Compensation, mobilizing funds and empowering the Convention's Regional Centers, and drafting technical guidelines for promoting the environmentally sound management of various kinds of hazardous wastes. [See also *Basel Convention on the Transboundary Movements of Hazardous Wastes* of October 2004 and previous environmental security scanning reports on the Basel Convention.] (July 2005) Ref. 1689

### Basel Convention on the Transboundary Movements of Hazardous Wastes

The COP7 of the Basel Convention on the Transboundary movements of hazardous wastes focused on increasing electronic waste issues, and disposal of old military vessels and decommissioned fishing boats. Under the theme 'Partnership for meeting the global waste challenge,' the participants agreed that partnership between governments; partnership with the private sector, international organizations and NGOs; and synergies with other chemical management conventions, such as the Rotterdam and Stockholm Conventions, are key for environmentally sound waste management policies. (October 2004) Ref. 1690

### **Central Asian Nations to Create Regulatory Frameworks for Reducing Nuclear and Toxic Waste Threat**

Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan, supported by a consortium of national and international organizations, are taking measures to reduce the threat posed by nuclear and hazardous material left over from the Soviet era. Some 800 million tons of radioactive and toxic waste are stored in vulnerable depots, threatening both general environmental contamination and specific contamination of the water supplies of millions of people, and increasing "dirty bomb" threats. A declaration adopted at Geneva on June 29, 2009, outlines the main actions to address the problem, including regulatory frameworks and capacity building. [Previous related item: *Central Asia Becomes Nuclear Weapon-Free Zone* in December 2008 environmental security

report.] (July 2009) Ref. 1691

### **UN E-Waste Forum and Basel Convention's Conference of Parties**

Electronic devices account for 20-50 million metric tons of waste per year around the world that introduce lead, cadmium, mercury and other hazardous wastes into the land and water supplies. To counter the acceleration of this problem, over 500 experts from more than 150 countries met at the UN offices in Nairobi, Kenya, November 27–December 1 for the Conference of the Parties (COP8) to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal. The conference theme was “Creating innovative solutions through the Basel Convention for the environmentally sound management of electronic waste.” An e-waste declaration and more than 30 decisions were adopted, including synergies and cooperation among the Basel, Rotterdam and Stockholm Conventions (UNEP/CHW.8/CRP.8), safer ship dismantling procedures, amendments to the guidelines for the environmentally sound management (ESM) of persistent organic pollutant wastes, the 2007-2008 program, and implementation of the Strategic Plan for the Implementation of the Basel Convention to 2010. The E-waste Declaration called for wider transfer of information on technologies and e-waste management from developed to developing countries, prevention and fighting e-waste trafficking, introduction of broader and stronger national legislation to control e-waste management, promotion of eco-friendly technologies and phasing-out toxic components, and raising awareness of e-waste issues and integrated systems to reduce and limit damage due to e-waste. The meeting also discussed environmentally sound management of ship dismantling and agreed to a draft ship recycling convention, as well as the need for greater guidance in managing abandoned ships. The next COP will take place in fall 2008, in Indonesia. [See also *Toxic Waste Disposal of Global Growing Concern* in September 2006, *Basel Convention on Hazardous Wastes to be Made More Effective* in July 2005, and other related items in previous environmental security reports.]

[Note: By 2010, an estimated 100 million phones and 300 million personal computers might become waste. In the U.S., it is estimated that 14–20 million personal computers are thrown out each year; developing nations are expected to triple their output of all electronic waste by 2010.] (December 2006) Ref. 1692

### **EU Vote on Revision of Waste Directive**

The European Parliament approved the revision of the waste framework directive, which is the basis of the EU waste management policy. The new directive will replace three others—Waste Framework Directive, the Hazardous Waste Directive and the Waste Oils Directive, setting clear definitions and waste management principles and creating a sound, harmonized legal framework for waste treatment. [See also *EU New Strategy on Waste Recycling* in December 2005 and other similar items in previous environmental security reports.] (June 2008) Ref. 1693

### **EU Pollution Prevention Strategy to focus on recycling of waste**

The EU environment ministers held an informal meeting 14-16 May 2004 in Waterford, Ireland. The main topic on the ministers' agenda was the EU's proposed Thematic Strategy for the prevention and recycling of waste. Originally introduced for consultation in May 2003 and focusing on a life-cycle approach, the proposed strategy calls for waste reduction targets of 20% by 2010 for hazardous waste, municipal waste, and industrial waste. To boost recycling, the proposal also set a legally binding target of 40% reduction in disposal by landfill and

incineration by 2010, and a zero-disposal target for 2050. The European Parliament is already on record as endorsing future legislation giving preference to waste disposal over re-use and recycling only when there is clear evidence that it is more environmentally friendly, and has also rejected compulsory waste reduction plans, favoring voluntary agreements instead. As an outcome of the May 2004 meeting, the life-cycle approach was confirmed as the mechanism to follow, but specific targets for waste reduction were not endorsed. (May 2004) Ref. 1694

### **Higher Targets for Packaging Recycling and Recovery**

The EU updated and strengthened its 1994 Directive for packaging waste, setting higher recycling and recovery targets to further reduce the negative environmental impacts created by the landfilling and incineration of packaging waste and by the production of virgin materials. This type of waste includes packaging made from paper, glass, metals, plastics and wood. (August 2005) Ref. 1695

### **Firm regulations for perchlorates, a component in rocket fuel, are needed**

Large scale dumping of perchlorates, a component in rocket fuel continues to pollute underground water in the United States due to lack of regulations. Although aircraft and missile developers were warned of this problem for many years, rather than addressing the problem, the Department of Defense (DOD) has ignored it, says Gene Ayres, author of the article *Rocket Fuel in our Food*, appeared in World Watch Magazine. While EPA openly acknowledges the gravity of the situation, there are not yet firm regulations for perchlorates.

EXTi (Electro Oxidation Technologies), a San Jose company, recently announced a new technology able to clean perchlorate (and nitrate) polluted water. National and international regulations seem inevitable in order to stop and/or limit the pollution. (October 2003) Ref. 1696

### **Medications disposal**

The disposal of antibiotics, expired medications, and endocrine disrupting compounds such as birth control pills via the wastewater system is a relatively new issue, but one which has long-range ramifications for the development of new wastewater treatment and sewage disposal regulations in the future. Current wastewater treatment requirements and technology do not address all of these pollutants, which pass through the wastewater system and reenter the environment downstream. Some of these compounds may then bioaccumulate and affect human health upon consumption. Current food safety laws do not address testing for all such compounds. Other compounds may interfere with the hormonal cycles of flora and fauna, disrupting reproductive cycles, or cause antibiotic-resistant strains of bacteria to emerge. (October 2003) Ref. 1697

### **Weapons-related**

#### **Increased Efforts Needed to Counter the Proliferation of Weapons of Mass Destruction**

The second report of the U.N. Security Council 1540 Committee concluded that although nations have made progress since the first report of the committee in April 2006, further measures are needed to completely carry out their obligations under the resolution intended to counter the proliferation of weapons of mass destruction. Information on all 192 U.N. nations was collected, out of which 155 provided reports on their 1540 implementation activities. The committee's

recommendations include enhancing its own efforts, as well as improving collaboration with global and regional intergovernmental organizations to assist nations with the implementation process.

“It’s Asia that has the most potent latent capabilities to develop nuclear, chemical and biological weapons,” said Paul Dibb, professor at the Australian National University’s Strategic and Defense Studies Center, at an Asian Pacific security forum. He also noted that groups such as the Association of Southeast Asian Nations and the Asia-Pacific Economic Cooperation forum have failed to establish effective nonproliferation arrangements, while Australia’s Prime Minister Kevin Rudd’s suggestion for an Asia Pacific Community to deal with security challenges in the region enjoys little enthusiasm. The mission of the new U.N. Regional Center for Peace and Disarmament in Asia and the Pacific, opened in Katmandu, Nepal, is to counter possible nuclear smuggling by terrorist and criminal groups in the region.

Meanwhile, the Global Partnership Against the Spread of Weapons and Materials of Mass Destruction, initially supporting the program to secure and destroy WMD materials in Russia and Ukraine, agreed to expand their efforts to other countries (not yet specified). [See also *New Concerns Rising over Chemical Weapons* in April 2007 and other related items in previous environmental security reports.] (July-August 2008) Ref. 1699

### **Chemical Weapons Convention Gets New Boost**

The Second Review Conference for the Chemical Weapons Convention was held in The Hague, April 7-18, 2008, attended by delegates from 114 of the 183 treaty states. The main issues brought up by participants were: threats posed by the use of chemical weapons by nonstate actors; deadlines for chemical weapons destruction (specifically named were Russia and the U.S., which have to destroy their chemical warfare agents by April 29, 2012, and Japan for destruction of its chemical weapons stockpiles in China); and universal adherence to the treaty. Delegates produced a report that reviews the treaty procedures and implementation issues, and urges the 12 countries that are not yet Party (Angola, the Bahamas, Dominican Republic, Egypt, Guinea-Bissau, Iraq, Israel, Lebanon, Myanmar, North Korea, Somalia and Syria) to join the international disarmament and nonproliferation treaty “as a matter of urgency and without preconditions.” The report does not address the convention’s relation to some new science and technology developments that could produce new threats—such as development of new incapacitating agents, advances in biology and nanotechnology, and industry verification mechanisms. It was proposed that, from now on, the Scientific Advisory Board of the Organization for the Prohibition of Chemical Weapons meet twice a year, not just once as it has previously. [See also *New Concerns Rising over Chemical Weapons* in April 2007 and other related items in previous environmental security reports.]

In the meantime, Pacific Consultants International warns that Japan is not on schedule for meeting its obligations towards China in the recovery and destruction of hundreds of thousands of chemical weapons abandoned at the end of World War II and will most probably not meet the April 2012 deadline, due to management problems. [See also *Japanese Chemical Weapons Cleaning in China Yet to be Completed* in June 2007, and other previous environmental security reports on this issue.] (April 2008) Ref. 1700

### New Concerns Rising over Chemical Weapons

The Organization for the Prohibition of Chemical Weapons (OPCW), the Chemical Weapons Convention’s (CWC) secretariat, focuses on issues related to existing weapons, but specialists

argue that new, modern chemicals and production plants could represent even higher risk. Jonathan Tucker of the German Institute for International and Security Affairs in Berlin remarks that a “new generation of small, flexible batch-processing chemical plants that can quickly be switched to producing any number of chemicals are not being inspected at all... and there are five times as many of them as there are declared dual-use plants.” New molecules, such as the “novichok” nerve agents, or “incapacitants” such as fentanyl are overlooked, undermining the “international norm” and confidence in the CWC. [See also *Eleventh Chemical Weapons Convention, Five Countries Organize CWC National Authorities*, and other related items.] (April 2007) Ref. 1701

#### Eleventh Chemical Weapons Convention

The 11th Conference of States Parties to the Chemical Weapons Convention (CWC) was held in The Hague, December 5-8. One of the controversial issues discussed concerned “incapacitating agents,” which Peter Herby, head of the Mines-Arms Unit at the International Committee of the Red Cross, considered toxic chemicals. Some experts also argued that using “nonlethal” materials on the battlefield would violate the CWC. There was also a call to clarify which chemicals—other than riot control agents—are allowed under the treaty’s exception for law enforcement, and that all these chemicals be publicly declared. The Conference approved the requests from Russia, the U.S. and several other nations for additional time to eliminate their stockpiles of toxic agents. There are now 181 nations party to the CWC, representing about 98% of the world’s population and there are calls that all nations become Party to the Convention before its 10th anniversary, next year. [See also *Five Countries Organize CWC National Authorities* in May 2006, *Micro-reactors Challenge Chemical Weapons Convention Effectiveness* in August 2005, and *Chemical Weapons Convention Annual Conference* in December 2004 environmental security reports.] (December 2006) Ref. 1702

#### **Strengthening Biological Weapons Convention**

##### Biological Weapons Convention (BWC) Meeting Improves International Resilience Systems to Address Infectious Disease and BioWeapons

About 500 participants from 95 countries, UN organizations such as WHO, FAO and the World Organization for Animal Health (OIE), regional disease surveillance organizations, academic institutions, NGOs, and corporations participated in the 2009 Meeting of Experts from States Parties to the Biological Weapons Convention in Geneva, August 24-28. The meeting focused on international cooperation for fighting infectious diseases, while also discussing peaceful uses of advances in bioscience and the establishment of mechanisms for promoting the implementation of the Convention’s Article X on scientific and technological cooperation related to “bacteriological (biological) agents and toxins for peaceful purposes.” The results of the meeting will be considered for the Meeting of States Parties, to be held December 7-11, 2009. Although in force since 1975, the treaty has no verification or compliance monitoring provisions or organization. According to the report *Ensuring Compliance With the Biological Weapons Convention*, some biodefense research might violate member-states commitments to the BWC. Along the same lines, *New Approaches to Biological Risk Assessment*, published by the British Royal Society and the International Council for the Life Sciences, calls for a harmonized international and inter-sectoral system to assess the “full spectrum” of bio-threats—ranging from naturally occurring diseases to accidental or intentional misuse of biological materials. The



report acknowledges the difficulties generated by the variety of hazards and the limited data available on some threats. Reportedly, a meeting at the White House on August 13 represented the first in a series of meetings with biological experts for strengthening the strategy on bioterrorism, including inputs for the BWC and its 2011 review conference. (August 2009) Ref. 1703

No Enforcement Mechanism Proposed for Strengthening the Bioweapons Treaty Due to “rapidly changing nature” of the threat

The 2009 Meeting of States Parties to the Biological Weapons Convention was held in Geneva, December 7–11, with focus on promoting capacity-building in the areas of disease surveillance, detection, diagnosis, and containment of infectious diseases. The new National Strategy for Countering Biological Threats presented by the U.S., although a comprehensive document designed to strengthen the Convention, doesn’t propose any international monitoring or enforcement system. A binding treaty on verification “would not be able to keep pace with the rapidly changing nature of the biological weapons threat,” noted Undersecretary of State Ellen Tauscher. (December 2009) Ref. 1704

Better International Controls Needed to Prevent Bioterrorism

“The biological weapons threat is multiplying and will do so regardless of the countermeasures we try to take,” warns Steven Block, a Stanford University biophysicist and former president of the Biophysical Society. The likelihood of SIMAD (Single Individual Massively Destructive), motivated by ideology or personal issues, is increasing fast and there is no adequate international treaty (the Biological Weapons Convention is not enough) or oversight agency to prevent malicious use of biotechnology work. There is no monitoring of the expanding gene-synthesis industry and the supervision of controversial experiments is voluntary and irregular at universities and private laboratories around the world. While scientists are still arguing on what approach would be the best to increase protection against bioterrorism, they agree on the need for swift and intensified international control to impede the accidental or deliberate release of genetically modified organisms. Along the same lines, China has updated its 2002 list of controlled export materials that could be used to produce biological weapons to fight terrorism. The new list added 14 types of viruses, toxins, bacteria, and equipment, and strengthened export control. (July 2006) Ref. 1705

Time to Strengthen the 1972 Biological Weapons Convention

Because the knowledge of how to weaponize diseases and alter their genetic properties is increasing, the sooner these capabilities are controlled, the safer the world will be. To this end, international experts met in Switzerland December 5-9 to strengthen the 1972 Biological Weapons Convention. Discussions focused on enhancing international surveillance capabilities for infectious diseases and improving national and international response to suspected use of biological or toxic weapons. In addition to a verification regime, Switzerland proposed more attention to biological weapon disarmament to prevent proliferation and terrorist access. Agreements necessary to manage these threats have not been achieved. An international code of conduct for scientists will be considered in 2005 at the Meeting of Experts (13-24 June) and the Meeting of States Parties (5-9 December). The Sixth Review Conference in 2006 will assess the Convention’s operation and implementation.

*Bioweapons Report 2004*, produced by the Bioweapons Prevention Project, assesses the global

state of technology that could be used to create biological weapons and the state of regulations addressing such efforts. It concludes that the BWC “lacks effective mechanisms for monitoring and verifying whether or not states parties are complying with their treaty obligations,” and unless updated at its 2006 review conference, the BWC will become irrelevant. The report also forecasts scientific advances by 2011, indicating that a more responsive mechanism is needed for reviewing scientific developments other than the five-year review conferences. Australia and Indonesia have scheduled a February regional workshop in Melbourne on the BWC and strategies to reduce the possibility of bioterrorism in South Asia. Other countries of the region will also be invited. (December 2004) Ref. 1706

#### Progress for Enforcing Biological Weapons Convention

This year’s meeting of states parties to the Biological Weapons Convention focused on strengthening the treaty’s implementation at the national level and advancing regional cooperation. The Implementation Support Unit established last year presented its report on helping member states implement the convention. Also discussed were efforts to increase the pact’s membership beyond the present 159 nations. The Nonaligned Nations Movement presented several recommendations to strengthen the BWC, such as a verification regime to ensure compliance, and seven issues to be considered at BWC meetings through 2010, including stricter export and import controls mechanisms, and monitoring of viruses that could be spread intentionally or accidentally. The next Meeting of States Parties is scheduled for December 1-2008 to consider measures to improve biosafety and biosecurity, scientific codes of conduct, and approaches for increasing awareness. The next review conference of the BWC is scheduled for 2011. [See also *Sixth Review Conference of the Biological Weapons Convention* in December 2006 and other related environmental security reports.] (December 2007) Ref.1707

#### Biological Weapons Convention Lacks Enforcement Mechanism, Warns Russian General

Col. Gen. Vladimir Filippov, commander of Russia’s WMD protection force, warned that the Biological Weapons Convention lacks enforcement mechanisms that would help prevent nations and terrorists from producing biological warfare agents. The issue was also previously raised by the Nonaligned Nations Movement at the 2007 meeting of states parties. The next Meeting of States Parties is scheduled for December 2008 and the review conference of the BWC is planned for 2011. [See also *Progress for Enforcing Biological Weapons Convention* in December 2007 and *Sixth Review Conference of the Biological Weapons Convention* in December 2006 and other related environmental security reports.] (March 2008) Ref.1708

#### Biological Weapons Convention Meeting, August 2008

The Meeting of Experts from States parties to the Biological Weapons Convention (BWC) held in Geneva, August 18–22, 2008, is part of a four-year program to improve effectiveness of the Convention. The focus of the meeting was increasing biosafety and biosecurity at international, regional, and national levels. The proposals included: improving awareness and education of scientists and policymakers; adopting and/or developing codes of conduct (especially for scientists who deal with biological materials); establishing international standards and external certification and audit mechanisms; increasing regional and international cooperation to improve biosafety and biosecurity methods; and organizing workshops for officials and scientists. [See also *Progress for Enforcing Biological Weapons Convention* in December 2007 and *Sixth Review Conference of the Biological Weapons Convention* in December 2006 and other related

items.] (July-August 2008) Ref. 1709

Biological Weapons Convention (BWC) Meeting Improves International Resilience Systems to Address Infectious Disease and BioWeapons

About 500 participants from 95 countries, UN organizations such as WHO, FAO and the World Organization for Animal Health (OIE), regional disease surveillance organizations, academic institutions, NGOs, and corporations participated in the 2009 Meeting of Experts from States Parties to the Biological Weapons Convention in Geneva, August 24-28. The meeting focused on international cooperation for fighting infectious diseases, while also discussing peaceful uses of advances in bioscience and the establishment of mechanisms for promoting the implementation of the Convention's Article X on scientific and technological cooperation related to "bacteriological (biological) agents and toxins for peaceful purposes." The results of the meeting will be considered for the Meeting of States Parties, to be held December 7-11, 2009. Although in force since 1975, the treaty has no verification or compliance monitoring provisions or organization. According to the report *Ensuring Compliance With the Biological Weapons Convention*, some biodefense research might violate member-states commitments to the BWC. Along the same lines, *New Approaches to Biological Risk Assessment*, published by the British Royal Society and the International Council for the Life Sciences, calls for a harmonized international and inter-sectoral system to assess the "full spectrum" of bio-threats—ranging from naturally occurring diseases to accidental or intentional misuse of biological materials. The report acknowledges the difficulties generated by the variety of hazards and the limited data available on some threats. Reportedly, a meeting at the White House on August 13 represented the first in a series of meetings with biological experts for strengthening the strategy on bioterrorism, including inputs for the BWC and its 2011 review conference. (August 2009) Ref. 1710

Recommendations for the Biological Weapons Convention and other International Mechanisms to Prevent Terrorists from Getting Pathogens (at the International Symposium on Securing High Consequence Pathogens and Toxins, Sandia National Laboratories)

More than 60 bioscience experts from around the world gathered at the International Symposium on Securing High Consequence Pathogens and Toxins, Feb. 1-6, at Albuquerque Sandia National Laboratories to discuss securing pathogens and toxins from terrorists. The goal of the symposium was to share information and begin dialogue in the view of establishing international biosecurity measures and standards and protocols that would lead to improved security of facilities conducting infectious disease research worldwide. "Although most international bioscience labs have systems in place to prevent people from being accidentally exposed to infectious diseases, no international guidelines exist that specify how labs should prevent malicious theft or sabotage of biological materials," says Sandia technical host Ren Salerno. He also recommended "biosecurity measures and standards be adopted and considered as national implementation policy for the Biological Weapons Convention." (Also see the Millennium Project Environmental Security Scanning December 2003 report Item 1. International Agreement Needed to Insure Laboratory Bio-safety.) (February 2004) Ref. 1711

**International Convention on Cluster Munitions**

### International Convention on Cluster Munitions Adopted by 111 Countries

The Convention on Cluster Munitions was formally adopted by 111 countries in Dublin, Ireland, on May 30, 2008. The Convention is a legally binding instrument that outlaws the use, production, transfer, and stockpiling of cluster munitions, and commits countries to clear areas contaminated by cluster munitions and assist victims and affected communities. The President of the International Committee of the Red Cross, Jakob Kellenberger, urged all countries to adhere to the Convention and noted “these weapons are not only morally unacceptable but also now illegal under international humanitarian law.” The Cluster Munitions Convention will be opened for signature in Oslo, December 2-3, 2008, and will enter into force after 30 ratifications. The U.S., China, and Russia did not participate in the meeting. [See also *Negotiations Continue for an International Instrument to Ban Cluster Munitions* in November 2007 and other related items in previous environmental security reports.] (May 2008) Ref.1713

### Negotiations Continue for an International Instrument to Ban Cluster Munitions

Cluster munitions were the focus of the Convention on Certain Conventional Weapons (CCW) meeting held in Geneva this month that resulted in a weak mandate with no legally binding document or language referring to cluster bomb prohibition or timeline. The EU’s proposal to negotiate a treaty in 2008 banning cluster munitions was rejected. UN Secretary-General Ban Ki-moon underlined in his message to the delegates the necessity of a legally binding international instrument that would prohibit the use, development, stockpiling and transfer of cluster munitions; while promoting the destruction of current stockpiles, battlefield clearance and risk mitigation activities. This is consistent with the aim of the Oslo Process to negotiate a ban on cluster munitions. On November 5, the Global Day of Action to Ban Cluster Bombs, public actions took place in 40 countries, calling on governments to take actions for banning cluster munitions. Supporters hope that momentum was created to advance the negotiations next month, when more than 100 countries will gather in Vienna to discuss a draft treaty. [See also *Progress Made on Banning Cluster Bombs* in March 2007 and other items on this theme in previous environmental security reports.] (November 2007) Ref.1714

### Progress Made on Banning Cluster Bombs

At the Conference on Cluster Munitions held in February 2007 in Oslo, 46 states and several international organizations decided to develop, by 2008, a legally binding international instrument to ban the use, production, transfer, and stockpiling of cluster munitions, as well as to create a framework for dealing with the consequence of cluster munitions’ use in the affected areas. Environmental damage and civil casualties are the highest concern for banning cluster bombs. Next meetings are planned for May/June in Lima, November/December in Vienna and early 2008 in Dublin. Last year Belgium has become the first country to ban cluster bombs, and this month [March 2007] the Belgian Senate passed legislation that criminalizes investment in companies that make cluster munitions. The Belgian Parliament plans to publish a list of companies that manufacture such munitions. Austria announced a moratorium on the use, production, or trade of cluster munitions. Canada promised to destroy its stockpile of cluster munitions. The U.S. Democrats recently introduced a bill in the U.S. Senate proposing to “restrict federal funds for the use, sale or transfer of cluster bombs.” Presently there are 34 countries producing cluster munitions and about 75 countries that stockpile them. [See also related items *CCW Protocol V on Explosive Remnants of War Entered into Force in November 2006*, *NGOs Launch Campaign to Ban Cluster Bombs*, and *Draft Protocol on Cluster Bombs*

*Cleanup Liability*] (March 2007) Ref. 1715

African Countries Call for International Ban on Cluster Bombs

The first meeting of African countries on cluster bombs adopted the “Livingstone Declaration,” endorsed by 38 out of 39 countries (South Africa, one of the continent’s two producer states was the exception.) The strong political declaration is formally committing the African countries to the negotiations for a global cluster munitions ban treaty to be held in Dublin, Ireland, May 19-30, 2008. There was widespread support for a broad definition of cluster munitions to avoid exceptions based on so-called ‘technical fixes,’ and on the need for comprehensive liability provisions for the affected communities. The Dublin meeting should conclude the Oslo process and agree on the final terms and language of a cluster bombs ban treaty, which would then be opened for signature before the end of 2008. [See also *Negotiations Continue for an International Instrument to Ban Cluster Munitions* in November 2007 and other items on this issue in previous environmental security reports.] (April 2008) Ref 1716

NGOs launch campaign to ban cluster bombs

The Cluster Munition Coalition, involving NGOs from around the world, launched a campaign aiming to ban, under international law, the use of cluster bombs. The campaign also calls for help for victims and an overall cleanup of explosive remnants. Several governments - including the Netherlands, Canada, New Zealand and Mexico support the campaign. The campaign has two aims: embedding in international law the responsibilities of parties with regard to ERW, and binding the use of cluster munitions (CM) by universal humanitarian standards. Regarding CM, the campaign aims to restrict use and production, as well as trade in cluster munitions. (November 2003) Ref. 1717

## **IMPROVED ENFORCEMENT OF ENVIRONMENTAL REGULATIONS**

For many environmental regulations, enforcement seems to be not strong enough or there is little understanding worldwide of how they should apply. With the aid of new technologies (such as space surveillance) and meetings discussing the international regulations, it is expected that the situation will improve considerably in the near future.

Developing countries’ compliance with environmental regulations is expected to improve via new modes of international assistance. International organizations, NGOs, and developed countries’ governments join efforts to help developing countries understand the importance of a healthy environment, improve their practices to be more environment-friendly, and to understand and comply with the international environmental legislation in place.

UN “Programme performance of the United Nations for the biennium 2002-2003” notes that over the last two years, “a total of 140 governments were supported in the implementation of multilateral environmental agreements through policy advice provided by regional offices in cooperation with United Nations organizations and convention secretariats, and interlinkages among environmental conventions were enhanced, particularly with regard to harmonized reporting.”

Advances in ICT, satellites, sensors, and the Internet are making it possible to monitor environmental agreements more effectively.

### **Likelihood of Climate Lawsuits Increasing**

Advances in environmental science and computer modeling are improving estimates of human-influenced climate change and its influence on extreme weather events. Some experts suggest that the likelihood of related litigation might increase, as sectors and companies that are considered serious contributors to climate change or promoters of public misinformation could be held liable for climate-change effects. *Beyond Adaptation*, a paper by WWF UK, notes that a new UN framework to compensate victims of climate change in developing countries is needed and suggests an international compensation fund to be set up by some future UN treaty. (December 2008) Ref. 1719

### **First Simultaneous ExCOPs for Improving MEAs' Synergies and Coordination**

As part of the UN's effort to improve coordination, reduce overlaps, and improve enforcement of multilateral environmental agreements, the first simultaneous extraordinary meetings of the Conferences of the Parties to the Basel (control of transboundary movement of hazardous waste), Rotterdam (prior informed consent for certain hazardous chemicals), and Stockholm (on POPs) Conventions, will be held February 22-26, 2010, in Bali, Indonesia, in coordination with the UNEP 11th Governing Council/Global Ministerial Environment Forum. The Synergies Oversight Team, composed of the Executive Secretaries of the three Conventions and representatives of UNEP and FAO, is coordinating the preparation of the simultaneous ExCOPs, while also assessing synergies in a strategic and long-term perspective. In a preamble to the conference, UNEP and FAO have launched a website that presents updated information on the ExCOPs: <http://excops.unep.ch>. Incidentally, the Basel Convention Committee has recently released a practical guide on national reporting by parties to the Basel Convention. [Related item: *UNEP Governing Council/Global Ministerial Forum Makes Progress on Global Environmental Governance* in February 2007 environmental security report.] (October 2009) Ref. 1720

The first simultaneous extraordinary meeting of the Conferences of the Parties to the Basel, Rotterdam, and Stockholm Conventions (ExCOPs) to foster synergies among the three main conventions addressing hazardous chemicals and waste was held in Bali, Indonesia, February 22-24, 2010. The synchronization includes all main aspects, ranging from joint activities, management, and services, to budget cycles and audits, as well as a review mechanism and follow-up work on enhancing coordination and cooperation among the three conventions. The negotiations' results are stipulated in the omnibus decision simultaneously adopted at the final plenary by the COPs of all three Conventions. This could be a test case for improved global environmental governance by increasing coherence in decisionmaking and monitoring at international, regional, and national levels. Reform of the international system of environmental governance was further discussed as a key theme at the 11th Special Session of the UNEP Governing Council/Global Ministerial Environment Forum (GCSS-11/GMEF), held February 24-26 (the outcomes were not yet available at the time of this writing.) [Related item: *UNEP Governing Council/Global Ministerial Forum Makes Progress on Global Environmental Governance* in February 2007 environmental security report.] (February 2010) Ref. 1721

**New UN-linked Body Proposed to Protect Biodiversity and Ecosystem Services**

As the IPCC helped to put global climate change on the world agenda, a new organization is proposed to do the same for biodiversity and ecosystem services. Building on the Millennium Ecosystem Assessment and the Consultative Process Towards an International Mechanism of Scientific Expertise on Biodiversity, the proposed Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) would bring together the policymaking and scientific communities from the biodiversity and ecosystem areas to provide timely information to support decision making. The framework for the new UN-linked body was discussed at an ad hoc intergovernmental and multi-stakeholder meeting held November 10-12, 2008 in Putrajaya, Malaysia, attended by over 175 participants from nearly 100 countries and more than 20 organizations. The meeting's results will be presented at the 25th session of the UNEP Governing Council. (November 2008) Ref. 1722

**UK Could Seize Planes to Enforce European Emissions Trading Scheme**

The UK Environment Agency will have increased power to seize assets from airlines that do not respect the new scheme to limit flights' carbon emissions in view of the European Emissions Trading Scheme for aviation. The measure is introduced in an effort to enforce regulations in the special case of airlines, which do not have fixed assets in the UK. [See also *Provisional Agreement for Including Aviation in the Emission Trading Scheme from 2012* in June 2008 and other similar items in previous environmental security reports.] (March 2009) Ref. 1723

**Central Asian Nations to Create Regulatory Frameworks for Reducing Nuclear and Toxic Waste Threat**

Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan, supported by a consortium of national and international organizations, are taking measures to reduce the threat posed by nuclear and hazardous material left over from the Soviet era. Some 800 million tons of radioactive and toxic waste are stored in vulnerable depots, threatening both general environmental contamination and specific contamination of the water supplies of millions of people, and increasing "dirty bomb" threats. A declaration adopted at Geneva on June 29, 2009, outlines the main actions to address the problem, including regulatory frameworks and capacity building. [Previous related item: *Central Asia Becomes Nuclear Weapon-Free Zone* in December 2008 environmental security report.] (July 2009) Ref. 1724

**Environmental Testing**Assessment of Toxicity Testing for Environmental Agents

In view of new directives and initiatives for toxicity testing in the U.S. and Europe, and the new testing technologies and methods that are emerging, EPA called for a comprehensive review of the present testing methods and strategies and recommendations for improvement. To that effect, the National Research Council (NRC) designated a Committee on Toxicity Testing and Assessment of Environmental Agents to conduct an independent two-part study. The focus is human toxicology and not ecologic effects of environmental agents. The first part of the study, *Toxicity Testing for Assessment of Environmental Agents: Interim Report* is a comprehensive analysis of the current approaches to toxicity testing and data needs to meet regulations. The committee agrees that new strategies and protocols are needed to improve the efficiency of toxicity screening and address some of the data gaps identified. The second part, expected to be

completed by fall 2006, focuses on developing long-range vision and strategy to advance the practices of toxicity testing and human health risk assessment of environmental contaminants. (April 2006) Ref.1725

#### Software Toolkit for Control of Hazardous Chemicals

The Secretariat of the Basel Convention on the Control of Transboundary Movements of Hazardous and Other Wastes developed a software “toolkit” that would greatly help assessing and managing the hazardous chemicals called polychlorinated biphenyls (PCBs). The PCB Inventory and Management Decision Supportive Tool (DST) will help collect and organize PCB data, and support planning for PCB disposal and transboundary movement. In addition to falling under the scope of the Basel Convention, PCBs are to be phased out of use by 2025 under the Stockholm Convention on Persistent Organic Pollutants. (May 2005) Ref.1726

#### **EU to Introduce New Environmental Index**

In order to better measure progress, the EU Commission plans to develop a comprehensive index of environmental sustainability, which would include indicators on the main environmental policy and protection aspects. The index would complement the Gross Domestic Product (GDP), thus helping sustainable development policies. A pilot version of the index will be presented in 2010. The European Statistical System will also implement Environmental Accounting as a standard in macro-economic statistics, while the Commission will speed up environmental and social data generation for producing near real-time information for decision-making. (October 2009) Ref. 1727

#### **European Commission Creates New Directorate-General for Climate Action**

The EC’s new Directorate-General for Climate Action will take over the relevant activities from the other EC DGs, and those related to international negotiations on climate change from the External Relations DG. This should give more focus and effectiveness for the EU’s role in world efforts to address climate change. [Related item: *European Climate and Energy Package Formally Adopted* in April 2009 environmental security report.] (February 2010) Ref. 1728

#### **Calendar with Environmental Deadlines Compliance**

The 2008 Compliance Calendar by the Environmental Resource Center is an excellent tool summarizing the most important deadlines for compliance with U.S. environmental regulations and reporting. In addition to highlighting the deadlines, it also contains a summary of the most important environmental regulations and responsible organizations. (September 2007) Ref.1729

#### **UNU Inter-linkages initiative**

Environmental Governance in 14 Asian and Pacific Countries - The UNU Inter-linkages Initiative helps understanding and implementation of multilateral environmental agreements at national and regional levels. Ref.: 1730

#### **UNU to discuss global integration of environmental assessments**

The Globally-Integrated Environmental Assessment Modeling Forum is an ongoing set of discussions, workshops, peer reviews, and newsletters on issues concerning globally integrated model-supported environmental assessments. Ref.: 1731



## **Improving Environmental Governance, UNU Reports**

### Emerging Forces in Environmental Governance

A recent book published by the United Nations University presents arguments for overhauling international environmental governance. It argues that a new environmental coordinating body is needed to solve problems associated with the proliferation of multiple organizations that administer various treaties, conduct research, and maintain the information required to ensure consistent enforcement of existing international environmental agreements. Enforcement options presented include creation of a World Environment Court, a UN Environmental Security Council with binding enforcement powers, and expansion of the UN Security Council mandate to include environmental security. (June 2004)

### Reforming International Environmental Governance: From Institutional Limits to Innovative Reforms

*Reforming International Environmental Governance: From Institutional Limits to Innovative Reforms* by the UNU addresses the international institutional framework that would best serve global environmental governance. The ad hoc nature of the current over 500 international agreements and institutions dealing with environmental issues around the world complicates the implementation and compliance process of environmental regulations. The contributors suggest institutional reform of the current international environmental governance system and evaluate three potential models: enforcement, centralization, and cooperation through increased coordination and collaboration. They examine the possibilities of improving international environmental governance by strengthening UNEP and clustering the existent international regulations; a potential World Environment Organization; and the prospect of a World Environment Court; as well as UN reforms. (May 2005) Ref. 1732

## **International Conference on Environmental Compliance and Enforcement**

Participants from over 60 countries and 125 organizations explored strategies to improve compliance with domestic and international environmental law at the 7th International Conference of the International Network on Environmental Compliance and Enforcement (INECE) held in Marrakech, Morocco, from 10-15 April 2005. Papers from the conference stressed the relationship of compliance and enforcement to the rule of law to help achieve a system of good governance and ultimately meet sustainable development objectives. Supporting materials are available on the interactive INECE website.

INECE is the only global network of independent experts dedicated to pursuing the rule of law, good environmental governance, and sustainable development at all levels of governance. It links the environmental compliance and enforcement efforts of more than 4,000 practitioners - inspectors, prosecutors, regulators, parliamentarians, judges, and NGOs - from over 120 countries, through training and capacity building programs, raising awareness, and enhancing enforcement cooperation. (April 2005) Ref. 1733

## **Improving Effectiveness of Multilateral Environmental Agreements**

The High-Level Meeting on Compliance with and Enforcement of Multilateral Environmental Agreements (MEAs), organized by UNEP, took place in Colombo, Sri Lanka, 21-22 January. The meeting reviewed and assessed the problems impeding the full implementation of MEAs and the best procedures to help governments comply with their obligations under the various international treaties for protecting the global environment. In addition to looking into the

technical aspects of compliance, the meeting also explored new legal, structural, and institutional improvements, such as synergies, inter-linkages, and clustering of MEAs. The draft Chair's Summary identifies 23 challenges grouped in 3 categories (institutional structures; interlinkages; and instruments to improve implementation) that need further consideration, capacity building, and resources. The Summary will serve UNEP in developing an action plan to improve MEAs' compliance and enforcement. The plan is expected to be presented to the UNEP Governing Council in 2007.

Note: The UNU Inter-Linkages Initiative helps the governments of 14 Asian and Pacific Countries understand and implement multilateral environmental agreements at national and regional levels <http://www.unu.edu/inter-linkages> [See *Developing countries' compliance with environmental regulations is expected to improve via new modes of international assistance* in January 2003 environmental security report] (January 2006) Ref. 1734

### **Environmental Performance Index to Help Improve Policymaking**

The Pilot 2006 Environmental Performance Index measures countries' performance relative to environmental targets, and aims to provide an analytical and empirical tool for improving policy choices. The Index is composed of 16 indicators from six policy categories: environmental health; air quality; water resources; biodiversity and habitat; productive natural resources; and sustainable energy. The indicators included in the index are: child mortality, indoor air pollution, drinking water, adequate sanitation, urban particulates, regional ozone, nitrogen loading, water consumption, wilderness protection, ecoregion protection, timber harvest rate, agricultural subsidies, overfishing, energy efficiency, renewable energy, and CO<sub>2</sub> per unit of GDP. Based on the Index, the five top ranked countries are: New Zealand, Sweden, Finland, Czech Republic, and the UK. The U.S. is ranked 28th. However, the report also shows the ranking based on the components of the Index, thus providing countries useful information to review their policies and improve environmental decisionmaking. The Pilot 2006 Environmental Performance Index was developed by the Center for Environmental Law & Policy at Yale University and the Center for International Earth Science Information Network (CIESIN) at Columbia University in collaboration with the World Economic Forum and the Joint Research Centre of the European Commission and was formally released at the annual meeting of the World Economic Forum, in Davos, on January 26, 2006. (January 2006) Ref. 1735

### **First International Research Center for "Creeping" Environmental Issues**

The world's first international research center dedicated to 'creeping environmental problems' has been established in the northwestern Chinese city of Lanzhou. These are the slow and cumulative problems, like global warming and desertification. The Center's vice-president, Ye Qian, is from the US National Center for Atmospheric Research. There will be more than 20 scientists from various countries working on the center's projects. (June 2005) Ref. 1736

### **East African Projects to Fight Environmental Crime and Link Journalists**

The Environmental Crime Project launched jointly by the Institute for Security Studies and Eastern Africa Police Chiefs Cooperation Organization has the mandate to develop mechanisms to improve environmental law enforcement and policy making in the East African region. The project will operate in Uganda, Kenya, Tanzania, Burundi, Rwanda, Seychelles, Ethiopia and Sudan, increasing protection against all forms of environmental crimes.

The new Network of Climate Journalists in the Greater Horn of Africa (NECJOGHA,

www.necjogha.org) represents an interactive resource for environment-related information and communication in the region. The network is the result of collaboration among many international and national environment organizations, universities, and climate centers. (July-August 2008) Ref. 1737

### **Conviction in Transborder Electromagnetic Pollution Case**

Cardinal Roberto Tucci, former head of Vatican Radio's management committee, and the Rev. Pasquale Borgomeo, the station's director general, were convicted by a Rome court for polluting the environment with electromagnetic waves from a transmission tower in the Rome suburb of Cesano, damaging the health of those living nearby. Although under the 1929 Treaty between the Holy See and Italy, Vatican is an independent city-state, Italy's Supreme Court ruled that the case could be tried. (May 2005) Ref. 1738

### **Developing countries' compliance with environmental regulations is expected to improve via new modes of international assistance**

The Global Judges Symposium concerning capacity building of legal stakeholders - Senior Judges and UNEP are helping developing countries improve their international environmental law capacity. UNEP convened a Global Judges Symposium on Sustainable Development and the Role of Law in Johannesburg from 18 to 20 August 2002. Chief Justices and other senior judges from approximately 70 countries around the world participated in the Symposium. These experts are convinced that the worldwide effort to crack down on environmentally-damaging developments and comply with agreements covering issues ranging from hazardous wastes to the trade in endangered species is being undermined. This is partly due to weaknesses in many countries' legal systems, but mainly as a result of lax enforcement. Ref.1739

### **IAEA to Improve Nuclear Security in 35 Countries**

The EU contributed €7 million to IAEA's Nuclear Security Fund to improve nuclear security in 35 countries, including 27 in Africa. The focus will be to secure radioactive materials and sites at risk of sabotage and improve capabilities to detect and respond to illicit trafficking in some African countries, including Ghana, South Africa, Morocco, Nigeria, Sudan, Tanzania, Uganda and Zambia. The program will also work to strengthen national legislation and regulatory infrastructures related to nuclear and radioactive material in—among other countries—Azerbaijan, Cape Verde, Comoros, Croatia, Swaziland, and the Former Yugoslavia Republic of Macedonia. Despite the latest contribution, “IAEA's nuclear security programme remained 90 per cent funded through unpredictable and heavily conditioned voluntary contributions,” notes IAEA Director General Mohamed ElBaradei. (July 2007) Ref.1740

### **IAEA Nuclear Terror Prevention Guide**

The International Atomic Energy Agency published a new manual, *Combating Illicit Trafficking in Nuclear and Other Radioactive Material*, to help harmonize the activities of the organizations involved in the process of detecting and/or responding to nuclear terror-related incidents. The 156-page manual is a cooperative effort of Interpol and the World Customs Organization. (January 2008) Ref.1741

### **Comprehensive Test Ban Treaty Organization to be Restructured**

The Comprehensive Test Ban Treaty (CTBT) Organization will undergo considerable

restructuring over the next two years as it progresses from the buildup phase to testing and evaluation, and operation and maintenance. The recently released Report of the 22nd Session of the organization's preparatory commission, held at the end of June 2004, offers some details of the plans. The CTBT will enter into force when 44 required states (Annex 2 States) ratify the treaty; thus far, 32 have ratified it. (July 2004) Ref. 1742

### **The UN Security Council Increased its Role in Preventing Terrorist Access to Weapons of Mass Destruction**

The UN Security Council unanimously adopted on April 28, 2004 a binding resolution criminalizing the production and/or acquisition of weapons of mass destruction by non-state actors. The Council decided that "all States...shall adopt and enforce appropriate effective laws which prohibit any non-State actor to manufacture, acquire, possess, develop, transport, transfer or use nuclear, chemical or biological weapons and their means of delivery, in particular for terrorist purposes, as well as attempts to engage in any of the foregoing activities, participate in them as an accomplice, assist or finance them." Being considered under Chapter VII of the UN Charter, the resolution is enforceable by the Security Council through tribunals, embargoes, or military force after all peaceful means of persuading delinquent Member States have been exhausted. However, during the debate, it was underlined that the Council would have to get separate approval for the means of enforcement. During the next two years a committee designated by the Security Council will monitor the implementation of the resolution and within six months all States are expected to present reports on their efforts to execute the provisions. (April 2004) Ref.1743

### **Problems with Destruction of Chemical Weapons and Potential Proliferation**

Only 30% of known chemical weapons stocks have been destroyed over the past ten years. The remaining 70% are supposed to be totally destroyed by 2012 to meet the Chemical Weapons Convention. Also during the UN First Committee (Disarmament and International Security) session, it was reported that while reliable safeguards structures have been established in many countries, moving chemical and biological production to Africa, Asia, Eastern Europe, and Latin America, where industrial regulations are inadequate, creates new verification challenges. The first Industry and Protection Forum to promote the implementation of the Chemical Weapons Convention and to discuss practical implementation issues will be held at the World Forum Convention Center in The Hague, November 1-2. [See also *New Concerns Rising over Chemical Weapons* in April 2007 and other related items in previous environmental security reports.] Concerning nuclear disarmament, Mexico's representative introduced a draft resolution on behalf of the New Agenda Coalition (Brazil, Egypt, Ireland, Mexico, New Zealand, South Africa and Sweden): "Towards a nuclear-weapon-free world, accelerating the implementation of nuclear disarmament commitment." (October 2007) Ref.1744

### **Progress in the Elimination of Chemical Weapons Stockpiles**

Participants to the 13th session of the Conference of the States Parties to the Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on Their Destruction held at The Hague, December 2-5, 2008, noted progress as nearly half of the stockpiles of chemical warfare materials declared by possessor States have been verifiably destroyed, it and reiterated the call that the actions be completed by the required April 29, 2012 deadline. Two countries have finished the operations, work continues in India, Russia and U.S.,

and Japan has begun the cleanup of chemical weapons abandoned in China during World War II, while Libya has yet to begin the process. The U.S. has already acknowledged that it can't meet the deadline and there are also considerable doubts about Russia and Japan meeting it. One of the main issues considered at the meeting was the 2009 budget for the convention's verification and monitoring body, the Organization for the Prohibition of Chemical Weapons. [See also *Problems with Destruction of Chemical Weapons and Potential Proliferation* in October 2007, and other related items in previous environmental security reports.] (December 2008) Ref. 1745]

## **Biological Weapons Convention Enforcement**

### PrepCom to Set Agenda for the BWC Review Conference

The Preparatory Committee for the Sixth Review Conference of the Biological Weapons Convention met in Geneva to prepare the agenda along with organizational and financial matters for the Review Conference to be held in November 2006. The Review Conference will examine the operations of the Convention since its review in 2002. It will also discuss new technological developments, and further actions necessary to strengthen the BWC (formally called the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction). Masood Khan, Pakistan's ambassador to the UN and expected president of the review conference, chaired the meeting. [See also *Recommendation for a Biosecurity Watchdog* in February 2006 and *Time to Strengthen the 1972 Biological Weapons Convention* in December 2004 environmental security reports.] (April 2006) Ref. 1746

### The Meeting of Experts to Strengthen a Global Ban on Biological Weapons

The Meeting of Experts was held in preamble to the annual meetings of the States Parties to the Biological and Toxin Weapons Convention (BTWC). Experts from 150 States Parties and UN World Health Organization (WHO) and Food and Agriculture Organization (FAO), focused on addressing the legal framework necessary for implementation and enforcement of the Convention's requirements, and security mechanisms concerning pathogenic microorganisms and toxins. (August-September 2003) Ref. 1747

### Recommendation for a Biosecurity Watchdog

*Globalization, Biosecurity, and the Future of the Life Sciences*, a report by the U.S. National Research Council and Institute of Medicine of the National Academies assesses the evolution of science and technology capabilities over the next 5-10 years with implications for next-generation bio-threats. Acknowledging that the accelerating pace of life sciences discoveries worldwide has fundamentally changed the spectrum of threats, it looks into next-generation bio-weapons and recommends ways to prevent misuse of science, including strengthening the scientific expertise of security organizations, and the creation of an independent science-and-technology advisory committee for intelligence agencies, as well as the promotion within the international scientific community of a common culture of awareness and responsibility to prevent misuse of science. In that context, one of the co-authors of the report, Canadian Peter A. Singer, suggests the creation of a global advisory group that would act as a watchdog to prevent science being misused to produce biological weapons. He advocates that Canada should advance the idea of such a network at the upcoming G8 Meeting to be held this summer in Russia and

which would have infectious disease as one of its three priorities.

Note: the preliminary negotiations for setting up a verification body to strengthen the Biological Weapons Convention, failed. The talks took place this month in Tokyo in preparation for the next review conference to be held in November, in Geneva. [See also *Codes of Conduct for Scientists to Strengthen the Biological Weapons Convention* in December 2005, and *Time to Strengthen the 1972 Biological Weapons Convention* in December 2004 environmental security reports.] (February 2006) Ref. 1748

#### Codes of Conduct for Scientists to Strengthen the Biological Weapons Convention

States Parties to the Biological Weapons Convention met this month in Geneva to conclude a three-year process designed to enhance the implementation of the Convention by adopting a set of principles to guide the development of codes of conduct concerning sensitive biological research. In view of present and future threats posed by biological and toxin weapons, States Parties agreed on a range of different approaches for addressing the codes of conduct function of national specifics and using existing mechanisms and frameworks whenever possible without impeding scientific discovery, or placing unnecessary constraints on research or peaceful international cooperation. Also, it was agreed that the codes and their underlying principles should be widely known and understood, and developed in cooperation with those concerned. States Parties to the BWC will meet again in Geneva, April 26–28 2006 for the Preparatory Committee and then November 20–December 8, 2006 for the Review Conference. [See also *Time to Strengthen the 1972 Biological Weapons Convention* in December 2004 environmental security report.] (December 2005) Ref. 1749

#### Sixth Review Conference of the Biological Weapons Convention

The three-week review Conference of the Biological Weapons Convention made some positive steps forward that included giving more power to the present temporary secretariat to oversee the treaty and monitor compliance, and holding, by 2011, four intersessional meetings on the treaty topics—enhancing national implementation, measures to improve biosecurity, scientific codes of conduct, peaceful scientific cooperation, and assistance to any country that does fall victim to biological weapons. One representative criticized the conference for not addressing future issues such as new nonlethal agents and nanotech-related methods for delivering biological agents. [See also *PrepCom to Set Agenda for the BWC Review Conference in April 2006, Recommendation for a Biosecurity Watchdog in February 2006, and Time to Strengthen the 1972 Biological Weapons Convention in December 2004 environmental security reports.*] (December 2006) Ref. 1750

#### **Overview of Explosive Remnants of War Protocol**

The Arms Control Web site published a comprehensive overview of the current state of affairs of the abandoned ammunition and unexploded ordnance and the Explosive Remnants of War (ERW) Protocol. The ERW is Protocol V to the Convention on Certain Conventional Weapons (CCW), aiming to make governments clean up battlefields after armed conflicts end. (September 2004) Ref. 1751

#### **Improved Cooperation Among International Organizations to Fight Marine Pollution**

The fight against marine pollution gained strength with the signing of a Memorandum of Understanding between the Secretariat of the Basel Convention on the Control of Transboundary

Movements of Hazardous Wastes and Their Disposal, and the UNEP Regional Seas Programme. The effort is designed to implement environmentally sound management of hazardous wastes in order to prevent coastal and marine pollution. It is based on collaboration of the 13 Basel Convention Regional Centres (BCRCs) with the various Regional Seas Programmes, and reciprocal technical and legal training support. [The Basel Convention regulates the movement of hazardous waste; it covers toxic, poisonous, explosive, corrosive, flammable, ecotoxic, and infectious wastes that are being moved from one country to another.]

IMO Secretary-General Efthimios E. Mitropoulos and the European Commissioner responsible for the environment, Stavros Dimas, also had a meeting this month focusing on better collaboration between the two organizations to enhance marine environmental protection from pollution from ships and related activities. They agreed on the need for ratification, by as many States as possible, of the newest IMO conventions such as the Ballast Water Management Convention and the Convention on Anti-fouling Systems, to enable them to come into force soon.

The amendments to the MARPOL Convention—including the revised phase-out schedule for single-hull tankers and a new regulation on the carriage of heavy grades of oil—will enter into force on April 5, 2005; and, on May 19, 2005, Annex VI of MARPOL on regulations for the prevention of air pollution from ships will be effective. (March 2005) Ref. 1752

### **Global Map of Human Impacts to Marine Ecosystems**

The first-ever comprehensive atlas showing the impact of human activities on the planet's marine environment is now available online. The international team of scientists combined the impact data of 17 different activities—ranging from fishing and commercial shipping to pollution and climate change—for 20 different marine ecosystems. The database could be used to monitor further future modifications in the global marine environment. The map reveals that while no ecosystem is completely unaffected, human activities had high impact on over 40% of the world's ocean-covered area. The biggest human impact seems to be in the North Sea, the South and East China Seas, the Caribbean, and North America's East Coast. Although the Arctic and the Antarctic areas are the least affected today, scientists are concerned that increased melting of the ice sheets will increase human activities into these areas. (February 2008) Ref. 1753

### **New Measure to Enforce Maritime Environmental Protection**

The Marine Environment Protection Committee (MEPC) of the International Maritime Organization (IMO) 60<sup>th</sup> session held March 22-26, 2010, made further steps to strengthen maritime environmental regulations, such as:

- adopted amendments to the MARPOL Convention to formally establish a North American Emission Control Area in which emissions of sulphur oxides (SO<sub>x</sub>), nitrogen oxides (NO<sub>x</sub>), and particulate matter from ships will be subject to more stringent controls than the limits that apply globally—expected to enter into force on August 1, 2011
- adopted a new MARPOL regulation to protect the Antarctic from pollution by heavy grade oils—expected to enter into force on August 1, 2011
- worked on developing guidelines related to safe and environmentally sound ship recycling, and agreed on the need to develop guidance concerning the recycling of flag-less and non-Party ships by Parties to the Convention—progress to be reported to MEPC 61

- agreed that the discharge requirements for the Wider Caribbean Region Special Area under MARPOL Annex V Regulations for the prevention of pollution by garbage from ships are to take effect on May 1, 2011
- prepared draft text on mandatory requirements for the Energy Efficiency Design Index (EEDI) for new vessels and on the Ship Energy Efficiency Management Plan (SEEMP) for all ships in operation; but negotiations continue on details, including target dates and reduction rates
- in order to advance work on measures to regulate and reduce greenhouse gas (GHG) emissions from international shipping, the Committee decided to establish an intersessional Working Group on technical and operational measures to increase the energy efficiency of ships and an Expert Group to assess the impact of various market-based instruments for international maritime transport—both to report to the MEPC 61<sup>st</sup> session, to be held in September 2010.

[Related items: *Tougher Global Limits Imposed on Air Pollution from Large Ships* in October 2008 and other previous environmental security reports.] (March 2010) Ref. 1754

The UK government has created the world's largest marine reserve (545,000 sq km) around the Chagos Islands, regarded as one of the world's richest marine ecosystems. The sixth session of the Conference of the Parties (COP) to the Nairobi Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Western Indian Ocean adopted a 25-year program of action for efficient management of the marine and coastal environment in the larger Eastern and Southern African region, as well as a Protocol to the Convention considering new emerging issues, such as climate change and the need for an ecosystem-based management approach. (April 2010) Ref. 1755

### **Observation and Information System for the World's Oceans to be Created**

Confirming that a systematic scientific analysis of the oceans and seas is needed, the OceanObs'09 (for ocean observatories) meeting held September 21-25, 2009, at Venice, Italy decided to build a comprehensive observation system for monitoring the marine environment, assessing longer term trends and promoting sustainable marine resources management. UNESCO announced that the first globally integrated oceans assessment system could be delivered under the auspices of the UN by 2014. In the meantime, the U.S. National Science Foundation and the Consortium for Ocean Leadership have signed a Cooperative Agreement as the next step toward construction of the Ocean Observatories Initiative, "a network of ocean observing components, and their associated cyberinfrastructure, that will allow scientists to examine ocean processes on global, regional and coastal scales." (September 2009) Ref. 1756

### **Water Footprint Measuring System**

On the occasion of World Water Day, reminding of possible conflicts over water, UN Secretary-General Ban Ki-moon urged the international community to create strategies for using water more efficiently and sharing it more fairly. Similarly, researchers suggest that it is timely to use a system to measure water footprint similar to that used for carbon footprint. A symposium held by the UNESCO-IHE (Institute for Water Education) discussed the "virtual water" issue specifically related to the world energy markets. It was pointed out that present practices are not sustainable and therefore it is necessary to introduce a system to measure water footprint in order to help better understand water issues, identify areas with highest impact, and develop adequate policies.



Calculating a water footprint might increase awareness and influence practices, similar to the impact that carbon footprint has. [See also *World Leaders Discuss Environmental Security Policies at Davos* in January 2007, *Water Scarcity* in March 2007, *World Water Forum* in March 2006, and other previous environmental security reports on the water issue.] (arch 2008)  
Ref.1757

### **New Air Quality Evaluation Tool**

According to a news story in Science Daily “The Grupo de Modelos y Software para el medio Ambiente of the Facultad de Informática at the Universidad Politécnica de Madrid has developed a very sophisticated tool (OPANA) that estimates the impact of air quality on the health of citizens using last generation models. ... [It produces] extremely precise measurements of the concentration of a certain atmospheric contaminant that a person breathes in a determined time and place, from a particular source (an industry, an incinerator, a motorway, etc.). It is possible to determine the consequent impact under almost any circumstances or distance from the source.” The results require the input of accurate data on local topography and land use, meteorology, and, most importantly, the estimated emissions in the area. (March 2009) Ref. 1758

### **World Bank Development Indicators Database Available Free**

The World Bank has made freely available online < <http://data.worldbank.org/> > its databases of more than 2,000 indicators from countries around the world, many with historical data for 50 years. This includes a large section on the environment. (April 2010) Ref. 1759

### **Kyoto/Climate Change**

- [Compliance Body Set Up for Kyoto Protocol](#)
- [Stricter Measures to Protect Polar Regions Expected](#)
- [Lawsuits over Failure to Meet Kyoto Commitments](#)
- [Global Warming Goes to Court](#)
- [Global Division of Financial Responsibility for Global Warming Impacts](#)
- [EU Not on Track Meeting Kyoto Requirements](#)

#### Compliance Body Set Up for Kyoto Protocol

The Compliance Committee for the Kyoto Protocol “designed to ensure the environmental integrity of the agreement and to contribute to the credibility of the carbon market created by the Protocol” has begun its operations, announced the UN Framework Convention on Climate Change. The 20-member Committee has two branches: the Enforcement Branch of the Committee that deals with non-compliance consequences for Parties that do not meet their commitments under the Protocol, and the Facilitative Branch of the Committee, that would provide advice and assistance to countries having difficulties meeting their commitments. The Committee deals with individual cases as they come up, and reports annually to the meeting of the Parties to the Protocol.

A European study, *An economic assessment of the Kyoto Protocol application*, states that the United States’ stand on the Kyoto Protocol influences the economic consequences of the Protocol implementation more than any other factor or region. The analysis considered four main factors: the participation of the United States—the major emissions-producing country; and the

role of Russia—the potential major emission credit seller; the Marrakech Accords' CO<sub>2</sub> sinks; and the trading mechanisms and related trade restrictions defined by the Protocol; and boycott movements. The report aims to help assess the most cost-effective options to reduce greenhouse gases emissions globally. [See also *Montreal Conference on Climate Change Reached New Agreements* in December 2005, *UN Meeting Fails to Agree on Post-Kyoto Strategy* in May 2005 and other previous environmental security reports.] (March 2006) Ref. 1760

#### Lawsuits over Failure to Meet Kyoto Commitments

The Friends of the Earth threaten to sue the government of Canada over its refusal to adopt adequate policies to cut greenhouse-gas emissions and meet its commitments as agreed under the Kyoto Protocol. The environmental group will file the lawsuit with the Canadian federal court and the Kyoto Protocol Compliance Committee, unless the government changes its position. In May, South Africa filed with the international Kyoto Committee a complaint against Canada and 14 other countries over failure to report on their progress, as required. [See also *Global Warming Goes to Court* in October 2006 environmental security report.] (November 2006) Ref. 1761

#### Global Warming Goes to Court

The New Zealand High Court has ruled that climate change factors can be considered during Greenpeace's upcoming appeal against the proposed Marsden B coal-burning power station. Greenpeace appealed the permission granted to the Marsden B power station to start burning coal, on grounds of environmental and mainly climate change consequences. Although this ruling is limited to New Zealand and to a specific industry, it creates a precedent with effects likely to be felt in other jurisdictions and sectors. In November, the U.S. Supreme Court will hear the case of *Massachusetts v. Environmental Protection Agency* (case 05-1120) filed by twelve states and several cities on EPA's role to regulate CO<sub>2</sub> as a greenhouse gas pollutant under the Clean Air Act. Over 16 other litigations are pending in U.S. federal and state courts against companies whose emissions are linked to global warming; more are expected to come. Swiss Re, the world's largest reinsurance company, estimates that the annual liability costs of global warming will be \$150 billion dollars per year within ten years. (October 2006) Ref. 1762

#### Global Division of Financial Responsibility for Global Warming Impacts

Oxfam has called for a system to allocate costs of global warming damage per country based on its percentage of greenhouse contribution. Poorer countries are not included. They list the US with 44%, Japan with 13%, Germany 7%, and so forth. With China's increasing role, the percentages would be continually adjusted. China will release its first national plan to address climate change just prior to the G8 Meeting, which it will attend in Germany. (May 2007) Ref. 1763

#### EU Not On Track Meeting Kyoto Requirements

A new study by the UK Institute for Public Policy Research warns that Britain and Sweden are the only countries in Europe that seem to be on target to cut greenhouse gas emissions under the Kyoto Protocol. Of the 15 European countries that ratified the Protocol, 10 would miss their targets unless they take urgent action, while France, Greece, and Germany could fulfill their obligations only if planned policies were successfully implemented. (December 2005) Ref. 1764

#### **OECD Environment Ministers calls for more ambitious policies to meet the environmental**

**targets**

At the 20-21 April 2004 meeting, the OECD environment ministers agreed that more ambitious policies supported by stronger political will are needed to meet the environmental targets that they set for 2010 in the OECD Environmental Strategy. A new Environmental Outlook will also be produced. (April 2004) Ref.1765

**New Mechanisms for Enforcing Biosafety and Biological Diversity Treaties**

The focus of the fourth Meeting of the Parties to the Cartagena Protocol on Biosafety (COP/MOP 4), held from 12-16 May 2008 in Bonn, Germany, was on enforcement measures. It adopted 18 decisions on issues related to: the Biosafety Clearing-House; identification and handling of living modified organisms; notification requirements; risk assessment and risk management; and monitoring and reporting. The timetable and framework were set for a liability and redress regime concerning potential damage caused by the movements of genetically modified organisms, which will be further discussed at the next meeting of the parties to take place in October 2010, in Nagoya, Japan. An ad hoc technical expert group was mandated to consider risk assessment and risk management issues. The *Rules, Procedures and Mechanisms Applicable to Processes under the Cartagena Protocol on Biosafety* was also published at this meeting. The Ninth Meeting of the Parties to the Convention on Biological Diversity followed, May 19-30, 2008, also in Bonn, Germany, assessing mechanisms to reduce loss of biodiversity. The CBD COP 9 adopted the “Bonn roadmap” that addresses issues concerning an international regime on access and benefit-sharing; a mechanism for assessing marine areas in need of protection; a resolution on biodiversity and climate change, including language cautioning against ocean fertilization; and an agreement on biofuels. [See also *International Biodiversity Meetings Make Decisions and Tougher Systems to Control GMO Suggested* in March 2006 environmental security report.] (May 2008) Ref.1766

**European Environmental Liability Directive Came Into Force**

The Environmental Liability Directive establishes a comprehensive framework on liability for damage to the environment, based on the “polluter pays” principle. It aims to ensure that the financial liability for environmental damage prevention or remediation falls on the polluters who caused it, rather than on the taxpayers. Operators are financially responsible for ensuring that they have preventive or remedial measures. When the environmental situation involves more than one member state, then they must cooperate on the necessary preventive or remedial actions. The Directive was adopted in April 2004 and member states were supposed to bring into force the appropriate laws and regulations by April 30, 2007. [See also *European Union Polluter Pays Law*] (April 2007) Ref. 1767

**Environmental Damage to Be Criminalized in the EU**

The Permanent Representatives Committee approved the proposal on the protection of the environment through criminal law. EU national governments will have to apply criminal sanctions to those causing “deliberate or negligent damage to the environment.” The list of punishable crimes will include: unlawful discharge of pollutants which could cause “death or serious injury to any person” or “substantial damage” to the environment; illegal waste shipment; killing or possession of protected fauna or flora; significant deterioration of habitats within protected sites; and any action related to ozone-depleting substances. The penalties are left to the discretion of member states as long as they are “effective, proportionate and dissuasive.” The

Directive is pending final approval by the Parliament and the EU Council, and is expected to enter into force in 2010. (May 2008) Ref.1768

#### Environmental Crime Could Become a Felony in the EU

The EU Commission has proposed that environmental crimes such as pollution with hazardous substances, illegal dumping of waste, or performing environmentally "dangerous activity" be treated as criminal offenses with minimum levels of punishment that could reach prison sentences or fines for serious cases. By applying the "polluter pays" principle, European courts could also put offenders out of business or order them to clean up the environment. If the proposal is approved by the European Parliament and member governments, it will become law for all 27 member nations. This would be the first criminal law drafted by the Commission after a 2005 EU Court of Justice ruling that that the Commission has the power to draft criminal laws and decide what constitutes a crime, notably in the area of the environment. Environmental groups welcomed the plan but said the list of punishable crimes should be expanded. (February 2007) Ref. 1769

#### **EC Enforces Compliance with EU Environmental Regulations**

Nine EU Member States are being referred to the European Court of Justice for failing to transpose into national law the European Environmental Liability Directive by the April 30, 2007 deadline. On June 1, 2007, the Commission sent a first written warning to 23 Member States; 14 have complied and the nine who did not are: Austria, Belgium (concerning the Brussels region only), Greece, Finland, France, Ireland, Luxembourg, Slovenia and the United Kingdom. [See also *European Environmental Liability Directive Came Into Force* in April 2007 and *EC Enforces Compliance of National Legislation with EU Environmental Regulations* in October 2007 environmental security reports.] (June 2008) Ref.1770

#### **EC Legislation Reform First Targets Environment-related Rules**

The European Commission has presented a three-year program to modernize EU legislation as part of its commitment to simplify the EU system of rules. About 250 basic pieces of legislation and 1,250 related legal acts would be updated by repeal, codification, or recasting. The main aims of the legislative reform are to: a) simplify the understanding and implementation of rules; b) transform directives into regulations for prompt and general application by all Member States; and c) improve enforcement. The program will be regularly updated. The process will start with the environment-related sector, since it's the most heavily regulated. The other sectors, as well as the administrative aspect, will follow shortly. The simplification process can be completed only if the European Parliament and Member States support it. (October 2005) Ref. 1771

#### **European Commission Enforces Environmental Pollution Legislation**

The Court of Justice of the European Communities ruled that the European Commission (EC) would have the right to require Member States to impose criminal penalties on environmental polluters "in order to ensure that the rules which it [the EC] lays down on environmental protection are fully effective." Although EU countries will still be the ones to prosecute, the Commission could extend its powers by recommending the level of punishment. This ruling is consistent with the Community's environmental strategy underlined by the obligation of having environmental protection requirements "integrated into the definition and implementation of the Community's policies and activities."

Note: The EC began improving its whole system of regulations, by three main actions: withdrawal or modification of pending proposals; simplification of existing EU-law; and better quality of new Commission proposals. (September 2005) Ref. 1772

### **EU Starts Legal Action Against Member States on Breaches of Environmental Law**

The European Commission is enhancing its environmental law enforcement by initiating a series of legal actions against Member States for breaching EU environmental law. The Commission has decided to pursue legal action against Italy in eleven cases, including non-compliance with the EU directive on Environmental Impact Assessment (EIA), and ten cases for lack of cooperation with the Commission (Article 10 of the Treaty) on issues involving nature protection (a military base enlargement on La Maddalena island); several cases on waste management aspects; water resources; and genetically modified organisms (GMO). Along with Italy, Spain and Greece were also sent final warnings for non-compliance with the EU Water Framework Directive. (October 2005) Ref. 1773

### **EU to Increase Environmental Regulations Enforcement**

The European Commission intends to increase the enforcement of environmental regulations by introducing criminal sanctions for serious environmental offences. In light of last month's Ivory Coast incident of toxic waste dumping, it aims to strengthen enforcement of the EU Waste Shipment Regulation and improve international cooperation to prevent illegal waste shipments. The issue will be addressed at the next Basel Convention conference to be held in Nairobi, November 27-December 1, 2006. [See also *Toxic Waste Disposal of Global Growing Concern* in September 2006, as well as *Basel Convention on Hazardous Wastes to be Made More Effective* in July 2005 and other related items in previous environmental security scanning reports.] (October 2006) Ref. 1774

### **EC Enforces Compliance of National Legislation with EU Environmental Regulations**

The European Commission opened several infringement procedures against Member States for not complying with EU environmental legislation. Some of the EC legal actions include: referring Ireland to the European Court of Justice over inadequacy of its national legislation for the implementation of the Environmental Impact Assessment Directive; legal action against the UK for not fully complying with ECJ judgments in two separate cases; Luxembourg and Belgium for non-compliance with the EU Directive on urban waste water treatment; final written warning to 12 EU Member States for failing to adopt emergency plans for chemical plants; action against several EU countries for exceeding EU limits on ambient concentrations of SO<sub>2</sub>; "Letter of Formal Notice" to Estonia, Latvia, and Lithuania for not correctly transposing certain provisions of the WEEE Directive into national legislation, and to Belgium, Denmark, Lithuania, Malta, Finland, and Sweden for inadequate implementation of the RoHS Directive into national law. [See also *E-waste Management Directive Came into Effect on August 13, 2005* in August 2005, and *RoHS Closer to Deadline* in May 2006 environmental security reports.] (October 2007) Ref. 1775

### **EC Reports EU Environmental Law Enforcement by EU Members is Poor**

European environmental law implementation presents "serious shortcomings" according to the "Fifth Annual Survey on the implementation and enforcement of EU environmental law" covering the year 2003. Timely transposing of environmental laws passed at the European Union

level into national laws is the main problem. In 2003, environmental law non-compliance represented over a third of the cases brought before the European Court of Justice. The survey found that most of the infringements were related to air quality, waste disposal and treatment, water quality, nature protection and environmental impact assessments. The report also suggests a more proactive policy in enforcing compliance by designing more “enforcement-friendly” environmental laws, and offering more support to nations in the implementation process. (August 2004) Ref. 1776

### **EU Parliamentary Committee Moves to Strengthen Air Pollution Laws**

EU Parliamentary Committee to Strengthen Air Pollution Laws by setting binding standards on air polluting substances. (January 2004) Ref. 1777

### **Aarhus Convention Implementation Strategies**

#### *Aarhus Clearing House Launched*

Aarhus Convention implementation is made more effective by the launch of a new clearinghouse <http://aarhusclearinghouse.unece.org>, which provides information on citizens' environmental rights. (September 2004)

#### *Meeting of the Parties (MOP-2) to the Aarhus Convention*

The second meeting of the Parties to the Aarhus Convention—UNECE Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters—took place in Almaty, Kazakhstan, on 25-27 May 2005. It reviewed progress so far and improvement of its mechanism to increase performance of the Convention's implementation in all regions. It assessed the application of principle 10 [access to environmental information at all levels] of the Rio Declaration at both global and regional levels. Agreement was reached on an amendment to the Convention for extending the role of the public in decisions involving genetically modified organisms (GMOs). The declaration adopted by the Ministerial segment of the meeting was not yet available at the time of this writing. (May 2005) Ref. 1778

### **European Network for the Implementation and Enforcement of Environmental Law (IMPEL) increases its role and plans to develop enforcement indicators**

Europe's IMPEL (European Network for the Implementation and Enforcement of Environmental Law) is an informal network of the environmental authorities of European Union Members. The network is increasing its policy advisory role and capacity building in EU candidate and accession countries. It also proposes to develop enforcement indicators measuring the success of pollution permits, inspection, and enforcement. Formal work is to be kicked off at the next IMPEL plenary meeting in November. (October 2003) Ref. 1779

### **UK Suggests Environmental Court similar to Australia and New Zealand**

A report for the UK Department for Environment Food and Rural Affairs (DEFRA) has recommended that a specialized court and judges be established to address environmental and “overdevelopment” issues. If the UK environmental court were to be established, becoming the third such national court in the world (after Australia and New Zealand), then increased environmentalist pressure for such a court in the US and other countries will increase. There have even been suggestions for a UN Environmental Security Council. It is reasonable to assume that increasing environmental law with increasing technological capacity to identify infractions

will put increased pressure on courts to become more capable of addressing these matters. (August 2004) Ref. 1780

### **E-waste Directives to be Enforced in the UK**

The two EU directives on E-waste will be enforced by UK legislation. The Waste Electrical and Electronic Equipment (WEEE) Directive is expected to be enforced by UK law on August 13, 2005. The WEEE Directive of the EC sets a recycling framework for electrical and electronic equipment in order to minimize the impacts of this kind of waste on the environment. The related directive on the Restriction of the use of certain Hazardous Substances (RoHS) in electrical and electronic equipment bans the use in manufacture after July 1, 2006 of certain hazardous substances (lead, cadmium, hexavalent chromium, polybrominated biphenyls (PBBs) and polybrominated diphenylethers (PDBEs)). The two directives on E-waste are already in force at EU level and were supposed to be added to EU Members legal system with rules for monitoring compliance by August 2004. [See *Two E-waste laws entered into force in the European Union (EU)* in February 2003 environmental security report.] (July 2005) Ref. 1781

### **New UK Chemical Data Base for Regulatory Compliance (for REACH)**

The UK's Chemical Industries Association has set up the ReachReady organization and database at [www.reachready.co.uk](http://www.reachready.co.uk) to aid organizations in complying with the EU's REACH (Registration, Evaluation and Authorization of Chemicals) regulations. [See also *Integration of Chemical Regulations (REACH) Approved by European Council* in December 2005, *The REACH Program Closer to Entry Into Force* in March 2005, and other related items in previous environmental security reports.] (April 2006) Ref. 1782

### **Denmark to Sue EU Over Annuling Flame Retardant Ban**

The Danish government announced its intent to sue the European Commission over annulling the ban on deca-BDE, a brominated flame-retardant, since it might cause birth defects and cancer. Brominated flame-retardants are a group of chemicals used in electronic devices. The deca-BDE was to be banned starting on July 1, 2006, under the EU Restriction of Hazardous Substances (RoHS) directive, which will regulate the use in new products of certain hazardous substances—lead, cadmium, mercury, hexavalent chromium, polybrominated biphenyls, and polybrominated diphenyl ethers (PBDE). However, in October 2005, the European Commission decided to exempt decaBDE from the RoHS Directive. [See also *Recycling Regulations in the EU* in August 2005 and *Two E-waste laws entered into force in the European Union (EU)* in February 2003 environmental security reports.] (January 2006) Ref. 1783

### **North America's Commission for Environmental Cooperation to Increase Enforcement of Environmental Regulations and Public Participation**

The Joint Public Advisory Committee (JPAC) of the Commission for Environmental Cooperation (CEC) of Canada, the United States, and Mexico held its third Regular Session for 2006 on 15 September in Montreal, Quebec, to discuss the proposed 2007-2009 Operational Plan. Participants assessed progress on cooperative projects the CEC is implementing to meet the goals and objectives of Looking to the Future: Strategic Plan of the Commission for Environmental Cooperation 2005–2010. The focus was on the implementation of the three program priorities as established by the CEC Council: information for decision-making; capacity building; and trade and environment, mutually reinforcing each other. Proposals called for

increased comparability and reliability of environmental data and networks among the U.S., Canada, and Mexico; improved submission and enforcement procedures—to speed the process and increase citizen participation and responsibilities; and creating a North-American comprehensive atlas of all resources, ecosystems, and pollution matters. The Operational Plan will be updated annually, with a rolling three-year horizon, to reflect shifts in programming and associated budget reallocations. (September 2006) Ref. 1784

#### **North America's CEC Ministerial Statement**

At the 12<sup>th</sup> Regular Session of the Council of the Commission for Environmental Cooperation (CEC), the environment ministers of Canada, Mexico and the United States adopted the Strategic Plan 2005-2010, which sets the priorities and strategies to achieve the goals. This takes into account the recommendations of the Ten-year Review and Assessment Committee, the Joint Public Advisory Committee (JPAC), and key stakeholders. The priorities for the coming years are: the development of Information for Decision Making (based on high quality environmental information that is integrated and comparable); support for Capacity Building; Trade and Environment issues that help promote environmental protection and improve enforcement of environmental law; and Expand Partnerships for Environmental Stewardship. [See also *Review of NAFTA's Environmental Side Accord* in October 2003 environmental security report. (June 2005) Ref. 1785

#### **States to Sue the Energy Producers Over Global Warming**

California and seven other states are to sue five large energy producers who they contend are responsible for nearly 10% of the greenhouse gases emissions of the United States. The suit demands substantial pollution cuts by the companies, saying the carbon dioxide from energy producers is a 'public nuisance.' (July 2004) Ref. 1786

#### **North American Environmental Atlas Online**

The Commission for Environmental Cooperation (CEC) launched the online *North American Environmental Atlas*, <http://www.cec.org/naatlas>, which allows visualizing significant North American environmental issues at a continental scale. It features the terrestrial ecological regions of North America and interactive thematic maps such as priority conservation areas, renewable energy capacity, and population, as well as links to data and related sources. The Atlas is in continuous development with new features and information to be added in the coming months, and suggestions for making the Atlas the most useful possible are welcome. (February 2008) Ref.1787

#### **CEC Invites Public Comment on Draft Document: Future Directions under the Commission for Environmental Cooperation Sound Management of Chemicals Initiative**

The draft document Future Directions under the Commission for Environmental Cooperation's Sound Management of Chemicals Initiative is available for public comment, "to assist in determining how the Sound Management of Chemicals (SMOC) initiative can best evolve in future years to assess, reduce and, wherever possible, eliminate threats from toxic chemicals to our environment and health in North America." (April 2004, ) Ref.1788



**A new Biodefense Agency within the Office of the Secretary of the U.S. Department of Defense suggested by the Institute of Medicine and the National Research Council**

The issues about how to handle the problems of genetically modified viruses and pathogenic chimeras (artificially created hybrids of disease-causing organisms), in particular those related to smallpox rose on the agenda of the scientific and health communities (including the WHO). The WHO's committee on smallpox research is currently weighing various proposals for new and continuing experimental efforts, including some based at CDC and US Army Medical Research Institute of Infectious Diseases (AMRIID). It is likely that the discussions on bio-safety/biodefense will soon move from the health and research committees to wider international legislative bodies triggering new Protocols to existing treaties (i.e. Biologic and Toxic Weapons Convention) or even new international treaties dealing with genetic manipulation and its hazards. (January 2004) Ref.1789

**ASEAN Seeks East Asia's Cooperation on Environmental Issues**

Senior environmental officials from ASEAN countries, Japan, China, and South Korea met in Malaysia's Penang state to discuss ways to improve regional cooperation and responses to ecological/environmental problems, such as the recent forest fires. Details of future cooperation, which are also expected to cover issues such as climate change and safeguarding biological diversity, will be discussed at a meeting to be held next month in Jakarta. (August 2005) Ref. 1790

**Asian Regional Forum on Combating Environmental Crime Formed**

The "Asian Regional Forum" will be established to share information and expertise in policy, law, training, investigation and prosecution related to environmental crimes in Asia. The Forum is the result of a meeting in Bangkok on 25 August 2005 of the Regional Intelligence Liaison Office for Asia and the Pacific (RILO A/P), the regional office of INTERPOL, the World Conservation Union, TRAFFIC (the wildlife trade monitoring network), the World Customs Organization, the UK-based Environmental Investigation Agency (EIA) and Thailand's Office of the National Implementation for Chemical Weapons Convention. The regionalization of the Green Customs Initiative was also discussed to share information and training materials for customs officials to combat illegal trade in commodities of environmental concern. It is estimated that environmental damage caused by illegal trade in hazardous wastes, smuggling proscribed hazardous materials, and exploiting and trafficking of protected natural resources worldwide is US\$22-31 billion annually. The Forum will be facilitated by the United Nations Environmental Program's Regional Office for Asia and the Pacific. (September 2005) Ref. 1791

**Southwest Pacific Islands Might "Localize" Environment-protection Legislation**

In contrast to the preceding item, in the southwestern Pacific ecosystem-based management of coastal areas might become very much decentralized. "The island nations of the south-western Pacific are considering allowing citizens to reclaim legal control of their local seas, in the hope they can use their traditional knowledge, customs and laws to protect fish stocks and biodiversity," says a New Scientist article. In this plan, villages will own the seas immediately adjacent to them, and can set up environment-protecting restrictions for them, with the legal backing of the central government. (April 2004) Ref. 1792

**International environmental law was one of the topics on the agenda of the 2003**

**International Bar Association Meeting**

The International Bar Association held its annual meeting in San Francisco 15-19 September 2003. International environmental law is one of the topics on the agenda. Although the outcomes of the meeting are not yet available, there were several sessions with eventual relevance to environmental security; e.g. *Health issues related to exposure to chemicals* session held by The Committee for Environment, Health and Safety Law stated that “Comprehensive new legislative requirements affecting virtually all sectors of industry are expected, which raise industrial concerns that necessary and important chemicals not be banned or delisted without adequate risk assessments.” (August-September 2003) Ref. 1793

**China’s Emergency Response Law to Punish Falsifying Environmental Information**

The Emergency Response Law, which came into effect in China on November 1st, has the objective of improving public security and reducing the environmental and health effects of natural disasters and industrial accidents. It requires government to provide accurate and timely information on public emergencies, and false reporting is banned and punishable. The law also says that in extremely serious emergency situations, which “severely threaten life and property, state security, public security, environmental security or public order (which are not specifically covered by the provisions in the law), the NPC Standing Committee or the State Council can declare a ‘state of emergency’ in accordance with the Constitution and relevant laws.” [See also *China May Restructure Environmental Effort* in October 2007 and other related items in previous environmental security reports.] (November 2007) Ref. 1794

**Indonesian Navy to Tighten Security in Sea Border Areas**

The Indonesian Navy announced that it will tighten security in its eastern and western sea border areas to support law enforcement efforts at sea for reducing illegal activities such as environmental pollution, smuggling, and even manipulation of shipping documents. Their law enforcement efforts will include prosecution and monitoring cases until sanctions are applied. (September 2008) Ref. 1795

**United Arab Emirates Establish Nuclear Agency**

The United Arab Emirates’ governing Cabinet approved the establishment of the new Nuclear Energy Authority, with “the mandate to evaluate and develop a peaceful nuclear energy program in line with the recommendations of the International Atomic Energy Agency” as part of its civilian nuclear power program. (March 2008) Ref. 1796

**Taiwan Cracking Down on Environmental Violators**

The prevalence of illegal toxic waste dumping has led Taiwan's Environmental Protection Agency to recruit a group of 70 volunteers to patrol industrial areas and report violations of the country's strict waste disposal and recycling rules. The effort is supported by emerging environmental activism among the populace at large. (August 2005) Ref. 1797

**Vietnam Cracking Down on Environmental Violators**

Over the past several months, Vietnamese authorities have taken strong measures against some environmental polluters, and the Minister of Natural Resources and Environment has ordered the government to get tough on polluters, levied heavy fines on one factory, and threatened criminal prosecutions. The country is having a hard time, however, in balancing the need for cleaning up

its environment with the necessity of attracting and keeping industrial development. (November 2008) Ref. 1798

### **Preparatory Process Started for the EfE 6th Ministerial Conference**

The 6th Ministerial Conference "Environment For Europe" (EfE) will take place at Belgrade in October 2007. The international preparatory process started officially with the 1st session of the Working Group of Senior Officials (WGSO) held in Geneva, 12-13 October 2005. The United Nations Economic Commission for Europe (UNECE) Committee on Environmental Policy (CEP) proposed reviewing issues such as sustainable development, energy, EU enlargement, coordination and implementation of UNECE Conventions, and closer links to other international processes (environment and health, in particular). The European ECO-Forum (a pan-European coalition of more than 200 environmental citizens' organizations) suggested an "action-oriented" review of implementation of several strategies and protocols (including the Protocol on Strategic Environmental Assessment, and the Protocol on Pollutant Release and Transfer Registers). The next meeting of the WGSO will be in June 2006. (October 2005) Ref. 1799

### **Consumer's Handbook for Reducing Solid Waste**

The booklet "Consumer's Handbook for Reducing Solid Waste" describes how individual consumers can help alleviate modern society's mounting solid waste problem by making environmentally aware decisions about everyday needs. It outlines many practical steps to reduce the amount and toxicity of solid waste. (November 2009) Ref. 1800

### **Summary of European Battery Regulations Released**

The environmental consulting firm Enhesa has published its 2009 Batteries Report, with a detailed comparative analysis of the regulatory requirements, including take-back and disposal, in nine European countries compared to the EU Batteries Directive 2006/66/EC. (December 2009) Ref. 1801

### **Space Technology**

[Increasing Capacity of Space Technology to Assist Environmental Security](#)

[Global Earth Observing System of Systems](#)

[NASA's Eyes in the Sky to Help Global Conservation](#)

[Open Skies Treaty may also Serve Environmental Agreements](#)

[European Geosciences Union General Assembly](#)

[Enhanced environmental legislation enforcement by improved coordination of global Earth observation](#)

[International Agreement on Earth Environmental Observing System](#)

[Better Use of Satellites to Monitor International Treaties](#)

[US National Ecological Observatory Network \(NEON\) Regional- and Continental-Scale Ecological Monitoring System Proposal](#)

### **Increasing Capacity of Space Technology to Assist Environmental Security**

The global environmental monitoring system is becoming increasingly capable of detailed diagnosis. The mission of the Aura spacecraft launched by NASA is to give scientists information on the nature and movements of pollutants and their effect on the atmosphere and the ozone holes. Over the next several years four more U.S. and French satellites should be

launched, forming a set of environmental monitors. Global Earth Observation System of Systems (GEOSS), a new collaboration between 17 U.S. federal agencies and nearly 50 countries will monitor data from thousands of manned and unmanned land, air, and sea stations from around the world as well as from space for a continuous assessment of the earth's vital signs. The National Oceanic and Atmospheric Administration leads the effort. The coalition members are scheduled to release a 10-year plan in February 2005. Global Monitoring for Environment and Security (GMES) launched a new *Observing the Earth* Portal to better highlight GMES's global monitoring activities and results. (July 2004) Ref. 1802

### **Global Earth Observing System of Systems**

#### *International Agreement on Earth Environmental Observing System*

At the second Earth Observation Summit on 25 April 2004, in Tokyo, representatives from 47 countries approved the framework document for implementing the observation plan, including the measures and goals for an observation network to be set up in ten years from 2005.

According to a news agency report, "The document adopted nine goals for observation, including minimizing damage from natural disasters and human-induced hazards, recognising environment-related factors affecting human health and welfare, improving management of energy and water resources, and others. The document also emphasized the importance of building up an international observation network to share information gained through satellites, observatories and ships, and to cover spots left unobserved under the current observation network." (April 2004) Ref. 1803

#### *Global Earth Observing System of Systems Gets 10-Year Mandate*

At the Third Earth Observation Summit held in Brussels, February 16, 2005, representatives of 54 nations and over 40 international organizations formally adopted the 10-year plan for implementing the Global Earth Observing System of Systems (GEOSS). The plan provides a framework and institutional mechanism to connect Earth observation tools used by different nations and agencies independently. GEOSS will facilitate environmental monitoring, a better understanding of the environment and trends of change, and building of an early warning system. Part of GEOSS, the Global Monitoring for Environment and Security (GMES) initiative jointly led by the European Commission and ESA is designed to collect and manage data and information for both environment and civil security purposes. (February 2005) Ref. 1804

### **NASA's Eyes in the Sky to Help Global Conservation**

NASA and the World Conservation Union (IUCN) signed an agreement to use the space agency's satellite system to map the earth, monitor global environment change, and help conservation efforts. Although the focus will be to discover unknown species of plants and animals and pinpoint their habitats, this is an important project for international collaboration for biodiversity protection in general. (November 2004) Ref. 1805

### **Open Skies Treaty may also Serve Environmental Agreements**

Participants in the Seminar on the Environmental and Ecological Use of the Open Skies Regime discussed the possible use of the Treaty's system for ecological purposes, such as natural disaster cases, urbanization, and enforcement of international environmental regulations. The main purpose of the Open Skies Treaty is to enhance military transparency through observation flights,

to facilitate the monitoring of compliance with existing or future arms control treaties, and to assist in conflict prevention and crisis management. The Treaty entered into force on January 1 2002, and currently has 31 States-Party, including the United States. (October 2004) Ref. 1806

### **European Geosciences Union General Assembly**

The annual European Geosciences Union General Assembly took place in Vienna from 24 to 29 April 2005 with about 8,000 scientists presenting over 3,000 papers from the fields of Earth and planetary sciences. Space science has become essential for monitoring climate change effects, geophysical changes and pollution, and for enhancing natural hazard awareness and management. [See also above item *Increasing Capacity of Space Technology to Assist Environmental Security*] (April 2005) Ref. 1807

### **Enhanced environmental legislation enforcement by improved coordination of global Earth observation by a global data-sharing and integrated system comprising all environmental observing facilities based on land, on sea, and in space**

At the Earth Observation Summit held in August in Washington, the delegates agreed to improve the access to data and exchange of information between countries and organizations and enlarge it towards a more encompassing global partnership. A 10-year Implementation Plan based on better use and coordination of existing systems and initiatives will be prepared. Its framework will be presented at the 2004 Ministerial Conference to be held in Tokyo and the Plan itself at the Ministerial Conference to be hosted by the European Union towards the end of 2004. (April 2004) Ref.1808

At a Cape Town meeting, government officials and scientists from over 30 countries agreed on the framework document prepared by the Group on Earth Observations (GEO), that stipulates the mechanism of the global data-sharing system. The document details the ten-year effort to implement the integrated system comprising all environmental observing facilities, linking together thousands of earth observation facilities based on land, on sea and in space. Signing is scheduled for the framework document in Tokyo at the end of April, and for the detailed 10-year implementation plan in Brussels in February 2005. (March 2004) Ref.1809

### **International Agreement on Earth Environmental Observing System**

At the second Earth Observation Summit on 25 April in Tokyo, representatives from 47 countries approved the framework document for implementing the observation plan, including the measures and goals for an observation network to be set up in ten years from 2005. According to a news agency report, "The document adopted nine goals for observation, including minimizing damage from natural disasters and human-induced hazards, recognising environment-related factors affecting human health and welfare, improving management of energy and water resources, and others. The document also emphasized the importance of building up an international observation network to share information gained through satellites, observatories and ships, and to cover spots left unobserved under the current observation network." (August-September 2003) Ref.1810

### **Better Use of Satellites to Monitor International Treaties**

The Treaty Enforcement Services using Earth Observation (TESEO) was established two years ago by the European Space Agency (ESA) to help monitor international treaties and bring

together agencies and organizations that otherwise do not usually collaborate. The international conventions involved in the TESEO effort range from monitoring wetlands and ensuring compliance with Kyoto Protocol emission targets to combating desertification and preserving World Heritage sites and protecting gorillas in east and central Africa. Several pilot projects have already begun. (March 2003) Ref. 1811

UN agencies and conventions' secretariats met to at the European Space Agency's (ESA's) offices in Frascati to determine how to make better use of satellite imagery. According to ESA, it is possible that the initiative will be folded into the upcoming Global Monitoring for Environment and Security (GMES) initiative sponsored by ESA and the European Commission; however, some ongoing projects (including the Kyoto inventory) will continue as independent activities. (March 2003) Ref. 1812

### **US National Ecological Observatory Network (NEON) Regional- and Continental-Scale Ecological Monitoring System Proposal**

The National Science Foundation has proposed formation of a new US network of research sites that would facilitate scientific cooperation on regional- and continental-scale ecological monitoring. The National Ecological Observatory Network (NEON) would focus on issues such as biodiversity, climate change, emerging infectious diseases, invasive species, and land use. As proposed by NSF, 17 NEON observatories would be built over the next 7 years — one for each major US eco-region. These observatories would link existing ecological research sites. But a Sept. 17, 2003, report by the National Research Council challenged the eco-regional approach. Debate over the approach may soon be resolved by Congressional funding. (October 2003) Ref. 1813

## **INTERNATIONAL STANDARDS WITH ENVIRONMENTAL SECURITY IMPLICATIONS**

International standards and agreements for better information sharing and integration are increasing the capacity of enforcing and complying with environmental conventions.

UNEP points out an increased participation by industry in the adoption of voluntary standards that take into account environmental considerations (i.e. through a partnership with some 300 financial and insurance institutions worldwide.)

### **New Standard-setting Instruments Adopted at UNESCO's General Conference**

UNESCO's General Conference 32nd session adopted five standard-setting instruments, including a Declaration Concerning the Intentional Destruction of Cultural Heritage. Although not a binding instrument, the declaration covers situations of both peace and war; and of international and non-international conflicts (including instances of occupation); It also calls upon States to "take all appropriate measures to prevent, avoid, stop and suppress acts of intentional destruction of cultural heritage, wherever such heritage is located" and cooperate with each other and raise public awareness regarding this issue. The other four instruments adopted are: the International Convention on the Preservation of the Intangible Cultural Heritage; the International Declaration on Human Genetic Data; The Recommendation on the Promotion and Use of Multilingualism and Universal Access to Cyberspace; and The Charter on the

Preservation of the Digital Heritage. (October 2003) Ref. 1815

### **More than 30 New International Food Safety Standards Adopted**

The Codex Alimentarius Commission adopted more than 30 new international standards, codes of practice, and guidelines concerning dangerous bacteria and chemicals in food. (July 2009) Ref. 1816

### **Software Standards to Connect Data Globally**

Denis Havlik of the Austrian Institute of Technology is coordinating an EU FP6 project, Sensors Anywhere (SANY), which embodies the technical capability to allow the free exchange and use of environmental monitoring data regardless of its source. SANY allows a user to search for and retrieve raw or processed environmental data using standardized methods and to receive it in a standard format set out by the Open Geospatial Consortium (OGS).

In another project with a related goal, the University of New Mexico, the Oak Ridge National Laboratory, and associated institutions worldwide are beginning work on establishing DataONE, a global data access and preservation network "for organizing and providing large amounts of highly diverse and interrelated but often incompatible scientific data", according to ORNL's Robert Cook. (November 2009) Ref. 1817

### **Emerging International Packaging Standards to Reduce Environmental Footprints**

The first meeting of the ISO TC122 SC4 Packaging and Environment committee was held in Stockholm to begin work on standards for reducing the environmental footprint of packaging. The standards will cover source reduction, reuse, recycling, energy recovery, chemical recovery, composting and biodegrading, and a seventh overall standard. The new international standards are expected to be finalized by mid-2012 and to consider existing packaging and environmental standards already in use in Europe and Asia. (December 2009) Ref. 1818

### **International S&T Information System Proposed**

To help resolve the conflict between protecting intellectual property rights and maximizing social benefits from public investments in research around the world, the International Council for Science's (ICSU's) Committee on Data for Science and Technology (CODATA) has proposed the Global Information Commons for Science Initiative. This initiative was launched at the World Summit on the Information Society held this month in Tunis, Tunisia, after being formulated at ICSU's annual meeting held in October, in Suzhou, China. The international S&T information system would help develop and implement "new policy guidelines and legal structures that will promote collaboration in a variety of research domains... [and could produce] a productive balance between private research and development, and publicly funded open science," says Paul David, an economist at Stanford University. (November 2005) Ref. 1819

### **New Standards for Handling Robotic Environmental Equipment**

ASTM International has released a new standard, ASTM E2592-07 - "Standard Practice for Evaluating Cache Packaged Weight and Volume of Robots for Urban Search and Rescue", that lays out specific ways to describe requirements for the storage, shipping and deployment of urban search and rescue robots. These recommendations apply equally well to the handling of robotic devices for environmental assessment and cleanup. (February 2008) Ref. 1820

**Chemical Emission Certification Extended to Electronic Devices**

GREENGUARD Environmental Institute (GEI), the country's largest certifier of chemical emissions from building products and furnishings, is expanding its certification efforts to include computers and other electronic devices. According to an Institute announcement, "The GREENGUARD program measures chemical 'outgassing' of the product during normal use and operation. Measured emissions are then compared to an extensive list of publicly available short term and long term health risk exposure levels available from the US Environmental Protection Agency, Occupational Safety Health Administration, the state of California, and CDC's Registry of Toxic Substances." (March 2008) Ref.1821

**UNESCO Draft Declaration on Bioethics and Human Rights**

UNESCO has issued a draft declaration that sets universal ethical guidelines for governments to consider ethical and human rights in science and technology (S&T) policymaking. It covers aspects of human rights, biodiversity, rights of indigenous people, and respect for traditional local resources and knowledge systems. The declaration suggests setting up ethics committees at different levels to assess scientific developments and encourage transparency and public participation in bioethics issues discussions. The draft declaration will be submitted for approval by all 192 UNESCO member states in October. (July 2005) Ref. 1822

**New ISO Standard on Sustainable Building**

ISO 21930:2007—Sustainability in Building Construction -- Environmental Declaration of Building Products complements ISO 14025 for the environmental product declarations (EPD) of building products, containing specifications, principles, and requirements, to encourage sustainable building. It sets the framework for environmental declarations of building products and takes into consideration the entire life cycle of a building. (December 2007) Ref.1823

**OECD Strengthens Environmental Standards for companies bidding on contracts to build civil infrastructure projects around the world**

The OECD nations have agreed to strengthen environmental standards for companies bidding on contracts to build civil infrastructure projects around the world with funding from export credit agencies. While the new guidelines would not necessarily be as stringent as those of the United States, officials said they would force firms bidding on infrastructure contracts to abide by far tougher environmental rules than they do now. (December 2003) Ref.1824

**NAFTA is Reviewing its Environmental Side Accord**

The NAFTA Commission for Environmental Cooperation (CEC) announced the review of the operations and effectiveness of the North American Agreement on Environmental Cooperation (NAAEC). The Ten-year Review Assessment Committee (TRAC) will assess the implementation of the NAAEC over the past ten years, examine the CEC and its programs, evaluate how the organization has addressed the environmental impacts of NAFTA, and suggest a roadmap of recommendations for the CEC over the next decade. The draft report will be circulated for public comment before the final report is delivered to the Council in spring 2004. (October 2003) Ref.1825

**Only Very Low-Energy Buildings to Be Built in EU after 2020**

The new EU energy efficiency legislation for buildings requires all Member States to alter their



building codes so that all new buildings meet high energy-saving standards from the end of 2020 if private, and two years earlier if public constructions, while existing buildings will have to be upgraded where possible. The directive is part of the wider 20/20/20 EU energy efficiency legislative package. (May 2010) Ref. 1826

### **Green Standards to Counter E-waste**

In view of e-waste being the fastest growing category of waste, Greenpeace launched a new e-waste campaign on August 25th. In a preamble to the campaign, it compiled data on progress in eliminating hazardous chemicals and in recycling policies of the main mobile phone and PC-makers and ranked the companies based on their scores. The criteria used in the Greenpeace assessment are tougher than those stipulated by the European Restriction of Hazardous Substances (RoHS) directive, including polyvinyl chloride (PVC) and some brominated flame retardants (BFRs) on the restrictions list. Greenpeace also advocates the “precautionary principle”, requesting companies to avoid chemicals with uncertain environmental impacts. [See also *RoHS Closer to Deadline* in May 2006, *Recycling Regulations in the EU* in August 2005 and *Two E-waste laws entered into force in the EU* in February 2003 environmental security reports.]

The Electronic Product Environmental Assessment Tool (EPEAT) produced by EPA also aims to encourage “green computers.” After working for three years with major computer manufacturers, EPA produced a “greener computers” list that consumers can consult to see what models are more environmentally friendly and why. The standards were developed by the Institute of Electrical and Electronics Engineers and consider 23 required criteria and 28 optional criteria in eight categories, including: content of environmentally sensitive materials (such as mercury, lead and cadmium); power requirements; lifespan; and the “end of life” recycling plans offered by the manufacturers. (August 2006) Ref. 1827

### **More than 30 New International Food Safety Standards Adopted**

The Codex Alimentarius Commission adopted more than 30 new international standards, codes of practice, and guidelines concerning dangerous bacteria and chemicals in food. (July 2009) Ref. 1828

### **ASTM Issues Standard Terminology for Nanotechnology**

The American Society for Testing Materials (ASTM) International Committee E56 on Nanotechnology has approved its first standard, E 2456, Terminology for Nanotechnology, under the jurisdiction of Subcommittee E56.01 on Terminology and Nomenclature. (December 2006) Ref. 1829

### **ANSI to Carry Out Survey on Needs for Nanotech Standards**

The American National Standards Institute (ANSI) has announced the initiation of a survey developed by the U.S. Technical Advisory Group to ISO Technical Committee 229—Nanotechnologies. According to the ANSI announcement, “Input from the survey will help to shape the U.S. position on international standardization activities in nanotechnology. The survey asks U.S. industry stakeholders to identify market needs and areas of standardization that they believe will lead to the commercialization of nanotechnology applications. The ISO effort currently focuses on three main areas: terminology and nomenclature; metrology and instrumentation ...; and science-based health, safety and environmental practices.” [See also *ISO*

*to Establish Standardization in the Field of Nanotechnologies* in the October 2005 environmental security report.] (April 2006) Ref. 1830

### **ISO to Establish Standardization in the Field of Nanotechnologies**

The International Organization for Standardization established in June 2005 the Technical Committee for Nanotechnologies (ISO/TC 229) with Chair and Secretariat in the UK. The scope of ISO/TC 229 is to produce standards for “classification, terminology and nomenclature, basic metrology, characterization, including calibration and certification, risk and environmental issues.” The first meeting of the new Committee will be held on 9-11 November 2005 in London, organized by the British Standards Institution (BSI). (October 2005) Ref. 1831

### **China Creates World's First National Standards for Nanotechnology**

The first national standards for nanomaterial in the world will come into effect in China on April 1st. Research on 15 nanomaterials standards is underway, but, so far, seven items are included: a Glossary, four standards for nanoproducts (nickel powder, zinc oxide, titanium dioxide, and calcium carbonate), as well as two for testing of gas adsorption BET and the granularity of nanopowder. (March 2005) Ref. 1832

## **SAFETY ISSUES**

The accelerating rate of technological change has fundamentally changed the spectrum of threats to the environment and human health, such as e-waste, possible risks of using nanotechnology and biotechnology, use of chemicals, and the spread and safety of nuclear, chemical, and biotechnology labs.

## **CHEMICAL AND BIOLOGICAL SAFETY ISSUES**

*Pathogens can be easily transferred. ... So scientists must be made aware of the ethical importance of their work.*

Francesco Quattrini, Swiss Foreign Ministry official, supporting a proposed international code of conduct for scientists as a measure aimed at preventing biological terrorism

Although laboratory biosafety standards exist, there is no international treaty governing their use and there is no uniformity of application or compliance requirements. Bioscientists from around the world began discussions on establishing international biosecurity measures along with standards and protocols that would lead to improved security of facilities conducting infectious disease research worldwide.

### **Some Chemical and Biosecurity Issues**

Reportedly, the al-Qaeda cell that shut down operations in the Tizi Ouzou province in Algeria after an accident might have been developing chemical and biological weapons. Last year, it was reported that allegedly up to 100 potential terrorists had attempted to enter postgraduate programs in Britain to gain access to laboratories. Experts and security organs repeatedly warn that the security measures to stop eventual development and use of such

weapons by terrorist groups are insufficient and inadequate.

Six-legged Soldiers: Using Insects as Weapons of War by Jeffrey A Lockwood warns about the possibility of terrorists developing an insect-based weapon and conducting a biological attack more easily than a chemical or nuclear strike. He therefore urges governments to create an effective “pest management infrastructure” able to detect insects carrying a deadly disease. Countries with inadequate safety standards for pharmaceutical and food production combined with insufficient import verification mechanisms open a new avenue for terrorist activity. In an increasingly globalized world with greater access to S&T knowledge and software, international standards, information-sharing agreements, common ground for cooperation with the local authorities, improved inspections and testing systems, and stronger and more comprehensive import safety regulations (especially for pharmaceutical and food production) are needed. [See also *Better International Controls Needed to Prevent Bioterrorism* in July 2006, *Call for Reinforcements to Chemical Safety* in September 2006, and other items on this theme in previous environmental security reports.] (January 2009) Ref. 1835]

### **Half of Transported European Hazardous Waste Could Be Illegal—How Much More Elsewhere?**

Hazardous substances such as ozone-depleting substances and toxic chemicals are increasingly profitable, difficult to tackle, and involve international organized crime. Estimates from the early 2000s suggest that 10-20% of the ozone-depleting substance trade was illegal (a value of \$25-60 million). The Basel Convention estimates international hazardous waste movement to be at least 8.5 million tonnes per year. Although it is difficult to estimate the illegal portion of this, a project undertaken in 13 European countries found that over 50% of the waste shipments examined were illegal. One could imagine higher percentages in countries with fewer inspection capabilities and in failed states. E-waste (electronic waste, some of which is hazardous) is growing worldwide. About 70% of it is dumped in developing countries in Asia and Africa. At a recent high-level meeting on enforcement issues held by the World Customs Organization, representatives of the United Nations Environmental Programme (UNEP), customs administrations, and other interested organizations agreed on an Action Plan to improve enforcement and tackle increasing environment crime. The Plan calls for increased detection efficiency by customs offices, creation of environmental crime units, and international co-operation and information exchange. (April 2008) Ref. 1836

### **Toxicogenomics Risk Assessment**

The Use of Toxicogenomics to Understand Toxic Effects and Improve Risk Assessment workshop held by the U.S. National Research Council, Committee on Emerging Issues and Data on Environmental Contaminants, sought to identify how current toxicogenomic information can be used to inform risk assessment today and to identify toxicogenomic research directions to facilitate risk assessment in the future. Two chemicals of regulatory and scientific interest, dibutyl phthalate and benzene, were used as case studies to highlight the current use, controversies, and potential for using toxicogenomic information in risk assessment. (November 2006) Ref. 1837

### **Organized Crime Targets Electronic Waste Recycling**

A series of raids in the UK to enforce the EU's Waste Electrical and Electronic Equipment Directive (WEEE) revealed increased involvement of organized crime in illegal export of

unrepairable electric and electronic equipment to developing countries, mostly in Africa. Organized crime is primarily interested in retrieving some valuable parts of those devices. Dumping as well as dismantling of electronic waste in developing countries in Africa and Asia represents a serious threat to human health and the environment. [Related items: *EC's WEEE Directive Goes into Effect in UK* in July 2007, *Waste Management Policies* in June 2008, and *Toxic Waste Disposal of Global Growing Concern* in September 2006 environmental security reports.] (July 2009) Ref. 1838

### ***Human Biomonitoring for Environmental Chemicals***

This is an independent study by the National Research Council (NRC) of the National Academies to address the challenges related to biomonitoring, including improving biomonitoring systems, interpreting the results of biomonitoring data to the public health, addressing ethical uses of the data, and communicating the results of biomonitoring to different forums. The report recommends improving the interpretation of biomonitoring results by expanding the scientific database on many chemicals; better coordination between biomarker development and population biomonitoring and the potential health implications; improved ability to assess the real health risks of detected chemicals; development of strategies for efficient communication of biomonitoring studies' results; and a review of the bioethical issues concerning biomonitoring, including confidentiality and reporting. (November 2006) Ref. 1839

### **Scientific Community's Questions Concerning Biodefense Standards**

The American Type Culture Collection (ATCC) convened an Expert Panel on the Development of Standards for Biodefense in Washington, DC, 5-6 April 2006. Considering the critical point reached in the evolution of the biodefense industry, the scientific community agreed that standards are needed to accelerate product development for biodefense-related diagnostics, therapeutics, and reagents. However, on debating the standards issue, a panel of experts generated a range of questions that still require resolution in several areas, including standard handling protocols—that would include protocols for handling, storage, transport, inactivation, and disposal of biomaterials. [See also *Better International Controls Needed to Prevent Bioterrorism* in July 2006, *Assessment and Recommendations for Biosecurity* in June 2006, and *Recommendation for a Biosecurity Watchdog* in February 2006 environmental security reports.] (August 2006) Ref. 1840

### **Proceedings of the Workshop Risk, Uncertainty and Decision Analysis for Environmental Security and Non-chemical Stressors**

The workshop “Risk, Uncertainty and Decision Analysis for Environmental Security and Non-chemical Stressors” was held April 26-29, 2007 in Lisbon, Portugal. The objective of the workshop was to explore how to improve risk assessment and modeling for non-chemical environmental stressors by adapting chemical risk assessment approaches and tools. The outcomes of the workshops were not available at the time of this writing. (April 2007) Ref. 1841

### **World network of regional CDC-like organizations proposed for combating the effects of bioterrorism**

During the EU/US Symposium: Transatlantic Cooperation on Combating Bioterrorism held November 24, 2003 at the Embassy of Italy in Washington, DC, the idea of a world network of regional CDC-like organizations was proposed as a necessary element of combating the effects

of bioterrorism on the general public. Initially a European CDC was proposed, but since a global system is really required, the conversation quickly moved to suggesting one for each region of the world. (November 2003) Ref.1842

### **Soviet-Era Anti-plague Institutes Still Pose Environmental Threat**

The United States has an extensive program aimed at minimizing the possible transfer and misuse of Soviet WMD R&D. One area that has fallen through the proverbial crack, however, is the collection of more than 80 anti-plague institutes, which were not a formal part of the Russian biowarfare program and therefore are not covered by the DOD Threat Reduction effort. These establishments, located in all parts of the FSU, still work with extremely hazardous pathogens under totally inadequate physical and biological security. This incredibly dangerous situation is described in a draft report from a major investigation by scholars from the Center for Nonproliferation Studies at the Monterey Institute of International Studies. (August 2005) Ref.1843

### **Russia to Destroy All Chemical Weapons Arsenal by 2012**

The Russian government approved a plan to destroy its chemical weapons arsenal by 2012, reported Agence France-Presse in Moscow. Under the proposal, 20% of Russia's 40,000 ton chemical weapons stockpile would be destroyed by 2007, 45% by 2009, and all of it by 2012, meeting its commitment under the Chemical Weapons Convention. "Even though it has the biggest chemical weapons stockpile in the world, Russia has also come up with the safest technologies for disarmament," said Viktor Khristenko, Russia's Industry and Energy Minister. Out of the \$6 billion program, foreign countries are expected to cover \$385 million. Final approval by the Russian government of the chemical weapons disarmament plan is expected before August 15. (July 2005) Ref. 1844

### **Japanese Chemical Weapons Cleaning in China Yet to be Completed**

June 2007 was the deadline agreed to by Chinese and Japanese authorities for cleaning up the Japanese chemical weapons littering China since the Japanese war against China. Yet, this month, a number of Chinese construction workers suffered health problems after being exposed to a ruptured mustard agent bomb believed to have been dropped by a Japanese warplane many years ago. The unexploded bomb was hit by the construction team while excavating for a residential building in Bayannaor City in Inner Mongolia. The Japanese government is expected to receive a request to destroy the weapon, sources said. In May 2007, Japan's Supreme Court ruled that Chinese victims of Japanese biological warfare and other atrocities that occurred before and during World War II are not eligible for compensation. (June 2007) Ref.1845

### **Discussions over World War II Japanese Warfare Program in China not Settled Yet**

The chemical weapons left over by the Japanese invading army during World War II are still realistic threats to the Chinese people and environmental security, say Chinese officials urging Japan to take more measures to accelerate the process of destroying them. Chinese Foreign Ministry spokesman Liu Jianchao demands that the Japanese government follow the Convention on the Banning of Chemical Weapons and the memorandum on the destruction of chemical weapons reached between the two governments.

Recently, Japan rejected China's demands for apology and compensation for damages caused by the Japanese germ warfare program during World War II. Chinese Foreign Ministry said, "Germ

warfare was one of the serious crimes of the Japanese militarist period during World War II... The Japanese government should properly deal with this problem by using an honest attitude, undertaking its full responsibilities and handling conscientiously the reasonable demands of the injured people.” The lawsuit has uncovered information about Japan’s biological warfare program kept secret by Japan’s government and the United States following World War II, says the Associated Press. For instance, the Unit 731 base near the Chinese city of Harbin may be responsible for as many as 250,000 deaths in the 1930s and ‘40s during the Japanese occupation of China. [See also *China: Japan to Pay \$2.7 Million for War Gas Leak* in October 2003 and *Effects of Poison Gas Used in WWII by Japan* in May 2003 environmental scanning reports] (July 2005) Ref.1846

### **EU and Japan Respond to Risks from Low Dose Chemicals**

A series of articles by Peter Waldman in the Wall Street Journal have brought to attention new scientific studies which have indicated that exposure to extremely low levels of certain industrial chemicals, even a few parts per trillion, can have harmful biological effects. Many of these results are controversial, and disputed by manufacturers and users. Compounds include bisphenol A, phthalates, and perchlorates. The EU and Japan are taking measures to impose stricter controls or outright prohibitions on such materials, and are conducting further investigations. (August 2005) Ref. 1847

### **Citation Statistics May Reveal Covert Weapons Work**

A team at the NM Institute of Mining & Technology has reported, in *Nature*, a statistical technique for using the interlocking network of authors and citations among scientific papers to detect covert research projects. Applying the method to a Soviet laboratory's body of publications, the scientists were able to detect a 10-year period during which it was engaged in bioweapons studies. (June 2004) Ref. 1848

### **Chemical Munitions on San José Island, Panama**

Several chemical munitions have been found recently on San José Island, Panama, a chemical weapons testing site up to 1948. Although the US has offered to dispose of the munitions found to date and provide funding for the equipment needed for any further cleanup, Panama has been unwilling to release Washington from further responsibility. Since the Panamanian government has refused the offer, the US government considers the matter closed. (August 2004) Ref.1849

## **Bioterrorism and Epidemics Threats**

### **Terrorists Could Tap Pharmaceutical Toxins**

*Old Plagues, New Threats* by the Cooperative Nonproliferation Program at the Stimson Center is a comprehensive analysis of the state of monitoring and regulation of emerging products and technologies. It uses the pharmaceutical industry as a case study and outlines the threats—from research and distribution to injection into patients of products derived from select agents. The growing interest in dangerous pathogens and toxins increases the potential of their use in biological weapons by nefarious actors. Lack of adequate regulations increases the possibility of such scenarios. [See also *Accelerating Synthetic Biology Applications Need Better Monitoring and Regulation* in July 2007 and other similar items in previous environmental security reports.]

(April 2008) Ref. 1851

### **African Countries are Vulnerable to Bioterrorism**

African science policy should give higher importance to the threat posed by biological weapons, according to an international meeting of representatives from the fields of science, law, and security, held in Kampala, Uganda, this month. Africa is vulnerable to bioterrorism; it lacks the institutions, technology, and expertise to protect its citizens from biological terrorism. Science and technology policy of African countries should simultaneously enhance biological research for eradicating diseases and assure strict security measures to prevent access to material eventually usable in bioterrorism. Because there is little scientific awareness in both the political leadership and cultures of African countries, it will be necessary to improve public understanding of science. The meeting was organized by the Kampala-based International Law Institute (ILI) and the US-based International Consortium for Law and Strategic Security (ICLSS).

(October 2005) Ref. 1852

### **UN Report Recommends New Powers to Combat Bioterrorism and Epidemics**

The UN report *A More Secure World: Our Shared Responsibility* recommends expansion of the UN's capacity to investigate and intervene in a country when a suspicious disease outbreak occurs, whether the epidemic has a natural or terrorist origin. The Security Council should cooperate with the WHO to respond to and support international action including "cordon operations" for quarantine and international public health access. If existing International Health Regulations (IHR) "do not provide adequate access for WHO investigations and response coordination, the Security Council should be prepared to mandate greater compliance." The report's recommendations will be considered at the fall summit of Heads of State. The eventual changes required to IHR—the rules that govern the WHO—might get to a vote in May.

Note: The recommendations might get serious support, in light of governments' response times to cases of SARS in 2003 and recent avian flu outbreaks. (February 2005) Ref. 1853

### **Interpol Warns World Unprepared for an Eventual Bio-terrorist Attack**

Interpol chief Ronald Noble warns that there is substantial evidence of a possible biological attack by Al Qaeda, "which could cause contagious disease to be spread," and "no entity in the world is prepared for it." Some 400 police officers and health officials from around the world will attend a bio-terrorism conference organized by Interpol beginning March 1, in Lyons, France, to improve cooperation and information sharing between intelligence agencies and police departments to better combat bioterrorism threats. (February 2005) Ref. 1854

### **New NAS Website on Biosecurity**

The Policy and Global Affairs division of the National Academy of Sciences launched a new website that is a collection of resources, studies and other activities at the National Academies related to biosecurity. So far, the categories are: biosecurity, publications, reports in preparation, and other activities. (November 2004) Ref. 1855

### **Bioterrorism Via Smuggled Ebola-contaminated Bushmeat from Africa**

Underground networks of African poachers have been selling illegal bushmeat for decades. Might these networks be contacted one day by bioterrorists? Experts speculate that Ebola-contaminated bushmeat could be smuggled into a country by bioterrorists to trigger an Ebola

outbreak. The World Health Organization (WHO) and Médecins Sans Frontières (MSF) are currently working in Gabon and the Congo with active cases of Ebola. (January 2005) Ref.1856

### **Russia No Longer Funding Bioterrorism Countermeasures Research**

Lev Sandakhchiyev, Director General of the Vektor State Science Center of Virology and Biotechnology in Novosibirsk, announced that from 2005 Moscow would not fund any more research for biological terrorism countermeasures, Interfax reported on February 1, 2005. “Russia has effectively wound up its program to develop protection against pathogens” said the Russian scientist, and he added that there are no “real, constructive programs” among Russia, the U.S. and Europe for cooperating to counter the threat of biological terrorism. (February 2005) Ref.1857

### **Bioterrorism, Preparedness, Attack and Response 4**

This new book edited by: John Blair, Texas Tech University, Lubbock, Texas; Myron Fottler, University of Central Florida, Orlando, Florida, and the Hon. Albert C. Zapanta, Office of the Secretary of Defense, Pentagon, reviews how bioterrorism could affect the healthcare system of the United States. The book gives one of the broadest overviews of the issues of bioterrorism preparedness thus far.

Contents:

Part I: Biological Agents and Terrorist Agents

The Bioterrorism Formula: Facing the Certainty of the Uncertain Future; The International Threat of Biological Weapons: Legal and Regulatory Perspectives; Cocktails, Deceptions and Force Multipliers in Bioterrorism; Modeling the Environmental Jolt of Terrorist Attacks: Configurations of Asymmetrical Warfare;

Part II: Chaos, Complexity and Change

Chaos and Complexity in a Bioterrorism Future; The Environmental Jolt of Likely Bioterrorism; Changing Organizations for Their Likely Mass-Casualties Future.

Part III: Organizations Respond? or Not

Multiprovider Systems as First Line Responders to Bioterrorism Events: Challenges and Strategies; Bioterrorism Visits the Physician's Office; Responding to Bioterrorism: A Lesson in Humility for Management Scholars; Bioterrorism Preparedness and Response: A Resource Guide for Health Care Managers.

Part IV: Defending the Homeland: Changes and Challenges

The Role of the Reserve Forces in Defending the Homeland; Civil-Military Relations in an Era of Bioterrorism: Crime and War in the Making of Modern Civil-Military Relations; Integration or Disintegration? An Examination of the Core Organization and Management Challenges at the Department of Homeland Security. (September 2004) Ref. 1858

### **Nuclear Safety**

Nuclear and biological threats remain on the international agenda as top issues without clear solutions. Although negotiations of the Nuclear Non-Proliferation Treaty did not make progress



over the past few years, there was progress in some related areas. The International Convention for the Suppression of Acts of Nuclear Terrorism, adopted by the General Assembly in April 2005, creates an enforced legal framework to counter nuclear terrorism. The Conference on Topical Issues in Nuclear Safety, held in October 2004 in Beijing, recommended that the IAEA develop a single set of international standards for all nuclear installations—from design to decommissioning. Given the growing diversification and globalization of the industry, the sooner these standards are developed and implemented, the better.

### **IAEA Director Warns on Continuous Nuclear Safety Issues**

In his annual report to the UN General Assembly, International Atomic Energy Agency Chief Mohamed ElBaradei said that nearly 250 incidents involving theft or loss of nuclear or radioactive material were reported to the Agency during the year ending in June 2008, meaning that the threat of radioactive material use by terrorist or malicious forces remains high. Also troubling is that much of that material is not subsequently recovered, or sometimes material is found that was never reported missing. He reiterated the need for effective binding international agreements and global nuclear security standards, advanced and independent verification technology, and stronger legal authority and resources for the Agency. Since 1993 when IAEA data exchange began, 1,340 incidents were reported, including 18 with highly enriched uranium or plutonium. (October 2008) Ref. 1860

### **New Recommendations for Reducing Nuclear Risk**

“Lifting the Nuclear Shadow: Creating the Conditions for Abolishing Nuclear Weapons” is a plan released by the British Foreign Ministry on steps towards elimination of nuclear weapons worldwide.

“Future of the Nuclear Security Environment in 2015” by the U.S. National Academies and the Russian Academy of Sciences presents avenues for cooperation to improve the international nuclear security environment by 2015. (February 2009) Ref. 1861

### **Nuclear Security Addressable only Internationally**

The head of the National Nuclear Security Administration, Thomas D’Agostino, said that the international community should agree on a common set of security standards to prevent the spread of WMD and terrorists or rogue nations acquiring sensitive materials. “Let me be clear when I say I believe the United States has a special responsibility in advancing nonproliferation and global security. But we should not and cannot do it alone,” he said. One important player might be the World Institute for Nuclear Security. The Institute formally opened its doors on September 29, 2008 in Vienna, Austria.

Meantime, a new disarmament study, *Abolishing Nuclear Weapons*, by the International Institute for Strategic Studies, examines the steps needed for ‘getting to zero’ and criticizes leaders advocating nuclear disarmament while “none of these states has an employee, let alone an interagency group, tasked full-time with identifying what would be required to verifiably decommission all its nuclear weapons.” [See also *Increased Efforts Needed to Counter the Proliferation of Weapons of Mass Destruction* in July-August 2008, and other related items in previous environmental security reports.] (September 2008) Ref. 1862

**International Nuclear Safety Regime Review**

“A Guide to Global Nuclear Governance: Safety, Security and Nonproliferation” is a review of international agreements and bodies addressing nuclear safety and security issues around the world. The report was prepared by the Canadian Centre for International Governance Innovation and is intended to be followed next year by a report of recommendations to improve international monitoring of nuclear material and combat proliferation. (September 2008) Ref.1863

**Nuclear Theft, Smuggling, and Sabotage Countermeasures**

The recent conference on strengthening nuclear security held in Vienna, Austria, 4–8 July, 2005 adopted Amendments to the Convention on the Physical Protection of Nuclear Material (CPPNM). The original CPPNM applied only to nuclear material in international transport. The amendments substantially strengthen the Convention by providing an expanded system for preventing, combating and punishing nuclear material theft, smuggling and sabotage. The amendments also request expanded cooperation among States regarding rapid measures to locate and recover stolen or smuggled nuclear material, to mitigate any radiological consequences of sabotage, and to prevent and combat relevant offences. The new rules will come into effect once they have been ratified by two-thirds of the 112 States Parties of the Convention. This is expected to take several years. (July 2005) Ref.1864

**UN Agency to Intensify Tracking of Illicit Nuclear Trafficking**

At its 48th General Conference, IAEA warned that nuclear and radiological terrorism didn't diminish in spite of the efforts to expand and accelerate preventive actions. The IAEA Illicit Trafficking Database includes about 600 illicit incidents involving unauthorized acquisition, possession, use, transfer, or disposal of nuclear material and/or other radioactive or dangerous material. Non-participating States are encouraged to join the 80 Member States to increase the program's efficiency. (September 2004) Ref.1865

**SIPRI Year Book 2007 Points out Environmental, Nuclear, and Energy Threats**

The 2007 edition of the authoritative Stockholm International Peace Research Institute (SIPRI) Yearbook, along with statistics on conflict and weapons expenditure, highlights the main categories of threats to peace that the world faces. Among the main threats, it lists: energy, which “could become a weapon”; and the environment, highlighting that “Using the world's resources to address hunger, environmental factors and poverty is likely both to improve human survival and to strengthen international security.” Concerning nuclear, chemical and biological threats, the report warns on high uncertainties of the stockpiles and research around the world and calls for increased transparency and better policies for risk assessments and risk-remediation strategies. (June 2007) Ref.1866

**Reports Addressing Nuclear Safety**

*Nuclear Security Report 2007*; Measures to Protect Against Nuclear Terrorism outlines concerns and strategies to consider in order to improve international nuclear security, mainly based on international collaboration. *Securing the Bomb 2007*, commissioned by the Nuclear Threat Initiative, provides a comprehensive assessment of vulnerable nuclear stockpiles around the world and makes recommendations for reducing the nuclear terrorism threat, including establishing a database with unclassified information on actual nuclear incidents. IAEA Illicit Trafficking Database reveals that in the period 1993–2006, the agency confirmed 275 cases of

illicit possession and connected activities involving nuclear materials and radioactive sources. (September 2007) Ref.1867

According to announcements, the US National Research Council has released a report, *Radiation Source Use And Replacement*, that “examines the use of high-risk radioactive materials [e.g. cesium chloride] found in medical and research equipment that could be accidentally dispersed or utilized to make a dirty bomb in a terrorist attack.” It also “identifies lower-risk alternatives that would not change the performance of the devices, and recommends options to remove and replace the high-risk sources.” The National Research Council recommends that U.S. research and medical facilities reduce their use of devices containing cesium chloride and urged U.S. officials to “stop licensing the cesium chlorine irradiators, halt their import and export and promote decommissioning of existing machines.” [See also Millennium Project’s January 2003 report on this issue: *Commercial radioactive components recognized as “dirty bomb” hazard.*] (February 2008) Ref.1868

*Monitoring Nuclear Weapons and Nuclear-Explosive Materials*, a new report by the Committee on International Security and Arms (CISAC) of the National Academy of Sciences (NAS), outlines technical and collaborative approaches that could help policy-makers minimize the proliferation of nuclear weapons, prevent terrorists from acquiring them, and reduce risks posed by existing nuclear arsenals. The report emphasizes that transparency, monitoring, and verification of all categories of nuclear weapons and material are crucial. It also addresses some of the institutional and technical approaches related to these issues. However, it doesn’t make recommendations on policy or action priorities. There are 30,000 existing nuclear weapons in the world of which the U.S. and Russia possess 95%. Nevertheless, the report notes “enough additional nuclear-explosive material exists in military and civil nuclear facilities worldwide to make something like 100,000 additional nuclear weapons”, possibly by non-nuclear weapon states and/or terrorist groups.

Another NAS report, *Safety and Security of Commercial Spent Nuclear Fuel Storage: Public Report* addresses the safety issues of spent nuclear fuel storage at commercial nuclear reactors. It makes recommendations to the U.S. Nuclear Regulatory Commission on measures to reduce terrorist attack possibilities, as well as implementation of these measures. It calls for plant-by-plant vulnerability analyses and prompt communication of the results for timely implementation of the measures to reduce potential risks.

Policy-makers, industry representatives, and experts representing the world's nonproliferation and nuclear power communities gathered for the 14th International Security Conference organized by Sandia National Laboratories on April 4-6 near Washington, D.C. to bolster discussions about the nuclear fuel cycle and strategies to reduce proliferation risks involving civilian nuclear fuels. (April 2005) Ref.1869

### **Multilateral Approach Needed To Keep Nuclear Arms from Terrorists**

Multilateral Approaches to the Nuclear Fuel Cycle, a study carried out by a group of experts from 26 countries at the request of the International Atomic Energy Agency (IAEA), concluded that multilateral cooperation is essential for curbing “burgeoning and alarmingly well organized nuclear supply networks, and from the increasing risk of acquisition of nuclear or other radioactive materials by terrorist and other non-State entities.” The report suggests multilateral

arrangements—by region or by continent—to strengthen controls over fuel manipulation, transparent fuel movement, enrichment, reprocessing and disposal and storage of spent fuel. The study is now widely circulated and will be discussed at the Nuclear Nonproliferation Treaty (NPT) Review Conference in May. International cooperation was also the call of UN Secretary General Kofi Annan at the 41st Conference on Security Policy held in Munich this month.

IAEA Director, Mohamed ElBaradei, warned that terrorist groups might have already obtained a nuclear weapon, or the material necessary to create one. He is proposing seven measures to strengthen the NPT, which will be presented at the May NPT Review Conference, including a five-year moratorium on construction of uranium enrichment facilities.

In the meantime, nuclear materials are moving around without control. Indian Police found weapons-grade uranium on two men who were arrested on suspicion of being drug peddlers. 253.6 grams (8.8 ounces) of substance was identified as 99% uranium by the Bhabha Atomic Research Center. The origin and destination of the uranium are currently being investigated. Russian police seized 40 kg of uranium-238 from a person who claimed to be using it as ‘weight lifting equipment’. (February 2005) Ref. 1870

### **Increasing Calls for Improved Management of Nuclear Materials and Nonproliferation**

International Atomic Energy Agency (IAEA) Director-General Mohamed ElBaradei, concerned about terrorism and the proliferation of nuclear materials, urged the international community to reinforce the Nuclear Non-Proliferation Treaty (NPT) and draw a concrete roadmap and timetable for irreversible nuclear disarmament. Senator Joseph Biden (D-Del.) introduced a bill this month [January 2005] that proposed to re-establish U.S. efforts to convert Russian nuclear weapons production sites to civilian use, as part of the counterterrorism bill, Targeting Terrorists More Effectively Act of 2005. Nuclear proliferation and threats top the discussions of the Geneva Conference on Disarmament that began on January 27. The May 2005 NPT Review Conference will further discuss nonproliferation initiatives and a new disarmament action plan.

The Institute for War and Peace recently reported on a former Grozny chemical factory wrecked by war, poverty and lawlessness, where dangerous radioactive cobalt lies practically unguarded and already caused the death of several people. In Armenia, the Metsamor aging nuclear power station is a problem given its location and the need to fly in fuel on Russian planes through Georgian airspace—equivalent to “flying around a potential nuclear bomb” states Alexis Louber, head of the EU delegation in Armenia. (January 2005) Ref. 1871

The menace of poor safety conditions at nuclear sites around the world persists. Recent massive landslides in Kyrgyzstan in an area with 20 neglected spent nuclear fuel depositories threaten the whole of Central Asia with nuclear ecological disaster. Furthermore, UN officials and non-proliferation experts are concerned that nuclear materials smugglers could be using the drug trafficking routes in Central Asia, exploiting the present instability in the region—such as the political turmoil in Kyrgyzstan. According to the IAEA, the disappearance of radioactive material from facilities in Central Asia after the breakup of the Soviet Union in 1991 was a “widespread phenomenon.” (April 2005) Ref. 1872

### **Increasing Nuclear Safety and Security**

The first International Conference on Effective Nuclear Regulatory Systems was held in Moscow, 27 February–3 March 2006. The 216 participants from 57 countries and seven international organizations discussed the full range of issues of nuclear security and safety in

light of the potential revitalization of nuclear energy for meeting world energy requirements without greenhouse gas production. Triennial forums will review progress in creating effective nuclear regulatory systems and deepening international collaboration.

On March 23, Slovakia became the first country to ratify the International Convention for the Suppression of Acts of Nuclear Terrorism; to date, 100 States have signed it. [See also *Nuclear Terrorism Convention Signed by 82 Countries at the UN Summit* in the September 2005, and *UN Agency to Intensify Tracking of Illicit Nuclear Trafficking* in the September 2004 environmental security reports.] (March 2006) Ref. 1873

### **IAEA Annual Report for 2004**

The annual report of the UN atomic watchdog calls for global cooperation on all nuclear issues—from countering the threat of nuclear and radiological terrorism to preventing nuclear weapons proliferation, and meeting a growing energy demand. The report is a comprehensive overview of the Agency’s work in 2004 in its three main domains: technology, safety and verification, also presenting prospects for future developments. It highlights that although attention to security of nuclear and other radioactive material and associated technologies increased significantly in recent years, international cooperation is essential to strengthen all countries’ preparedness to respond properly to the threat of nuclear and radiological terrorism and to build regional and global networks for combating transnational threats. The report notes that out of the over 650 confirmed incidents of trafficking in nuclear or other radioactive material recorded since 1993, the highest number of incidents—121 (of which 11 involved nuclear material) were in 2004. The report will be presented at the IAEA General Conference to be held in Vienna beginning 26 September. Other IAEA reports and documents prepared for the Conference will be made available as they are published. (July 2005) Ref. 1874

### **Non-Proliferation Treaty Deadlock Continues**

The second of three sessions of the Preparatory Committee for the 2010 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) was held from April 28 to May 9 at the UN Office at Geneva, Switzerland. Participation included delegates of 106 States parties, representatives of specialized international organizations, and of 64 NGOs. The main issues discussed included: nuclear non-proliferation, disarmament and international security; nuclear-weapon-free zones; nuclear safeguards; the peaceful use of nuclear energy; and the Middle East situation. No special agreements were reached. The third session will be held May 4-15, 2009, and the Review Conference will be April 26–May 21, 2010, both in New York. (May 2008) Ref. 1875

### **Australia to Propose Panel to Advance Work for the NPT Review in 2010**

Australian Prime Minister Kevin Rudd announced plans to create an International Commission on Nuclear Nonproliferation and Disarmament to make constructive recommendation for the 2010 Nuclear Nonproliferation Treaty Review Conference. The commission would follow on the work of Australian-led 1996 Canberra Commission and Japan’s Tokyo Forum. The first report of the panel is supposed to be presented at a major international conference of experts in Australia late 2009. [See also *Non-Proliferation Treaty Deadlock Continues* in May 2008 and other similar items in previous environmental security reports.] Meantime, the intergovernmental Financial Action Task Force warns that the international community is failing to efficiently control financial transactions that help fund illegal production, technology transfer, and trade of

chemical, biological and nuclear weapons. Free-trade zones and transshipment hubs in the Netherlands, Singapore and the UAE are specifically vulnerable sites. (June 2008) Ref.1876

### **Nuclear-Free Zones**

Nuclear-Free Zones are multiplying all over the world showing humanity's commitment to ban nuclear weapons. The treaty bans all production, testing, and admittance of nuclear weapons in the region, as well as helping any other country to do so. Nuclear-free zones include the Antarctic, Africa, Latin American and the Caribbean, South Pacific, South Asia, and Mongolia. Currently Central Asia, Central Europe, South Asia and the Peninsula of Korea, and the Middle East are in negotiations for their own free zones. Ref.1877, 1878

The Agency for the Prohibition of Nuclear Weapons in Latin America and the Caribbean (OPANAL) has presented a paper: *What means Nuclear-Weapon-Free Zones?* which specifies some principles to be considered in the existent and future NWFZ treaties such as: applications during wartime as well as peacetime; prohibition of peaceful nuclear tests; prohibition of military attacks on nuclear facilities of Member States; extension of denuclearization to the maritime areas adjacent to Member States; and new international enforcement mechanisms for possible cases of violating the treaties (such as the Bangkok Treaty mentions).Ref.1879

The Nuclear Nonproliferation Treaty (NPT) has 188 states parties; only India, Pakistan, Israel and North Korea are not parties to the NPT. There is international consensus that the gravity of the increasingly serious threat to the treaty and international security posed by the proliferation of weapons of mass destruction –nuclear, biological and chemical – reinforces the need to strengthen the treaty.

#### *Central Asia agrees to become a Nuclear Free Zone*

Uzbekistan, Kazakhstan, Tajikistan, Kyrgyzstan and Turkmenistan agreed to become the world's next nuclear weapons-free zone after five years of negotiations. The treaty bans all production, testing, and admittance of nuclear weapons in the region, as well as helping any other country to do so. This is the first such agreement to be negotiated under the UN. It is expected to be signed by the end of this year. Other nuclear free zones include the Antarctic, Africa, Latin America, South Pacific, South Asia, and Mongolia. Currently Central Europe, South Asia and the Peninsula of Korea, and the Middle East are in negotiations for their own free zones. (October 2002) Ref.1880

#### *Cuba's ratification of the Treaty of Tlatelolco completes Latin American and the Caribbean Nuclear Weapons Free Zone*

Cuba was the last of 33 eligible states to ratify the Treaty of Tlatelolco October 26,2002, which establishes a nuclear weapon-free zone in Latin America and the Caribbean. (October 2002) Ref.1881

#### *Central Asia Becomes Nuclear Weapon-Free Zone*

With the Kazakh Senate approving the Central Asian Nuclear Weapon-Free Zone treaty, and Kazakhstan President Nursultan Nazarbayev expected to ratify it shortly, Central Asia—including Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan — becomes a nuclear weapons-free zone, with the parties banning the possession as well as stationing of other

nations' nuclear weapons on their territories. (December 2008) Ref. 1882]

### **U.S. and Allies Should Change Priorities, Says New Book On Terrorism**

The Four Faces of Nuclear Terrorism from the Monterey Institute in California recommends new priorities based on risk (likelihood multiplied by impact) and concludes that addressing the availability of highly enriched uranium should be put at the top of the list: "The United States must dramatically revise U.S. efforts to protect fissile materials abroad so as to make securing, consolidating, and eliminating highly enriched uranium (HEU) the leading and most urgent task, taking clear precedence over addressing the dangers posed by plutonium, which must, nonetheless, remain an important priority. The overarching principal guiding policy should be to move toward a world in which fewer countries retain HEU, fewer facilities within countries possess HEU, and fewer locations within those facilities have HEU present." (August 2004) Ref. 1883

### **Russia Accepts London Convention on Dumping of Radioactive Wastes**

The Russian Federation announced its acceptance of the regulations that ban dumping radioactive wastes in seawater, as stipulated under Resolution LC.51(16) to the London Convention. Adopted in 1993, Resolution LC.51(16) to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, "London Convention", prohibits all forms of radioactive wastes dumping into seas (including incineration at sea of industrial wastes). The resolution is now in force for all 81 Parties to the London Convention. (June 2005) Ref.1884

### **A Single set of International Standards is proposed for Nuclear Power Plants from Design to Decommissioning**

The Conference on Topical Issues in Nuclear Safety, with 274 delegates from 37 countries held last month [October 2004] in Beijing, recommended that the International Atomic Energy Agency (IAEA) develop a single set of international standards for all nuclear installations from design to decommissioning. Given the growing diversification and globalization of the industry, the sooner these standards are developed and implemented, the better. (November 2004) Ref. 1885

### **Reducing Proliferation Risks by Converting 60 High- to Low-Enriched Uranium Research Reactors Could Take 10 Years**

A key to lowering risks induced by the proliferation of weapons-grade uranium is converting civil nuclear research reactors to run on low-enriched uranium (LEU) instead of high-enriched uranium (HEU). So far 31 research reactors have been converted to low-enriched uranium and 7 have been partly converted. However, IAEA estimates it could take 10 years to convert some 60 civilian research reactors that are still running on HEU that are targeted for this conversion. Approximately 200 experts from across the globe discussed these conversion issues at the International Meeting on Reduced Enrichment for Research and Test Reactors (RERTR) held in Vienna, November 8-11. (November 2004) Ref.1886

### **Safeguarding radioactive materials is inadequate**

Possibly 100 countries may hold radioactive materials that are not safely guarded. Friedrich Steinhäusler, a physicist from the University of Salzburg in Austria and a former member of the International Commission on Radiological Protection, and scientists from Stanford University in

California found gaping holes in the ability to detect nuclear smuggling, inadequate inventory of radioactive materials, and serious shortages of trained staff, equipment and resources. The countries surveyed are: the US, China, Germany, Austria, Poland, Romania, Switzerland, Israel, Brazil, Kazakhstan and Bangladesh.

Recent looting and destruction at nuclear sites in Iraq could lead to radioactive material being used by terrorists to make dirty bombs, said the International Atomic Energy Agency (IAEA) Director-General. As a result, the U.S. may welcome IAEA experts' examination of nuclear arms development sites in Iraq.

IAEA, Interpol, and the World Customs Organization conference expressed serious concerns over the “frightening picture” of easy access to radioactive material, poor border controls, inadequate monitoring equipment, and widespread smuggling. IAEA is discussing plans to strengthen the IAEA's Convention on the Physical Protection of Nuclear Material. (May 2003) Ref. 1887

### **Nuclear safety during conflicts**

During the war in Iraq, uranium and radioactive isotopes lay unguarded for several days of looting in a warehouse near the nuclear center at Tuwaitha. With new uses of radioactive materials for “dirty bombs” and the increased drive by various states to acquire nuclear capability, increased attention is being paid to guarding nuclear materials and facilities during conflicts and social instability. (April 2003) Ref. 1888

### **Nuclear Safety—groundbreaking resolutions adopted by the IAEA General Conference ranging from establishing nuclear-weapon-free-zones to nuclear material storage and transportation**

In its effort to strengthen nuclear and radiation safety, the IAEA 47th General Conference held in Vienna, 15-19 September, adopted several resolutions: establishing a nuclear-weapon-free-zone (NWFZ) in the Middle East "as an important confidence-building measure"; resolution calling on all Member States to implement safeguards agreements and stressing the importance of additional protocols that would strengthen the system's capability for detecting undeclared nuclear material and activities; a comprehensive resolution that stresses key IAEA role for global cooperation and covers all aspects related to nuclear and radioactive material from manufacture, storage, transport to waste management. Emphasizing transportation safety, it requests the development of an Action Plan for the safe transportation of radioactive material based on the findings of the International Conference on the Safety of Transport of Radioactive Material held at the IAEA in July 2003. (August-September 2003) Ref. 1889

### **Tightened nuclear security needed to overcome ‘dirty bombs’**

At the March 2003 International Conference on Security of Radioactive Sources, IAEA Director-General Mohamed El Baradei raised the problem of “orphaned” radioactive devices that have been distributed worldwide over the past 50 years and have fallen outside official regulatory control. He warned that current controls on radioactive sources are inadequate, especially in the former Soviet republics and called for additional security measures. "Our database of cases of smuggling...gives an indication that there is a market and there is an effort to obtain radioactive sources, and the obvious question is why," El Baradei said.

The four-day conference was organized by the IAEA and co-sponsored by the Russian



Federation and the United States in co-operation with the European Commission (EC), the European Police Office (EUROPOL), the International Criminal Police Organization (Interpol) and the World Customs Organization (WCO). The issues discussed ranged from the prevention of illicit trafficking to the response to a “dirty bomb” attack. (March 2003) Ref.1890

### **Commercial radioactive components recognized as “dirty bomb” hazard**

The Monterey Institute Center for Nonproliferation Studies has released an assessment of the security risks posed by commercial radioactive sources (e.g. a cesium-137 cancer therapy device), which might be used by terrorists to manufacture a "dirty bomb." Up to now, the security of such everyday components, used in science, healthcare, and industry, has not been of substantial concern to planners, but the recent association of terrorists with radiological dispersal devices has brought about a change in their view of this threat. It is now recognized that improved control of such “ingredients” is imperative. (January 2003) Ref.1891

Dirty bombs are not weapons of mass destruction (i.e. extensive immediate fatalities), but rather of mass disruption, in the form of public panic and of later prolonged and expensive cleanup. It is nevertheless important to remove this weapon from the terrorist arsenal. Control of even high security risk components is very spotty, and generally limited to advanced countries – at present the US and Canada permit the export of most high-risk sources without any government check of end users. (January 2003) Ref.1892

### **FDA Approves Dirty Bomb Antidotes**

The Food and Drug Administration (FDA) approved the commercialization of two products designed to help deal with consequences of terrorists using dirty bombs. The drugs (pentetate calcium trisodium injection, Ca-DTPA; and pentetate zinc trisodium injection, Zn-DTPA) help speed elimination of radiation from the body and are especially effective for treating contamination from plutonium, americium and curium. (August 2004) Ref.1893

### **Increased Funds for Study of Long-term Effects of Atomic Radiation**

The UN Special Political and Decolonization Committee approved a draft resolution encouraging UNEP to increase funding for the UN Scientific Committee on the Effects of Atomic Radiation. General Assembly Resolution 56/50 called on the Committee to continue its 47 years of work on the problems in the field of ionizing radiation.

The draft resolution also requests dissemination of the Scientific Committee's finding to the General Assembly, the scientific community and the public, and welcomes member states' readiness to provide the committee with relevant information on the effects of ionizing radiation in affected areas. Increased funding will ensure the Scientific Committee's ability to successfully discharge its responsibilities and mandate. (October 2002) Ref.1894

### **New European Union Law Controls Radioactive Sources**

The new European law to control radioactive sources adopted on December 22 sets out requirements that ensure control over every present and past high activity radioactive source in Europe. The new law addresses the issue at all levels: from prevention and recovery of orphan sources to remediation including responsibility, intervention and financing. The law requires that each source be duly identified and marked, as well as detailed record keeping of all sources for perfect traceability. (December 2003) Ref.1895

**Proposed EU legal nuclear safety standards was blocked by five countries asking that the two draft laws be downgraded into non-binding instruments**

The European Commission proposal to create the European Union's first ever legal nuclear safety standards is blocked by Germany, UK Sweden, Finland and Belgium who ask that two draft laws be downgraded into non-binding instruments. (October 2003) Ref.1896

**UN Conference on Disarmament 2003 Session**

The UN Conference on Disarmament in Geneva has been unable to reach consensus on a program of work since 1998. The impasse may be resolved by the "Five Ambassadors Initiative" [see the Millennium Project's September 2002 emerging environmental security issue report] that proposes four separate tracks with a separate work plan for each track: 1) guarantees not to use nuclear weapons against non-nuclear states; 2) nuclear disarmament; 3) a ban on production of weapons-grade fissile materials; and 4) prevention of an arms race in space. Delegates to the Disarmament Conference have welcomed this initiative, but it is not yet clear if it will be adopted. February 5-7, 2003, the Secretary-General's Advisory Board on Disarmament Matters will meet in closed session in New York, and may make recommendations useful to the Conference on Disarmament. This first part of the Conference ends on March 28. The next two parts will be held from May 12 to June 27, and from July 28 to September 10. (January 2003) Ref.1897

**Russia signs treaty to track nuclear waste**

Russia, US, and EU signed The Multilateral Nuclear Environmental Program in the Russian Federation (MNEPR) treaty to clean up Russian atomic waste and stop it from getting into the hands of terrorist groups. It provides a legal framework for handling atomic waste enabling authorities "to control the proliferation of weapons of mass destruction" French Foreign Minister Dominique de Villepin said. (May 2003) Ref.1898

**Russian Submarines Dismantlement an International Concern**

Russia intends to raise the issue of foreign aid to assist in the dismantlement and destruction of its obsolete submarine fleet at the upcoming G8 summit. Current proposals to extend existing programs for securing nuclear materials (and destroying biological and chemical agents) to other countries worry Russia because of potential dilution of funds appropriated for this purpose. (May 2004) Ref.1899

**Russia's Floating Nuclear Plants Pose International Security Risk**

Russia has started building the world's first floating nuclear power plant. A ship with two 35-megawatt reactors is expected to be operational in three years and supply electricity in remote areas in Russia as well as potential foreign markets. Despite warnings from environmentalists, Russia plans to build seven of these nuclear ships. [See also *Increasing Nuclear Safety and Security*] (April 2007) Ref.1900

**Revival of Nuclear Power in Asia Poses Security Concerns**

China is planning to build two large new nuclear reactors per year for the next 16 years. While much of the rest of the world is turning away from this energy source, 16 of the 27 nuclear power plants now being built worldwide are in China, India, Japan and South Korea. The political-

military issues of this are addressed in the new edition of *The Military Balance* by the London-based International Institute of Strategic Studies. (October 2004) Ref.1901

### **China to Control NBC and Missile Exports, Possibly Join MTCR**

Speaking at the 5th Sino-US Conference on Arms Control, Disarmament and Nonproliferation, Vice Foreign Minister Zhang Yesui announced a set of laws and regulations to control exports of nuclear, biological, chemical, and missile technologies. These presumably represent the full embodiment and extension of the similar biological weapons and missile provisions announced in August and October 2002. Zhang also indicated China's willingness to join the Missile Technology Control Regime (MTCR). (July 2004) Ref.1902

### **International Cooperation to Address Radioactive Waste Emergent Disaster in Central Asia**

"Radioactive waste in northern Tajikistan is the biggest human-made disaster in Central Asia," said an Environmental Officer of the OSCE at a two-day conference on radioactive waste disposal sites in northern Tajikistan and its consequences on the environment and health of the local population. During the Soviet era, nuclear waste in Tajikistan was not managed well. As a result, it is now claimed that 10 million people in the basin of the Syr-Darya River have been affected by nuclear waste. Over 200 participants from countries of the Commonwealth of Independent States, as well as representatives of the UN, the EU, the U.S., and Iran came to Dushanbe to share their expertise in addressing this problem, which has also been a cause of tension with neighboring states, namely Uzbekistan, Kyrgyzstan and Kazakhstan. The conference recommendations will be submitted to the International Atomic Energy Agency (IAEA) and the OSCE Permanent Council for a further action plan. (November 2004) Ref.1903

### **UN Investigators Warn of Illegal Uranium Mining in DRC**

UN investigators warned that illegal mining at a closed uranium mine in the Democratic Republic of the Congo poses a terrorism risk. UN authorities "recommended that this mine be secured and put in the charge of a private operation for much more disciplined operations, with the aim of avoiding risks including the high rate of radioactivity ... and uranium trafficking with those who shouldn't get it in their hands." The potential threats of transnational organized crime in cooperation with terrorists for illegal uranium mining are significant. (July 2004) Ref.1904

### **Israeli Dimona Nuclear Reactor**

Ben Gurion University, the Water Authority, and the Center for Atomic Researches in Wadi Sureek have published findings of elevated radiation levels in the Negev and Arava aquifers near the Dimona reactor. This follows warnings from the Palestinian Environment Quality Authority last year of the potential environmental threat of the aging Dimona reactor. (July 2004) Ref.1905

### **Small Disposable Nuclear Power Plants Raise Environmental Concerns**

The U.S. Department of Energy's Lawrence Livermore National Lab is developing a "small sealed transportable autonomous reactor" (SSTAR) that can meet the energy needs of developing countries without the risk of diverting fissile material to weapons programs. The reactor will have partial breeder capability, and will incorporate a mechanical system to move a generation point along a linear fuel store. A satellite-based alarm system to guard against tampering is planned. The reactors can be transported to a location, and without needing refueling or maintenance, generate power in the 10-100 MW range for up to 30 years. A prototype is hoped

for by 2015. (September 2004) Ref. 1906

## POTENTIAL HEALTH THREATS OF SOME NEW TECHNOLOGIES

### NANOTECHNOLOGY

The following are a few websites providing continuous updates on nanotechnology assessments, and therefore could be useful to those concerned with addressing potential health and environmental implications of nanotechnology:

<http://epa.gov/oppt/nano/>

<http://www.nanotechproject.org/inventories>

<http://www.nanobusiness.org/index.php>

### Assessmet of Potential Health and Environmnetal Implications of Nanotechnology

Code of Conduct for Responsible Nanotechnologies

Nanoparticulates environmental pollution and health risk might trigger international regulatory agreements

Genetic Engineering, Nanotechnology, and Robotics Technology Forecast—calls for “rapidly develop ethical and legal standards and defensive technologies”

International Council on Nanotechnology (ICON) Created

Grand Challenges for Nanotechnology

Risks of Nanotechnology Applications

Nanomaterials Handbook

Device for Nanoparticle Study

New Wiki on Safe Nanotech in the Workplace

International Approaches to the Regulatory Governance of Nanotechnology

Roadmap for Characterizing Nanomaterial Health Effects

New Review of Analytical Methods to Assess Nanoparticle Toxicity

Database for Nano Environmental Health and Safety

New Technology to Measure Single Nanoparticles

New Inventory Lists More Than 1000 Nanoproducts

Global Archive of Government Nanotech Documents Launched

List of Experts in Nanotechnology Ethics Published

Transatlantic Regulatory Cooperation: Securing the Promise of Nanotechnologies

Scientists Object to Generalized Nano-Hazard Statements

OECD Reports on Nanotech Risks

International Approaches to the Regulatory Governance of Nanotechnology

NanoAssociation for Natural Resources and Energy Security (NANRES) Formed

Rise of General Public Interest and Outcry

New Paper Claims Nanotech Environmental Downsides Trivialized or Ignored

New Paper Suggests Concentrating Toxicity Studies on Smaller Nanoparticles

Call for Systematic Studies to Link Nanoproperties and Hazards

Five-year Review of Royal Society Report

Report Reviews Nanoparticle Risks and Regulation  
New Studies Add to Knowledge on Nanoparticles and Biological Reactions  
Regional Reports on Nanotech Issued by International Group  
Improved Investigative Techniques for Identifying Engineered Nanomaterials in the Environment  
Insects Are Affected by, and Can Spread, Carbon Nanoparticles  
Industry Silver Nanotech Group Opposes "New Material" Designation  
German Body Advises against Nanosilver in Consumer Products  
EPA Unveils Nanotech Risk Research Plan  
EPA Official Says Carbon Nanotubes Will Continue to Be Regulated Case-by-Case  
Petition Filed for EPA to Regulate Nanosilver  
Policy Framework for Addressing Nanomaterial Risks in California  
Health Canada Seeks Comments on Nanomaterials Definition  
European Commission to Review Nanomaterial Policies  
European Environmental Bureau Assessment of Nanotech Governance Issues  
EC's DEEPEN Final Report on Nanotech Development Ethics  
European FramingNano Governance Platform  
European Consumer Organizations Call for Better Nano Regulation  
EC Publishes Paper on Options for Framing Public Policy on Nanotech  
Five-Year European Study of the Needs and Opportunities for Nanotech R/D  
Nanomaterials Labeling in New EU Uniform Cosmetics Rule  
Russia Sets Up Nanotech Risk Assessment and Regulation Cooperation  
Russia and Finland to Cooperate on Nanotech Regulation Development  
Australia Sets Up Framework for Safe Nanotech  
Australian Government Proposes New Nanotech Regulations  
India to Establish Nanotechnology Regulatory Board  
Nanomaterials Guidelines Adopted by 53 African Countries  
New Map of Nanotech Centers  
New Wiki on Safe Nanotech in the Workplace  
ILO Booklet on Workplace Hazards  
Comprehensive Review of Engineered Nanomaterials Health and Safety  
Nanotechnology--Assessment of Health Safety and Environmental Factors  
Governing Uncertainty: Environmental Regulation in the Age of Nanotechnology  
EU Efforts Underway to Improve Nanotech EHS Information  
Report Suggests Current Nanotech Protective Gear May Not Be Adequate  
Study Shows Ill Effects of Multiwall Carbon Nanotubes  
Researchers Call for Broad Approach to Nanotube Risk Assessment  
European Project to Study Metal Oxide Nanoparticle Risks  
Metallic Impurities Affect Carbon Nanotube Toxicity  
Questions Raised on Reliability of In Vitro Nanomaterials Toxicity Testing  
New Results on TiO<sub>2</sub> Nanoparticle Toxicity to Cells  
New Technique for Non-toxic Nanosilver  
Sodium Cholate Found to Be Safe Surfactant for Carbon Nanotubes  
Device for Nanoparticle Study  
EU Tightens Safety Precautions on Nano-containing Cosmetics  
Lack of Standards for Engineered Nanoparticles in European Surface Waters

“Environmental and Human Health Impacts of Nanotechnology”  
“Nanoethics: Big Ethical Issues With Small Technology”  
UK Solicits Participation in Nanotech Policy Formulation  
UK House of Lords Committee Urges Nanosafety Transparency  
UK Report Calls on Government to Support Nanotech Risk Assessment  
UK Nanotech EHS Directory Published  
UK Defra Committee Report on Nanosilver  
UK Nanotechnologies Strategy: Small Technologies, Great Opportunities report  
Norwegian Research Group Launches Nanotech Particles Project  
New Centre for Nano Safety Established in Scotland  
Tunisia Sets Up Unit for Environmental Applications and Nanotechnology  
First Sri Lankan Information Portal for Nanotechnology  
NGO Coalitions Raise Doubts about Nanotech and the Environment  
Study Shows Nano Damage Differs by Medium, Target Kingdom  
New Technique Allows Study of Nanoparticles in Embryos  
Guide for Unbound Nanoparticles in Occupational Settings  
Worldwide Nanotech Labs Deficient in EHS Protection  
Australian Group Releases Two Workplace Nanosafety Reports  
New Nanotech Survey Book Covers Environmental Aspects  
*What Is Nanotechnology and Why Does It Matter?* Book on Nanotechnology and Ethics  
Paper Examines "Nanotechnology: Safe By Design?"  
Paper Reviews Nanotech Remediation of Waste Sites  
New Estimation Technique for Nanoparticles in the Environment  
Characterising the potential risks posed by engineered nanoparticles  
Comprehensive Overview of Nanomaterial Properties and Biological Interactions  
Wide Use of Nano-Silver Raises Health and Environmental Issues  
Comparison of Micro- and Nano-particles' Toxicity to Cells  
Review of Safety Practices in the Nanotechnology Industry  
Study of Scientists' and Public's Views of Nanotechnology  
New Policy Brief: Appropriate Risk Governance Strategies for  
Nanotechnology Applications in Food and Cosmetics  
New OECD Report on Nanotech Risks in the Workplace  
Wise-Nano Project of the Center for Responsible Nanotechnology  
Other Initiatives for Addressing Nanotechnology Risks  
EU Parliament Recommends Stronger Nanotech Precautions  
European Nanotechnology Action Plan  
EU to Fund Nanoparticle Environmental Risk Study  
EU Efforts Underway to Improve Nanotech EHS Information  
European Nanotech Safety Proceedings Published  
EU Tightens Safety Precautions on Nano-containing Cosmetics  
European Report on Workplace Exposure to Nanoparticles  
Russia Introduces Nanotechnology Certification System  
New report on Oversight of Next Generation Nanotechnology  
UK to Have New Nanotechnology Risk Information Service  
UK Solicits Participation in Nanotech Policy Formulation  
SAFENANO Publishes First Global Review of EHS Risks of Nanotechnology

Australian New Report and Research Group on Nanotechnology  
Pressure Increases in Australia for Nanotech Safety Regime  
New South Wales Pushes for Nanotech Risk Protection  
China Moves Strongly into Nanotech Arena  
Berkeley, California, Considering Nanoparticle Health and Safety Law  
Proposal for Establishing an Arab Council on Nanotechnology (ACON)  
Tunisian Nanotech Association Formed  
Nanotechnology and worker safety and health  
Nanotechnology Protest  
Corporations under Stockholder Pressure for Nanotech Disclosure  
Nanotechnology Health Concerns Highlight Need for International Technology Convention  
National Research Council Calls for Better Nanotech Risk Assessment  
UN Report Assesses Nanotech and Climate Change  
EU “ObservatoryNANO” project  
New EU Committee Report Very Critical of Nanotech Regulation  
New EU Study on Regulation and Governance of Nanotechnologies  
Report on Ethical Evaluations of Nanotechnology  
Study Shows Toxicity Implications of Nanoparticle Size  
Study Shows Ill Effects of Multiwall Carbon Nanotubes  
EPA Official Says Carbon Nanotubes Will Continue to Be Regulated Case-by-Case  
EPA to Require Company Nanotube Use or Import Notices  
California Requests Nanotube Safety Data  
Increased Research Needed to Address Environmental, Health, and Security Issues  
    Related to Nanotechnology  
Environmental Effects from Nanomaterial Production May Outweigh Its Benefits  
New Study on the Carcinogenicity of Nanoparticles and Other Dusts  
UK Report on Novel Materials in the Environment: The case of nanotechnology  
New Study Shows Nanoparticles in Sewage Could Escape into Bodies of Water  
Diesel Exhausts Emit Nanoparticles Affecting Lung Function  
New Batteries Raise Health/Safety Worries about Lithium Nanoparticles  
Carbon Nanotubes May Spread in Water More Widely Than Thought  
Scientists Correlate Nanoparticle Structure and Toxicity  
Major German Study on Nanotech in Food Industry  
Nanotube Toxicity Tests Unreliable  
Inhaled Nanoparticles May Have Easy Path to Brain  
High Aspect Ratio Nanoparticles May Pose Asbestos-like Risks  
Possible Environmental Hazard from Quantum Dots  
Cleanup and Other Nanomaterials May Re-release Pollutants  
Nanotechnology and the Food and Agriculture Sector  
Reaction to Voluntary Nanomaterial Reporting Scheme  
FDA Forms Internal Nanotechnology Task Force  
National Nanotech Regulation Experts Discuss Emerging Issues  
European Commission Opens Nano2Life Network  
French Group Opens Public Web Site on Nanotechnology  
Chinese and Russian New Nanotechnology Organizations  
UK Nanotechnology Policy Review Announced

[UK Review Faults Governments' Nanotech Risk Assessment Plans](#)  
[Nanomaterials' Biological Risks a Complex Problem](#)  
[Online Consultation on Nanomaterials Specification in EU Technical Guidance for Chemicals](#)  
[Swiss Firm Offers Nanotech Risk Assessment Data and Safety Certification](#)  
[UN Environment Programme Calls for Nanotech Safeguards](#)  
[Survey Gives Insight into Effective Nanotech Education Methods](#)  
[New Report on Nanotechnology Applications in Water Treatment](#)  
[French Research Council to Study Nanotube Toxicity](#)  
[European Guide to Green Masters Programs Launched](#)  
[Toxic Metals Carried into Cells by Nanoparticles](#)  
[Nanotechnology Health Concerns Highlight Need for International Technology Convention](#)  
[Industry/Environmental Cooperative Effort on Nanotechnology Risks](#)  
[Low Environmental Risk from Nanomaterial Manufacturing](#)  
[Nanomaterials in Drinking Water May be Hazardous](#)  
[UK Launches \\$8.5M Nanotech Risk Research](#)  
[EPA Nanotechnology White Paper](#)  
[German NanoCare Project to Evaluate Nanoparticles](#)  
[New Patent Office Nanotech Index Should Speed Research](#)  
[Nanotech Health, Safety, and Environment Working Group Set Up by ISO/ANSI](#)  
[Managing the Effects of Nanotechnology](#)  
[New Technique for Non-toxic Nanosilver](#)  
[NGO Coalitions Raise Doubts about Nanotech and the Environment](#)  
[Lux Report Addressing Nanotech Health, Environmental, and Safety Risks](#)  
[Buckyballs Risks](#)  
[Evidence of Damage to Beneficial Microbes from Nanoparticles](#)  
[Grant for Review of Best Practices in Nanotech Safety](#)  
[Nanotechnology's Bottom-up Approach Gets a Boost](#)  
[Other Nanotechnology Safety Assessments](#)  
[Other Nanotechnology Assessment Reports](#)

#### Code of Conduct for Responsible Nanotechnologies

The European Commission (EC) invites comments on the proposed Recommendation on a Code of Conduct for Responsible Nanosciences and Nanotechnologies Research. The Commission intends to collect views on the safe development of NST from a broad audience, ranging from research, industry, civil society, policy and media, and the general public.

The UK's Royal Society and a group of other organizations have begun an initiative to develop a "Responsible NanoCode" for businesses working with nanotechnologies. According to Nanowerk, "The aim of the Code will be to establish a set of internationally relevant principles which outline good practice for businesses involved in all aspects of these emerging technologies and their applications including research, development, manufacturing, distribution and retailing." The code will be developed by a working group of representatives from a variety of stakeholders.

A U.S. Congressional bill 'To ensure the development and responsible stewardship of nanotechnology' was referred on July 31, 2007 to the Committee on Science and Technology,



and in addition to the Committees on Ways and Means, Energy and Commerce, and Homeland Security. A "Pollution Prevention through Nanotechnology" conference will be held September 25-26, 2007, in Arlington, VA. The forum is organized by EPA to improve understanding of nanotechnology and to "encourage responsible development of nanotechnology that prevents pollution." (July 2007) Ref.1909

Nanoparticulates environmental pollution and health risk might trigger international regulatory agreements

Nanoparticulate (less than 100 nanometers in size) pollution has been shown to enter the bloodstream and brain after being inhaled. In addition to causing damage at the point of entry to the body, nanoparticulate pollution has been shown to cause lung damage and has been implicated in cardiovascular disease. Since the field of nanotechnology is new, no long-term studies of occupational exposure to nanoparticulate pollution have yet been performed. Like any other form health threat and environmental pollution, nanoparticulates are likely to find their way into international regulatory agreements. US EPA and the Woodrow Wilson Center's Program on Governance and Foresight have held seminars on this new form of pollution and health risk. (January 2004) Ref.1910

Genetic Engineering, Nanotechnology, and Robotics Technology Forecast—calls for "rapidly develop ethical and legal standards and defensive technologies"

"Promise and Peril of the 21st Century" by the futurist and inventor Ray Kurzweil is an interesting forecast of genetic engineering, nanotechnology, and robotics (GNR) technologies and their implications. He offers warnings on threats posed by nanotechnology, as well as those of its control and access. Further, he calls attention to "the vital task in front of us: to rapidly develop ethical and legal standards and defensive technologies that will be essential to our security. This is a race, and there is no alternative."

Similarly, an International Herald Tribune article, "Research alert: small can kill" based on DuPont research, draws attention to the fact that assessing the potential environmental and health impacts of nanomaterials could take years, being much outpaced by the rate of industrial adoption of nanotechnology. (November 2003) Ref.1911

International Council on Nanotechnology (ICON) Created

The International Council on Nanotechnology (ICON) is a coalition of academic, industry, regulatory, and non-governmental organizations working together to ensure that nanotechnology benefits humanity without negative implications for health and the environment. ICON activities' categories include: science and engineering research into the potential environmental and health impacts of engineered nanostructures; social science research into public perceptions toward new technology, and the role that regulatory and other governmental policies can and should play in nanotechnology stewardship; collaborative policy activities that develop international standards for engineered nanostructure terminology and metrology, safety guidelines, and best laboratory practices; public communication and outreach that tracks all relevant technical data on nanotechnology's potential risks; and presentation of this information in terms and formats that are accessible by laypersons. ICON is located and coordinated by The Center for Biological and Environmental Nanotechnology (CBEN) at Rice University. (November 2004) Ref.1912

### Grand Challenges for Nanotechnology

A group led by Andrew Maynard of the Woodrow Wilson Center's Project for Emerging Nanotechnologies suggest five "grand challenges" for nanotechnology over the next 15 years:

- develop instruments to assess exposure to engineered nanomaterials in air and water within next 3-10 years
- create and test ways of evaluating the toxicity of nanomaterials in 5-15 years
- generate models to predict their possible impact on the environment and human health over the next 10 years
- develop ways to assess the health and environmental impact of nanomaterials over their entire lifetime, within the next five years
- organize programs to enable risk-focused research into nanomaterials, within the next 12 months

The leadership of the House of Representatives Science Committee commented, "This paper should be a landmark in the history of nanotechnology research. It lays out a clear, reasonable, prioritized, consensus-based set of priorities for examining the potential environmental and health consequences of nanotechnology over the next decade and a half." (November 2006) Ref.1913

### Risks of Nanotechnology Applications

A recent article in Nanowerk pointed out the increasing use of nanomaterials in building construction, and the consequent rise in health and environmental risks because of this usage. (November 2006) Ref.1914

### Nanomaterials Handbook

A new 780-page Nanomaterials Handbook has been published by CRC Press. With 27 chapters by 62 authors, this encyclopedic work thoroughly covers the field, and received a very favorable review in Nature. The only significant criticism was its lack of almost all 2005 and later work (a type of problem difficult to avoid in a very large compendium in a rapidly advancing field). (October 2006) Ref. 1915

### Device for Nanoparticle Study

Izon Ltd. of Christchurch, New Zealand, advertises a relatively inexpensive new device for the detection and measurement of nanoparticle. The qNano is a proprietary scanning ion occlusion spectroscopy (SIOS) platform for fluid-borne nanoparticle analysis. According to an announcement, it provides, "dynamically adjustable nanopores, enabling tunable, resistive pulse sensing over a wide particle size range." (July 2009) Ref. 1916

### New Wiki on Safe Nanotech in the Workplace

According to Meridian, "The Rice University-based International Council on Nanotechnology (ICON), Texas, introduced the GoodNanoGuide, an online, community-driven wiki for information about the safe handling of nanomaterials. ... It is designed to be a practical tool for people who handle nanomaterials as well as an online repository of safety protocols." The guide is available at the site below. (July 2009) Ref. 1917

### International Approaches to the Regulatory Governance of Nanotechnology

The Regulatory Governance Initiative (RGI) at Carleton University, Ottawa ON, has published a

new report, *International Approaches to the Regulatory Governance of Nanotechnology*, that addresses the question: "How have Canada and other jurisdictions reacted to the recent emergence of nanotechnology-based products in the marketplace (and what is the current state of affairs)?" According to the story in *Nanowerk News*, it contains descriptions of the policy, regulatory, and stewardship approaches undertaken, and discusses the effectiveness of these approaches. (May 2009) Ref. 1918

#### Roadmap for Characterizing Nanomaterial Health Effects

*Principles for characterizing the potential human health effects from exposure to nanomaterials: elements of a screening strategy*, a report sponsored by the EPA, details the various ways in which nanoparticles can be characterized (shape, size, electrical properties, etc.) and the kinds of tests that can be carried out to determine their effects, in different contact modes, on anatomical and physiological elements in the body. (October 2005) Ref. 1919

#### New Review of Analytical Methods to Assess Nanoparticle Toxicity

According to the abstract, "Nanotoxicology relies on many analytical methods for the characterization of nanomaterials as well as their impacts on in vitro and in vivo function. This review provides a critical overview of these techniques from the perspective of an analytical chemist, and is intended to be used as a reference for scientists interested in conducting nanotoxicological research as well as those interested in nanotoxicological assay development." (March 2009) Ref. 1920

#### Data Base for Nano Environmental Health and Safety

The International Council on Nanotechnology (ICON), managed by Rice University's Center for Biological and Environmental Nanotechnology, has established the ICON Environmental, Health and Safety (EHS) database, containing summaries (abstracts) and citations for research papers related to the EHS implications of nanoscale materials. The database allows search by keywords and by aspects of the research reported, such as "exposure pathway = inhalation". (September 2006) Ref. 1921

#### *Databases on Nanosafety*

##### OECD Database on Nanomaterials Safety Research

The July 2009 issue of the bimonthly newsletter published by the European Network on the Health and Environmental Impact of Nanomaterials notes the establishment of the OECD Database on Research into the Safety of Manufactured Nanomaterials, which "holds details of completed, current and planned research projects on safety, which are to be updated (electronically) by delegations."

##### *Automated Nanosafety Database Planned*

According to a news release, a four-year R/D effort, the Nano Health Environment Commented Database (NHECD), is underway to "create and maintain an automated database that will retrieve, index and extract from scientific publications results related to the health and environmental impact of nanoparticles. The annotated, commented results and the extracted information will be stored at a central repository that will be available to research scientists, regulatory bodies and NGOs, [and] the general public." The EU FP7 project is coordinated by Prof. Oded Maimon and managed by Abel Browarnik, both of Tel Aviv University's Dept. of

Industrial Engineering. (August 2009) Ref. 1922

*New Database of Nanotechnology Risk Studies*

The Project on Emerging Nanotechnologies at the Woodrow Wilson International Center for Scholars in Washington has just established an on-line database intended to provide information on nanotech risk projects worldwide. Although it currently contains U.S government-sponsored research, it is planned to be international and comprehensive. (December 2005) Ref. 1923

*Nanotech Consumer Products Data Base*

The Emerging Nanotechnologies Project of the Woodrow Wilson International Center for Scholars has launched the first publicly accessible on-line 'Nanotechnology Consumer Products Inventory.' The database lists over 200 nanotech-related consumer products by name, manufacturer, country of origin, and category, and includes a product photograph, description, and Web link. The database is available at <http://www.nanotechproject.org/index.php?id=44> and is still being expanded. (March 2006) Ref. 1924

New Technology to Measure Single Nanoparticles

Prof. Lin Yang and his team at Washington Univ. have developed a "whispering-gallery-mode resonator" that provides a new degree of accuracy—1% to 2%—in the measurement of nanoparticle size. (December 2009) Ref. 1925

New Inventory Lists More Than 1000 Nanoproducts

The Wilson Center/Pew Trusts' Project on Emerging Nanotechnologies (PEN) has noted that its inventory of consumer nanoproducts has now exceeded 1000 entries. [Related item: *New Map of Nanotech Centers* in the August 2009 environmental security report.] (September 2009) Ref. 1926

Global Archive of Government Nanotech Documents Launched

The Center for the Study of Law, Science, & Technology at Arizona State University's Sandra Day O'Connor College of Law has launched the Nanotech Regulatory Document Archive, a global database of government documents on nanotechnology. Each document will be accompanied by an abstract. The archive will be set up as an edited wiki, and, notes Nanowerk News, "Documents for a specific jurisdiction can be accessed by clicking on a map or on a region, nation or entity." (December 2009) Ref. 1927

List of Experts in Nanotechnology Ethics Published

The ObservatoryNano project has published Experts NanoEthics and Ethical, Legal and Social Aspects of Nanotechnology [sic], a comprehensive list of personnel in the field. According to the announcement, it "includes senior academics and consultants, experienced in nanoethics or ethical, legal and social aspects of nanotechnology from different countries in Europe and the rest of the world ... [and in] addition, a list of junior experts including PhD students and young professionals". Each entry includes complete contact information and a note on area of expertise. (December 2009) Ref. 1928

ObservatoryNANO 2nd Annual Report on Ethical and Societal Aspects of Nanotechnology  
Meridian Nanotechnology and Development News reports that the ObservatoryNANO project

has published a report on nanobioethics that includes discussions of the ethical, legal and societal aspects of nanotech for health, medicine, nanobiotechnology, nanotech for agrifood, and on nanotechnology and animal testing. (May 2010) Ref. 1929

#### Transatlantic Regulatory Cooperation: Securing the Promise of Nanotechnologies

The EU and the US have undertaken a collaborative research project, *Regulating Nanotechnologies in the EU and US: Towards Effectiveness and Convergence*, to investigate the regulatory challenges raised by nanotechnologies and to assess the effectiveness of existing approaches. A conference, *Transatlantic Regulatory Co-operation: Securing the Promise of Nanotechnologies*, will be held September 10-11, 2009, in London, to discuss recommendations from the project, and to consider new ideas for the future. A subsequent, shorter meeting on the same subject will be held at the Wilson Center in Washington on September 23, 2009.

*Securing the Promise of Nanotechnologies Towards Transatlantic Regulatory Cooperation* report by the international collaborative project *Regulating Nanotechnologies in the EU and U.S.*, is a comprehensive state-of-the-art overview of aspects related to nanotechnology: environment, health and safety risks; and key regulatory frameworks, issues and challenges—including relevant national and international institutions—in the U.S., EU, and internationally, with specific focus on chemical, food, and cosmetics regulations. The report highlights that although “No efforts have been undertaken as yet to create a formal, treaty-based, international framework for nanomaterials regulation,” in the future such an international framework treaty might be needed, given the globalization of nanotechnology developments. It concludes that the EU and the US should play a greater role in developing an international nanotech regulatory framework. Commenting on the report, some experts expressed that nanotechnology and biotechnology would need a complex and flexible regulatory system, due to their unknown evolution and often absence of data. (August 2009) Ref. 1930

A study published in *Nature Nanotechnology* and reported by *Nanowerk News* found that public perceptions of nanotechnology do not follow previously seen patterns for new technological developments, and concludes that “Given the potential malleability of perceptions, novel methods for understanding future public responses to nanotechnologies will need to be developed.” (September 2009) Ref. 1931

#### Scientists Object to Generalized Nano-Hazard Statements

A group of distinguished scientists in the nanotechnology field have published an open letter in *Nanotoxicology* in order "to draw the attention of the nanotoxicology community to how the term 'nanoparticles' is being somewhat indiscriminately used, especially in the titles of scientific papers and in statements to the press." Their objection takes as an example "a recent paper that linked nanoparticles in the most general sense to seven very serious cases of occupational lung and pleural injury occurring in China. The exposures were not characterized, but histological assessment of lung biopsies and pleural fluid indicated the presence of nanoparticles with an unidentified origin or chemistry. Despite a lack of information on the nature of the nanoparticles, the research was published under the title 'Exposure to nanoparticles is related to pleural effusion, pulmonary fibrosis and granuloma' ". The panel strongly cautions all involved in communication of nanotech issues to consider the present uncertainties in the study of nanotech pathogenesis, to be precise in stating the technical bases and limitations of studies, and not to make such generalized statements as in the title cited above. (December 2009) Ref. 1932

### OECD Reports on Nanotech Risks

The OECD has published three reports on the safety of engineered nanomaterials:

- *Report of the Questionnaire on Regulatory Regimes on Manufactured Nanomaterials* summarizes objectives and activities covered by each piece of legislation; features for consideration when amending or drafting legislation for regulatory oversight
- *Report of the Workshop on Risk Assessment of Manufactured Nanomaterials in a Regulatory Context*
- *Report of the Questionnaire on Regulatory Regimes on Manufactured Nanomaterials*
- *OECD Programme on the Safety of Manufactured Nanomaterials 2009-2012: Operational Plans of the Projects*  
[http://www.oecd.org/department/0,3355,en\\_2649\\_34365\\_1\\_1\\_1\\_1\\_1,00.html](http://www.oecd.org/department/0,3355,en_2649_34365_1_1_1_1_1,00.html)
- *Report of the Workshop on Risk Assessment of Manufactured Nanomaterials in a Regulatory Context* presents critical issues specific for risk assessment of nanomaterials in a regulatory context and identifies approaches for risk assessment based on the current state of knowledge. Presentations included Risk Assessment Case Studies on nano-TiO<sub>2</sub>, nano-Ag and Carbon Nanotubes.  
[http://www.oecd.org/department/0,3355,en\\_2649\\_34365\\_1\\_1\\_1\\_1\\_1,00.html](http://www.oecd.org/department/0,3355,en_2649_34365_1_1_1_1_1,00.html) [May 2010]
- *Report of the Questionnaire on Regulatory Regimes on Manufactured Nanomaterials* summarizes objectives and activities covered by each piece of legislation; features for consideration when amending or drafting legislation for regulatory oversight  
[http://www.oecd.org/department/0,3355,en\\_2649\\_34365\\_1\\_1\\_1\\_1\\_1,00.html](http://www.oecd.org/department/0,3355,en_2649_34365_1_1_1_1_1,00.html)[May 2010]
- *OECD Programme on the Safety of Manufactured Nanomaterials 2009-2012: Operational Plans of the Projects* aims to ensure that the approach to hazard, exposure and risk assessment is of a high, science-based, and internationally harmonized standard  
[http://www.oecd.org/department/0,3355,en\\_2649\\_34365\\_1\\_1\\_1\\_1\\_1,00.html](http://www.oecd.org/department/0,3355,en_2649_34365_1_1_1_1_1,00.html)[May 2010]
- *Report of an OECD Workshop on Exposure Assessment and Exposure Mitigation: Manufactured Nanomaterials* (90 pp.) Contents include presentations on Exposure Measurements--Latest Developments in Analytical Methodology; Distinction Between Carbonaceous Nanomaterials and Background Airborne Particulate Matter; Relevance of Dustiness and Aerosol Dynamics for Personal Exposure; Development of Exposure Situations for Manufactured Nanoparticles (MNPs); Control Banding Nanotool- A Qualitative Risk Assessment Method; Approaches for the Definition of Threshold Limit Values for Nanomaterials <https://www.oecd.org/dataoecd/15/25/43290538.pdf>
- *Comparison of Guidance on Selection of Skin Protective Equipment and Respirators for Use in the Workplace: Manufactured Nanomaterials* (25 pp.)  
<https://www.oecd.org/dataoecd/15/56/43289781.pdf>
- *Emmision (sic) Assessment for Identification of Sources and Release of Airborne Manufactured Nanomaterials in the Workplace: Compilation of Existing Guidance* (25 pp.) <https://www.oecd.org/dataoecd/15/60/43289645.pdf> (August 2009)

OECD has released several new publications in its series on the Safety of Manufactured Nanomaterials, including “Preliminary Review of OECD Test Guidelines for their Applicability to Manufactured Nanomaterials.” (September 2009) Ref. 1933

### OECD to Release Guidance for Manufactured Nanomaterials Testing

The Organization for Economic Cooperation and Development plans to publish in the next month or so new draft guidance on the preparation of samples used for safety testing of manufactured nanomaterials. According to the Bureau of National Affairs, an OECD official stated that using traditional bulk chemical test methods with nanomaterials can lead to unexpected results and, "Materials tend to agglomerate or will attach themselves to other things that are in the [test] medium. So there is always the possibility that people are not testing the thing that they thought they were testing," He also announced that OECD will be explaining human health and environmental safety aspects of nanotechnology at a series of regional meetings. "We will be explaining the kind of work we've been doing and the kind of guidance documents that we've developed," he said. The first such event will be Nov. 27 in Beijing, for the Asia-Pacific region. (November 2009) Ref. 1934

### OECD Publishes Nanomaterials Roadmap and Information Gathering Analyses

The Organisation for Economic Co-operation and Development has published *Manufactured Nanomaterials: Roadmap for Activities During 2009 and 2010*, which, according to Nanowerk News, "presents a brief description of the ways in which the Working Party on Manufactured Nanomaterials (WPMN) contributes to the overall objectives of the Environment, Health and Safety Programme (EHS), and the OECD as a whole." It has also issued *Analysis of Information Gathering Initiatives on Manufactured Nanomaterials*, which specifies a desirable set of information elements, and considerations and recommendations for countries planning such an activity, and summarizes existing efforts in seven countries. (December 2009) Ref. 1935

### NanoAssociation for Natural Resources and Energy Security (NANRES) Formed

A group of nanotechnology-interested companies have formed the NanoAssociation for Natural Resources and Energy Security (NANRES), which, according to Nanowerk News, "is designed to advance the research, development, and commercialization of innovative energy and environmental-specific nanotechnologies." (December 2009) Ref. 1936

### Rise of General Public Interest and Outcry

The rise of general public interest and outcry can signal a turning from involvement of technocrats and some politicians to a more general political atmosphere.

Disruptions by environmentalists have forced the cancellation of three of the scheduled debates in France on nanotech issues. [See item *French Public Debate on Nanotechnology* in the October 2009 environmental security report.]

Johannes Simons, of the Institute for Food and Resource Economics at the University of Bonn, and colleagues have published a paper, *The Slings and Arrows of Communication on Nanotechnology*, that addresses the general problems of communicating nanotechnology risk. According to Nanowerk Spotlight, they utilized research from Germany, the US, and Australia to develop their recommendation, "...risk communication on nanotechnologies requires target-specific approaches...", and that "...it is important to involve trusted institutions in the risk communication process. This could help people to accept the information because they do not suspect the communicator of having some hidden interests or of deceiving them with misleading information."

The need for reforms in the process is supported by a study by Prof. Elizabeth Corley, of Arizona State University's School of Public Affairs, and Dietram A. Scheufele of the University

of Wisconsin—Madison that, “found widening gaps in nanotech knowledge since 2004 between the least educated and most educated citizens. Americans with at least a college degree have shown an increase in understanding of the new technology, while knowledge about nanotechnology has declined over time for those with education levels of less than a high school diploma”, according to a Nanowerk News story.

The 5th International NanoRegulation Conference took place on November in Rapperswil, Switzerland, with the theme, " 'No Data, no Market?' - Challenges to Nano-Information and Nano-Communication along the Value Chain", presenting views and expectations regarding information and data exchange along the value chain, and possible approaches to the problem. A report is now available. According to Meridian Nanotechnology and Development News, "the debate at the conference revealed an urgent need for '...a coordinated information transfer of relevant nanospecific data along the value chain,' while recognizing the concerns that nano-labeling could be misunderstood as an indication of hazard by consumers." (January 2010) Ref. 1937

#### New Paper Claims Nanotech Environmental Downsides Trivialized or Ignored

The International POPs Elimination Network's Nanotechnology (IPEN) Working Group and the European Environmental Bureau (EEB) issued a paper claiming, "there is emerging evidence ... claims [of nanotech benefits] do not provide the whole picture, with serious environmental risks and costs being trivialised or ignored". The 8-page paper covers a variety of topics, and contains a large number of references to the literature. The EEB also published a series of papers on Nanotechnologies in the 21st Century. IPEN is a global network of more than 700 public interest NGOs, and EEB represents over 145 environmental organizations in 31 countries. (August 2009) Ref. 1938

#### New Paper Suggests Concentrating Toxicity Studies on Smaller Nanoparticles

An on-line paper by researchers from the Center for the Environmental Implications of NanoTechnology (CEINT), Duke University, suggests that particles in the <30 nm section of the 1-100 nm "nano spectrum" should receive the most attention in studying the environmental and human health impacts of nanomaterials, since it is in that high surface-area-to-volume ratio range that possibly hazardous increases in reactivity are more likely to be observed. (September 2009) Ref. 1939

#### Call for Systematic Studies to Link Nanoproperties and Hazards

A recent paper by Dr. Amanda Barnard of CSIRO Australia discusses a “number of strategies ... combining the desirable aspects of theory, simulation, experiment and observation, and leading to predictions for incorporation into preventative frameworks” for mitigation of possible hazards from nanomaterials. (September 2009) Ref. 1940

#### Five-year Review of Royal Society Report

To mark the fifth anniversary of the publication of the Royal Society report on nanotechnology, the Responsible Nano Forum "invited opinion formers from science, risk, investment, NGOs, unions, business and consumer groups to reflect on the legacy of the report and what still remains to be done." The new report features contributions on: General Reflections; Regulation, responsibility, safety, and risk; Standardisation; Social, ethical, and public engagement; and International organisations. The Responsible Nano Forum also created a new website at



www.nanoandme.org to provide a forum for discussion of nanotech issues. (August 2009)  
Ref. 1941

#### Report Reviews Nanoparticle Risks and Regulation

A new paper in the Royal Society's Interface reviews the current state of nanoparticle risk research and regulation. The authors discuss "Lessons from History", "Nanotoxicology & Exposure" (concluding that "in many cases knowledge is sufficient to implement effective controls to minimise exposure and these should be put into place"), and "Knowledge gaps & the road to regulation." The 12-page paper lists 52 references. (September 2009) Ref. 1942

#### New Studies Add to Knowledge on Nanoparticles and Biological Reactions

Work being done by Silvia H. De Paoli Lacerda and Jack F. Douglas at the Polymers Division of the National Institute of Standards and Technology (NIST) is shedding new light on the effects of nanoparticle size (5nm to 100nm) on their association with a whole range of important blood proteins. (January 2010) Ref. 1943

#### Regional Reports on Nanotech Issued by International Group

ICPCNanoNet is a repository of published nanoscience research for scientists in the EU and International Cooperation Partner Countries (ICPC). It has begun to publish its series of annual regional reports describing nanoscience and nanotechnology initiatives and activities in eight ICPC regions: Africa, Caribbean, Pacific, Asia, Eastern Europe and Central Asia (EECA), Latin America, Mediterranean Partner Countries (MPC), and Western Balkan Countries (WBC). Their extensive content includes regional initiatives, national programs for nanoscience and nanotechnology, responsible government agencies, centers for nanoscience and nanotechnology research, and national nanoscience and nanotechnology networks. It is an EU FP7 support action coordinated by the UK Institute of Nanotechnology that brings together partners from the EU, China, India and Russia. For access to reports, registration is required. (August 2009) Ref. 1944

#### Improved Investigative Techniques for Identifying Engineered Nanomaterials in the Environment

A recently published note summarizes the present state of affairs in retrieving and analyzing nanoparticles from the environment. Some nanoparticles in the outside world have originated from masses of normally sized material of the same kind; others were coated originally or have acquired disguising coverings. This short article from Environmental Science and Technology of the American Chemical Society cites several current efforts to improve investigative techniques. (August 2009) Ref. 1945

#### Insects Are Affected by, and Can Spread, Carbon Nanoparticles

David Rand and Robert Hurt, and colleagues, at Brown University have published a study that, according to Nanowerk News, "raises the possibility that flies and other insects that encounter nanomaterial 'hot spots,' or spills, near manufacturing facilities in the future could pick up and transport nanoparticles on their bodies, transferring the particles to other flies or habitats in the environment". Further, "adult [fruit] flies died or were incapacitated when their bodies were exposed to large amounts of certain nanoparticles." Larvae were unaffected by ingested nanomaterial. The scientists also found that contaminated flies could transfer the nanoparticles to other flies, and hence possibly to humans. (August 2009) Ref. 1946

### Industry Silver Nanotech Group Opposes "New Material" Designation

The Silver Nanotechnology Working Group (SNWG) has released the content of a presentation it made to EPA's Scientific Advisory Panel on the topic of "Evaluation of Hazard and Exposure Associated with Nanosilver and Other Nanometal Oxide Pesticide Products". In it, the group stated that EPA has safely and successfully regulated these products for decades, and that "calls for treatment of nanosilver as a new material requiring development of expensive new test regimes and discriminatory regulatory consideration are difficult to justify." (December 2009) Ref. 1947

### German Body Advises against Nanosilver in Consumer Products

The Federal Institute for Risk Assessment (BfR), of the German Federal Ministry of Food, Agriculture and Consumer Protection (BMELV), is advising against the use of nanoscale silver ions in consumer products until a definitive safety assessment is available. (June 2010) Ref. 1948

### EPA Unveils Nanotech Risk Research Plan

The Environmental Protection Agency has announced a new research strategy for the next several years for work on the health and environmental risks from manufactured nanomaterials and on nanotech-based cleanup techniques. (October 2009) Ref. 1949

### EPA Official Says Carbon Nanotubes Will Continue to Be Regulated Case-by-Case

According to the Bureau of National Affairs' Daily Environment Report, cited in Meridian's Nanotechnology and Development News, EPA, "will continue to regulate carbon nanotubes on a case-by-case basis, as the distinct characteristics of each kind of carbon nanotube could mean each has different implications for human health and the environment." (July 2009) Ref. 1950

### Petition Filed for EPA to Regulate Nanosilver

The International Center for Technology Assessment (ICTA) and a coalition of consumer, health, and environmental groups has filed a petition with EPA, requesting that it regulate all nanosilver products as pesticides and ban all consumer products containing nanosilver, under the Federal Insecticide, Fungicide and Rodenticide Act. The action is being interpreted as a first step in a campaign for more intensive evaluation and possible regulation of nanoproducts. (November 2009) Ref. 1951

### Policy Framework for Addressing Nanomaterial Risks in California

The Program on Reproductive Health and the Environment at the Univ. of California, San Francisco, has developed a draft set of policy recommendations to address the potential health risk for the state of California from nanomaterials and nanotechnology: "A Nanotechnology Policy Framework: Policy Recommendations for Addressing Potential Health Risks from Nanomaterials in California". The report presents "an overview of nanotechnology materials and their potential exposures and human health risks, and proposes a selection of policy options for addressing potential hazards and risks from nanotechnology." (May 2010) Ref. 1952

### Health Canada Seeks Comments on Nanomaterials Definition

Health Canada has developed an interim policy statement that establishes a working definition for nanomaterials, in order to provide a basis for applying current legislation and regulations to

nanotechnology products. They are seeking informal feedback from international stakeholders; comments will be accepted until 31 August 2010. (April 2010) Ref. 1953

#### European Commission to Review Nanomaterial Policies

Responding to a request from the European Parliament, the European Commission plans to "review all relevant legislation within two years to ensure safety for all applications of nanomaterials in products with potential health, environmental or safety impacts over their life cycle," according to EU Environment Commissioner Stavros Dimas. (October 2009) Ref. 1954

#### European Environmental Bureau Assessment of Nanotech Governance Issues

According to Nanowerk, the European Environmental Bureau has issued a report, *Nanotechnologies in the 21st Century - A Critical Review of Governance Issues in Europe and Elsewhere* (October 09), outlining the critical governance structures needed for the safe development and use of nanotechnology. The report "reviews the current uncertainties associated with the governance of nanotechnologies ... [and] presents NGO initiatives for nano regulation calling for the application of the precautionary principle and pre-market registration of materials." (October 2009) Ref. 1955

#### EC's DEEPEN Final Report on Nanotech Development Ethics

The release of the Final Report from the EC-funded DEEPEN Project has been announced. The project characterizes itself as "Europe's leading research partnership for integrated understanding of the ethical challenges posed by emerging nanotechnologies in real world circumstances, and their implications for civil society, for governance, and for scientific practice." (October 2009) Ref. 1956

#### European FramingNano Governance Platform

The final version of the FramingNano Governance Platform [See *European FramingNano Governance Platform Draft Now Available* in the January 2010 issue of these reports] is now available. According to Nanowerk News, it, "describes a heuristic process of how current and future challenges in nanotechnology governance can be identified, assessed and decided on, and proposes a number of structural elements to achieve this", among them, "governance and regulation of nanotechnologies must be considered a dynamic affair which needs to be continuously adapted", and, "the relevant stakeholders and the interested public have to be meaningfully included in the definition of commonly accepted principles, criteria and values to be used for the assessment of these changes." [March 2010]

The draft FramingNano Governance Platform sets out a proposal for the framing of policy on nanotechnology in Europe; and, according to Nanowerk News, "highlights the major challenges to be overcome in order to successfully craft governance policies for nanotechnologies, and the communication issues that need to be addressed if Europe is to harness the full potential of this rapidly growing area of technology." The Governance Plan was discussed at the final International Conference of the FramingNano FP7 held in December 2009 and is being submitted to the European Commission "as a model of management to be followed by European policy makers and stakeholders." (January 2010) Ref. 1957

#### European Consumer Organizations Call for Better Nano Regulation

Two European consumer organizations – the European Consumers' Organisation (BEUC) and

the European consumer voice in standardization (ANEC) – have issued a preliminary inventory of products on the EU market that contain nanomaterials. Its launch was accompanied by a series of demands from the organizations for better European regulation of nanotechnology. (November 2009) Ref. 1958

#### EC Publishes Paper on Options for Framing Public Policy on Nanotech

The Governance and Ethics Unit of the EC's Directorate-General for Research has published an overview paper on options for framing public policy on nanotechnologies. According to the announcement, "The document gives an overview on four current or recently finished research projects in this field (Deepen, Nanocap, Nanoplat and FramingNano). The authors' aim is to give an insight into the nature of public debate on nanosciences and nanotechnologies, and the ways in which deliberative approaches could lead to better governance of these technologies." (February 2010) Ref. 1959

#### Five-Year European Study of the Needs and Opportunities for Nanotech R/D

A report on GENNESYS (Grand European Initiative on Nanoscience and Nanotechnology using Neutron- and Synchrotron Radiation Sources), a five-year European-wide study of the needs and opportunities for coordinating future R/D in nano science and technology, has been published. The 500-page report is the result of the collaborative work of more than 600 experts, and, according to Meridian Nanotechnology and Development News, "assesses the state of nanomaterials science and technology, highlights future challenges and research needs, and pinpoints the areas of research that will most benefit from joint research strategies with synchrotron radiation and neutron sources." (May 2010) Ref. 1960

#### Nanomaterials Labeling in New EU Uniform Cosmetics Rule

A story in Nanowerk News reports that the EU has harmonized 55 existing directives into a single regulation on the labeling of cosmetics in the Union. One provision, opposed by Germany, requires that product labels indicate the presence of nanomaterials. (November 2009) Ref. 1961

#### Russia Sets Up Nanotech Risk Assessment and Regulation Cooperation

According to Nanowerk News, the CEO of RUSNANO, Anatoly Chubais, and the head of the Russian Federal Medical-Biological Agency, Vladimir Uiba, signed an agreement, "...to work jointly to ensure safe production and safe application of nanotechnology and nanomaterials." The charter of the collaboration is to "...ensure the sanitary and epidemiological well being of the country's inhabitants during scientific research, development work, production, consumption, and disposal of products, materials, and finished goods created with nanomaterials and nanotechnology and during commercialization of nanotechnology". (February 2010) Ref. 1962

#### Russia and Finland to Cooperate on Nanotech Regulation Development

RUSNANO Deputy CEO Andrey Malyshev and Reijo Munther, Director, Materials Technology, of Tekes, the Finnish Funding Agency for Technology and Innovation, have signed a memorandum on standardization and regulation in nanotechnology. The discussions examined problems in nanotech regulation and approaches to developing coordinated positions for presentation to standardization and safety agencies. (February 2010) Ref. 1963

### Australia Sets Up Framework for Safe Nanotech

As part of the National Enabling Technologies Strategy, the framework provides funding to support nanotech/biotech policy and regulatory development, industry uptake, international engagement, and strategic research, as well as for public awareness and community engagement to increase understanding of enabling technologies (February 2010) Ref. 1964

### Australian Government Proposes New Nanotech Regulations

The Australian government is inviting discussion of a proposal to strengthen regulation of industrial nanomaterials use in Australia. According to Nanowerk News, "Major regulatory reforms ... include: refinement of pre-market assessment categories for nanoforms of new chemicals, particularly where human health or environmental exposure can reasonably be anticipated; and a mandatory notification and assessment program for nanoforms of existing chemicals." It is expected that this carefully drafted proposal may serve as a model for other jurisdictions' regulatory efforts.

Probably also adding to the prominence of nanotech risk in the public eye in Australia is a new report, "What you should know about nano" for the Australia Institute by Fern Wickson of the University of Bergen, presented at the Asia-Pacific Science, Technology and Society Network Conference in Brisbane, and recommending stronger regulatory measures. (November 2009) Ref. 1965

### India to Establish Nanotechnology Regulatory Board

The Indian Nano Mission Council has announced the establishment, probably in March, of a Nanotechnology Regulatory Board to regulate industrial nanotech products. (February 2010) Ref. 1966

### Nanomaterials Guidelines Adopted by 53 African Countries

Representatives of 53 African governments attending the African regional meeting on Strategic Approach to International Chemicals Management adopted a non-binding resolution on handling manufactured nanomaterials. The resolution calls for: 1) a ban on shipment of wastes containing nanomaterials to countries that lack capacity for adequately managing them; 2) the establishment and implementation of legal frameworks for the safe production, use, transport, and disposal of nanomaterials; 3) a health assessment of people exposed to nanomaterials; 4) the establishment of partnerships for capacity building related to nanotechnology. In the preamble to the International Conference on Chemical Management focusing on nanotechnologies and manufactured nanomaterials, to be held in 2012, the delegates suggested that the report should address all the aspects relative to nanotechnology and safe handling of nanomaterials throughout their life cycles and application of the 'no data, no market' principle prior to commercialization. (March 2010) Ref. 1967

### New Map of Nanotech Centers

An article in Nanowerk News calls attention to a new map issued by the Pew Trusts/Wilson Center's Project on Emerging Nanotechnologies. The new work plots as varying-diameter and color-coded circles the locales and metro centers of nanotech enterprises of various types around the U.S. Available adjacent to the map are links to raw data and inventories of entities in various application areas. (August 2009) Ref. 1968

New Wiki on Safe Nanotech in the Workplace

According to Meridian, "The Rice University-based International Council on Nanotechnology (ICON), Texas, introduced the GoodNanoGuide, an online, community-driven wiki for information about the safe handling of nanomaterials. ... It is designed to be a practical tool for people who handle nanomaterials as well as an online repository of safety protocols." The guide is available at the site below. (July 2009) Ref. 1969

ILO Booklet on Workplace Hazards

According to Meridian Nanotechnology and Development News, the International Labour Organization has published a new booklet, Emerging risks and new patterns of prevention in a changing world of work, that summarizes key new occupational safety and health issues, including those related to technological innovations such as nanotechnology and biotechnology. (May 2010) Ref. 1970

Comprehensive Review of Engineered Nanomaterials Health And Safety

A consortium led by Edinburgh Napier University and the Institute of Occupational Medicine published a 426-page final report of the project Engineered Nanoparticles - Review of Health & Environmental Safety (ENRHES), described by Nanowerk News as "A comprehensive and authoritative review of the health and environmental safety of engineered nanomaterials [that] considers sources, pathways of exposure, [and] the health and environmental outcomes of concern". The report contains prioritized recommendations to aid policymakers in formulating regulations. (January 2010) Ref. 1971

Nanotechnology--Assessment of Health Safety and Environmental Factors

Frost & Sullivan, and Research and Markets, are offering a new research report, Nanotechnology--Assessment of Health Safety and Environmental Factors (Technical Insights). According to the announcement, the report provides "an overview of the HSE implications of nanotechnology ... a forced field analysis of the industry drivers and challenges... [a] strategic evaluation of the possible initiatives... ..[and] Profiling of commonly used HSE nomenclature with a list of the ongoing research projects in North America and Europe." The report is available for €4533-€5928, depending on the scope of the license. (January 2010) Ref. 1972

Governing Uncertainty: Environmental Regulation in the Age of Nanotechnology

Governing Uncertainty: Environmental Regulation in the Age of Nanotechnology, according to a review, "makes a significant contribution to the issues it sets out to address, namely how government confronts conditions of acute uncertainty about environmental and health risks, and how, given such uncertainty, government structures its regulatory policy," And, Meridian Nanotechnology and Development News says, "it addresses the dilemma faced by governments wanting to satisfy the desire for scientific innovation while also taking into account the direct and indirect effects of such emerging technologies." (March 2010) Ref. 1973

EU Efforts Underway to Improve Nanotech EHS Information

A new EU FP7 project will create a database on the health, safety and environmental impact of nanoparticles. The project, "Nano Health-Environment Commented Database (NHECD)," is coordinated by Professor Oded Maimon from Tel Aviv University, Israel. Also, Khara Deanne Grieger and colleagues of the research group Nanotechnology & Risk at the Technical

University of Denmark (DTU) are working on identifying the gaps in knowledge of the environmental, health and safety impacts of nanomaterials. A systematic analysis of 31 reports and articles found that serious knowledge gaps exist in all areas of basic nanotech EHS knowledge, viz., the lack of reference materials and standardization; environmental fate and behavior; human and environmental toxicity; test methods to assess, particularly, the effects; and commercial or industrial-related aspects (e.g. life cycle assessments). (July 2009) Ref. 1974

#### Report Suggests Current Nanotech Protective Gear May Not Be Adequate

In a paper to be published in a journal next year, Patricia Dolez of the Dept. of Mechanical Engineering, at the École de technologie supérieure, in Montréal, and colleagues, point out possible problems with the adequacy of current workplace protective equipment when dealing with nanomaterials in the environment, and suggest that further research is needed into these special risks. (October 2009) Ref. 1975

#### Study Shows Toxicity Implications of Nanoparticle Size

Researchers at the Institute of Nanotechnology, National Chiao Tung University, Hsinchu, Taiwan, conducted a study on the effect of the size of gold nanoparticles on their toxicity in a mouse model. The work showed that injection of particles of 3, 5, 50, and 100 nm size had no harmful effects, but those ranging from 8 to 37 nm induced severe sickness in mice. (July 2009) Ref. 1976

#### Study Shows Ill Effects of Multiwall Carbon Nanotubes

A new study at BASF SE produced evidence that inhaled multiwall carbon nanotubes can produce inflammation and other ill effects in rats at a "dose ... 200 times lower than an inhalation exposure level generically deemed to pose high concern through the United Nations' Globally Harmonized System of Classification and Labeling of Chemicals (GHS)," according to a scientist commenting on the results, as reported by the Bureau of National Affairs, and cited in Meridian's Nanotechnology and Development News. (July 2009) Ref. 1977

#### Researchers Call for Broad Approach to Nanotube Risk Assessment

Enrico Bergamaschi and colleagues of the Department of Clinical Medicine, at the University of Parma (Italy) Medical School suggest in a recent paper that "we need a much more detailed toxicological approach to hazard assessment before judgement regarding the long-term safety of carbon nanotubes can be made," according to a story in Nanowerk News. They point out that "carbon nanotubes are a recent invention ... and so clinical and epidemiological evidence for any long-term effects they may have on human health are entirely lacking" and recommend that "we should combine experimental, clinical and epidemiological evidence ... [and] set up preventive measures as well as assess the need to implement periodic health examinations of employees exposed to carbon nanotubes." (September 2009) Ref. 1978

#### European Project to Study Metal Oxide Nanoparticle Risks

According to an item in Nanowerk News, CIC biomaGUNE, the Centre for Cooperative Research in Biomaterials, in Guipúzcoa, Spain, is to lead the European FP7 project HINAMOX (Health Impact of Engineered Metal and Metal Oxide Nanoparticles: Response, Bioimaging and Distribution at Cellular and Body Level). The aim of the three-year project is to evaluate the possible impact on health of metal oxide nanoparticles, including zinc, cerium, titanium and iron

oxides. (October 2009) Ref. 1979

#### Metallic Impurities Affect Carbon Nanotube Toxicity

According to a story in *Highlights in Chemical Science*, Martin Pumera and Yuji Miyahara of the National Institute for Materials Science, Ibaraki, Japan describe in a recent paper how “A main factor in nanotube toxicity are the metal contaminants that remain from manufacture, which are typically one to ten per cent by weight.” In a test, only 100 ppm of iron was needed to dominate the ability of five nanotube samples to reduce or oxidize two biomarkers - hydrogen peroxide and hydrazine. The story goes on to point out that this value is significantly lower than the detection limits of the methods routinely used to assess nanotube purity. (September 2009) Ref. 1980

#### Questions Raised on Reliability of In Vitro Nanomaterials Toxicity Testing

In talks, one self-characterized as provocative, at the National Science and Technology Council's workshop *Nanomaterials and Human Health & Instrumentation, Metrology, and Analytical Methods*, Prof. David Grainger of the Univ. of Utah and Dean Martin Philbert of the University of Michigan's School of Public Health raised serious questions about the reliability of in vitro tests for toxicity of nanomaterials and advocated more whole body research, basing their criticism on the variability of in vitro tests and the lack of knowledge of nanomaterial interactions in a full biological environment. (November 2009) Ref. 1981

#### New Results on TiO<sub>2</sub> Nanoparticle Toxicity to Cells

Scientists at UCLA's Jonsson Comprehensive Cancer Center have published the results of a study showing that a physicochemical reaction to ingestion of TiO<sub>2</sub> nanoparticles can induce DNA breaks, chromosomal damage, and inflammation in cells in various organs in a mouse model. (November 2009) Ref. 1982

#### New Technique for Non-toxic Nanosilver

Andrea Travan and colleagues at the Dept. of Life Sciences, Univ. of Trieste, have reported a new method for rendering silver nanoparticle non-toxic to mammalian cells. (See Item 7.8.2, *Wide Use of Nano-Silver Raises Health and Environmental Issues*, in the June 2009 issue of this report.) The method involves immobilizing the particles in a hydrogel, so that they, “can exert their antimicrobial activity by contact with the bacterial membrane, but cannot [be] absorbed and internalized by eukaryotic cells,” according to an item in *Nanowerk*. (July 2009) Ref. 1983

#### New Technique May Reduce Silver Nanoparticle Hazard

Scientists at the Laboratory of Polymer Chemistry at the University of Helsinki report success in chemically binding silver nanoparticles to a polymer, thereby reducing the likelihood of a silver particle finding its way from a product into the body. The details of the possible toxicity of silver nanoparticles are still being investigated. It is known that they do cause some cell damage. In the proposed configuration, only silver ions escape, to exert their antimicrobial action. (February 2010) Ref. 1984

#### Sodium Cholate Found to Be Safe Surfactant for Carbon Nanotubes

Prof. Lifeng Dong and associates at Missouri State University, Springfield MO, have shown that sodium cholate is an environmentally friendly surfactant for the purification and dispersion of



single-walled carbon nanotubes, not affecting cell morphology, proliferation, or growth. (November 2009) Ref. 1985

#### Device for Nanoparticle Study

Izon Ltd. of Christchurch, New Zealand, advertises a relatively inexpensive new device for the detection and measurement of nanoparticle. The qNano is a proprietary scanning ion occlusion spectroscopy (SIOS) platform for fluid-borne nanoparticle analysis. According to an announcement, it provides, "dynamically adjustable nanopores, enabling tunable, resistive pulse sensing over a wide particle size range." (July 2009) Ref. 1986

#### Lack of Standards for Engineered Nanoparticles in European Surface Waters

As reported by Meridian Nanotechnology and Development News, a recent article in the Journal of Environmental Monitoring "concludes that it is impossible to set limit values for engineered nanoparticles (ENPs) in European surface waters now and in the foreseeable future...due to the extensive lack of knowledge not only of toxic effects, degradability, and bioaccumulation of ENPs in the aquatic environment, but also due to the questionable validity of test systems and methods to establish environmental quality standards" and goes on to explain the role of the EU Water Framework Directive (WFD) as an environmental control. (November 2009) Ref. 1987

#### "Environmental and Human Health Impacts of Nanotechnology"

Topics covered in this ten-chapter book include: The properties, preparation and applications of nanomaterials; Characterization and analysis of manufactured nanoparticles; The fate and behaviour of nanomaterials in aquatic, terrestrial and atmospheric environments; Ecotoxicology and human toxicology of manufactured nanoparticles; Occupational health and exposure of nanomaterials; and Risk assessment and global regulatory and policy responses. (December 2009) Ref. 1988

#### "Nanoethics: Big Ethical Issues With Small Technology"

According to the Nanowerk News review, "This book explores in an accessible and informative way how nanotechnology is likely to impact the lives of ordinary people in the coming years and why ethical reflection on nanotechnology is needed now. Articulate, provocative and stimulating, this timely book will make a significant contribution to one of the most important debates of our time." Military applications is one of the topics discussed. (December 2009) Ref. 1989

#### UK Solicits Participation in Nanotech Policy Formulation

The UK government, "is developing a strategy for nanotechnologies to build on existing actions, recommendations and strategies, and ensure that everyone in the UK can benefit from the societal and economic opportunities that these technologies may offer whilst addressing the challenges that they might present." In aid of this, the Dept. for Business, Innovation & Skills has opened a Web site to solicit input from, "everyone from researchers, businesses, regulators and policy makers to third sector organisations and the general public," and is, "seeking ... views on current and future opportunities and challenges, the effectiveness of existing policies and what changes or new initiatives might be needed in the future." (July 2009) Ref. 1990

#### UK House of Lords Committee Urges Nanosafety Transparency

Nanotechnologies and Food, a 112-page report presented by the UK House of Lords science and

technology committee, urges, "the government and research councils to carry out more checks into the use of nanomaterials in food and in particular the dangers for the human body." This call is the third in two years, following those for more stringent safety checks from the Royal Society and the Royal Commission on Environmental Pollution. (January 2010) Ref. 1991

#### UK Report Calls on Government to Support Nanotech Risk Assessment

According to a story in the Financial Times, a report just issued by the UK's Nanotech Knowledge Transfer Network calls, "for the government to assuage public fears over nanotechnology by supporting risk assessments of new products", especially on behalf of small start-ups that may not have the resources for such activities. (January 2010) Ref. 1992

#### UK Nanotech EHS Directory Published

The UK's Nanotechnology Knowledge Transfer Network has published the UK Nanotechnology Health, Safety and Environment Directory 2009, listing more than 30 institutes, government departments, networks and commercial service providers that are recognized as contributing in some way to the EHS debate. (November 2009) Ref. 1993

#### UK Defra Committee Report on Nanosilver

The Advisory Committee On Hazardous Substances of the UK Department for Environment, Food and Rural Affairs (Defra) has issued its report on nanosilver. The paper (7 pp, with references) states that it reviews information and studies on the environmental exposure and effects of nanoparticulate silver, comments on known or predicted environmental exposure levels and whether these present a human health or environmental risk, and considers what action should be taken to further develop understanding in this area. It does not comment on risk management issues because of insufficient information and because those are the responsibility of the relevant policy and regulatory bodies. (December 2009) Ref. 1994

#### UK Nanotechnologies Strategy: Small Technologies, Great Opportunities report

The UK government published *Nanotechnologies Strategy: Small Technologies, Great Opportunities*, a comprehensive overview of all aspects related to regulations, standardization, policies, and strategies for advancement of nanotechnology in a safe and economically sound way. According to Meridian Nanotechnology and Development News, "The overall aims of the strategy are as follows: 1. Transparent, integrated, responsible and skilled nanotechnologies industry with good links to, and support from Government; 2. Better understanding of the risks associated with the use of, and exposure to, nanomaterials, and enough people with the right skills to assess them; 3. Better informed policies and regulations relating to nanomaterials and nanotechnologies; and, 4. Well-informed public and stakeholders and a leading position on nanotechnologies for the UK on the world stage." (March 2010) Ref. 1995

#### Norwegian Research Group Launches Nanotech Particles Project

The SINTEF Group, the largest independent research organization in Scandinavia, has established a project, 'The environmental fate and effects of SINTEF-produced nanoparticles', to investigate the behavior and effects of nanoparticles in marine environments. Several other nanotech-oriented efforts are also underway in the Group. (October 2009) Ref. 1996

#### New Centre for Nano Safety Established in Scotland

Edinburgh Napier University has set up a new Centre for Nano Safety as "a multi-disciplinary centre addressing the potential human and environmental effects of nanomaterials, incorporating human and environmental toxicology as well as microbiology." (November 2009) Ref. 1997

#### Tunisia Sets Up Unit for Environmental Applications and Nanotechnology

In Tunisia, the National Agency of Environmental Protection (ANPE) and the Tunisian Association of Nanotechnology have set up a partnership for the creation of a unit for nanotechnology research and environmental applications of nanotechnology. (December 2009) Ref. 1998

#### First Sri Lankan Information Portal for Nanotechnology

The Sri Lanka Institute of Nanotechnology Pvt. Ltd (SLINTEC) has announced the launch of the first Sri Lankan information portal for nanotechnology, < [www.susnanotec.lk](http://www.susnanotec.lk) >, an interactive site that will act as an information hub for nanotechnology research in Sri Lanka. According to the announcement, "The purpose of the website [is] creating awareness on nanotechnology amongst students, educate potential investors and clients on the research being done, enable the government to measure the performance of funding, provide a forum for scientists to share their thoughts, attract potential human resources, satisfy public curiosity and aid business sector decision makers in their planning and evaluation of nanotechnology." (April 2010) Ref. 1999

#### NGO Coalitions Raise Doubts about Nanotech and the Environment

According to an article in Nanowerk News, cited in Meridian Nanotechnology and Development News, "Two international coalitions of non-governmental organizations (NGOs) are challenging industry claims about the potential environmental benefits provided by nanotechnology products. The groups, the European Environmental Bureau and the International POPs Elimination Network (IPEN) Nanotechnology Working Group, state that emerging evidence is showing that the claims put forth by industry regarding nanotechnology do not provide the whole picture, and that environmental risks and costs are being trivialized or ignored." (July 2009) Ref. 2000

#### Study Shows Nano Damage Differs by Medium, Target Kingdom

Research by Prof. Pu-Chun Ke of Clemson Univ. indicates that the biological damage from carbon nanoparticles varies both with the state of the particles (pristine vs. well-functionalized fullerene) and whether the target cells are plant or mammalian, reports a story in nanowerk.com. (March 2010) Ref.2001

#### New Technique Allows Study of Nanoparticles in Embryos

Prof. David Cramb of the Univ. of Calgary Chemistry Dept. and colleagues report development of a methodology to measure various aspects of nanoparticles in the blood stream of chicken embryos. This will allow measurement and understanding of nanoparticle uptake into embryonic tissues, to aid in bioaccumulation studies involving embryos. (March 2010) Ref. 2002

#### Guide for Unbound Nanoparticles in Occupational Settings

According to Meridian Nanotechnology and Development News, ASTM International offers for purchase its Standard Guide for Handling Unbound Engineered Nanoscale Particles in Occupational Settings, which, in addition to providing handling principles and techniques,

describes actions that can be taken to minimize human exposure to the particles. (March 2010)  
Ref. 2003

#### Worldwide Nanotech Labs Deficient in EHS Protection

According to a story in Meridian Nanotechnology and Development News, "Researchers at the University of Zaragoza, Spain, found, by conducting an online survey, that most researchers who handle nanomaterials that could become airborne do not use suitable personal and laboratory protection equipment." The survey indicated that 25% of the nanotech labs did not use any type of protection and many of the labs disposed of nanomaterials in the same way as other chemicals. (February 2010) Ref.2004

#### Australian Group Releases Two Workplace Nanosafety Reports

Safe Work Australia has announced the release of two research reports on engineered nanomaterials, *Engineered Nanomaterials: Evidence on the effectiveness of workplace controls to prevent exposure*, prepared by the Royal Melbourne Institute of Technology, and *Engineered nanomaterials: A review of the toxicology and health hazards*, researched by Toxikos Pty Ltd. (November 2009) Ref. 2005

#### New Nanotech Survey Book Covers Environmental Aspects

A new book, *Nano-Society - Pushing the boundaries of technology* (ISBN: 978-1-84755-883-1), surveys 122 nanotech research projects, grouped into four sections, one of which, *Simply Green – Environmental Applications and Risk Management*, covers Green nanotechnology, Dealing with pollution, Energy – renewable and clean, and Nanotoxicology – assessing the risks. (October 2009) Ref.2006

#### *What Is Nanotechnology and Why Does It Matter?* Book on Nanotechnology and Ethics

Nanoethics Group announced the release of a new book, *What Is Nanotechnology and Why Does It Matter?: From Science to Ethics*, published by Wiley-Blackwell and resulting from a collaboration between ethicists and nanotechnology scientists. The book comprises three units. Unit 1 — What is Nanotechnology; Unit 2 — Risk, Regulation, and Fairness— risk, precaution, regulation, equity, and access. Unit 3 —Ethical and Social Implications— urgent issues: environment, military, privacy, medicine, and enhancement. (March 2010) Ref.2007

#### Paper Examines "Nanotechnology: Safe By Design?"

As summarized by Meridian Nanotechnology and Development News, this paper discusses the idea that the safety aspects of nano products can be ensured by proper design, pointing out the difficulties of identifying the specific physical and chemical properties that produce the distinct sets of beneficial or adverse effects, and manipulating those properties to produce the final product objective. (March 2010) Ref.2008

#### Paper Reviews Nanotech Remediation of Waste Sites

Dr. Barbara Karn of EPA's National Center for Environmental Research and colleagues have published a paper, *Nanotechnology and In Situ Remediation: A Review of the Benefits and Potential Risks*. It was written, "...to focus on environmental cleanup and provide a background and overview of current practices, research findings, societal issues; potential environment, health and safety implications and future directions for nanoremediation..." of waste sites. The

paper includes 76 references. A Nanoremediation Site Map developed in conjunction with the paper can be found at [http://www.nanotechproject.org/inventories/remediation\\_map/](http://www.nanotechproject.org/inventories/remediation_map/) (February 2010) Ref.2009

#### New Estimation Technique for Nanoparticles in the Environment

Christine Robichaud, at Duke Univ.'s Pratt School of Engineering, and colleagues at Duke and UCLA, have developed a new way of estimating how much of a possibly hazardous material, e.g., titanium dioxide nanoparticles, is being generated, allowing future studies to assess possible risks. "We combined science and engineering knowledge with business and economic modeling to come up with what we think is the maximum amount of titanium dioxide nanoparticles out there," Robichaud said. "By taking the amount of bulk titanium dioxide produced, which is better understood, and applying the rates of new technologies to convert it to the nanoparticle form found in journal articles and patent applications, we estimated the maximum ceiling amount." (May 2009) Ref.2010

#### Characterising the potential risks posed by engineered nanoparticles

Characterising the potential risks posed by engineered nanoparticles—UK Government research—a progress report by the UK Department for Environment, Food and Rural Affairs (DEFRA), covers the work of five Task Forces: Metrology, Characterisation, Standardisation and Reference Materials; Exposures – Sources, Pathways, and Technologies; Human Health Hazard and Risk Assessment; Environmental Hazard and Risk Assessment; and Social and Economic Dimensions of Nanotechnologies. According to the DEFRA announcement, the report includes details of the UK's action plans and assesses progress made towards meeting the 19 research objectives presented in the 2005 report. (October 2006) Ref. 2011

#### Comprehensive Overview of Nanomaterial Properties and Biological Interactions

Researchers at UCLA and the California NanoSystems Institute (CNSI), together with colleagues in academia and industry, have published a research review article that is described as "a comprehensive overview of current knowledge on the physical and chemical properties of nanomaterials that allow them to undergo interactions with biological molecules and bioprocesses". The paper details several important research advancements and their implications for risk assessment. (June 2009) Ref. 2012

#### Wide Use of Nano-Silver Raises Health and Environmental Issues

Friends of the Earth and Health Care Without Harm Europe have published a report describing the public health threat posed by the use of nano-silver particles as an anti-microbial element in consumer products. Use of this material may risk the development of bacterial resistance to it, and, as it is released into the environment, it may interfere with bacterial action in waste treatment processes. (June 2009) Ref. 2013

#### Comparison of Micro- and Nano-particles' Toxicity to Cells

Researchers in the Department of Plant, Soil and Insect Sciences at the Univ. of Massachusetts, led by Prof. Baoshan Xing, have published a new study showing that the size of oxide nanoparticles, in addition to their composition, is an important factor in their toxicity to bacteria, a characteristic with ecological implications. (April 2009) Ref. 2014

### Review of Safety Practices in the Nanotechnology Industry

A Review of Safety Practices in the Nanotechnology Industry - Phase One Report: Current Knowledge and Practices Regarding Environmental Health and Safety in the Nanotechnology Workplace was prepared for the International Council on Nanotechnology by the University of California, Santa Barbara. According to the press release, the report “offers a review and analysis of existing efforts to develop 'best practices' ” but “finds that efforts to catalogue workplace practices have not systematically documented current environment, health and safety practices in a variety of workplace settings and geographies.” (October 2006) Ref. 2015

### Study of Scientists' and Public's Views of Nanotechnology

A new paper reports on “the heuristics that the leading U.S. nanoscientists use when they make policy decisions about regulating nanotechnology” and compares them with the corresponding process in the general public. Included in their work is data on which nanotech application areas the scientists feel are most in need of new regulations. The authors highlight that although there is no conclusive evidence on many environmental and health aspects of nanotechnology, policy and some legal framework should be established. (June 2009) Ref. 2016

### New Policy Brief: Appropriate Risk Governance Strategies for Nanotechnology Applications in Food and Cosmetics

The International Risk Governance Council has published a recommendations document, Appropriate Risk Governance Strategies for Nanotechnology Applications in Food and Cosmetics. This report presents the conclusions arrived at as the result of an April 2008 “multi-stakeholder expert workshop (with representatives from regulators, industry, academia and consumer groups) ... to discuss key issues and to develop risk governance policy guidelines for nanotechnology applications in food and cosmetics.” (June 2009) Ref. 2017

### New OECD Report on Nanotech Risks in the Workplace

The OECD has published a report, Preliminary Analysis of Exposure Measurement and Exposure Mitigation in Occupational Settings: Manufactured Nanomaterials that, “provides researchers with suggestions on how to respond to the lack of standards on techniques for measuring workplace exposure to nanomaterials.” Further, “Researchers can still institute and develop standards on an individual basis, the report says, but recommends that consensus standards, biomarkers, and other tools and resources need to be developed.” The report also outlines the first part of an OECD project on this issue. (April 2009) Ref. 2018

### Wise-Nano Project of the Center for Responsible Nanotechnology

The Wise-Nano project of the Center for Responsible Nanotechnology is a collaborative website for researchers from around the world addressing the facts and implications of advanced nanotechnology and what to do about them. (November 2004) Ref.2019

### Other Initiatives for Addressing Nanotechnology Risks

Citing gaps in regulating future uses of nanotechnology (including those relating to particle size, the use of nano versions of already approved ingredients, and packaging), the British Food Standards Agency suggests in its recently released regulatory review that legislation be speedily amended to require that all nanocomponents be subject to their own risk assessment. The Royal

Society has also issued a statement, following up its 2004 report on nano hazards, saying that Industry should disclose how it tests products containing nanoparticles. Further, the Department for Environment, Food and Rural Affairs (Defra) is currently working on extending their regulatory framework to include nanomaterials.

Germany also is also beginning a risk survey on nanotechnology in food, cosmetics, and other commercial products. The survey will be conducted by ZIRN (Center of Interdisciplinary Risk-science and Sustainable Development of Technology) and will investigate current and future nanotechnology applications, as well as potential risks. Its results will be discussed in two subsequent workshops and then transformed into a "risk barometer" for the information of the public. They could also lead to new regulations.

*Nano-Regulation: A multi-stakeholder-dialogue-approach towards a sustainable regulatory framework for nanotechnologies and nanosciences* report has been issued by the Innovation Society Ltd., an independent consulting company, based at the Technology Centre of the Federal Institute of Materials Science & Technology (EMPA) in St. Gallen, Switzerland, as part of its Platform "Nano-Regulation" project, in cooperation with NanoEurope and NanoCluster Bodensee. The report presents the results of a Delphi process undertaken with 35 expert representatives of all stakeholder communities in nano regulation.

Nanoforum, an all-Europe nanotechnology network funded by the EU and its Institute for Environment and Sustainability, has released a report outlining the conclusions from its workshop, 'Nano and the Environment' held in Brussels in March 2006. The workshop brought together stakeholders from all sectors of the nanotech world to discuss key issues surrounding nanotechnology and the environment, including monitoring, pollution and remediation, and resource saving. The report covers detection of air and water pollutants; life-cycle analysis; applications for energy sustainability; risk assessment; nanotechnology applications for remediation of environmental toxins; commercialization; challenges of communication within the nanotech field, regulatory policy initiatives; public education; and societal and ethical implications.

Along the same lines, *Taking Action on Nanotech Environmental, Health, and Safety Risks*, report by Lux Research, concludes that nanotechnology environmental, health, and safety risks have to be promptly addressed, urging the government to consider comprehensive and clear regulations. (June 2006) Ref.2020

The Project on Emerging Nanotechnologies launched by the Woodrow Wilson Center (WWC) and the Pew Charitable Trusts will assess possible health and environmental implications of nanotechnology and potential nanotechnology risk management strategies. It will be a reliable source of information for businesses, governments, and the public through reports, analyses and regular meetings with leaders in the field.

The Institute of Nanotechnology, a global leader in nanotechnology matters, will officially launch the European Nanotechnology Trade Association (ENTA), on June 1, 2005, to act as an interface between nanotechnology businesses across Europe and: governments, science and industry policy makers; and the public and watchdog organizations 'to ensure transparency and that new nanotechnologies are developed in a safe and responsible manner.' (April 2005) Ref.2021

The U.S. Environmental Protection Agency (EPA) awarded 12 grants to universities to investigate the potential health and environmental impacts of nanomaterials. Six of the grants awarded will investigate if manufactured nanomaterials could have any negative health effects or

environmental impacts, while the other six grants will study the fate and transport of nanomaterials in the environment. The grants were awarded through EPA's Science to Achieve Results research grants program.

The National Toxicology Program, a part of the U.S. National Institutes of Health, will be conducting animal studies to investigate the effects of nanoparticles in the lungs and on the skin, and their uptake and distribution into and through the body.

Other U.S. agencies, including the Occupational Safety and Health Administration and the Food and Drug Administration, have also begun to pay attention to the field.

(November 2004) Ref.2022

#### EU Parliament Recommends Stronger Nanotech Precautions

Meridian Nanotechnology & Development News reports a Bureau of National Affairs story that the European Parliament has forwarded to the European Commission a resolution saying that current regulations are not sufficiently precautionary for handling nanomaterials. According to the story, it “has no legislative force, but must be considered by the European Commission when formulating EU policy on nanotechnology. The Commission's current approach to nanomaterials is that no major regulatory initiative is necessary.” (April 2009) Ref. 2023

#### European Nanotechnology Action Plan

The European Commission has announced its Action Plan to improve European competitiveness in nanotechnology. The plan outlines European-wide and national measures to strengthen nanotechnology research and implementation in a safe and responsible way. The measures in the action plan include: boosting funding—including research to assess possible impact on human health and the environment; respect of ethical principles and citizens’ concerns and expectations; building risk assessment into the research and developing guidelines for such risk assessment (including reassessment of existing EU legislation); full access of the public to research; strengthening international dialogue on common issues; and improved infrastructure. The plan also calls for a legislative review, which may lead to future treaty provisions. (June 2005)

Ref.2024

#### EU to Fund Nanoparticle Environmental Risk Study

The EU is launching a new project, ENNSATOX, led by Dr Andrew Nelson, a chemist at the University of Leeds, to investigate the environmental impact of nanoparticles found in everyday products, such as suntan cream, including the relationship between the physical structure of nanoparticles and their toxicity. The project has been awarded €3 million, and will involve scientists from five countries.

This new project is especially significant since research has not yet settled the question of whether metallic compound nanoparticles in preparations, like sunscreens, applied to the skin constitute a health risk. According to a published report, an inquiry by the New South Wales Parliament in Australia has, “concluded that nano versions of existing chemicals should be assessed as new chemicals and recommended that ‘ingredient labelling requirements for sunscreens and cosmetics include the identification of nano-scale materials’ ”. The same report states, “The [Therapeutic Goods Administration] estimates about 70 per cent of sunscreens with titanium dioxide and 30 per cent with zinc oxide have these materials in a nanoparticle form.”

The ENNSATOX project will pay particular attention to this family of compounds. (December 2008) Ref. 2025



### EU Efforts Underway to Improve Nanotech EHS Information

A new EU FP7 project will create a database on the health, safety and environmental impact of nanoparticles. The project, "Nano Health-Environment Commented Database (NHECD)," is coordinated by Professor Oded Maimon from Tel Aviv University, Israel. Also, Khara Deanne Grieger and colleagues of the research group Nanotechnology & Risk at the Technical University of Denmark (DTU) are working on identifying the gaps in knowledge of the environmental, health and safety impacts of nanomaterials. A systematic analysis of 31 reports and articles found that serious knowledge gaps exist in all areas of basic nanotech EHS knowledge, viz., the lack of reference materials and standardization; environmental fate and behavior; human and environmental toxicity; test methods to assess, particularly, the effects; and commercial or industrial-related aspects (e.g. life cycle assessments). (July 2009) Ref. 2026

### European Nanotech Safety Proceedings Published

The proceedings of the European Commission Dialogue Workshop on Nanotechnology: Safety for Success, held in Brussels in October, have been published online, covering a number of topics in nanotech regulation and risk assessment. (December 2008) Ref. 2027

### EU Tightens Safety Precautions on Nano-containing Cosmetics

The European Parliament has tightened up safety requirements on cosmetics to require additional checks on those containing nanomaterials; the new rules take effect in 2012. (March 2009) Ref. 2028

### European Report on Workplace Exposure to Nanoparticles

The European Agency for Safety and Health at Work (OSHA) has released a 91-page "Literature Review - Workplace exposure to nanoparticles.", which, according to an item in Meridian Nanotechnology and Development News, "reviews the most recent publications on nanoparticles and focuses on the possible adverse effects of workplace exposure while also presenting the regulatory background and activities being taken to manage this emerging risk." (June 2009) Ref. 2029

### Russia Introduces Nanotechnology Certification System

Russia has launched NANOCERTIFICA, the Russian Federation's first certification system for industrial nanotechnology production. According to Nanowerk News, the opening press conference addressed "development of testing and the methodological base of the certification system" and "the financing and qualification level of conformity evaluation centers and the possibility of using nanomaterials in medicine, cosmetology, ecology and water purification". (October 2008) Ref. 2030

### New report on Oversight of Next Generation Nanotechnology

The Wilson Center's Project on Emerging Nanotechnologies has issued a new report that calls for the creation of a new Department of Environmental and Consumer Protection to oversee product regulation, pollution control and monitoring, and technology assessment. (May 2009) Ref. 2031

### UK to Have New Nanotechnology Risk Information Service

The UK Department of Trade and Industry has announced that a new nanotechnology risk information service, Safenano.org, is due for launch in April 2007, and "will take the form of a web-based information service ... with a regular bulletin service and comprehensive database of relevant publications. Emerging scientific evidence concerning the potential risks of nanoparticles and nanotubes, together with information about Health and Safety, Occupational Hygiene, Toxicology and Risk Assessment will be interpreted and delivered to the audience in an integrated way, to support effective risk management." (November 2006) Ref.2032

### UK Launches New Nanotechnology Environmental Service

The UK Institute of Occupational Medicine's SAFENANO Information Service and Community Portal has set up SAFENANO Scientific Services to provide multidisciplinary risk management solutions to companies operating in the nanotechnology industry. The services, planned to assist with safety issues ranging from employees' working conditions to end products, include training, laboratory tasks, and toxicology information update. (January 2008) Ref. 2033

### UK Solicits Participation in Nanotech Policy Formulation

The UK government, "is developing a strategy for nanotechnologies to build on existing actions, recommendations and strategies, and ensure that everyone in the UK can benefit from the societal and economic opportunities that these technologies may offer whilst addressing the challenges that they might present." In aid of this, the Dept. for Business, Innovation & Skills has opened a Web site to solicit input from, "everyone from researchers, businesses, regulators and policy makers to third sector organisations and the general public," and is, "seeking ... views on current and future opportunities and challenges, the effectiveness of existing policies and what changes or new initiatives might be needed in the future." (July 2009) Ref. 2034

### SAFENANO Publishes First Global Review of EHS Risks of Nanotechnology

According to an article in Nanowerk News, Defra, the UK Government Department for Food & Rural Affairs, has published a report, EMERGNANO: A review of completed and near completed environment, health and safety research on nanomaterials and nanotechnology, from the SAFENANO initiative. "[The report] provides a unique identification and analysis of research carried out worldwide on nanotechnology safety, including that relating to hazard, exposure, risk assessment & regulation." The article continues, "EMERGNANO identified more than 670 projects from around the world, and ... assessed more than 260 unique, relevant projects .... The final report provides a comprehensive listing of projects, alongside detailed evaluation of their outputs." See also *UK Launches New Nanotechnology Environmental Service* in January 2008 environmental security report.] (April 2009) Ref. 2035

### Australian New Report and Research Group on Nanotechnology

Options for a National Nanotechnology Strategy, a report by an Australian federal government taskforce, outlines the establishment of a national nanotechnology office and a public awareness campaign on the potential social and ethical implications of nanotechnology. The report notes the insufficient information about the potential health risks of nanoparticles and calls for more research on toxicity and occupational and environmental risks. NanoSafe Australia is a new group of nanotechnology toxicologists formed for investigating risks associated to nanoparticles use and handling. (October 2006) Ref. 2036

### Pressure Increases in Australia for Nanotech Safety Regime

After a recent panel discussion on nanotechnology and occupational health and safety held at Parliament House in Canberra, Australian unions and industry are calling for urgent regulation to protect workers from nanotechnology risks in the face of a dearth of hard data, making for difficult decisions on the nature and timing of new safety requirements. According to an ABC report, Brian Power of the Australian Nano Business Forum believes 98% of nanotechnology is safe, but agrees workers should be protected from any risks. He also emphasizes Australia will ultimately have to follow international guidelines on a company register and labeling. (March 2009) Ref. 2037

### New South Wales Pushes for Nanotech Risk Protection

The government of New South Wales (Australia) will push for national mandatory labeling of nanoparticles used in workplaces, and for improved testing facilities to assess the safety of new nanomaterials. Suggestions for including immediate labeling of nanoparticles in food, sunscreens and cosmetics, and that nanoparticles be treated by regulators as new chemicals were not taken. (May 2009) Ref. 2038

### China Moves Strongly into Nanotech Arena

China has budgeted \$18 billion of its stimulus package for R/D this year, and the expectation is that a large piece of that will go into its sweeping nanotech program. A sign of this is that China now produces more papers on nanotech than any other country. A major concern in the future, of course, will be the safety of nanotech-containing Chinese exports. (April 2009) Ref. 2039

### Berkeley, California, Considering Nanoparticle Health and Safety Law

The city of Berkeley, California is proposing the world's first local regulation of nanomaterials. It would add a nanoparticles health and safety disclosure to a city law that already requires an inventory and safety plan from any business or other person handling large quantities of hazardous materials. Other localities have discussed such measures, but this is the furthest any has progressed. (November 2006) Ref.2040

### Proposal for Establishing an Arab Council on Nanotechnology (ACON)

An expert meeting on ethics of nanotechnologies in the Arab region has called for creation of an Arab Council on Nanotechnology (ACON). According to the proposer, Dr. Mukhles Sowwan of Al-Quds University in Jerusalem, "The mission of ACON should be to raise awareness of the benefits and dangers of molecular nanotechnology, and assist in the creation and implementation of comprehensive balanced plans for responsible use of this technology." (May 2009) Ref. 2041

### Tunisian Nanotech Association Formed

The creation of the Tunisian Association of Nanotechnology has been announced. The Minister of the Environment and Sustainable Development noted, "...the seminal importance of the use of nanotechnologies on the prevention of pollution, water desalination, and the environment", and cautioned that the use of nanotechnology should go, "hand in hand with risk assessment measures to ensure a sound use of these new technologies." According to allAfrica.com, he also announced that the Tunis Environmental Centre of Environmental Technologies (CITET) would open its laboratories to members of the association. (December 2008) Ref. 2042

### Nanotechnology and worker safety and health

A meeting was held in Washington on 18 May at which officials from the Dept. of Labor's Occupational Safety and Health Administration (OSHA) and CDC's National Institute of Occupational Safety and Health (NIOSH) discussed with interested parties from government and business the current state of work on the relationship between nanotechnology and worker safety and health. The major conclusion to be drawn from the meeting is that almost no data on this problem is yet available. Both agencies are conducting and sponsoring research in the area, but even fundamental information on the mechanisms involved, such as dermal absorption, and the role of metal particles embedded in nanomaterials, is lacking. It is estimated that there will be a million new nanotechnology workers, and there are many programs underway to clarify the safety and health situation. (May 2004) Ref.2043

*Implications of Nanotechnology for Environmental Health Research* comprises the results of a workshop by the Institute of Medicine's Roundtable on Environmental Health Sciences, Research and Medicine, aiming to assess promises and implications of nanotechnology in order to develop a research agenda to address critical issues related to the impact of nanotechnology on health and the environment. In addressing priorities, policy, and government implications, the report concludes that for efficient assessment of potential hazards of nanotechnology, the following are required: an adequate nomenclature; an effective risk-benefit analysis; and both a research framework and strong leadership. (April 2005) Ref.2044

### Nanotechnology Protest

A group of environmental protesters disrobed in front of a high-end Madison Avenue clothing store in New York City to bring media attention against nanotech clothing that has stain-resistant nanotechnology-treated fabrics. This may be an early incident in a new anti-nanotech campaign that could grow into a major movement condemning uses of these new techniques. The situation is exacerbated by the very real lack of comprehensive scientific research on nanotechnology risks, and certainly by lack of public awareness of what is known about the hazards. (June 2005) Ref. 2045

### Corporations under Stockholder Pressure for Nanotech Disclosure

According to a story in Meridian Nanotechnology and Development News, a number of companies are coming under pressure from stockholder resolutions to make public the presence of nanomaterials in their products, and their policies for dealing with these possibly hazardous substances. (January 2009) Ref. 2046

### Nanotechnology Health Concerns Highlight Need for International Technology Convention

Buckyballs are spheres formed by a specific number and arrangement of carbon atoms. They are very important for a range of nanotechnology applications, but according to research presented at a recent meeting of the American Chemical Society, Buckyballs can cause extensive brain damage in fish. Other studies have shown that such particles can enter the brain. The fish studies, however, were the first to link nanoparticles to the destruction of brain tissue. Additional studies are underway to determine if coating such nanoparticles affects toxicity.

In reaction to this and other nanotechnology-related health issues, the ETC Group suggests, "The international community must formulate a legally-binding mechanism to govern the products of

new technologies, based on the Precautionary Principle, one that addresses their health, socio-economic and environmental implications. International assessment should be incorporated under a new International Convention for the Evaluation of New Technologies (ICENT).” (April 2004) Ref.2047

*Nanotechnology: Environmental Implications and Solutions*

According to a review in US National Institute of Health’s (NIH) Environmental Health Perspectives, this new book "gives an excellent summary of traditional environmental pollution issues", but "may disappoint those who expect dramatic revelations about nanoparticles as pollutants". One chapter gives a good summary of the production and applications of nanomaterials, but in general the work is wanting in nano-specific information, except, to some extent, in the section on air pollution (albeit with several errors). (July 2005) Ref.2048

National Research Council Calls for Better Nanotech Risk Assessment

The National Research Council issued a new report, Review of Federal Strategy for Nanotechnology-Related Environmental, Health, and Safety Research, that, “finds serious weaknesses in the government's plan for research on the potential health and environmental risks posed by nanomaterials”, and emphasizes that, “An effective national plan for identifying and managing potential risks is essential to the successful development and public acceptance of nanotechnology-enabled products”. (December 2008) Ref. 2049]

UN Report Assesses Nanotech and Climate Change

The Institute of Advanced Studies of the United Nations University issued a new report, Innovation in Responding to Climate Change: Nanotechnology, Ocean Energy and Forestry, that, “offers three innovative solutions in responding to climate change, namely nanotechnology, ocean energy and forestry”, critically assesses, “the opportunities and challenges that each type of innovation presents”, and, “addresses the question why these innovations—despite their large potential to reduce emissions, ocean energy alone could cover the world’s electricity needs—have not yet reached the stage of mass commercialization.” (December 2008) Ref. 2050]

EU “ObservatoryNANO” project

The EU FP7 (EU’s Seventh Research Framework Programme) project “ObservatoryNANO” has begun operation. According to nanoforum.org, it is funded for four years and “will collate and analyze data regarding scientific and technological (ST) trends and economic realities and expectations. The ST and economic analysis will be further supported by assessment of ethical and societal issues, impacts on health, environment and safety, as well as regulation, standardization, and legislative issues.” (April 2008) Ref. 2051

The EU FP7 “ObservatoryNANO” project has expanded its operation. Its Web site, <http://www.observatory-nano.eu> - is now on-line, and contains (click on “Catalogue”), most of 56 recently written interim reports on scientific and technological developments in all sectors of nanotechnology, including energy, environment, and health. (November 2008) Ref. 2052

The EC FP7 ObservatoryNANO project has published its Annual Report, summarizing developments in the field, including their effects, and concerns for human health and the environment. (June 2009) Ref. 2053

### New EU Committee Report Very Critical of Nanotech Regulation

Nanoforum reported that the European Parliament is currently discussing its Committee on the Environment, Public Health and Food Safety's draft report on regulatory aspects of nanomaterials. The report is very critical of the present state of nanotech regulation in the EU and calls for much more stringent measures. (February 2009) Ref. 2054

### New EU Study on Regulation and Governance of Nanotechnologies

"Mapping Study on Regulation and Governance of Nanotechnologies" published by the EU project FramingNano provides a comprehensive overview of nanotechnology regulations and governance at European and global levels, as well as identifying relevant stakeholders for further negotiations of a Governance Plan for responsible development of nanotechnologies. (February 2009) Ref. 2055

### Report on Ethical Evaluations of Nanotechnology

The Wilson International Center's/Pew Trust's Project on Emerging Nanotechnologies has issued a new report on *Ethical Evaluations of Nanotechnology* that strives to, "...address social and ethical issues ... [and] both the substantial potential risks of nanotechnology and its possible significant contributions to our well-being and environmental sustainability," and, "emphasizes ways in which such topics intersect with governmental functions and responsibilities, including science and technology policy, as well as research funding, regulation and work on public engagement", according to a Project announcement. (January 2009) Ref. 2056

### Study Shows Toxicity Implications of Nanoparticle Size

Researchers at the Institute of Nanotechnology, National Chiao Tung University, Hsinchu, Taiwan, conducted a study on the effect of the size of gold nanoparticles on their toxicity in a mouse model. The work showed that injection of particles of 3, 5, 50, and 100 nm size had no harmful effects, but those ranging from 8 to 37 nm induced severe sickness in mice. (July 2009) Ref. 2057

### Study Shows Ill Effects of Multiwall Carbon Nanotubes

A new study at BASF SE produced evidence that inhaled multiwall carbon nanotubes can produce inflammation and other ill effects in rats at a "dose ... 200 times lower than an inhalation exposure level generically deemed to pose high concern through the United Nations' Globally Harmonized System of Classification and Labeling of Chemicals (GHS)," according to a scientist commenting on the results, as reported by the Bureau of National Affairs, and cited in Meridian's Nanotechnology and Development News. (July 2009) Ref. 2058

### EPA Official Says Carbon Nanotubes Will Continue to Be Regulated Case-by-Case

According to the Bureau of National Affairs' Daily Environment Report, cited in Meridian's Nanotechnology and Development News, EPA, "will continue to regulate carbon nanotubes on a case-by-case basis, as the distinct characteristics of each kind of carbon nanotube could mean each has different implications for human health and the environment." (July 2009) Ref. 2059

### EPA to Require Company Nanotube Use or Import Notices

The U.S. Environmental Protection Agency (EPA) Office of Enforcement and Compliance Assurance will begin enforcing a requirement that companies file premanufacture notices for

manufacturing or importing carbon nanotubes, beginning March 1, 2009. (February 2009) Ref. 2060

#### California Requests Nanotube Safety Data

The California Department of Toxic Substances Control (DTSC) has asked more than two dozen manufacturers and importers of carbon nanotubes to provide toxicity, monitoring, and safeguards data on those products. There is also a report that Environment Canada may shortly make a similar request to nanomaterial users. (February 2009) Ref. 2061

#### Increased Research Needed to Address Environmental, Health, and Security Issues Related to Nanotechnology

The Environmental, Health, and Safety Research Needs for Engineered Nanoscale Materials report by the Nanoscale Science, Engineering, and Technology (NSET) Subcommittee of the U.S. National Science and Technology Council's Committee on Technology identifies environmental, health, and safety (EHS) research and information needs related to understanding and management of potential risks of engineered nanoscale materials.

*A Matter of Size: Triennial Review of the National Nanotechnology Initiative*, a new report from the National Research Council's Committee to Review the National Nanotechnology Initiative, although generally positive on the initiative's work in overseeing the U.S. government's role in developing nanotechnologies, suggests that improvements are needed mostly in the areas of measuring economic return, and addressing potential safety risks associated with nanomaterials. "The body of published research addressing the toxicological and environmental effects of engineered nanomaterials is still relatively small," states the report. Accepting the report's recommendations, in an interview with *The Scientist*, E. Clayton Teague, director of the federal National Nanotechnology Coordination Office, pointed out that the federal budget for environment, health, and safety research regarding nanotechnology will expand from \$38 million in 2005 to \$44 million in 2007, trying to fulfill the research needs suggested by the NSET report in addressing EHS issues related to nanotechnology. (September 2006) Ref. 2062

#### Environmental Effects from Nanomaterial Production May Outweigh Its Benefits

An item in *physorg.com* states that "Environmental gains derived from the use of nanomaterials may be offset in part by the process used to manufacture them, according to research published in a special issue of the *Journal of Industrial Ecology*." A paper by Hatice Şengül and colleagues at the University of Illinois at Chicago, asserts that "strict material purity requirements, lower tolerances for defects and lower yields of manufacturing processes may lead to greater environmental burdens than those associated with conventional manufacturing." A team led by Vikas Khanna at Ohio State University "found, for example, that the lifecycle environmental impacts [of carbon nanofiber production] may be as much as 100 times greater per unit of weight than those of traditional materials, potentially offsetting some of the environmental benefits of small size of nanomaterials" like less waste and cleaner processes. (October 2008) Ref. 2063

#### New Study on the Carcinogenicity of Nanoparticles and Other Dusts

According to *Nanowerk.com*, the German Federal Institute for Occupational Safety and Health has released a study whose aims were to analyze differences between the carcinogenicity of granular dusts in the rat lung after intratracheal instillation, to find out the optimal dose metric for their carcinogenic potency, and to interpret their potential relevance for human health. Four

of the 16 dusts tested could be classified as nanoparticles. The conclusion was that, overall, the state of knowledge meets the EU criteria for a classification of most of the particles into category 2 of carcinogenic substances. (July-August 2008) Ref. 2064

#### UK Report on Novel Materials in the Environment: The case of nanotechnology

The UK Royal Commission on Environmental Pollution issued this latest report, which “examines issues related to innovation in the materials sector and the challenges and benefits arising from the introduction of novel materials (specifically nanomaterials) ... [and] makes recommendations on how to deal with ignorance and uncertainty in this area”. This document is accompanied by four supplemental reports and is partly based on input solicited from more than 100 organizations with relevant experience. (November 2008) Ref. 2065

#### New Study Shows Nanoparticles In Sewage Could Escape Into Bodies Of Water

Researchers at ETH Zurich, the University of Applied Sciences Wädenswil, and BMG Engineering AG, led by Prof. Wendelin Stark, have shown that a portion of nanoparticles of cerium dioxide in industrial sewage, previously thought to be removed by biological purification or trapped in sewage sludge, can remain in the effluent and can leave the sewage works practically unchanged. According to the news story, what happens to the particles after a sewage plant has scarcely been researched up to now. (July-August 2008) Ref.2066

#### Diesel Exhausts Emit Nanoparticles Affecting Lung Function

According to a news release, Prof. Angela Violi, of the Univ. of Michigan College of Engineering, is presenting a simulation paper to the American Chemical Society that predicts that nanoparticles from diesel engine exhausts “can get trapped in the lungs and inhibit the function of a fluid [a surfactant] that facilitates breathing”. Also the EPA has awarded a grant to a team of researchers led by Prof. Robert Yokel, of the College of Pharmacy at the Univ. of Kentucky, to define the basic properties of nanoparticles of cerium oxide, a diesel fuel additive used in Europe. According to an announcement, the research will define the basic properties of the particles and examine how they are absorbed by the body. (July-August 2008) Ref. 2067

#### New Batteries Raise Health/Safety Worries about Lithium Nanoparticles

A recent column by Philip Stiff, a member of the Project on Emerging Nanotechnologies at the Wilson Center, raises questions about the “foreseen and unexplored environmental, health and safety risks associated with the manufacture, use, recycling, and disposal of nanoscale lithium-ion batteries”, emphasizing the lack of studies on the end-of-life processes for these units. (October 2008) Ref.2068

#### Carbon Nanotubes May Spread in Water More Widely Than Thought

A study by Jaehong Kim and colleagues at Georgia Institute of Technology has shown that carbon nanotubes, which are hydrophobic and clump together in water, may nevertheless interact with natural organic matter found in lakes and rivers, in ways that lead to their wider dispersion. (December 2006) Ref. 2069

#### Scientists Correlate Nanoparticle Structure and Toxicity

Andre Nel and his team at UCLA's Johnson Cancer Center have been investigating the relationships between the structural characteristics of nanoparticles and their toxicity. According



to Meridian Nanotechnology and Development News, this work "contributes to efforts to identify key factors or tests that can be used to predict toxicity, permit targeted screening, and allow materials scientists to generate new, safer nanoparticles with this structure-toxicity information in mind.... [They] found that ambient particles and positively charged polystyrene spheres generated high levels of reactive molecules, and induced oxidative stress in defense cells from the lung called macrophages. Little activity was observed for carbon black, titanium dioxide, and negatively charged polystyrene spheres." (October 2006) Ref. 2070

#### Major German Study on Nanotech in Food Industry

The German Federal Institute for Risk Assessment (Bundesinstitut für Risikobewertung (BfR)) is undertaking a major assessment of the potential dangers of nanotechnology in the food industry. The study will involve 100 experts from research, industry, public agencies, consumer associations, and NGOs in a multi-phase interviewing and mutual commenting process. According to Food Production Daily, "the objective is to identify ... nanomaterials, assign them to concrete applications, and then draw conclusions on consumer exposure. ... The applications will then be classified according to the level of probable risk and risk reduction strategies developed." The project is expected to be finished by the end of the year. (September 2006) Ref.2071

#### Nanotube Toxicity Tests Unreliable

Researchers from the Institute of Toxicology and Genetics at the Karlsruhe Research Center in Germany may have discovered why carbon nanotubes toxicity tests are not consistent. Their investigation revealed that a reaction between the nanotubes and two non-soluble toxicity test reagents, formazan and methylthiazol tetrazolium (MTT), was causing a "false positive" outcome. Three other tests on the same nanomaterial had yielded negative results. (September 2006) Ref.2072

#### Inhaled Nanoparticles May Have Easy Path to Brain

Studies by scientists at the University of Rochester Medical Center found that nano-sized materials inhaled by rats had rapid and efficient pathways from the nasal cavity to several regions of the brain. They also caused changes in gene expression in the invaded regions. These are preliminary results, in an animal model, and have not shown actual cellular damage, but later proof of deleterious effects in higher models would have a strong effect on the regulation of airborne nanoparticles. [See also *Nanotechnology Health Concerns Highlight Need for International Technology Convention* in April 2004 and *Nanotech Health Dangers Increasingly Understood around the World* in January 2004 environmental security reports.] (September 2006) Ref.2073

#### High Aspect Ratio Nanoparticles May Pose Asbestos-like Risks

A consortium of UK scientists, led by the Institute of Occupational Medicine, Edinburgh, has published a report discussing whether high aspect ratio (much longer than wide) nanoparticles (HARN), such as nanowires and carbon nanotubes, may pose the same health risks as asbestos fibers. The report concluded that there is enough evidence to suggest that HARN, which have the same physical characteristics as asbestos, are likely to induce similar pathology. The report presents a set of prioritized recommendations for future research.

Similar concerns have caused France's High Council of Public Health (HCSP) to recommend

that workers in contact with carbon nanotubes receive the greatest protection under French law. Further, a new paper from Chinese researchers systematically reviews most of the experimental results on the variety of factors affecting carbon nanotubes' cytotoxicity. (January 2009)

Ref. 2074

#### Possible Environmental Hazard from Quantum Dots

According to an item in Nanowerk, "New research is showing that quantum dots (QDs) may be toxic to cells under acidic or alkaline conditions." It appears that the metallic shells of these semiconductor nanocrystals, increasingly used in electronic systems, may decompose under non-neutral pH conditions, (e.g. during weathering) releasing toxic zinc or cadmium. (January 2009)

Ref. 2075

#### Nanotechnology—Health Implications of Quantum Dots

Quantum dots (QD) are nanoparticles that consist of a metalloid core and a shell that surrounds the core and makes the particle biologically active. They form an important class of elements in nanotech-based applications, particularly biological ones, but raise the same environmental safety questions as other nanomaterials. A recent toxicological review of QD at Duke Univ. indicated that:

- "QD toxicity depends on multiple factors including their physico-chemical properties (e.g. size, charge, concentration, outer coating bioactivity, and stability) and environmental conditions.
- "Human exposure to QD may result from environmental, workplace and therapeutic exposure. There may be a risk of bioaccumulation of these materials within organs and tissues (e.g. in lungs) with still unexplored or under-explored health risks."
- QDs may enter the environment in wastes from any (QD) activity, their persistence may be long, and the exposure risk varies with the host material - water, air, or various soil types.
- The principal concern with QD relates to the possible effects from toxic metals (e.g. Cd, Se) in the metalloid core, in particular as determined by the physical, chemical, and physiological properties of the core/coating complex. Some in vitro studies suggest that prolonged exposure may be toxic to cells.

[See also *Nanotechnology* in January 2006 and previous environmental security reports.]  
(February 2006) Ref. 2076

#### Cleanup and Other Nanomaterials May Re-release Pollutants

Research by Prof. Baoshan Xing, of the Department of Plant, Soil & Insect Sciences at the University of Massachusetts has indicated that fullerenes and carbon nanotubes may exhibit reversible adsorption of polycyclic aromatic hydrocarbons, releasing into their environments toxic substances previously adsorbed by them. (September 2006) Ref.2077

#### Nanotechnology and the Food and Agriculture Sector

Nanotechnology in Agriculture and Food Production: Anticipated Applications, by Jennifer Kuzma and Peter VerHage from the University of Minnesota's Center for Science, Technology, and Public Policy, discusses possible future nanotech-based food and agriculture applications, their potential benefits and risks, and requirements for environmental, health and safety oversight. Their investigation also resulted in creation of a searchable, online database covering

more than 160 research projects. (September 2006) Ref. 2078

#### Reaction to Voluntary Nanomaterial Reporting Scheme

According to Meridian Nanotech News, "The U.K. Department for Environment, Food, and Rural Affairs (Defra) has released a document summarizing and responding to the results of a consultation it published in March seeking opinions on a 'Voluntary Reporting Scheme' for [the properties of] engineered nanomaterials." The scheme met with general support, as did its underlying evidence-based approach for determining the need for risk controls. (September 2006) Ref. 2079

#### FDA Forms Internal Nanotechnology Task Force

The US Food and Drug Administration has announced the formation of an internal Nanotechnology Task Force for determining regulatory approaches that encourage the continued development of innovative, safe and effective FDA-regulated products that use nanotechnology materials, and to identify and recommend ways to address any knowledge or policy gaps that exist, so as to better enable the agency to evaluate possible adverse health effects from FDA-regulated products that use nanotechnology materials. (August 2006) Ref.2080

#### National Nanotech Regulation Experts Discuss Emerging Issues

An interview with three key figures on emerging issues in nanotechnology regulation in the U.S. presents an overview of the nanotech-regulations situation in the U.S., notes that interest in evaluating the potential health and environmental risks of nanotechnology is growing, and reveals a high consensus that reasonable nanotech-regulations would be beneficial for the industry as well as for society. The article is the result of interview with Dr. Jeff Wong, Chief Scientist at the California Department of Toxic Substances Control (DTSC); Bill Gulledge, Managing Director of the American Chemistry Counsel (ACC)'s Chemical Products & Technology Division and Chair of the ACC Nanotechnology Panel; and Tom Jacob, former DuPont Manager of Government Affairs for the Western Region and currently of T.R. Jacobs & Associates, LLP. (June 2010) Ref. 2081

#### European Commission Opens Nano2Life Network

According to an announcement from its coordinator, "Nano2Life (N2L) is the first European Network of Excellence in nanobiotechnology supported by the European Commission under the 6th Framework Programme. Its objective is to support ... [Europe's] position as a competitive player and to make it a leader in nanobiotechnology transfer by merging existing European expertise and knowledge in the field of Nanobiotechnology." It comprises 64 organizations and companies, with associate members from South Korea, Japan, Australia, and North America. One of the points in its Programme of Activity is founding the first European Ethical, Legal and Social Aspects Board (ELSA) in the field of Nanobiotechnology. This body will undoubtedly concern itself in a major way with questions of nanotechnology risk, the environment, and regulation. (August 2006) Ref.2082

#### French Group Opens Public Web Site on Nanotechnology

The Citizen Alliance on the Challenges of Nanotechnologies (CACEN) (in French "Alliance Citoyenne sur les Enjeux des Nanotechnologies": ACEN) has opened a new (French language) website <nano.acen-cacen.org> where citizens can find and share information, questions, and

analyses about societal issues raised by nanotechnologies. (June 2010) Ref. 2083

#### Chinese and Russian New Nanotechnology Organizations

The Chinese Academy of Science's National Center for Nanoscience and Technology and Institute of High Energy Physics have opened a Laboratory for Biological Effects of Nanomaterials and Nanosafety in Beijing on the IHEP campus. Russia has opened the Pilot Scientific and Technical Center of Excellence for Nanotechnology Development in Moscow. (July 2006) Ref.2084

#### UK Nanotechnology Policy Review Announced

The UK government has asked the Council for Science and Technology to review national nanotechnology policy commitments and provide written evidence of their findings. This review is in part a follow-up to the 2004 Royal Society report, Nanoscience and nanotechnologies: opportunities and uncertainties. (July 2006) Ref. 2085

#### UK Review Faults Governments' Nanotech Risk Assessment Plans

The UK's Council for Science and Technology (CST) has released a review of the government's response to the recommendations on nanotech risk studies made in the Royal Society's 2004 report. The review states that the government's efforts to provide support for such research are progressing too slowly. It equally criticizes the US and other countries for similar failures. (April 2007) Ref. 2086

#### Nanomaterials' Biological Risks a Complex Problem

Two research projects at Rensselaer Polytechnic Institute, led by Asst. Prof. of Biomedical Engineering Deanna M. Thompson and Asst. Prof. of Earth and Environmental Sciences Anurag Sharma, have shown that the size, type, and dispersion of nanomaterials all may affect the materials' biological effects. Prof. Thompson's work dealt with the effect of nanotubes' degree of dispersion on their impact on cell growth, while Prof. Anurag's study was on long-duration effects on bacteria of nanotubes as compared with activated carbon or C60 fullerenes. (April 2007) Ref. 2087

#### Online Consultation on Nanomaterials Specification in EU Technical Guidance for Chemicals

According to an announcement from the EU, "The [European] Commission has ... launched a public consultation of the preliminary opinion of the Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR) on the appropriateness of the EU Technical Guidance Documents for chemicals in regard to nanomaterials. The online consultation, which will run until 23 May 2007, aims to gather feedback on proposed modifications to the Technical Guidance Documents and on needs for further research and development." The report notes that "... special characteristics of nanomaterials - potentially differing considerably from the conventional chemicals - have to be appropriately characterised. Furthermore, their toxicological behaviour and effects on health and the environment need to be assessed properly." Further, "The SCENIHR identifies issues requiring improvements in the technical guidance and methodologies, and proposes a staged strategy for the risk assessment of nanomaterials." (April 2007) Ref. 2088

#### Swiss Firm Offers Nanotech Risk Assessment Data and Safety Certification

According to an article from [www.in-pharmatechnologist.com](http://www.in-pharmatechnologist.com), the Swiss firm The Innovation Society "has developed the Cenarios system (Certifiable Nanospecific Risk management and Monitoring System) ... to collate risk related information from scientific, regulatory, technological and market sources and to generate a database of material to be applied to specific products and processes using nanotechnology." The system includes capabilities for managing risk assessment, and a continually updated database of current scientific and technical results. (March 2007) 2089

#### UN Environment Programme Calls for Nanotech Safeguards

UNEP's annual report on the global environment, GEO 2007, dedicates a whole chapter, Emerging Challenges – New Findings, to nanotechnology implications for the environment, looking at 'The environmental benefits of nanotechnology', 'The environmental risks of nanotechnology', and future developments. The report notes that "swift action" is needed to adjust the legislative processes to properly address the challenges presented by nanotechnology, with priority given to assessing the potential risks of nanomaterials already being mass-produced, and calls for global test protocols and greater cooperation between private- and public-sector industries and between the developing and industrialized worlds. (February 2007) Ref.2090

#### Survey Gives Insight into Effective Nanotech Education Methods

A new survey report from the University of Wisconsin-Madison Materials Research Science and Engineering Center (MRSEC) Interdisciplinary Education Group suggests improved ways of educating audiences on the nature of nanotech, and its problems and possibilities. (February 2007) Ref. 2091

#### New Report on Nanotechnology Applications in Water Treatment

Nanotechnology-based techniques are highly successful in removing both organic and inorganic contaminants from water. The consulting firm of Frost & Sullivan has issued a new report, Impact of Nanotechnology in Water and Wastewater Treatment, which outlines key nanotech water treatment applications and analyzes market and industry factors. It also provides a directory of contact information. (February 2007) Ref. 2092

#### French Research Council to Study Nanotube Toxicity

The French National Research Council (CNRS) is beginning a three-year project to study the "eco-toxicity" of carbon nanotubes, as part of a National Research Agency project. The project will investigate three main aspects: the polluting effects of nanotubes in the environment; toxicity in humans; and how to produce nanotubes using cleaner methods. (February 2007) Ref.2093

#### European Guide to Green Masters Programs Launched

The Institute of Nanotechnology has announced the official launch of the European Nanotechnology Masters Recognition Scheme, for 10:30 a.m., 20 June 2007, at the Congress Center, Düsseldorf, as part of EuroNanoforum 2007, The Scheme site, which can be visited at <http://www.nano.org.uk/nanomasters/>, offers online access to descriptions of nanotechnology-related master's degree programs throughout Europe. (May 2007) Ref. 2094

### Toxic Metals Carried into Cells by Nanoparticles

Scientists at the Swiss Federal Institute of Technology (ETH) Zurich and the Swiss Federal Laboratories for Materials Testing have discovered that metal oxide nanoparticles had up to 8 times the toxicity of the same metals in salt forms when brought into contact with lung epithelial cells. The explanation by one researcher is that "cell membranes provide a selective barrier against ions, preventing the dissolved metal salts from entering. Once a metal-containing nanoparticle has penetrated a cell, however, metal ions can leach from the particle and generate ROS [reactive oxygen species] in the cell interior". The degree of the toxicity is related to the specific metal being introduced. (May 2007) Ref.2095

### Nanotechnology Health Concerns Highlight Need for International Technology Convention

Buckyballs are spheres formed by a specific number and arrangement of carbon atoms. They are very important for a range of nanotechnology applications, but according to research presented at a recent meeting of the American Chemical Society, Buckyballs can cause extensive brain damage in fish. Other studies have shown that such particles can enter the brain. The fish studies, however, were the first to link nanoparticles to the destruction of brain tissue. Additional studies are underway to determine if coating such nanoparticles affects toxicity.

In reaction to this and other nanotechnology-related health issues, the ETC Group suggests, "The international community must formulate a legally-binding mechanism to govern the products of new technologies, based on the Precautionary Principle, one that addresses their health, socio-economic and environmental implications. International assessment should be incorporated under a new International Convention for the Evaluation of New Technologies (ICENT)." (April 2004) Ref.2096

### Industry/Environmentalist Cooperative Effort on Nanotechnology Risks

DuPont and Environmental Defense recently agreed to collaborate on a framework for the responsible development, production, use and disposal of nanomaterials. According to a statement, its intent is "to define a systematic and disciplined process that can be used to identify, manage and reduce potential health, safety and environmental risks of nano-scale materials across all lifecycle stages. This framework will then be pilot-tested on specific nano-scale materials or applications of commercial interest to DuPont". (October 2005) Ref. 2097

### Low Environmental Risk from Nanomaterial Manufacturing

A new study from Rice University compares the environmental and health risks associated with the production of five nanomaterials—single-walled carbon nanotubes, buckyballs, zinc selenide quantum dots, alumoxane nanoparticles and titanium dioxide nanoparticles—with the risks of making six everyday products—silicon wafers, wine, high-density plastic, lead-acid car batteries, refined petroleum and aspirin. Using end-to-end analysis of the manufacturing processes, the research team concluded that they present environmental risks no greater than do the technologies in such industries as oil refining, or wine or aspirin production. It should be noted that this work dealt only with possible hazards in manufacturing nanomaterials, not in utilizing them in products. The study is planned for publication in the 15 November issue of *Environmental Science and Technology*. (October 2005) Ref. 2098

### Nanomaterials in Drinking Water May be Hazardous

Preliminary results from research at Arizona State University indicate that the presence of certain nanomaterials in drinking water may be hazardous to intestinal cells. A layer of colon cells was broken down when exposed to a simulated intestinal fluid containing titanium dioxide particles. Further, the experiment showed that such a breakdown would allow the particles to pass into other parts of the body. The next phase of the effort will examine the potential adverse effects of the nanomaterials inside cell tissue. (October 2005) Ref.2099

### UK Launches \$8.5M Nanotech Risk Research

As a follow-up to the 2004 study into the risks and benefits of nanotechnology, the UK government's Department for the Environment, Food and Rural Affairs has announced an \$8.5 million research plan to identify long-term environmental and health risks from the technology. The new program should lead to a framework for containing any "unacceptable risks" associated with nanotechnology. The study had three foci, to: 1) understand the physical and chemical properties of nanoparticles; 2) determine the avenues of exposure to them; and 3) assess their possible human health impacts. The report describing the effort identifies 19 research objectives and describes ways in which they could be funded. [See also *Progress on Establishing Frameworks for Responsible Nanotechnologies* in October 2005, *Nanotechnology Assessment Reports* in March 2005, and *New UK Study on Future Impacts of Nanotechnology* in August 2004 environmental security reports.] (December 2005) Ref.2100

### EPA Nanotechnology White Paper

The U.S. Environmental Protection Agency released a draft paper that identifies gaps and research needed for better understanding the environmental and health implications of nanotechnology and for designing appropriate regulatory safeguards. After presenting the current state of nanotech, the paper suggests recommendations on next steps for addressing science policy issues and research needs and even indicates that the complexities of nanotechnology are too much for a single government agency to handle. (December 2005) Ref.2101

### German NanoCare Project to Evaluate Nanoparticles

This month marks the beginning of the NanoCare project under the auspices of the German Ministry of Education and Research. This project brings together thirteen companies, universities and research institutes, and focuses on "the properties of nanoparticles to ensure that they pose no risk to humans and the environment when used in chemical materials." It will operate for three years and has €7.6 million in funding from government and industry. (March 2006) Ref.2102

### New Patent Office Nanotech Index Should Speed Research

The U.S. Patent and Trademark Office is about to unveil its new expanded classification schedule for its cross-reference art collection (XRAC) of Nanotechnology, Class 977, material. This schedule will have 263 new subclasses (or categories) in which nanotech-related items can be filed and organized, compared to only one massive subclass at present. (January 2006) Ref.2103

### Nanotech Health, Safety, and Environment Working Group Set Up by ISO/ANSI

A result of the inaugural meeting of the International Organization for Standardization (ISO)

Technical Committee 229, Nanotechnologies, held in London, November 9-11, 2005, was the establishment of a working group on health, safety and the environment, to be convened by the United States within the American National Standards Institute (ANSI) framework. The group will work on standards for environmental issues involving nanomaterials. [See also *ISO to Establish Standardization in the Field of Nanotechnologies* in the October 2005 environmental security report.] (November 2005) Ref.2104

#### NIOSH to Form Field Research Team for Assessing Nanotechnology Processes Safety

The National Institute for Occupational Safety and Health (NIOSH) will form an interdisciplinary Field Research Team for assessing occupational health and safety practices related to nanotechnology operations. The interdisciplinary team will include researchers representing areas such as industrial hygiene, engineering, occupational medicine, and risk assessment, who will serve in limited-time assignments in the field, in those locations where nanomaterials are developed or utilized. The information and insight provided by the team will periodically update NIOSH's "Approaches to Safe Nanotechnology" on-line guidance document [www.cdc.gov/niosh/topics/nanotech/nano\\_exchange.html](http://www.cdc.gov/niosh/topics/nanotech/nano_exchange.html). (January 2006) Ref.2105

#### Managing the Effects of Nanotechnology

*Managing the Effects of Nanotechnology* by J. Clarence (Terry) Davies, is a comprehensive overview of the existing legal framework that would apply to nanotechnology, and outlines aspects that should be covered by new regulations. The author notes the need for a "right regulatory framework for nanotechnology--framework that encourages initiative and innovation, while also protecting the public and the environment." (January 2006) Ref.2106

#### New Technique for Non-toxic Nanosilver

Andrea Travan and colleagues at the Dept. of Life Sciences, Univ. of Trieste, have reported a new method for rendering silver nanoparticle non-toxic to mammalian cells. (See Item 7.8.2, Wide Use of Nano-Silver Raises Health and Environmental Issues, in the June 2009 issue of this report.) The method involves immobilizing the particles in a hydrogel, so that they, "can exert their antimicrobial activity by contact with the bacterial membrane, but cannot [be] absorbed and internalized by eukaryotic cells," according to an item in Nanowerk. (July 2009) Ref. 2107

#### NGO Coalitions Raise Doubts about Nanotech and the Environment

According to an article in Nanowerk News, cited in Meridian Nanotechnology and Development News, "Two international coalitions of non-governmental organizations (NGOs) are challenging industry claims about the potential environmental benefits provided by nanotechnology products. The groups, the European Environmental Bureau and the International POPs Elimination Network (IPEN) Nanotechnology Working Group, state that emerging evidence is showing that the claims put forth by industry regarding nanotechnology do not provide the whole picture, and that environmental risks and costs are being trivialized or ignored." (July 2009) Ref. 2108

#### Lux Report Addressing Nanotech Health, Environmental, and Safety Risks

Nanotechnology's environmental, health, and safety (EHS) risks can be addressed responsibly today, states a new Lux Research report, *A Prudent Approach to Nanotech Environmental, Health, and Safety Risks*. Explaining different types of risks associated with nanotechnology, Lux estimates that of \$8 trillion projected manufacturing output using some nanotechnology



through 2014, 25% is exposed to real risk at manufacturing (which should be easiest to mitigate), 7% is exposed to real risk at use, 14% is exposed to risk at end-of-life, while 40% is exposed to perceptual risk. The report states that risks can be effectively addressed today by using well-established risk management techniques, and it also suggests that specific actions from corporations, start-ups, investors, and governments are needed to address nanotech EHS risks. It comments that U.S. government funding for nanotech EHS risk assessment should be increased from the present earmarked 3.7% of the \$1.05 billion U.S. National Nanotechnology Initiative budget for 2006. [See also item 9.4 *Nanotechnology: Environmental Implications and Solutions* in May 2005 environmental security monthly report.]

Note: on June 29, 2005 Lux Research released *Nanotechnology: Where Does the U.S. Stand?* "assessing how U.S. research and business activities in nanotech measure up to those of international competitors." (Report available only to Lux Research clients) (June 2005) Ref.2109

### Buckyballs Risks

#### *Buckyballs Risks to DNA*

Using computer simulations, researchers at Oak Ridge National Laboratory in Tennessee, and Vanderbilt University found that buckyballs bind strongly to DNA, distorting the strands, which could interfere with the DNA's function, disrupting replication and repair and increasing mutation rates. However, the researchers admit that only actual experiments could determine buckyballs' impact on DNA in the real world. (December 2005) Ref.2110

Reacting to last month's remarks on possible dangers that "buckyballs" could present to human DNA, Dr. Hicham Fenniri, senior researcher at the National Institute for Nanotechnology in Edmonton, Canada, comments that there are no such risks. He explains that since buckyballs are not soluble in water, it would be difficult for them to reach the DNA to damage it. (January 2006) Ref. 2111

#### *Buckyballs Might Affect the Environment*

Scientists have found that buckyballs (the C60 hollow molecule nanospheres), envisioned for use in a wide variety of applications, are soluble in water, and influence the functioning of bacteria. So far, research shows that the particles at a concentration of 0.5 parts per million inhibited bacterial growth and respiration. Several features influence their behavior, including water's Ph. Thus, buckyballs are not biologically inert. This reveals that more research is necessary to understand buckyballs' behaviors and influences on the environment, and to guide the development of any eventual regulations concerning nanotechnology applications. (May 2005) Ref.2112

### Evidence of Damage to Beneficial Microbes from Nanoparticles

Papers presented at the annual conference of the American Chemical Society by scientists from the Univ. of Toledo, the Univ. of Utah, and Utah State Univ. indicated that titanium dioxide, copper oxide, zinc oxide, and silver nanoparticles, all used in consumer products and likely to turn up subsequently in the environment, may damage environmental microbes that perform vital functions, such as removing pollutants from water and may also pose a hazard to aquatic life. (March 2009) Ref. 2113

### Grant for Review of Best Practices in Nanotech Safety

Researchers at the University of California, Santa Barbara received a grant from the International Council on Nanotechnology (ICON), a multi-sectoral consortium, to conduct a "Review of Best Practices for Nanotechnology Safety", to be completed by the end of 2006. The first phase will

involve a comprehensive review of all existing "best practice" development efforts. The second will conduct interviews of a broad range of companies internationally to determine current practices, having as a goal, "to identify critical needs for the standardization and implementation of safe practices in the nanotechnology industry in different parts of the globe." A project official, Barbara Herr Harthorn, commented, "The ICON-funded study will provide essential data on current nanotech industry standards and practices for enhancing the environmental and health safety of nanomaterials. By providing comparative data on companies in the US, Europe and Asia, it will help shed light on new safety models as they are being implemented and also help identify where they are most needed. This work will provide important baseline data for ... research ... UCSB is planning on risk and society issues." (March 2006) Ref.2114

#### Nanotechnology's Bottom-up Approach Gets a Boost

Foresight Nanotech Institute and Battelle Memorial Institute will lead a broadly based project to create a nanotechnology roadmap to help investment become more strategic and help set goals. The roadmap will focus on a bottom-up approach to nanotechnology based on productive nanosystems, using molecular machines to make larger products, scaling up to desktop manufacturing systems. The current approach mostly focuses on the reverse: large machines making smaller things like nanotubes, and other arrangements of molecules and atoms. The roadmap will describe a step-by-step development process starting with today's laboratory capabilities and providing useful products at every stage. Creating a roadmap that includes a broader range of approaches to nanotechnology will make cost, benefits, and time-to-impact judgments more clear for all. Such a roadmap may also assist future developers of international agreements on nanotechnology standards and trade. (June 2005) Ref.2115

#### **Other Nanotechnology Safety Assessments**

*Current Developments/Activities on the Safety of Manufactured Nanomaterials/Nanotechnologies* report by the Organization for Economic Co-operation and Development (OECD) summarizes the 2nd Meeting of the Working Party on Manufactured Nanomaterials held in Berlin, Germany, April 25-27 2007. It catalogs the initiatives in industrialized countries to address the health and environmental safety implications of manufactured nanomaterials organized by progress since the first meeting and work underway or planned in the country or organization. The recommended headings were:

1. Any national regulatory developments on human health and environmental safety including recommendations or discussions related to adapting existing regulatory systems or the drafting of laws/ regulations/ guidance materials;
2. Developments related to voluntary or stewardship schemes;
3. Information on any risk assessment decisions;
4. Information on any developments related to good practice documents;
5. Research programmes or strategies designed to address human health and/ or environmental safety aspects of nanomaterials;
6. Information on any public/ stakeholder consultation.

EPA Conference on Nanoscale Materials. On 13 August EPA announced that it will be holding a Peer Consultation on Materials Characterization of Nanoscale Materials: September 6-7, 2007, in Rosslyn VA. The meeting's goal is to help develop EPA's Nanoscale Materials Stewardship Program (NMSP) under the Toxic Substances Control Act (TSCA). EPA is

requesting comment on characteristics currently used or potentially available to characterize nanoscale materials, rationale for the use of these characteristics, and issues to consider regarding use of these characteristics in the NMSF.

Study Shows Nanotube Manufacture May Pollute Environment. A study by Desirée L. Plata and colleagues at MIT, reported at the 234th national meeting of the American Chemical Society, has shown that chemical vapor deposition, one of the main methods for making carbon nanotubes, can release into the environment various toxic polycyclic aromatic hydrocarbons, and other hydrocarbons that are harmful to the atmosphere and human health.

Canada published a new Substances Program Advisory Note 2007-06, Requirements for nanomaterials under the New Substances Notification Regulations (Chemicals and Polymers)

The Nanotechnology Engagement Group published its final report, *Democratic technologies?* addressing public involvement, dialogues, and ethical aspects of nanotechnology. (August 2007) Ref.2116

*REFNANO: Reference materials for engineered nanoparticle toxicology and metrology* addresses the potential role of reference materials in toxicology and metrology created by a team of UK scientists, commissioned by the UK Department for Environment, Food and Rural Affairs (Defra). It provides a prioritized list of reference materials relevant to nanotechnology, focusing on materials produced and used in the UK.

The Director of the Woodrow Wilson Center's Project on Emerging Nanotechnologies has indicated disappointment with a recent report, *Prioritization of Environmental, Health, and Safety Research Needs for Engineered Nanoscale Materials*, prepared by a working group of the Nanoscale Science, Engineering, and Technology Subcommittee (NSET), part of the federal government's National Science and Technology Council. The Director states, "Notably absent are important details like budget allocations, implementation time frames, and assigned responsibilities." (September 2007) Ref.2117

Survey of Nanotube Toxicity to Immune Systems. Exploring the Immunotoxicity of Carbon Nanotubes (<http://www.springerlink.com/content/g4u1716412126840/>) paper reviews some existing studies assessing carbon nanotubes' toxicity to immune systems and provides the potential mechanistic explanation. (September 2008)2118

UK Government Nanotechnology Policy Workshop for Industry held on October 19, 2007, organized by the Department for Environment, Food and Rural Affairs (Defra) and the European Nanotechnology Trade Alliance (ENTA) to provide updates from the UK government regarding: research progress from the nanotechnology research coordination group; Defra's voluntary reporting scheme; Council for Science and Technology report on government progress against nanotechnology commitments; overview of the international efforts; and industry perspectives. BSI British Standards is publishing nine documents addressing nanotechnology health and safety issues for UK industry; seven deal with terminology—from fabrication to labeling—and two provide guidance for safe handling and disposal of free engineered nanoparticles, and for specifying nanomaterials.

Indian scientists warn that India faces serious nanotech environmental health and safety issues due to absence of guidelines on nanoparticle toxicity and biosafety regulations in India and worldwide. Scientists from the Energy Resources Institute in Delhi launched a study this year to investigate the opportunities and risks associated with the technology. (October 2007) Ref.2119

Scientists at Cambridge Univ. and the Daresbury Laboratory have developed a new method of studying the effects of carbon nanotubes on living cells. Alexandra Porter, a lead scientist at Cambridge, has explained that, by using transmission electron microscopy (TEM) and confocal microscopy, the entry and migration of nanotubes into and within cells can be visualized. First results, published in the October 28 online edition of *Nature Nanotechnology*, showed that cell death caused by certain nanotubes depended on the dose and exposure time and suggest that the toxicity is linked to the movement of the tubes into the cytoplasm and nucleus of a cell. This might help to elucidate the relationship between the physics and chemistry of nanomaterials and their biological effects, and hence help nanotech EHS research.

*Nanotechnology large risks with tiny particles* report by KemI, Sweden's chemical regulators, proposes that the Government: allocate special research funds to the Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (Formas) for research on health and environmental risks of nanomaterials; instruct the Swedish Chemicals Agency to: follow developments in the area and propose measures whenever justified, and to participate actively in the development of new or modified testing methods within the OECD cooperative framework; instruct the Swedish Chemicals Agency to produce a deeper analysis of the use of nanomaterials in chemical products and articles after consultation with the trade organizations concerned; instruct the governmental agencies concerned to review the need for complementing existing legislation; arrange, in the context of Sweden's EU presidency in 2009, a workshop on how the health and environmental risks of nanotechnology should be dealt with by legislation.

The U.S. Agency for Toxic Substances and Disease Registry (ATSDR) (part of the Department of Health and Human Services) has requested nominations from a list of proposed substances that it will evaluate for toxicological profile development. The list of proposed substances includes nanomaterials. The list of selected substances will be published late winter or early spring in the Federal Register. The added profiles will be publicly available in October 2008. Interested parties can monitor the profile list for the latest information at <http://www.atsdr.cdc.gov/toxpro2.html>.

A U.S. national survey on the potential impacts of nanotechnology reveals that while more optimistic about the possible benefits of nanotechnology, nanoscientists are significantly more concerned than the general public for some issues related to the environmental and health impacts of nanotechnology. They say that more research is needed to assess nanotech long-term implications. Only 15% to 20% of the public expressed concern related to nanotech risks, versus 20%-30% by nanoscientists. The study was published in *Nature Nanotechnology* (November 25.)

*The challenge of regulating nanomaterials* is a well-documented article published in the *Environmental Science and Technology* journal, offering an excellent overview of the nanotechnology-related risks and regulations picture.

EuroNanOSH, the first European Conference focusing on occupational safety and health from the viewpoint of nanotechnology and engineered nanoparticles in workplaces, will be held in Helsinki 3-5 December 2007. According to the announcement, "The Conference will evaluate the current safety situation of engineered nanoparticles in Europe and consider what actions are required in the near future. ... one of the main objectives of the Conference is to present the current understanding regarding the safety of engineered nanoparticles and to draw conclusions to protect workers both within and outside of Europe."

The Nanotechnology for Security and Crime Prevention III conference, organized by the

Institute of Nanotechnology, will be held January 17, 2008, at The Royal Society, London. The conference will provide an update on the latest advances in nanotechnology with applications for security and fight against crime. Several papers on chemical detection will be presented. (November 2007) Ref.2120

The first nanotechnology genotoxicity (toxicity at the molecular level) tests found that carbon nanotubes could damage DNA. Researchers at the University of Dayton have assessed the DNA damage response to multi-walled carbon nanotubes (MWCNT) in mouse embryonic stem cells. The methodology used is highly versatile for testing genotoxicity and hence can be expanded for genotoxicity tests of other nanomaterials.

The “Nanotechnology & the Media: The Inside Story” meeting held at the Woodrow Wilson Center discussed the results of a study analyzing media coverage of nanotechnology risks in the U.S. and UK. The study reveals a large increase in the number of articles, with the focus being mainly on health, environmental and security aspects. Coverage is higher for regulatory and reports related issues than for scientific matters. Concerns about nanotech risk are increasing at non-profits and governments, and governments are responding most strongly to risk concerns. In general, there was a strong feeling that there is not enough media coverage on the nanotech risk issues. (December 2007) Ref.2121

The First Annual Conference on Nanotechnology Law, Regulation and Policy will be held February 28-29 in Washington, DC. The conference will include discussions of whether the FDA will implement its Nanotechnology Task Force Report, how OSHA will address nanotechnology-related issues in the workplace, and how the European and Asian approaches to nanotechnology regulation differ from that of the U.S. The conference is co-sponsored by the Food and Drug Law Institute, and the Woodrow Wilson International Center for Scholars Project on Emerging Nanotechnologies, in partnership with Arizona State University and the Burdock Group.

The UK Institute of Occupational Medicine’s SAFENANO Information Service and Community Portal has set up SAFENANO Scientific Services to provide multidisciplinary risk management solutions to companies operating in the nanotechnology industry. The services, planned to assist with safety issues ranging from employees’ working conditions to end products, include training, laboratory tasks, and toxicology information update. (January 2008) Ref.2122

The European Commission has adopted a Code of Conduct for Responsible Nanosciences and Nanotechnologies Research, and is recommending to the Member States the adoption of the Code to govern research in this field. The Code is based on seven principles such as sustainability (non-threatening to the present or future environment) and accountability, and provides guidelines for their implementation.

European Commission grants \$587,000 to London School of Economics researchers to conduct an international research project on regulating nanotechnologies in the European Union and the United States.

*Technology Roadmap for Productive Nanosystems* by Foresight Nanotech Institute and Battelle, according to the announcement, “... is a first attempt to map out the R&D pathways across multiple disciplines to achieve atomically precise manufacturing.” It provides a detailed technical background for consideration of the environmental problems that might arise during these processes.

*Strategy for Nanotechnology-Related Environmental, Health, and Safety Research* published

February 2008 by the National Science and Technology Council describes the National Nanotechnology Initiative's (NNI) strategy for addressing priority research on the environmental, health, and safety (EHS) aspects of nanomaterials. The report assigns priorities to research and information needs that were identified in the NSET Subcommittee document Environmental, Health, and Safety Research Needs for Engineered Nanoscale Materials, published on September 21, 2006.

*Risks of nanotechnology remain uncertain* published in the American Chemical Society's Environmental Science & Technology Online is a comprehensive overview of the current state of nanotechnology risk assessment, emphasizing the paucity of solid scientific results in that important field and giving useful examples and references. (February 2008) Ref.2123

Federal Toxics Disclosure Law Could Provide Data on Nanotechnology Risks. According to a news release, the Project on Emerging Nanotechnologies (PEN) of the Woodrow Wilson Center and the Pew Charitable Trusts has released a legal analysis that finds that EPA's Toxic Release Inventory (TRI) could be applied to the production and commercialization of nanotechnology, although the applicable statute may need to be amended to take care of the special aspects of nanotechnology risk assessment. The report also emphasizes that additional disclosure-related measures for nanotechnology risks should be considered and that "additional research is required to determine whether application of TRI to nanomaterials should be pursued as a policy priority in the near term".

Nanotechnologies at the OECD. According to nanoforum.org, "The OECD has prepared an overview of its work on nanotechnologies for Forum VI of the Intergovernmental Forum on Chemical Safety (IFCS). The paper, titled Nanotechnologies at the OECD, describes the two activities of OECD related to nanotechnologies: i) the activities of the Working Party on Manufactured Nanomaterials (WPMN); and ii) the Working Party on Nanotechnology (WPN)." The stated objective of WPMN is "to promote international co-operation in human health and environmental safety related aspects of manufactured nanomaterials (MN), in order to assist in the development of rigorous safety evaluation of nanomaterials."

Explosivity and Flammability of Nanopowders. An item from nanoforum.org announces a new report on this subject from the NANOSAFE2 project, "One of the main questions asked about nanopowders, when it comes to explosivity and flammability, is: do nanopowders behave like other powders and, as such, can they more readily ignite and explode? During this study, carried out in the frame of the European Nanosafe2 project, safety parameters of nanopowders and their associated techniques and practices have been characterised for a representative set of particles of industrial relevance." It concludes that behavior depends on the materials and surfaces on which nanopowders are applied and hence, "Specific prevention and protection measures should then be taken."

Report Warns of Nano Hazards in Foods. A new report from Friends of the Earth notes that "Untested nanotechnology is being used in more than 100 food products, food packaging and contact materials currently on the shelf, without warning or new FDA testing." and "calls on the FDA to stop the sale of all nano food, packaging, and agricultural chemicals until strong scientific regulations are enacted to ensure consumer safety and until ingredients are labeled." (March 2008) Ref.2124

New Analysis of Nanotech Risk Assessment Funding by the Project on Emerging Nanotechnologies, analyzing nanotech spending for fiscal year 2006, found that only \$13

million—representing less than 1% percent of the \$1.4 billion U.S. National Nanotechnology Initiative budget—was spent on federal research projects highly relevant to addressing possible environment, health and safety risks related to nanotechnology. The same year, European countries invested nearly double—\$24 million —on similar nanotech risk-assessment projects. Draft legislation proposed by the U.S. House of Representatives Science Committee would require that in the future, a minimum 10% of the NNI budget be devoted to risk assessment research.

The NSTI Nanotech 2008 Conference is scheduled to be held in Boston 1-5 June. Two sessions on “Environmental [sic], Health and Toxicology”, including a paper on “Legislative, Regulatory [sic] and Risk Management for Nanotech EHS”, are on the program for 5 June. (April 2008) Ref. 2125

According to a story in PhysOrg.com, “A major study ... in Nature Nanotechnology suggests some forms of carbon nanotubes ... could be as harmful as asbestos if inhaled in sufficient quantities.” Reporting experiments carried out on mouse tissue, one of the researchers, Prof. Kenneth Donaldson of the University of Edinburgh, stated, “Long, thin carbon nanotubes showed the same effects as long, thin asbestos fibers”, causing pathological responses known to be precursors of mesothelioma. The scientists noted that it is still unknown if the tubes can be inhaled and reach sensitive portions of the lungs. (May 2008) Ref.2126

A petition filed by a citizens’ coalition with the U.S. Environmental Protection Agency is demanding the agency exercise its pesticides’ regulating authority and stop the sale of about 260 products containing nano-silver, due to the compound’s possible risks to human health and the environment. The coalition of consumers, health, and environmental groups is led by the nanotech watchdog International Center for Technology Assessment. (May 2008) Ref.2127

The European Commission is planning to launch a large-scale public consultation for raising awareness about nanotechnologies’ potentials and at the same time for addressing citizens’ concerns about nanotech’s possible health and environmental impacts. (June 2008) Ref.2128

Stanley Shaw, a chemical biologist at Massachusetts General Hospital Center for Systems Biology, and his colleagues at the Broad Institute of Harvard and MIT have designed a high-throughput screening method for assessing the biological effects of nanomaterials. The technique uses robotic equipment to place individual nanoparticle types and cell types in various combinations into hundreds of tiny wells in a plate, where an automatic screening system determines the resulting biological effects. Software then analyzes the data, seeking relationships among the different combinations. (June 2008) Ref.2129

The Project on Emerging Nanotechnologies of the Woodrow Wilson Center, in cooperation with the Grocery Manufacturers Association, has issued a report that examines the path of several hypothetical applications of nanotechnology-enabled food packaging through the current regulations and examines potential future challenges related to this issue. (June 2008) Ref.2130

#### Studies on Potential Environmental and Health Impacts of Nanotechnology

*Nanoscience and Nanotechnologies: Opportunities and Uncertainties*, by the UK Royal Society and the Royal Academy of Engineering reviews the state of knowledge and ignorance about

potential health, safety and environmental impacts of nanotechnology, plus an assessment of the social and ethical issues of its future. Although clearly stipulating that there is no ground for a moratorium on nanotechnology research, the report calls for more research into the health, safety, and environmental impacts of nanotech. It recommends establishment of “an Interdisciplinary centre (probably comprising several existing research institutions) to undertake research into the toxicity, epidemiology, biopersistence and bioaccumulation of manufactured nanoparticles, their exposure pathways, and methods and instrumentation for monitoring them in the environment.” (August 2004) Ref.2131

*Nanotechnology: Environmental Implications and Solutions*

Although the book review in Small Times says that the title is overstated—the book not offering “solutions”—it presents a comprehensive overview of today’s environmental regulations and their current status, addresses pollution issues including control techniques, and does an assessment of nanotechnology referring to its potential health risks, risk communication, and ethical issues. The book appears to be a good source of information both for environmentalists—explaining nanotechnology – and for nanotech scientists—informing about environmental policies and procedures. (May 2004) Ref.2132

*Soot Particulates may cause genetic mutations in mice*

McMaster University researchers reported that mice breathing filtered air have 52 % lower mutation rates than those mice exposed to soot in open air from a steel mill. It is not known if such particles can make their way through the blood system to affect sperm-forming cells. Although more research is needed, and it is currently unknown if people could inherit pollution-damaged DNA, this is a new area for serious attention. It is clear that High Efficiency Particulate Air (HEPA) electronic filters offer an effective way of removing particulate matter from the air. (May 2004) Ref.2133

Study Finds TiO<sub>2</sub> Nanoparticles as Possibly Brain-damaging

Preliminary results in a new study from EPA's National Health and Environmental Effects Research Laboratory indicate that titanium dioxide nanoparticles may cause a reaction that could seriously damage brain cells. The particles trigger the release from some cells of biologically active molecules, known as reactive oxygen species (ROS), which can damage surrounding cells. (June 2006) Ref.2134

Other Nanotechnology Assessment Reports

*New Paper Reviews Aspects of Public Perception of Nanotech*

According to an article in Meridian nanotechnology & development news, “This article compiles much of the research conducted over the last several years regarding what factors influence the public's perception of nanotechnology.” (March 2009) Ref. 2135

*New Study of Nanomaterials and Plant Toxicity*

According to an article and a technical review in nanowerk, Prof. Pu Kun Che and colleagues at Clemson Univ. have published one of the few papers so far on the effects of nanoparticles on plants, and the possible resulting hazards to both the plants and the associated food chain. They determined that nanoparticles above certain concentrations could clog the vascular systems of plants. (March 2009) Ref. 2136



*Scientific Forward Look on Nanomedicine* is a foresight study by the European Science Foundation, assessing the application of nanotechnology to medicine. This study included over 100 international experts from academia, industry, private foundations and governmental agencies, who reviewed future developments, opportunities and challenges facing this emerging field worldwide. The study analyzes the current state-of-the-art in nanomedicine, identifies Europe's strengths and weaknesses, and provides recommendations on future research priorities and organizational matters.

*Response To The Royal Society And Royal Academy Of Engineering Report: 'Nanoscience and nanotechnologies: opportunities and uncertainties'* is a 'response report' to the independent study conducted by the UK Royal Society and the Royal Academy of Engineering (published in July 2004) on the opportunities and uncertainties concerning nanotechnology to ensure that England has an adequate regulatory system for responsible nanotechnology development. This 'response report' sets out the UK Government's agenda on nanotechnologies; and will be reviewed by an independent body after two and five years.

'Potential Environmental Pollution and Health Hazards Resulting from Possible Military Uses of Nanotechnology with Implications for Research Priorities Helpful to Prevent and/or Reduce Such Pollution and Hazards' is the result of a two-round Delphi by the Millennium Project of the American Council for the UNU that assembled a 25-member expert panel to identify and rate these issues. (March 2005) Ref.2137

*ETC Report on Nanotechnology Impact on Food and Agriculture*

The ETC Group recently released a report, "Down on the Farm: The Impact of Nano-Scale Technologies on Food and Agriculture", that addresses nanotechnologies' impact on farmers, food and agriculture. The report recommends that until the clear implications of nanotechnology use in agriculture and food chain are known, its use be guided by the Precautionary Principle or even prohibited until a regulatory regime specifically designed to examine these nano-scale products finds them safe. The report also addresses the 'green goo' issue related to potential dangers associated with synthetic biology or nanobiotechnology and, given the extreme risks (that even mainstream scientists are beginning to acknowledge), calls for an immediate moratorium on laboratory experimentation and environmental release of these materials until there is thorough knowledge of their health, environmental and socio-economic implications. (November 2004) Ref.2138

Recent results have shown the need for great care in interpreting results on the toxicity of nanotubes and other nano materials. They show major differences between in vitro and in vivo tests, (June 2006) Ref.2139

Assessing exposure to airborne nanomaterials: Current abilities and future requirements. (April 2007) Ref. 2140

Informa Healthcare has started publication of a new quarterly journal, *Nanotoxicology*, in both online and print versions. Information about it can be found at <http://www.informaworld.com/smpp/title~content=t716100760>

The inaugural issue features a 16-page article, "Assessing Exposure to Airborne Nanomaterials: Current Abilities and Future Requirements," written by Andrew Maynard, chief science advisor at the Wilson Center's Project on Emerging Nanotechnologies, and Robert Aitken, director of

strategic consulting at the Institute of Occupational Medicine (Edinburgh, UK) (April 2007)  
Ref.2141

The Institute for Food and Agricultural Standards (IFAS) at Michigan State University has released a 32-page report, *An Issues Landscape for Nanotechnology Standards: Report of a Workshop*. According to the announcement, "The report discusses critical issues surrounding five standards themes affecting ...nanotechnologies ... (1) timing and standards-setting, (2) product vs. process standards, (3) international harmonization, (4) integration of operational standards, and (5) participation and transparency." (April 2007) Ref.2142

Nanotech Products Meeting to Be Held in London, 16-17 May—updated information is now available at [www.nano.org.uk/events/ionevents.htm](http://www.nano.org.uk/events/ionevents.htm) The meeting examined nanotechnologies that are described as “offering real environmental benefit, and will also review the findings of the recently published STOA report on the Role of Nanotechnology in Chemical Substitution.” (April 2007) Ref.2143

The International Council on Nanotechnology and the University of California at Santa Barbara have issued a new report, *A Review of Current Practices in the Nanotechnology Industry*, the second in a series. [See *Review of Safety Practices in the Nanotechnology Industry*]. According to the announcement, it is "the first comprehensive, international survey of workplace safety practices in the nanotechnology industry" and "documents results from survey data collected from 64 organizations in North America, the European Union, Asia and Australia." The release also says it, ... "finds that many nanotech companies and laboratories believe nanoparticles ... may pose specific environmental and health risks for workers. In response, companies are reporting that they are developing special programs and procedures for mitigating risks to workers and consumers. Yet, due in part to a lack of general information regarding nanomaterials risks, companies and labs have workers using conventional environmental, health and safety (EHS) practices when handling nanomaterials, even though the practices were developed to deal with bulk materials that can have markedly different chemical properties than their nano-sized counterparts." The Director of ICON says "The use of conventional practices for handling nanomaterials appears to stem from a lack of information on the toxicological properties of nanomaterials, as well as nascent regulatory guidance regarding the proper environmental, health and safety practices that should be used with them." (November 2006) Ref.2144

*RCRA Regulation of Wastes from the Production, Use, and Disposal of Nanomaterials*, by the American Bar Association's Section of Environment, Energy, and Resources, discusses a number of issues related to the EPA's regulation of nanomaterial wastes under the Resources Conservation and Recovery Act (RCRA). Topics include the possible need for new definitions of hazardous nanomaterial characteristics, injunctive relief against imminent and significant risks, and the current practice of relying on the waste generator's process knowledge. (August 2006) Ref.2145

The Nano Science and Technology Institute (NSTI) has published the Proceedings of its 2006 Conference. Vol. 1, Chapter 6 of that work is entitled Environmental, Health and Societal Impacts of Nanotechnology, and includes a paper, *A Framework for Responsible Nanotechnology Standards*, describing a joint effort of Environmental Defense and DuPont. The Proceedings are available in print, or in a 2677-pp. CD-ROM. (August 2006) Ref. 714

The new report by Woodrow Wilson International Center's Project on Emerging Nanotechnologies, *Nanotechnology: A Research Strategy for Addressing Risk*, makes several recommendations for nanotechnology risk assessment, including that the government: institute a top-down strategic framework for risk-based nanotechnology research, prioritize research, establish joint industry funding, and coordinate research activities internationally. (August 2006) Ref.2146

The final report of Defra (UK organization), *Environmental Regulatory Gaps Study on Nanotechnologies*, addresses environmental regulation gaps concerning potential risks posed by products and applications of nanotechnologies, and it identifies measures that can be put in place to ensure adequate protection for human health and the environment. It is a comprehensive overview, analyzing each sector concerning nanotech—from substances, production and application, to environmental impacts—with respect to existing regulations, and highlighting the eventual gaps. (August 2006) Ref.2147

The International Risk Governance Council ([www.irgc.org](http://www.irgc.org)) has issued a white paper, *Nanotechnology Risk Governance*, which uses the IRGC's risk governance framework, published in 2005, to analyze and identify current deficits in nanotechnology risk governance, separately considering current and future developments. It then offers initial recommendations for how decision makers may choose to deal with these risk governance gaps. These recommendations will be subject to further work, including discussions with appropriate stakeholders. (July 2006) Ref.2148

The UNESCO World Commission on the Ethics of Scientific Knowledge and Technology has published a 25-page report, *The Ethics and Politics of Nanotechnology*. The work discusses "Nanotechnology Research Now" and "Ethical, legal, and political implications of nanotech", and it concludes with a list of the most recent reports that have been released covering nanotechnology, its implications, and the social, political and ethical issues surrounding it. (July 2006) Ref.2149

The European Commission Scientific Committee on Emerging and Newly Identified Health Risks has issued a 79-page "modified opinion" on the appropriateness of existing methodologies to assess the potential risks associated with engineered and adventitious products of nanotechnologies. This report discusses in detail the scientific rationale, including risk assessment methodologies and prioritization of needs in knowledge, and concludes with Committee and minority opinions, and references. (July 2006) Ref.2150

CDC's National Institute for Occupational Safety and Health (NIOSH) has announced the release of a new progress report, *Progress Toward Safe Nanotechnology in the Workplace*, which, according to the release, details the advancements made by NIOSH in advancing scientific knowledge in understanding the occupational safety and health implications of engineered nanoparticles, and also suggests potential areas where future research could further expand this knowledge. (March 2007) Ref.2151

#### National Nanotech Initiative Issues Risk Assessment Report

The US National Nanotechnology Initiative has issued a report, *Understanding Risk Assessment of Nanotechnology*, which manages in eight pages to offer a comprehensive, technically oriented introduction to nanotech risk assessment. The document contains 44 endnotes, listing hundreds of Web sites and paper citations. (March 2007) Ref.2152

#### EPA Publishes White Paper on Nanotechnology

The US Environmental Protection Agency has issued a Nanotechnology White Paper. The 132-page document describes nanotech and its benefits and risks, and discusses risks assessment issues and research needs and priorities. An appendix contains a description of EPA's framework for nanotechnology research. (March 2007) Ref.2153

The International Council on Nanotechnology (ICON) and Rice University's Center for Biological and Environmental Nanotechnology (CBEN) have been maintaining an online database of references to current work in nanotech environmental health and safety issues. They have now announced the launch of a new monthly online review journal, The Virtual Journal of Nanotechnology Environment, Health & Safety (VJ-Nano EHS). The new publication will contain primarily items added to the database during the current month, so that users can easily keep up with progress in the field. The site will also provide a series of occasional papers, access to the whole database, and a capability for search by a number of different aspects of the work reported, such as risk exposure group, particle type, and exposure pathway. The journal may be accessed at <http://icon.rice.edu/virtualjournal.cfm>. (March 2007) Ref.2154

*Green Nanotechnology: It's Easier Than You Think*, from the Project on Emerging Nanotechnologies of the Woodrow Wilson International Center, discusses links between nanotechnology and environmentally friendly development and production. It also presents recommendations for proactive federal policy measures to encourage such applications of nanotech. (May 2007) Ref.2155

#### New Book Studies Media and Nanotechnology

Nanotechnology, Risk and Communication, co-authored by Professor Stuart Allan of Bournemouth University, United Kingdom [Palgrave Macmillan 2009], is “one of the first major studies of media coverage, policy debates and public perceptions about nanotechnology.” (April 2009) Ref. 2156

#### **Some Conferences on Nanotechnology with Environmental Security Implications**

##### International Nanotech Workshop to Precede June Prague Meeting

The 1st ICPC NanoNet Workshop will be held on June 1st, 2009, at the same venue as EuroNanoForum 2009, which begins on June 2nd. [See item European Nanotech Meetings to Be Held in June and September 2009 in March 2009 environmental security report.] The Workshop will present reviews of nanotech activities from speakers representing all regions of the world. (April 2009) Ref. 2158

##### US/Africa/Caribbean Nanotech Conference to Be Held

The United States-Africa and Caribbean Nanotechnology Initiative (USACANI) Workshop will be held from June 21-26, 2009 in Trinidad, Trinidad and Tobago. According to an announcement in Meridian Nanotechnology & Development News, “The purpose of the conference is to bring together nanoscience and nanotechnology leaders to discuss issues critical to the United States, Africa, and the Caribbean.” (February 2009) Ref. 2159

#### EuroNanoForum 2009 to Be Held in Prague, June 2-5, 2009

The fourth international nanotechnology conference, EuroNanoForum 2009, an official event of the EU, will be held in Prague, June 2-5, 2009, with the topic “Nanotechnology for a Sustainable Economy”. Among the individual sessions will be “Environmental applications and implications of nanotechnology” and “Nanotechnology: education, standardization and social perception of benefits and risks”. (December 2008) Ref. 2160

#### Indian Conference on Nanotechnology and Regulatory Issues

An Indian National Conference on Nanotechnology and Regulatory Issues is scheduled January 9-10, 2009 at the Centre for NanoScience and Nanotechnology, Saltlake City, Kolkata. The purpose of the conference is to bring together policymakers, nanoscientists, lawyers and academicians to debate and discuss a range of issues relating to nanotechnology regulation in India. (October 2008) Ref.2161

#### International Environmental Nanotechnology Conference 2008

The 2008 International Environmental Nanotechnology Conference: Applications and Implications will be held 7-9 October in Chicago IL. According to the announcement, “The conference will bring together researchers and practitioners from around the world to discuss the nanotechnology applications for remediation of environmental contaminants; the implications of releasing manufactured nanoparticles into the environment, and pollution control and nano-enabled sensing.” (September 2008) Ref.2162

#### Nanoparticle Warnings at Euroscience Open Forum

Two speakers at the Euroscience Open Forum in Barcelona discussed the need for more research on the environmental risks posed by nanoparticles. Hermann Stamm, head of nanotechnology and molecular imaging at the Institute for Health and Consumer Protection in the European Commission's Joint Research Council brought up concerns about a connection between nanoparticles from exhaust engines and air pollution, and lung cancers and heart disease. Ken Donaldson, of Queens' Medical Research Institute, Scotland, reported on his work on the asbestos-like properties of nanotubes. (July-August 2008) Ref.2163

#### European Nanotechnology Conference in Switzerland in September 2008

NanoEurope, a European exhibition for the transfer of nanotechnology knowledge, will be held in St.Gallen, Switzerland 16-17 September 2008. According to the announcement, it “will present successful commercial nanotechnology applications and introduce new scientific knowledge that can be commercialized”, and will also feature a business exposition. (July-August 2008) Ref.2164

The U.S. National Nanotechnology Coordination Office (NNCO) will hold a public meeting on January 4, 2007, to address the needs and priorities of environmental, health, and safety (EHS) research on engineered nanoscale materials. According to the announcement, the purpose of the meeting is to lay-out "strategic and interim goals for filling the EHS information needs gaps for nanomaterials." It will be structured around the following research areas: instrumentation, metrology, and analytical methods; nanomaterials and human health; nanomaterials and the environment; health and environmental surveillance; and risk management methods. (December

2006) Ref. 2165

A conference, Nanotechnology - Products and Processes for Environmental Benefit, is to be held in London on 16-17 May 2007 under the auspices of the Royal Society. More information will be available shortly. (December 2006) Ref. 2166

The 'Nanotechnologies - Safety for Success' conference, held 14-15 September in Espoo, Finland, has published its final report. The conference was attended by 180 specialists from 20 countries. According to the announcement, speakers introduced the audience to the opportunities, unknowns, and potential risks of evolving nanotechnologies, facilitated dynamic stakeholder discussion and identification of coordinated and concerted actions, and identified the key actions for efficient and well coordinated policies on nanotechnologies in Member States, in the European Union and internationally. (December 2006) Ref. 2167

'Nanotechnology for Security and Crime Prevention' 18 January 2007, The Royal Society, London, will examine a wide spectrum of new scientific developments taking place in the fight against crime, from anti-terrorism laser technology with the potential to revolutionize airport security to the latest research discoveries in nanoforensics.

“Health & Environmental Summit on Nano” will be held during Nanotech 2007, May 20-24, 2007 in Santa Clara, California, convened by the Nano Science and Technology Institute (NSTI) in collaboration with the U.S. Food and Drug Administration, to assist with the FDA’s fact-finding programs for Nanotechnology in Consumer Goods, including drugs, biologics, food and cosmetics. The 4th NanoSpain Workshop will be held in Seville, 12-15 March 2007, bringing together several hundred participants to discuss the latest developments in nanotechnology. (November 2006) Ref.2168

#### EU Conference on Nanotechnology Safety Policies

The current Finnish Presidency of the EU held a conference, Nanotechnologies - Safety for Success, in Otaniemi, Finland on 14-15 September 2006, with the goal of facilitating a dialogue on the opportunities and concerns presented by nanotechnologies. Another objective was the development of specific safety recommendations for the application of nanotechnologies. The conference was attended by 180 experts from 20 countries. The presentations, covering the key actions for efficient and well-coordinated policies, are available on the conference's Web site.

#### International Nanotech Conference to be Held in Egypt, March 2007

An international conference, NanoTech Insight 2007 will be held in Luxor, Egypt, 10-17 March 2007, to discuss the latest trends and discoveries in nanoscience. Topics will include scientific and technical developments, applications, and ethical and environmental impacts. (October 2006) Ref.2169

#### OECD Meeting on Manufactured Nanomaterials

The OECD will hold a meeting of the recently established Working Party on Manufactured Nanomaterials in London on 26-27 October 2006 to finalize recommendations for the 2006-2008 Programme of Work regarding human health and environmental safety aspects of manufactured nanomaterials in the chemical sector, to be forwarded to the Chemicals Committee of OECD. The meeting will discuss reports on recent developments in nanotechnologies and nanomaterials, their safety, and related activities in other International Organizations. For example, there will be

discussions of taking over the Woodrow Wilson Center's database and cooperating with other databases, such as the International Council for Nanotechnology (ICON)'s. (September 2006) Ref.2170

#### Upcoming Conferences on Nanotechnology Safety

A conference on "Nanoparticles for European Industry – Manufacture, Scale-Up, Stabilization, Characterization and Toxicology" will be held 2-3 May 2006, at the Olympia Conference Centre, London. The meeting, sponsored by the Institute of Nanotechnology and the European Nanotechnology Trade Alliance, will present the latest views on issues of critical importance to industry, including innovations in manufacturing techniques, and scale-up and stabilization of nanoparticles. The conference will include sessions on toxicology and characterization, plus presentations on current approaches to regulation.

The International Symposium on Nanotechnology in Environmental Protection and Pollution will be held in Hong Kong, China 18-21 June 2006. One of the three sections of the Symposium is directed toward Nanotechnology Toxicity and Environmental Pollution, including Environmental Cleanup, Filters and Membranes, Nanoelectromechanical Systems (NEMS) and Advanced Devices for Environmental Monitoring, Environmental Impact and Assessment, Nanotechnology Defense, Responsible Commercialization, and Nanotechnology Industry Standards. (March 2006) Ref.2171

#### Research Awards on Nanotech and Energy Presented to Nine Projects

E.ON, a leading power and gas company, has presented the E.ON Research Awards to international universities and research institutes. Nine research proposals representing outstanding ideas and innovations in applications of nanotechnology to energy problems were awarded grants. One that attracted particular attention was for a sunlight-driven photocatalysis hydrogen generating process being developed by Prof. Gianluca Li Puma, of the Energy Technologies Research Institute at the Univ. of Nottingham, England. (March 2009) Ref. 2172

### **Electromagnetic Fields**

[Warnings on Possible Wi-Fi Dangers](#)

[Potential Magnetic Fields Regulations in Japan](#)

[Study Says Mobile Phones Raise Tumor Risk](#)

[Cell Phones damage rat brains](#)

[Microwave Frequencies used for Environment-sensing are in Jeopardy](#)

#### Warnings on Possible Wi-Fi Dangers

The expansion of wireless connections and use increases experts' concerns and warnings on possible health effects of electronic smog. Recent research suggesting that use of mobile phones might increase brain tumor occurrence worsens concerns about the possible impact of the spreading Wi-Fi networks that expose people to electronic waves involuntarily. The spread of wireless connections might be dangerous mostly to the health of children and to the additional ~3% of population that the World Health Organization estimates are "electrosensitive." Sir William Stewart—chairman of the UK Health Protection Agency and former chief scientific adviser to the UK Government—along with some European governments, school boards and parents, scientists, and doctors are calling for an official investigation of the risks that electronic

waves might pose to human health and the environment. [See also *Conviction in Transborder Electromagnetic Pollution Case, Study Says Mobile Phones Raise Tumor Risk*, and *Cell Phones Damage Rat Brains*] (April 2007) Ref. 2174

#### Potential Magnetic Fields Regulations in Japan

The Japanese Ministry of Economy, Trade and Industry plans to introduce regulations concerning magnetic fields around power-transmission cables and other electric facilities. Although the country has regulations on electric fields, per se, magnetic fields are not subject to any standards. A working group will be created in June under the Subcommittee on Electric Power Safety to conduct investigations on the link between electromagnetic fields and human health problems, and to advise the ministry. The initiative seems to be partly triggered by a study to be released soon by the World Health Organization on environmental health standards regarding electromagnetic fields. Along the same lines, the UK is finalizing a report that assumes a link between power lines and cancer, and that therefore recommends regulations for building around high-voltage power cables because of possible health risks. (April 2007) Ref. 2175

#### Study Says Mobile Phones Raise Tumor Risk

A study by the Swedish National Institute for Working Life has indicated that the use of mobile phones over a long period of time can raise the risk of brain tumors. The criterion for heavy use was 2000 hours or more, equivalent to ten years use at an hour a day. The work involved 2200 cancer patients and an equal number of controls. According to a Reuters dispatch, one of the scientists said that the results pointed to a 2.5× higher risk of a malignant tumor on the side of the head the phone is used. These results are at odds with earlier Dutch and British research, which found no such correlation. [See also *Cell Phones Damage Rat Brains* in February 2004 environmental security report.] (April 2006) Ref. 2176

#### Cell Phones damage rat brains

Although many studies over the past decade suggest that cell phone use may cause various adverse effects such as headaches and memory loss, no scientific consensus exists about the effect of long-term, low-level radiation on the brain and other organs. A comprehensive \$12 million federal investigation of cell phone safety is currently under way but will take at least five years to complete. Meanwhile, researchers are attempting to replicate a recent Swedish study that showed significant blood vessel leakage, as well as areas of shrunken, damaged neurons in rat brains exposed to cell phone radiation. The higher the radiation exposure level, the more damage was apparent. International standards and agreements to limit radiation exposure from devices such as cell phones may emerge in response to future confirmations of these studies. (February 2004) Ref.2177

#### Microwave Frequencies used for Environment-sensing are in Jeopardy

Interference caused by increasing microwave activities from such applications as mobile phones, wireless computer communications, collision avoidance systems, and possible new military communications technologies are ruining the reliability of satellite data for weather forecasting and climate change. In a recent interview with the BBC, Dr Stephen English, manager of the Satellite Radiance Assimilation Group at the UK Met Office, called attention to the serious impact on climate change research of allowing various terrestrial radio services to use narrow bands in the microwave spectrum which are uniquely suited for making satellite-based



meteorological observations that yield vital data for such research. He told the BBC, "Microwave observations are vital because they see through clouds—this is not possible in any other frequency band. We only need a few narrow-frequency bands for Earth remote-sensing, but most of these are unique, so there is no alternative. These bands are primarily used for temperature, water vapor, sea ice, clouds (ice and liquid), and rainfall and snowfall estimation." According to the BBC, a meteorologists' working group on frequency management says protecting key regions of the microwave spectrum for passive remote-sensing is "a dramatic challenge", because of "the huge pressure of the commercial and military telecoms". (December 2004) Ref. 2178

## **Underwater Sounds from Human Sources Endangering Marine Life**

### Underwater Sounds from Human Sources Endangering Marine Life

A new report by the Natural Resources Defense Council (NRDC), *Sounding the Depths II: The Rising Toll of Sonar, Shipping and Industrial Ocean Noise on Marine Life*, is a comprehensive overview of the scientific record on the impact of man-made underwater noise on marine life. It shows that increasing human marine activity—industrial, commercial, and military—became life threatening to whales, dolphins, fish, and other marine species. The report reviews worldwide incidents of mass whale strandings related to military activities, and the oil and gas industry; maps the "hotspots" affected by different human activities; presents the latest scientific findings on noise and whale strandings; and suggests several measures for reducing the impacts of human-made ocean noise. The recommendations include geographic and seasonal restrictions on intense noise from military sonar and seismic air guns; better monitoring and marine life research; stronger international regulations and enforcement concerning marine life protection; and technological improvements to reduce sonic damage.

Another report, produced by the Convention on Migratory Species and UNEP's Regional Seas Programme, estimates that noise pollution linked with underwater sonar and military maneuvers is putting at risk over 4% of marine species. [See also *Coalition Urges UN to Consider Legislation to Curb Harmful Ocean Sounds* in June 2005, *Scientific Models Could Help Navy Avoid Whales During Sonar Tests* in February 2005, *European Parliament Resolution to Protect Whales From Sonar* in October 2004, and *Research Confirms Military and Industry Sonar Harms Whales* of July 2004 environmental security reports.] (November 2005) Ref. 2180

### Research Confirms Military and Industry Sonar Harms Whales

The newly released report by the scientific committee of the International Whaling Commission (IWC) indicates that there is compelling evidence that sonar used by the military and the oil and gas industry harms whales. Scientists are unsure why sonar causes whale stranding, internal bleeding, and death. The use of low-frequency sonar is already limited by an agreement worked out between the US Navy and environmental groups whereby the Navy scales back its low-frequency sonar deployment from 75% of the world's oceans to approximately 1% of that area. Now the Natural Resources Defense Council (NRDC) is targeting the more common mid-frequency sonar.

The IWC report may reinforce the actions of U.S. animal welfare groups that threaten to sue the U.S. Navy over the use of mid-frequency sonar that harms whales. The groups sent a petition to the European Parliament that asks countries to immediately mitigate the effects of mid-frequency sonar. (July 2004) Ref. 2181

### The Debate over Use of Sonar by the Navy Continues; Legal Settlement Approved

After a temporary restraining order issued July 3, blocking the use of high-intensity, mid-frequency sonar by the U.S. Navy during international Rim of the Pacific (RIMPAC) war games taking place in waters around Hawaii, on July 7, the judge has approved a settlement between the Navy and conservation groups, permitting the use of mid-frequency sonar during the eight-nation military exercises. The settlement agreement requires new safeguards, including a buffer zone, increased monitoring for marine mammals through underwater detection and aerial surveillance for marine mammals during sonar drills and the reporting of sightings to a marine mammal response officer. This type of sonar has been associated with mass strandings and deaths of whales, dolphins, and other marine species in U.S. waters and around the world. The conservation groups that filed the lawsuit were: Natural Resources Defense Council, the International Fund for Animal Welfare, the Cetacean Society International, the Ocean Futures Society (OFS), and (OFS) founder and director Jean-Michel Cousteau. [See also *Underwater Sounds from Human Sources Endangering Marine Life* in November 2005, *Coalition Urges UN to Consider Legislation to Curb Harmful Ocean Sounds* in June 2005, and other previous environmental security reports on the same issue.] (July 2006) Ref.2182

### U.S. Supreme Court Rules in Favor of Navy in Sonar Case

On November 12th the U.S. Supreme Court ruled to lift restrictions on the Navy's use of sonar off the coast of California, arguing that national security interests prevail over possible damages that such sonar might cause to whales and dolphins. [See also *Sonar Restrictions Debate Continues* in January 2008 and other previous environmental security reports on the same issue.] (November 2008) Ref. 2183

### U.S. to Study Sonar Impact on Marine Mammals

The U.S. government approved a budget to research the effects of military sonar systems on whales and dolphins. Several scientists and environmental groups claim that underwater sonar to detect submarines interferes with the ecolocation system of whales and dolphins, sometimes causing mass strandings. The research will be conducted in Hawaii and will include studying the effects of military sonar systems on marine mammal hearing, as well as the development of electronic systems to detect the presence of marine mammals in naval training areas. The Hawaii research will provide an independent scientific view and reliable data on the effects of sonars on marine mammals and hopefully will elucidate the concerns. [See also *The Debate over Use of Sonar by the Navy Continues; Legal Settlement Approved, Underwater Sounds from Human Sources Endangering Marine Life*] (May 2007) Ref.2184

### Sonar Restrictions Debate Continues

Earlier in January, a U.S. District Court judge in Los Angeles ordered clear rules for the U.S. Navy's training with mid-frequency sonar off the coast of Southern California. The restrictions include: a minimum 12-nautical-mile no-sonar zone along the California coastline; shutdown of sonar when marine mammals are spotted within 2,200 yards; mandatory monitoring for marine mammals one hour prior to sonar exercises; and aerial surveillance prior to and during the exercise. However, later in the month, President Bush overruled the Court's decision and signed an exemption for the Navy to use sonar in its training, then a federal judge temporarily lifted certain measures, and the Navy has resumed sonar training off the coast of Southern California.

[See also *U.S. to Study Sonar Impact on Marine Mammals* in May 2007, and other previous environmental security reports on the same issue.] (January 2008) Ref.2185

### **International Convention for the Evaluation of New Technologies needed**

ETC Group is collaborating with other partners to develop an International Convention for the Evaluation of New Technologies (ICENT), which it hopes to submit to the United Nations in 2004.

"Mulch ado about nothing? Or the Sand Witch?" Communiqué recently released by The Action Group on Erosion, Technology and Concentration (ETC group) expressed concern about the potential impacts that nanotechnology-based products might have on the environment and health, because these products are coming to market in the absence of government regulations and/or public discussion. ETC Group suggests that the public should be fully engaged in a discussion of the socio-economic, as well as health and environmental implications of nano-scale technologies and international regulations and standards concerning the use of nano-scale technologies are needed. To this end, ETC Group is collaborating with other partners to develop an International Convention for the Evaluation of New Technologies (ICENT), which it hopes to submit to the United Nations in 2004. (October 2003) Ref.2186

### **Publication of Data Dangerous to the Environment**

A recent article by futurist and inventor Ray Kurzweil reminds us of the question of how to weigh the need for free interchange of the results of scientific research against the possibility that those results would offer a recipe for an environment-destroying terrorist attack. The particular example cited was the publication in the GenBank database of the full genome of the 1918 influenza virus. This information could theoretically lead to the reconstruction of the virus, and its possible release in weaponized form. The threat to the environment from this kind of information dissemination has received relatively little attention so far outside of the nuclear field, but is certain to become a major topic for international discussions. [See also *Control of Pathogenic Chimeras and GMOs under Study* in January 2004, *Bioweapons Are Already Possible to Make, Says New CIA Report* and *New Lethal Viruses Developed* in November 2003 environmental security reports]. (October 2005) Ref.2187

### **Toxicogenomic Technologies and Risk Assessment of Environmental Carcinogens: A Workshop Summary**

This report is a summary of the workshop organized by the National Research Council's Committee on How Toxicogenomics Could Inform Critical Issues in Carcinogenic Risk Assessment of Environmental Chemicals. Scientists, policymakers, and advisors participated in the workshop. They assessed how toxicogenomics could address critical knowledge gaps in risk assessments, including how toxicogenomic data could be applied to improve risk assessments, particularly cancer risk from environmental exposure to chemicals. After an overview of the types of data gaps that make regulatory risk assessment difficult, the workshop analyzed the types of toxicogenomics and their role in carcinogen risk assessment, and discussed the types of research that could move the field forward. (October 2005) Ref. 2188

### **Leading cancer specialists call for REACH strengthening**

At a colloquium organized by the French Association for Research on Treatments Against Cancer at UNESCO Headquarters, a transatlantic group of leading cancer specialists presented

scientific evidence on the necessity of strengthening the Registration, Evaluation and Authorization of Chemicals (REACH) policy, in order to better control carcinogenic chemicals. The participant experts stated that REACH was much weakened under the pressure of the chemicals industry from both sides of the Atlantic. Corinne LePage, a French lawyer, wants to “advance the idea that polluting is a crime against humanity.” [See also items related to the REACH program] (May 2004) Ref.2189

## **GMO Issues**

### GMO Debate Continues

A preliminary ruling by the World Trade Organization established that the EU regulatory framework of GMOs is in non-concordance with its obligations under the Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement). The EU defends its legislation as being consistent with the internationally recommended approach and the requirements of the Cartagena Protocol on Biosafety. Several environmental groups consider the WTO ruling conflicting with the democratic principle of peoples' right to know and decide, and, along with the EU, argue that the WTO is not the appropriate forum for this kind of decision.

Meantime, the biotechnology industry is pushing to abolish the Genetic Use Restriction Technologies (GURTs) (de facto moratorium on sterile seed technologies) at the next high-level meeting of the Convention on Biological Diversity (CBD) to be held in Curitiba, Brazil, March 20-31, 2006. Over 300 organizations worldwide campaign for a global ban on Terminator technology, asserting that sterile seeds threaten biodiversity and food sovereignty, and undermine the livelihood of the 1.4 billion people who depend on farm-saved seed.

A new report by experts of the European Commission's Joint Research Centre (JRC), *New case studies on the coexistence of GM and non-GM crops in European agriculture*, concludes that the unintended occurrence of GMO content threshold of 0.5% in harvested crops is safe for coexistence farming of crops like maize, cotton, and sugar beet before the grain has to be labeled as biotech. This is still under the EU's 0.9% threshold for food and animal feed. Reducing the threshold under 0.5% would require extra farming measures like arranging seed plots as a function of dominant wind patterns, notes the report. [See also *GMOs Controversy Continues* in July 2005 and other related items on the same issue in previous environmental security reports.] (February 2006) Ref. 2191

### Tougher Systems to Control GMO Suggested

*GM Contamination Report 2005*, by GeneWatch UK and Greenpeace International, warns that current practices and legal frameworks are not adequate to protect against GMO spread in unwanted places and to other plants. Reviewing cases of contamination and negative side effects of genetically modified organisms, the report reveals that over the past decade, GM crops have been planted illegally, or have pollinated non-GM food in 39 countries, which is nearly double the number of countries that introduced GM crops since 1996, when they were first commercialized. The report calls for an independent international commission to be set up to investigate, and for an international register of such incidents to be set up under the Cartagena Protocol on Biosafety. (March 2006) Ref. 2192

### The Debate over Genetically Modified Organisms (GMOs) Continues

The EU is still divided over GMO bans. At the recent European Environment Council meeting, five European countries, Austria, France, Germany, Greece, and Luxembourg got majority support for rejecting the European Commission's proposal to lift the bans on transgenic varieties of maize and oilseed rape, under the justification that they present risks to human health and the environment. Meanwhile, Italy requested that the European Food Safety Authority (EFSA) conduct its own independent scientific research to assess possible health risks associated with GMO rather than rely on data provided by the biotech industry. [See also *EU Commission Seeks to Increase Biotech Food Safety* in January 2004 and *The EU Ended its Ban on Genetically Modified Foods* in May 2004 environmental security reports.]

Japan, after finding a U.S. corn cargo infected with the unapproved Bt-10 biotech corn variety, decided to test every U.S. cargo entering the country. In China, genetically modified rice illegal cultivation and commercialization is spreading, increasing concerns that the non-approved variety could enter markets overseas. (June 2005) Ref. 2193

### FAO calls for an international framework for GM trees

Genetic modification activities in forestry are taking place in some 35 countries and a commercial phase has already started without full scrutiny of potential benefits and risks. FAO says it is essential that environmental risk assessment studies be conducted with protocols and methodologies agreed upon at national and international levels. (July 2005) Ref. 2194

### GM Crops Created Superweed

Scientists from the Centre for Ecology & Hydrology in the UK argue that there is a potential that modified genes from GM crops could transfer into local wild plants, creating herbicide-resistant "superweeds." The findings of their four-year study were recently made public. The phenomenon was observed in a trial where cross-fertilization between GM oilseed rape, brassica, and a distantly related plant, charlock, created a new form of charlock that didn't react to lethal herbicide. The same was demonstrated in the lab for other weeds that became herbicide resistant. Although they consider that the potential of such cross-fertilization in the field is likely to be very low, they add that "this unusual occurrence merits further study in order to adequately assess any potential risk of gene transfer." [See also *The Controversies over GMO Bans Continue* in June 2005 and other previous environmental security reports.] (July 2005) Ref.2195

### The First Meeting of the Conference of the Parties to the Cartagena Protocol on Biosafety adopted procedures and mechanisms to implement and promote compliance with the Protocol aiming to protect biological diversity

The Cartagena Protocol on Biosafety to the Convention on Biological Diversity entered into force in September 2003. The first meeting of the Parties (COP MOP 1) held in Kuala Lumpur, 23-27 February 2004, adopted procedures and mechanisms to implement and promote compliance with the Protocol aiming to protect biological diversity from the potential risks that may be posed by living modified organisms (LMOs), commonly referred to as genetically modified organisms (GMOs). The delegates adopted documentation requirements and other procedures concerning labeling, handling, transport, packaging, and identification of LMOs. Some matters on which no agreement was reached will be considered at the next meeting, to be held in 2005. A negotiating group of experts will address the issue of liability and redress for damages resulting from transboundary movements of GMOs and develop a regime by 2008

(February 2004) Ref.2196

EU Commission Seeks to Increase Biotech Food Safety

The EU executive Commission adopted new legislation that requires each variety of genetically modified organisms used in food and animal feed to be assigned a unique code so products containing these GMOs can be accurately labeled and traced when they get on the market.

(January 2004) Ref.2197

European Parliament enacts genetically modified food labeling rules

In a preamble to lifting the ban on GM food, the European Parliament passed regulations for the traceability and labeling of genetically modified (GM) food and feed products and sets the accidental mixing of GM in non-GM to no more than 0.9%. The new regulation also allows EU states to set 'appropriate measures' that protect conventional strains from cross-pollinating with GM crops. The new regulations are expected to come into force in September, with firms having six months to apply them. (January 2004) Ref.2198

The EU ended its ban on genetically modified foods

By authorizing the import of GM sweet corn, the EU ended its five-year ban on GM food. The Bt-11 maize imports are authorized for the next 10 years.

This first step might eventually ease the present restrictions of introducing GM food in the EU region. However, the rigorous labeling legislation [see *European Parliament Enacts Genetically Modified Food Labeling Rules*], applies. Also, as more than 70 percent of the European consumers oppose GM foods, it is not likely that lifting the ban on other GM food products will follow soon. (May 2004) Ref.2199

The Aarhus Convention and GMOs

The second meeting of the new Working Group on Genetically Modified Organisms under the Aarhus Convention concluded that a legally binding mechanism for public participation related to GMO activities in the framework of Aarhus Convention is needed. If developed, the legally binding options would be proposed to the next Conference of the Parties in 2005. (October 2003) Ref.2200

GM Food Protein Revealed to Cause Allergic Lung Damage in Mice

A study in Australia has revealed that subtle structural changes may occur when genetic modification is used to transfer a protein from one species to another. An anti-pest pea protein, coded for by a gene introduced from a bean, caused unexpected immune effects in mice. It turns out that when the transferred gene is expressed in the new organism, slight modifications may occur in the resultant protein, which is then different enough to trigger an immune response. Mice who ate the pea seed and then were exposed to the new protein developed skin reactions and mild lung tissue damage not seen on exposure to the original bean form of the chemical. [See also *GMOs Controversy Continues* in July 2005 and other related items on the same issue in previous environmental security reports.] (November 2005) Ref.2201

**Chemicals could be the Cause of 'Gulf Syndrome'**

A new study by a federal panel of medical experts concluded that there is high probability that some '91 Gulf War veterans suffer from inexplicable illnesses due to exposure to neurotoxins

such as sarin, (from an Iraqi weapons depot blown up by American forces in 1991); pyridostigmine bromide (a drug given to troops to protect against nerve gas); and pesticides used to protect soldiers in the region. This is a new view, inconsistent with previous panels' conclusions. (October 2004) Ref.2202

### **China's ASAT Test Created Serious Long-Range Low-Earth Orbital Pollution**

The January 11, 2007 Chinese anti-satellite (ASAT) test created tens of thousands of new pieces of space debris in low-earth orbit (LEO) with size greater than 1 cm—large enough to cause significant damage to a satellite they might hit. So far about 900 pieces greater than 5-10 cm have been cataloged as being created by the Chinese test. Even without the Chinese test, a NASA model shows that some heavily used parts of LEO already have such a high density of debris that collisions of objects at these altitudes will increase the number of debris fragments by 200% in two hundred years. The January additions make this situation worse, and multiple future tests or uses of such ASATs—especially against much larger satellites—could greatly increase the threat to satellites, the Space Station, space shuttles and other space craft as they travel through this polluted space. At high altitudes, where the atmosphere is very thin, this debris can stay in orbit for centuries, and so far there is no effective way to remove it. This is likely to steadily increase space insurance costs and without major changes could eventually seriously limit access to space. This shows that one actor can affect future access to space for all. Currently 41 nations own satellites. Since there is no mechanism to address this pollution event, some kind of anti-ASAT debris creating treaty seems inevitable, possibly drafted by the Inter-Agency Space Debris Coordination Committee in Vienna. (February 2007) Ref. 2203

### **Geo-engineering Promises/Threatens Major Consequences**

Discourse over the use of geo-engineering in the strategies for reducing greenhouse gas emissions increases. While some projects appear to offer major environmental benefits at a fraction of the cost of currently proposed remedial measures for climate change, many also raise the specter of potential catastrophic and perhaps unforeseen consequences. The National Academy of Sciences recently held a workshop to discuss this topic. Some of the papers are available online and the proceedings are expected to be posted soon. (June 2009) Ref. 2204

### **Japanese asbestos claims**

A recent ruling by the Japanese Supreme Court has derailed attempts by a number of Japanese citizens to sue for health impacts of working with asbestos at US military facilities. Under the current Status of Forces Agreement, suits are brought against the Japanese government, rather than against the United States. However, reimbursement can be sought by Japan, if Japanese courts rule in the plaintiffs' favor. The Supreme Court ruling dismissed the claims made on the basis of a statute of limitations expiration. (April 2003) Ref.2205

### **Phthalates May Trigger Lupus**

A new study at Indiana State University provides some evidence, in a mouse model, that phthalates may trigger lupus. In the study, only a certain strain of mice developed fatal cases of lupus after injection with a phthalate compound; much work remains to be done to clarify the possible connection. (December 2005) Ref. 2206

**Personal Computer Dust Health Implications**

A report by the Computer Take Back Campaign and the Clean Production Campaign blames brominated flame retardants used in computer casings and other electronics for a host of neurological and reproductive health problems. In order to avoid using materials with these flame retardants, some companies have begun replacing flammable materials with nontoxic flame-resistant materials. The European Union has already banned the use of some of these chemicals in electronic products by 2006, and several states in the US have taken legislative steps to do so as well. (June 2004) Ref.2207

**POLLUTION****Greenhouse Gas on the Rise**

At the same time, methane—22 times more powerful than CO<sub>2</sub> for global warming—is emitted as result of melting permafrost at a rate five times faster than thought, and could become a significant factor in global warming, representing a “a climate time bomb,” warn scientists. Most of the methane-releasing permafrost is in Siberia. Another study reveals that carbon trapped in this type of permafrost could be 100 times the amount of carbon released into the air each year by the burning of fossil fuels.

Deep ice drilled out of Antarctica confirms that carbon dioxide levels are substantially higher now than at any time in the last 800,000 years. (September 2006) Ref.2209

**China to Pass U.S. in CO<sub>2</sub> Emissions this Year Making U.S. and China Target for Changing Climate Change Policies**

A strategic focus on just the U.S. and China is the most efficient use of environmental lobbying power, said Dr. Jessica Matthews, President, Carnegie Endowment for International Peace, at a recent session at the Woodrow Wilson International Center for Scholars’ Environment and Security Program. The magnitude of changes necessary to affect the growth of greenhouse gas emissions will require the leadership of the top two emitters. Without them, she argued, the changes in other countries are of insufficient significance. China may pass the U.S. in annual CO<sub>2</sub> emissions before the end of 2007. (March 2007) Ref.2210

**Polluted Skies and Global Warming Puzzle Decoded**

A team of U.S. and Israeli scientists seem to have found the link between global warming and cloud formation. The pattern they identified shows that light-reflecting pollution favors cloud formation, while light-absorbing aerosols impede it by warming the air, which impedes moisture condensation. This finding helps better understand and predict climate change, as well as the role of different kinds of pollution in cloud formation and rain activity. (July 2006) Ref.2211

**Ozone Hole Worst Ever Recorded**

In addition to pollution, climate change is increasingly recognized as a cause for upper atmosphere ozone depletion. A new UN report revealing continuous ozone depletion, notes that this year’s Antarctic ozone hole covered 29.5 million square kilometers and the ozone mass deficit was 40 million tonnes (European space Agency, ESA, measurements on October 2), the largest ever recorded. The assessment is based on a compilation of data provided by NASA and the ESA, and observations by the WMO Global Atmosphere Watch (GAW) ozone network.



Scientists warn that the trend might continue for the next two decades unless measures are taken to curb climate change and diminish levels of ozone destroying substances in the atmosphere, and countries generally adhere to and enforce the Montreal Protocol and Vienna Convention on phasing out of ozone-destroying chemicals. At a Montreal Protocol meeting, held in New Delhi, October 28-November 3, UNEP will be presenting a 10-year road map for governments to follow in protecting the ozone layer. (October 2006) Ref.2212

### **New Predictions for the Atmosphere by 2030**

Research funded by the EU network ACCENT assessed the state of the global atmospheric environment and evaluated the likely changes by 2030 in conjunction with current regulations. It presents three scenarios: Current Legislation Scenario—based on current air quality legislation; the Maximum technically Feasible Reduction scenario—based on implementation of technological breakthroughs to achieve maximum emissions reduction; and the Intergovernmental Panel on Climate Change (SRES-A2) scenario--- a relatively pessimistic approach is shown in contrast to the two more optimistic scenarios. The results suggest that current international legislation on air pollutant emissions is not adequate to reduce ozone and ecosystem damage (mainly caused by elevated nitrogen pollution.) (October 2006) Ref.2213

### **Burning Fossil Fuels Acidifies Oceans, Erodes Coral Reefs**

Impacts of Ocean Acidification on Coral Reefs and Other Marine Calcifiers, a report co-authored by scientists from Australia, Canada, France, Germany, Japan, Monaco, New Caledonia, and the United States, is a comprehensive analysis of marine calcifiers, documenting that worldwide emissions of carbon dioxide from fossil fuel burning is making the oceans more acidic, dramatically altering ocean chemistry and threatening marine biodiversity, mainly causing coral decalcification. Although recommending further research for determining the extent of the impacts, it predicts that calcification rates might decrease as much as 60% within the 21st century. (July 2006) Ref.2214

### **The Oil Spill Likely to Initiate International Regulations Discussions and Accelerate Alternative Energy Developments**

The British Petroleum (BP) oil spill in the Gulf of Mexico has alerted the world to the need for better regulatory environments, safety systems and response capacity, and the need to accelerate efforts for alternative sources of energy. It could also fuel disputes between oil corporations and local populations such as those in Peru, Ecuador, and Nigeria. Given the international implications of the environmental consequences of dangerous oil offshore exploration and polluting oil sands, as well as the fact that most operating companies are foreign and/or multinational corporations, international regulations (beyond national criminal penalties) are likely to be created. (May 2010) Ref. 2215

### **New Research Finds Human Energy Usage is a Long-Term Heating Problem Independent of Greenhouse Gases and Solar Radiation**

In addition to greenhouse gases and rises in solar radiation, the planet could continue to be warmed by the increasing number of people who are using ever larger amounts of energy that add heat from their use (combustion engines, nuclear reactors, etc.). In a briefing by Professor Eric Chaisson of Tufts University to the Foundation for the Future this month [March 2007], he demonstrated that human energy use will continue to warm the planet: 1) If global non-

renewable energy use continues increasing at its current rate of ~2% annually and nothing else changes, then a 3 degree Celsius rise will occur in ~8 doubling times, or ~280 years (or ~350 years for a 10 degree Celsius rise); and 2) More realistically, if world population plateaus at 10 billion inhabitants by 2100, developed (OECD) countries increase non-renewable energy use at 1% annually, and developing (non-OECD) countries do so at ~5% annually until east-west energy equity is achieved in mid-22nd century after which they too continue generating more energy at 1% annually, then a 3 degree Celsius rise will occur in ~300 years, or 10 degrees Celsius in ~450 years. Hence, it is necessary to find energy sources, such as geothermal, tidal, wind, and photovoltaics that, unlike fossil or nuclear sources, do not add heat as they convert energy for human usage. (March 2007) Ref.2216

### **Pollutants Travel Globally**

Researchers have begun studying whether gases from the United States are responsible for pollution in Europe. Specific emphasis is being placed on the transport of pollutants contributing to ozone depletion. [See also item *Space Technology use for Environmental Security* in this subchapter.] (July 2004)

A new and larger study by the International Consortium for Atmospheric Research on Transport and Transformation, or ICARTT, an air quality study billed as the largest and most comprehensive yet done, reveals that pollutants from Asia, in particular China, are reaching the East Coast of North America and are presumably continuing eastward toward Europe and Africa. (August 2004) Ref.2217

### **Health Impacts of Fuels**

According to a new study published in the *International Journal of Cancer*, the risk of ovarian cancer increases with increased exposure to diesel exhaust. Likewise, exposure to gasoline engine exhaust also was found to increase the risk of ovarian cancer. However, the study's findings contradict those of previous studies linking other types of cancers to engine exhausts. Meanwhile, a study in *Occupational and Environmental Medicine* showed that living near a fuel station might quadruple the risk of acute leukemia in children. (August 2004) Ref.2218

### **Safe Toxin Levels Unknown**

A recent paper in the journal *Public Library of Science - Medicine* reported that a review of the epidemiological data shows that there is no clearly safe level of exposure to four of the most common environmental toxins - lead, radon, tobacco smoke and such byproducts of drinking-water disinfection as the trihalomethanes. The general practice has been "to assume that there is no safe level of exposure to carcinogens and use linear dose-response models to estimate human health risks at low exposure levels ... [but] that a threshold, or 'safe', exposure level exists for noncarcinogens." If further work confirms the conclusion of this study that the non-carcinogen part of that assumption is incorrect, there may be substantial changes in the international regulatory approach to environmental pollutants. [See also *EU and Japan Respond to Risks from Low Dose Chemicals* in the August 2005 environmental security report] (January 2006) Ref.2219

### **Drug Metabolites Identified in Wastewater—Removal Possible**

University of Buffalo researchers announced (Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy in Orlando, FL, March 16, 2006) that metabolites of two antibiotics

and a medical imaging agent have been found in wastewater treatment plants. "Current wastewater treatment processes are optimized to reduce nitrates and phosphates and dissolved organic carbon, the major pollutants of concern in domestic wastes," said Diana Aga, UB's research leader, "However, treatment facilities don't monitor or measure organic microcontaminants like residues of pharmaceuticals and active ingredients of personal care products." The team described methods for identification and treatment of these pollutants. Such antibiotics and their metabolites can increase drug resistance among disease organisms and synthetic hormones can act as endocrine disruptors. Italian researchers also found high concentrations of pharmaceuticals in aquatic environments at levels close to those that may induce adverse ecotoxicological effects. (March 2006) Ref.2220

### **Microplastics Recognized as Environmental Threat to Oceans**

A note has been published on the results of a conference held last month to discuss the increasing threat to the maritime environment posed by plastic "microparticles" (< 5 mm). A report quoted a speakers as stating that, "as plastic items break down, any toxic additives they contain—including flame retardants, antimicrobials, and plasticizers—may be released into the ocean environment", "plastics can act like sponges to collect hydrophobic persistent organic pollutants, such as PCBs", and "microplastics can impact marine food chains". (November 2008) Ref. 2221

### **Dechlorane Plus® Detected in Atmosphere**

An atmospheric monitoring network in the U.S. Great Lakes region has detected the presence of Dechlorane Plus, an organochlorine flame retardant, the limited preliminary data for which indicates that it is persistent, bioaccumulative, and potentially toxic. This is the first report of the presence in the environment of this widely used chemical. Major uses of Dechlorane Plus are in electrical wires and cables and in computer connectors. Some of its properties may be similar to those of the polybrominated diphenyl ether (PBDE) compounds already banned in Europe and in some parts of the U.S. (January 2006) Ref.2222

### **Accelerating Environmental Health Crises in China**

Tens of millions in southwest China suffer because of coal plants. The Yellow River, a water source for 140 million people, is drying up, due to agricultural and industrial demands, falling water tables, and changes in glacial and snow-cap melting patterns. On November 20, Beijing's air quality was rated as 'hazardous' and residents were warned to stay indoors. While per capita emissions remain low compared to developed nations, the growing impact of China on climate change, along with severe intra-country air pollution, is of increasing concern to environmentalists and policy makers. The World Energy Outlook 2006 reports that China will surpass the U.S. in 2009 as the biggest emitter of carbon dioxide. This is nearly a decade ahead of previous predictions. [See also *China Creates 11 Independent Environmental "Watchdog" Centers* in July 2006, *China's President Hu Ordered Environmental Regulations for Military Activities* in April 2006, and other related items in previous environmental security reports.] (November 2006) Ref.2223

### **Repeated Spills in China Threaten Human Health and the Environment**

After last November's catastrophic slick of several toxic chemicals into the Songhua River following an explosion at a petrochemical plant in China's northern Jilin Province, several new major toxic spills have threatened the environment and health of millions of Chinese in other

parts of the country. One spill of diesel oil into the Yellow River forced the shutdown of 63 pumping stations cutting off the water supply to six million inhabitants of the Shangdong capital city of Jinan. A cadmium spill in southern China's Guangdong province cut tap water supply to tens of thousands of people for more than a week in December, and another cadmium spill that occurred recently in Hunan was neutralized faster with less implication for the population. A field mission report by UNEP following the Songhua River spill makes several recommendations to the Chinese authorities for overcoming and coping with such incidents, including considering the implementation of a program such as UNEP's Awareness and Preparedness for Emergencies at Local Level (APELL). The report also highlights that the environmental and health implications of the spill can't be completely assessed yet. (January 2006) Ref.2224

### **North American Report on Children's Health and Environment Indicators**

*Children's Health and the Environment in North America* is the first ever report analyzing the link between children's health and environmental quality. The report considers 13 indicators under three thematic areas: asthma and respiratory disease; effects of exposure to lead and other toxic substances; and waterborne diseases, finding that only one of the indicators, addressing asthma, was fully reported by all three countries, Canada, Mexico and the U.S. Highlighting that children are at higher risk by exposure to environmental pollution than are adults, the report recommends better data collection and reporting, for improving public policy in this area. The report is the result of a joint effort of The Commission for Environmental Cooperation, the International Joint Commission, the Pan American Health Organization, the World Health Organization (WHO), and the governments of Canada, Mexico and the United States. (January 2006) Ref.2225

### **EPA Warnings on Various Potential Health Hazards**

The Environmental Protection Agency has issued a final Federal Register notice designating 31 areas throughout the U.S. as "nonattainment" and "unclassifiable/attainment" for the 24-hour national air quality standards for fine particulate matter, also called PM2.5. These communities will have to formulate plans for reducing fine particle pollution.

Another EPA announcement warns that high levels of PCBs can readily occur in the caulking material used in buildings built or renovated from 1950 to 1978, and that there is a continuing risk to personnel from exposure to PCBs in the material around doors and windows, and in the joints between masonry products such as brick or concrete block. (October 2009) Ref. 2226

### **Studies Show Increased Hazards from Some Types of Airborne Particles**

Latest research reveals that certain kinds of airborne metallic microparticles, such as nickel, vanadium, and carbon, appear to pose a much higher toxic risk than other materials, putting acute stress on the lungs and heart. Low grade oil, such as is used in diesel trucks and space heaters, is a major source in urban areas. Scientists stress that more work needs to be done to study the relationships between particulate composition and biological harm. (December 2009) Ref. 2227

### **Health Hazards from "Environment-friendly" Reusable Bags**

A new study warns of possible health hazards from reusable plastic bags, revealing high levels of mold, bacteria, and yeast in samples. [Related items: *New Material Makes Biodegradable Plastic Bags* in January 2009, *India to Enact Regulation Curbing Plastic Bags Use* in January 2009, and *Restrictions on Plastic Bags Expanding* in January 2008.] (June 2009) Ref. 2228

**Possibly Tainted Imported Drywall Raises Health Fears**

A number of complaints from around the US have alerted authorities to possible health and other problems allegedly caused by imported Chinese drywall. It appears that a large but unknown quantity of this product may contain, or have been contaminated with, chemicals that over time emit noxious fumes. (April 2009) Ref. 2229

**Low-fume Paint Requirements Spread**

Illinois recently passed a law requiring the use of low-VOC (volatile organic compounds) paints; many other states already have such laws or are expected to enact them, and manufacturers are modifying product lines to meet similar requirements in other parts of the world. VOCs in paints and other finishes have been shown to present serious health hazards. [Previous related item: *Models for Photochemical Pollution Assessment in Urban Areas* in June 2006 environmental security report.] (July 2009) Ref. 2230

**Study Reveals Extensive Danger from Lead in Foreign Paints**

A new study reveals that approximately 73% of consumer paint brands tested from 12 countries in Africa, Asia, and South America exceeded the former U.S. standard of 600 parts per million (ppm) for lead in paint (now 90 ppm), with 69% of the brands having at least one sample exceeding 10,000 ppm. “A global ban on lead-based paint is drastically needed” underlines main author, Dr. Scott Clark, professor of environmental health at the University of Cincinnati. (August 2009) Ref. 2231

**European Environment Agency Draws First Map of Europe’s Noise Exposure**

The European Environment Agency has launched the most comprehensive map of noise exposure, NOISE (Noise Observation and Information Service for Europe). Using database map software, map products show the numbers of people exposed to noise generated by air, rail and road traffic across Europe and in 102 large urban agglomerations. NOISE is expected to help enforce the Environmental Noise Directive adopted in 2002 and to reduce human noise exposure. (November 2009) ref. 2232

**Greenhouse Gas Emissions Increase Ocean Noise Pollution**

New research reveals that oceans are becoming noisier due to declines of the concentration of chemicals that absorb sound as result of ocean acidification caused by increased concentrations of CO<sub>2</sub>. Model simulations show that increased acidity could reduce sound absorption (mostly of lower frequency range) by 60% by 2100 in high latitude oceans, potentially affecting marine life. The study, published in the journal *Nature Geoscience*, was conducted by researchers at the University of Hawaii School of Ocean and Earth Science and Technology. (December 2009) Ref. 2233

**Other Environment-Related Protection Measures**

It is estimated that the rate of loss of biodiversity is now the highest in human history. More regional balance among Parties to the biological diversity conventions and more efforts in capacity-building for competent national authorities are essential to reverse the present bio-

diversity loss trend. UNEP in cooperation with the convention secretariats is assisting more than 120 countries to develop and implement national biodiversity strategies and action plans.

### **Desertification Synthesis (Millennium Ecosystem Assessment 3)**

The *Desertification Synthesis* report was launched on June 17, to mark World Day to Combat Desertification. It represents a synthesis and integration of the findings of the assessment of ecosystem change—mainly desertification—due to human activity, as well as the consequences of these changes on future human wellbeing. It provides scientific evidence for sustainable living policies. “Growing desertification worldwide threatens to swell by millions the number of poor forced to seek new homes and livelihoods,” according to the report. The *Desertification Synthesis* is part of a series of six MA synthesis reports. [See also items 9.1 *Biodiversity Synthesis Report (Millennium Ecosystem Assessment 2)* of May and 8.7 *Human Footprint on Earth Ecosystem at Critical Stage and Millennium Ecosystem Assessment Synthesis Report* of March 2005 environmental security monthly reports.] (June 2005) Ref.2235

### **Ecosystems & Human Well-being: Wetlands & Water Synthesis**

*Ecosystems & Human Well-being: Wetlands & Water Synthesis*, the fifth synthesis report by the Millennium Ecosystem Assessment (MEA), was launched at the opening ceremony of COP9 of the Ramsar Convention on Wetlands. The report assesses the current situation of wetlands in view of strengthening the link between scientific knowledge and decision-making for the conservation and wise use of wetlands, and setting future agendas for Ramsar. The report found that the degradation and loss of wetlands, as well as the status of both freshwater and coastal wetland species is deteriorating faster than those of other ecosystems. (December 2006) Ref. 2236

### **Ecosystems and Human Well-being: Health Synthesis**

*Ecosystems and Human Well-being: Health Synthesis*, a report by WHO, is the sixth (last) in the series of the Millennium Ecosystem Assessment reports. Examining the complex interdependence between the ecosystems and human health, the report assesses the current state of affairs, as well as the critical factors that might trigger future changes in ecosystems and the possible health implications. Pointing out the benefits reached over the past 50 years in adapting the natural ecosystems to benefit the human condition, the report notes that not all regions and groups of people have benefited equally from this process. Continued ecosystem degradation, with already serious consequences to human health, could grow worse over the next 50 years. Regions facing the greatest risks include sub-Saharan Africa, Central Asia, parts of Latin America, and certain areas in South and Southeast Asia, points out the report. [See also *Millennium Ecosystem Assessment Synthesis Report* in March 2005, *Biodiversity Synthesis Report* (MA report 2) in May, *Desertification Synthesis* (MA report 3) in June, and *Environmental concerns increase opportunities and challenges for business* (MA report 4) in July environmental security monthly reports.]

Note: The *Millennium Ecosystem Assessment* (MEA) won the 2005 Zayed International Prize for the Environment, awarded for 'scientific and or technological achievement in environment'. (December 2006) Ref. 2237

### **New International Financial Alliance to Support Biodiversity**

Representatives of 191 Parties to the Convention on Biological Diversity and over 100 ministers

met in Bonn to improve the set of rules that help protect biodiversity. Plant and animal species are being lost at a rate between 100 and 1000 times the natural extinction rates. One of the results of the meeting was the establishment of Life Web as a financing mechanism for protected areas. So far, more than 60 Parties have made financial pledges. For example, German Chancellor Angela Merkel pledged 500 million Euros for forest protection up to 2012 and 500 million Euros a year after that. (Mat 2008) Ref.2238

### **European environment - State and outlooks 2005**

The *European environment - State and outlooks 2005* report by the European Environment Agency (EEA) analyzes the European ecological footprint. Revealing that it takes 2.1 times the biological capacity of Europe to support Europe, the authors emphasize that Europe should reassess its consuming patterns and consider new policies that would take into account the disproportionate impact European present behavior has on the rest of the world's environment. With rich graphs and data, the report shows a comprehensive regional analysis as well as detailed analysis by country and sectors over time. For example, while in 1961, Europeans represented over 12% of global population with a demand on global ecological capacity of less than 10%, by 2002, Europe's population represented only 7% of the world total but its demand on global ecological capacity increased to nearly 20%. The report outlines some economic, technological, and policy strategies for addressing Europeans' ecological footprints without jeopardizing their quality of life. More detailed sub-reports on specific sectors and policies are to come next year. (December 2006) Ref. 2239

### **Europe 2005: The Ecological Footprint**

*Europe 2005: The Ecological Footprint* is a report launched at the European Parliament, by WWF and Global Footprint Network, analyzing the impact of Europe's lifestyle on the ecosystem. It reveals that Europe's ecological footprint is 2.2 times larger than its own biological capacity. With just 7% of world population, Europe consumes 17% of the world resources supply—a figure that has risen nearly 70% since 1961. The report shows that innovation and addressing ecological deficits are fundamental to maintaining Europe's competitiveness and wellbeing. *Europe 2005: The Ecological Footprint* is based on Global Footprint Network's National Footprint Accounts and analysis (specifically France, Germany, Greece, Poland, and the UK), as well as a comparison of the footprints of 25 European nations. [See also items 9.1 *Biodiversity Synthesis Report (Millennium Ecosystem Assessment 2)* of May and 8.7 *Human Footprint on Earth Ecosystem at Critical Stage and Millennium Ecosystem Assessment Synthesis Report* of March 2005 environmental security monthly reports.] (June 2005.) Ref.2240

### **Mediterranean Threatened by Development Pressures, Says Blue Plan Report**

*A Sustainable Future for the Mediterranean: the Blue Plan's Environment & Development Outlook*, a report by the UNEP's Mediterranean Action Plan, states that if current trends continue, the region's ecosystem will be severely jeopardized by 2025. The report suggests an alternative based on the principles of sustainable development that could boost the quality of life over the coming decades while protecting the environment. The report was commissioned by the 21 nations bordering the Mediterranean Sea and is the result of the cooperation of 300 experts. (April 2006) Ref.2241

**Europe to Redouble Efforts to Stabilize Biodiversity by 2010**

At the fourth Intergovernmental "Biodiversity in Europe" Conference, held February 22–24 at Lake Plitvice National Park, Croatia, officials from 40 European governments and 32 environmental organizations agreed to redouble their efforts to achieve the goal of halting Europe's biological diversity decline by 2010. Climate change, human activities, and low political priority of biodiversity were noted as the main factors that should be addressed to curb present trends. The benefits of the development of the Pan European Ecological Network and the initiatives of several banks to establish European biodiversity investment funds were stressed. The conclusions of the Conference will be advanced at next month's meeting of the Convention on Biological Diversity. (February 2006) Ref.2242

**World's Largest Environmental Forum to Set Priorities**

About 3000 environmental leaders in government, business, NGOs, universities, and international organizations attended the 3rd IUCN World Conservation Congress in November 2004 in Thailand. It would address the issue of natural resource conservation relative to economic and population growth. The Congress is proposed to have three elements: IUCN Commission Meetings, the World Conservation Forum, and the Members Business Assembly. The Commission meetings would set the priorities for conservation work for the coming four years, addressing species extinction, management of protected areas, laws to conserve nature, ensuring that fair benefits flow to rural people from natural resources, building understanding of how ecosystems function, and improving public understanding of conservation. The World Conservation Forum would discuss and define solutions for problems such as the loss of species and ecosystems, globalization and related health concerns, poverty alleviation, and economic and legal steps to ensure the sustainable use of natural resources. (May 2004) Ref.2243

**The Little Green Data Book, 2005**

"The Little Green Data Book 2005," a joint product of the World Bank's Development Data Group and Environment Department is a quick reference on key environmental data for over 200 countries (one country per page). It presents 47 environment indicators and data, structured under the headings of agriculture, forests, biodiversity, energy, emissions and pollution, water and sanitation, and 'greener' national accounts. Unfortunately the current book's data are only through 2003; nevertheless, it helps the reader get the big picture in a small resource. It can be ordered by sending a email to [eadvisor@worldbank.org](mailto:eadvisor@worldbank.org) or it can be downloaded at: [http://lnweb18.worldbank.org/ESSD/envext.nsf/44ByDocName/TheLittleGreenDayaBook2005/\\$FILE/2005Littlegreendatabook.pdf](http://lnweb18.worldbank.org/ESSD/envext.nsf/44ByDocName/TheLittleGreenDayaBook2005/$FILE/2005Littlegreendatabook.pdf) (April 2005) Ref. 2244

**New Zealand's Largest Environmental Management Forum**

The Environmental Institute of Australia and New Zealand (EIANZ) will hold its annual Environmental Conference in Christchurch, New Zealand, 29 March – 1 April 2005. This will be the largest Australasian environmental management event to be held in New Zealand; more than 300 specialists are expected to attend. According to the conference announcement, concurrent sessions will explore case studies in resource management, environmental management systems; integrated planning and systems-thinking; environmental assessment and reporting; and communication and environmental education. Field trips and technical tours will include the Living Streams restoration program, a Maori perspective of resource management at Te Waihora/Lake Ellesmere; the Kowhai Organic Farm at Lincoln University and ecosystem



protection in Canterbury's braided rivers. The meeting is designed to be environment-friendly; delegates can make their travel carbon-neutral by paying a CO<sub>2</sub> carbon offset charge ranging from \$3 to \$26. These funds will be used for regeneration of native forest. (December 2004) Ref. 2245

### **Brazil launches Project Drake to counter biopiracy**

Biopiracy, or the harvesting / removal of genetic material without payment or royalties, is increasing as genetic engineering technologies continue to develop new medicines and other genetically derived products. In response to this economic loss, the Brazilian federal police have launched Project Drake, a program to monitor aerial and seaports as well as to increase awareness of the problem. Currently, US foreign policy recognizes genetic Intellectual Property Rights (IPR) under the 1994 Uruguay Round of GATT trade negotiations. Through IPR, genetic material can be traded, in exchange for "socially valuable innovations" that arise from it. Furthermore, the Trade-Related Aspects of Intellectual Property Rights (TRIPS) facilitates multinational markets' use of genetic resources. (August-September 2003) Ref.2246

### **Experts Call For Global Network to Prevent Asteroid Disasters**

The report Asteroid Threats: A Call for Global Response by the Association of Space Explorers presented for consideration by the UN calls for an international contingency plan to counter threats from Near Earth Objects (NEO), such as an asteroid impact on the Earth. It points out that although a possible collision is predictable up to 15 years in advance, developing the technology needed to divert an incoming asteroid may require international cooperation. The UN Committee on the Peaceful Uses of Outer Space will debate the report at its 2009 session to be held in June 2009. (November 2008) Ref. 2247]

### **Solar Storm Could Wipe Out Power Grid**

A recent article in New Scientist, sparked by a report from the National Academies, calls attention to the grave danger to the electronic environment posed by a very large "coronal mass ejection" – a solar storm, one of which, although admittedly extremely rare (the worst one so far was in 1859), could effectively destroy the electricity grid over a large section of the US. Magnetospheric effects from the coronal plasma ball would induce large DC currents in the high-voltage grid, melting transformers and leading to a national disaster of unimaginable proportions. (April 2009) Ref. 2248

## **NEW ORGANIZATIONS WITH MANDATES WITH EVENTUAL ENVIRONMENTAL SECURITY IMPLICATIONS**

### **Global Facility for Disaster Reduction and Recovery to Mitigate Impact of Natural Disasters**

The Global Facility for Disaster Reduction and Recovery, set up by the UN International Strategy for Disaster Reduction in cooperation with the World Bank, is a new initiative aiming to improve preparatory and recovery actions to lower the risks and consequences of natural disasters. The Facility will mainly ensure that disaster risk reduction is considered a priority in development projects in countries at risk, and will provide expertise and technical assistance for including risk reduction in strategic planning. The World Bank Global Hotspots Study identifies

86 vulnerable countries with risks of high mortality and economic loss. [See also *ICSU Launched Global Disaster Research Program* in October 2005, and *New Developments for Addressing Natural Disasters* in July 2005 environmental security reports.] (October 2006) Ref.2250

### **FAO Launched New Crisis Management Centre**

In collaboration with the World Organisation for Animal Health, the UN Food and Agriculture Organization launched a new Crisis Management Centre to fight avian influenza outbreaks and other major animal health or food health-related emergencies. The center continuously monitors disease information around the globe and is able to respond in less than 48 hours, when a suspected outbreak is reported. [See also *Bird Flu Spreads Increasing Threats of a Human Pandemic* in February 2006 and other previous environmental security reports on this issue.] (October 2006) Ref.2251

### **WHO-sponsored pandemic flu task force holds first meeting in Geneva**

The Ad Hoc Influenza Pandemic Task Force held its first meeting to discuss best actions in case of an outbreak. The Task Force is providing independent risk assessments and advising WHO on possible measures to be taken. These could include rapid containment effort, warning governments of risks and accelerating vaccine production. The Task Force includes 21 experts and will function until June 15, 2007, when WHO's revised International Health Regulations come into effect. (October 2006) Ref.2252

### **UN Creates Secretariat of the Global Bioenergy Partnership at FAO**

The recently inaugurated Secretariat of the Global Bioenergy Partnership (GBEP) will help UN efforts to promote “green” fuels by facilitating a global political forum to support bioenergy production, marketing and use, and assisting international exchanges of know-how and technology. The focus will be mainly on helping developing countries’ governments and institutions formulate sustainable bio-energy policies and strategies to help reduce dependency on fossil fuel, as well as encouraging investments in multilateral projects for bio-energy development. It will also assist in formulating guidelines for measuring greenhouse gas emission reductions due to the use of bio-fuels. The GBEP Secretariat is located at the UN Food and Agriculture Organization headquarters in Rome and is supported by the Italian Ministry for the Environment, Land and Sea. [See also *UN Commission on Sustainable Development Fosters Energy Security* in May 2006 environmental security report.] (September 2006) Ref.2253

### **‘3R’—Reduce, Reuse and Recycle New Environmental Think Tank for Asia**

The ‘3R’—Reduce, Reuse and Recycle—is a new initiative launched by the Asian Development Bank, Asian Institute of Technology, UNEP, and the UN Economic and Social Commission for Asia and the Pacific (UNESCAP) to promote sustainable use of natural resources and increase environmental efficiency. The center will be located at the Asian Institute of Technology in Bangkok. It will function as a think tank on environmental technology, knowledge dissemination, research capacity building, regulations, and policy related to 3R practices in cooperation with other related Asian initiatives. (August 2006) Ref.2254

### **Asian Consortium on Non-traditional Security Issues**

The Consortium of Non-traditional Security Studies in Asia (NTS-Asia) is made up of 14

research institutes and think tanks from Asia that will study issues including efforts to tackle pandemics, environmental degradation, and cooperation during disasters resulting from climate changes. Climate change, the avian flu, and other “invisible, diverse, and unpredictable” threats are becoming a top security concern in many Asian countries. The consortium will be hosted by Singapore and plans to hold annual conferences on non-traditional security issues with peer institutes from the U.S. and Europe. (January 2007) Ref.2255

### **UN StEP Initiative for Reducing E-Waste**

Solving the E-waste Problem (StEP) is a global public-private initiative coordinated by the United Nations University with the overall aim of improving e-waste management by creating global standards for e-scrap and recycling. The partnership includes various UN organizations, major high-tech manufacturers, and governmental, NGO and academic institutions, along with recycling/refurbishing companies. Five task forces will help shape new e-waste standards: Policy & legislation (assessment of current e-waste policies and recommendations for future strategies); ReDesign (improve electronics design for better reuse, repair, refurbishment and recycling); ReUse (development of a global reuse system to minimize environmental impacts) ReCycle (develop sustainable e-waste recycling systems); and Capacity building (globally accessible documentation on e-waste). The initiative was officially launched on March 7. [See also *UN E-Waste Forum and Basel Convention’s Conference of Parties, Toxic Waste Disposal of Global Growing Concern in September 2006, WEEE Comes into Effect*, and other related items.] (March 2007) Ref. 2256

### **World's First Academy of Environmental Law opened by International Union for the Conservation of Nature (IUCN) is a global network to promote environmental legal education and advanced environmental law research**

The Academy of Environmental Law opened by International Union for the Conservation of Nature (IUCN) in China, November 4, is a global network of university law departments and will function as a forum to promote environmental legal education and advanced environmental law research, and convene annual colloquiums in different parts of the world. (November 2003) Ref.2257

### **UN to Enhance Eco-Development Procedures**

UNESCO and Italy began the procedure for establishing the Institute on a Partnership for Environmental Development (IPED) to provide capacity building to help expedite economic development while protecting the environment in developing countries. It will operate mostly by helping to set environmental targets for the UN's priority development projects, and providing necessary knowledge and training to developing countries on how to effectively integrate environmental dimensions into economic development. IPED will be located in Trieste, Italy. *A legal framework for the integration of environmental, social and governance issues into institutional investment*, a report just released by UNEP, addresses the issue of eventual “legal obligation” of institutional investors to consider environmental, social, and governance issues when choosing how to invest their resources. [See also *Efforts for Increasing Corporate Eco-responsibility* in July 2004 environmental security report.] (October 2005) Ref.2258

### **Interpol Creates Global Information Center to Combat Bioterror Threat**

At a recent Interpol conference, police and health specialists decided to create a global

information center to fight the threat of bioterrorism and asked for greater cooperation between law enforcement and health organizations. The health sector representatives called for an alert system that would allow quick response in case of an epidemic—whether of natural origin or from a bioterrorism source. Three training workshops are scheduled: the first in South Africa at the end of this year, the next two in 2006 in Chile and China. The information center on bioterrorism will be located at the Lyon Interpol headquarters and be available to all 182 members of the organization. (March 2005) Ref.2259

### **Carpathian Mountain office of the United Nations Environment Programme**

The United Nations Environment Programme (UNEP) has opened a new office at the Vienna International Centre, which will act as the Interim Secretariat of the Framework Convention on the Protection and Sustainable Development of the Carpathians. The office will also promote environmental cooperation in Central and Southeastern Europe. Four of the Convention's signatories (the Czech Republic, Hungary, Poland and Slovakia) have requested the European Commission to adhere to the Convention and support its implementation. (July 2004) Ref.2260

### **Russian Green Party Formally Organized**

The Green Russia party (now its official name) has now been formally organized with Alexei Yablokov as its chairman and Alexander Nikitin, the former naval officer, and nuclear safety activist, as one of its principal figures. The party's major present goal is to achieve the 50,000 member level necessary for participation in elections. [See also *Russia's Green Movement Plans to Become a Political Party* of October, 2004 environmental security monthly report] (June 2005) Ref. 2261

### Russia's Green Movement Plans to Become a Political Party

The Green movement finally made a public appearance in Russia, with a press conference on 15 October, led by Alexei Yablokov. A major figure in their campaign to become a recognized political party is Alexander Nikitin, the former naval officer who was acquitted of espionage for revealing pollution hazards in Russia's submarine program. Yablokov claims that 50-60% of the population is concerned about a healthy environment and would support a trusted green party. It is unclear if this group can overcome the substantial bureaucratic obstacles to forming a new party to participate in the 2007 parliamentary election, but their efforts are certain to bring the environment much more strongly into the forum of public discussion in the country. (October 2004) Ref. 2262

### **China Climate Change Organization Formed**

China National Council of International Human Dimensions Programme on Global Environmental Change (CNC-IHDP) was launched by Chinese scientists and humanities researchers to increase Chinese involvement in international discussions on the impact of global climate change. The new organization run by the Chinese Academy of Sciences will coordinate the efforts of researchers in all fields to promote China's research on global climate and environmental changes, and to investigate the relationship between those changes and sustainable development, globalization and human safety, and global land change and urbanization. (September 2004) Ref. 2263

**Liberia's First Environment Center Opened**

The UNHCR has opened an environmental protection agency in Liberia to ensure that the repatriation of thousands of refugees will not have a negative impact on the environment already devastated by 14 years of war. The agency will educate the repatriates on how to use and revive the environment as they resume their daily activities. (March 2005) Ref.2264

**European Green Diplomacy Network**

The EU recently announced an initiative to enhance its capacity to negotiate effectively on environmental issues. The "Network of Diplomats and Experts on European Diplomacy on Environment and Sustainable Development" was established some months ago, and will draw on existing diplomatic resources in the new, enlarged, 25-member EU. The Network has identified efforts to encourage Russia to ratify the Kyoto Protocol as a first activity. Other targets include effective negotiations at a meeting of the UN Convention on Biological Diversity (CBD) in February 2004, and efforts to promote renewable energy and marine environmental protection. In terms of methods, the Network will gather intelligence on the positions of other actors, and will play an active role through, among other things, setting up campaigns to get the EU message out across the world. The initiative will seek to redress the problem of EU negotiators spending much of their time in internal processes, thereby moving toward a more proactive -- rather than reactive -- approach in their negotiating tactics. (November 2003) Ref.2265

**European Chemicals Agency created under the Registration, Evaluation, Authorization, and Restriction of Chemicals (REACH) program**

On 31 October 2003, the European Commission submitted to the European Parliament a proposal for the establishment of the Registration, Evaluation, Authorization, and Restriction of Chemicals (REACH) program. On 3 December 2003, the President of the European Parliament announced that he had referred the proposal to the Committee on the Environment, Public Health and Consumer Policy. One of the most important elements in the proposed regulation is the establishment of a European Chemicals Agency. On 12 December 2003, at the Brussels European Council, a political agreement was reached on the location of this European Chemicals Agency, which will have its seat in Finland. Under the REACH system, EU Member States will maintain a system of official control, but the European Commission itself will establish guidelines for the enforcement of the REACH program. [See also the issues on the REACH program]. (January 2004) Ref.2266

**European Space Policy Institute founded**

The European Space Policy Institute (ESPI), founded in Vienna at the initiative and with the support of the European Space Agency (ESA) and the Austrian Space Agency (ASA), is intended to become the focal point for promoting European space policy in the world. It creates a network of think tanks that will cooperate in know-how and join forces in order to conduct comprehensive space policy research. Any organization or legal person with a particular interest in taking part in ESPI activities may become a member of the Institute. (November 2003) Ref.2267

**New Regional Environmental Offices in Asia to Strengthen Environmental Protection**

In an effort to strengthen UNEP's delivery of regional-level programs, a new office was opened in China. As part of an effort to promote the Northwest Pacific Action Plan (NOWPAP), a 1994

agreement made by China, Japan, South Korea and Russia to preserve the marine environment in Northeast Asia, regional coordination offices are also planned to open shortly in Toyama, Japan and Pusan, South Korea.

Environmental information centers opened in Baku, Azerbaijan and Dushanbe, Tajikistan as a step in the implementation of the United Nations Aarhus Convention (to promote public access to environmental information and encourage participation in decision-making in environmental affairs). The offices were opened with support from the Organization for Security and Co-operation in Europe (OSCE) and Azerbaijan's Ministry of Ecology and Natural Resources, and respectively the Tajik Ministry of Nature Protection. (August-September 2003) Ref.2268

At a recent waste management and pest control conference, a United Nations Environment Programme (UNEP) official said that many countries in West Asia had laws regarding the management of waste and environmental pollution, but that enforcement was problematic. The lack of technical expertise and infrastructure were also cited as barriers to more effective regional waste management. (August-September 2003) Ref. 256

*Kazakhstani* non-governmental organizations (NGOs) that concentrate on environmental issues are wielding growing influence over government policy, as was evidenced at a conference held in Almaty in early June 2003 that focused on developing new environmental legislation to be introduced into Parliament later this year. (August-September 2003) Ref.2269

#### **Network of Environment Centres in Central Asia**

The resolution adopted at the third regional seminar on the implementation of the Aarhus Convention in Central Asia, organized by the OSCE Centre in Dushanbe, calls for the set up of a new network of Aarhus Resource centers in five Central Asian states (Tajikistan, Kyrgyzstan, Kazakhstan, Uzbekistan and Turkmenistan) to raise environmental awareness and provide the general public with access to information. The network will improve the mechanism for implementing the Convention and help governments and civil society in the region to collaborate on decisions regarding environmental policy. (February 2004) Ref.2270

#### **Regional Environmental Center for Central and Eastern Europe**

REC-Hungary's role after EU enlargement in 2004 - The REC will continue to build environmental agreement monitoring and compliance capacity in Europe and developing countries. (January 2002) Ref. 2271

### **NEW INITIATIVES AIMING TO INCREASE ECO-EFFICIENCY**

In an effort to set up more ambitious targets for reducing global warming and greenhouse gas emissions, several local and regional governments, organizations, and corporations launched new eco-efficiency initiatives.

#### **Global Investment Road Map for a Transition to a Greener Economy Launched by UNEP**

The United Nations Environment Program launched a Green Economic Initiative to encourage an environmentally friendly economy. A comprehensive road map will be delivered to all

governments within 18 to 24 months to help make the necessary transitions. Investments considered the most likely for economic returns and job creations are: clean energy and other clean technologies; sustainable agriculture; ecosystem infrastructure; cutting greenhouse gas emissions; and sustainable urban planning. (October 2008) Ref.2273

### **Green Economy a Solution for Addressing the Global Economic Crises**

Fiscal stimulus packages adopted around the world to help address the economic crises include important measures involving renewable energy and environmental issues. Energy and climate change themes also dominated the World Economic Forum 2009, highlighting that industries related to energy-efficiency are a growing jobs-creating sector. The report *Green Investing: Towards a Clean Energy Infrastructure*, launched at the Forum, states that clean energy investment should more than triple—to at least \$515 billion a year between now and 2030—to prevent emissions reaching unsustainable levels. In the same spirit, UN Secretary-General Ban Ki-moon suggests creating a global Green New Deal. Such initiatives could be important also to reduce potential social unrest in developing countries that could experience a reversal of progress due to the global financial crisis. The crisis could reverse progress by cutting access to capital markets, income from trade and remittances, money from voluntary contributions for UN and other international development efforts, and increasing economic nationalism. As tensions triggered by the economical crises already led to social unrest in several countries around the world, and climate change warnings increase, green economy policies should be implemented without delay as a comprehensive strategy to address both. [See also *Briefings on Environmental Security at NATO Conference* in April 2008 and other related items in previous environmental security reports.] (January 2009) Ref. 2274

### **Global Fuel Economy Initiative Aims to Increase Cars' Fuel Efficiency 50% by 2050**

The Global Fuel Economy Initiative was launched by a coalition of the FIA Foundation, the International Energy Agency, the International Transport Forum and UNEP to call on the global auto industry and governments to reduce by 50% emissions from cars by 2050, mainly by improving fuel efficiency. The report “50 by 50' Global Fuel Economy Initiative” explains that improving new car fuel efficiency by 50% could stabilize world emissions through 2050, and outlines a roadmap on how to achieve the goals, with interim targets for 2020 and 2030. An additional outcome is increased energy security, by reducing dependency on oil imports. The number of cars is expected to triple by 2050. The initiative was launched at the 79th international motor show held in Geneva, March 5-15, 2009. [See also *World Leaders Discuss Environmental Security Policies at Davos* in January 2008, *EU Renewable Energy Policy becomes Legally Binding* in December 2008 and other related items in previous environmental security reports.] (March 2009) Ref. 2275

### **Corporate CEOs Pledge Actions on Climate Change at UN Global Compact Summit**

More than 150 CEOs signed the “Caring for Climate” platform at the UN Global Compact Summit held in Geneva July 5-7, including 30 from the Fortune Global 500. The pledge called for companies to reduce their carbon emissions and meet energy-efficiency targets, and called on governments to establish post-Kyoto market mechanisms to reduce greenhouse gas emissions. (July 2007) Ref.2276

**Global Trends in Sustainable Energy Investment 2007**

*Global Trends in Sustainable Energy Investment 2007— Analysis of Trends and Issues in the Financing of Renewable Energy and Energy Efficiency in OECD and Developing Countries* is a report by UNEP Sustainable Energy Finance Initiative and New Energy Finance organization. It is an overview of the financial aspect of the current status of sustainable energy development, with regional and sectoral trends. The analysis is intended for stakeholders and policy makers with involvement in sustainable energy. (July 2007) Ref.2277

**Renewable Energy Projects May Face New Scrutiny**

According to a paper published in Inderscience's International Journal of Nuclear Governance, Economy and Ecology, some renewable energy sources might not be so green and might even be damaging to the environment. The paper's author, Jesse Ausubel, Director of the Rockefeller University's Program for the Human Environment in New York, focuses primarily on land use efficiency of the various alternatives (e.g. wind, biomass, hydro), and points to nuclear as the best choice from the standpoint of minimizing environmental footprint. (July 2007) Ref.2278

**US EPA recommendations for "Green Infrastructure"**

US EPA has a website for "green infrastructure," with information about improving relationships between the built and natural environments. (September 2007) Ref.2279

**Green Un-building Becomes Major Environmental Goal**

The practice of "green un-building" – environmentally friendly demolition – is becoming a major goal of environmental groups worldwide. Reuse or recycling of materials from destroyed structures can save enormous amounts of scarce resources. (October 2007) Ref.2280

**EU-US Joint Energy-Efficiency Standards for Office Equipment**

The European Commission and the U.S. Environmental Protection Agency agreed to implement the joint Energy Star Programme by introducing higher energy-efficiency standards for office equipment such as computers, copiers and printers. (June 2009) Ref. 2281

**Green Information Technology is forecasted as 2008 top IT Strategy**

Gartner, Inc., a leading news source in information technology (IT), is predicting that concern for environmental issues will have a most significant impact on IT planning and operations over the next three years. The major factors involved here are energy conservation and efficiency, material conservation and recycling, and "green building" of data processing installations. UN-GAID will co-sponsor a conference and exhibit, The Positive Impact of ICT (Information and Communications Technology) on the Environment and Climate Change, on 27-28 November 2007, at the United Nations. Tutorials will focus on the role of information and communication technologies in assuring environmental sustainability. They will address the broader issue of information and communication technologies' impact on the environment and climate change. (October 2007) Ref.2282

**State of Green Business 2008**

The *State of Green Business* report provides an example of a set of evaluations of environmental accomplishments. It takes stock of green business activities in the United States, and features the debut of the GreenBiz Index, a set of 20 indicators of green business progress that measures how



efficiently companies are using resources, reducing toxics, purchasing green fleet vehicles and renewable power, and reporting social and environmental performance. It also features ten key green business trends of 2007 as well as lists of books, websites, reports, business initiatives, and other resources of the past year. (February 2008) Ref.2283

#### **New “Green IT” Software under Development**

A group at Oxford University’s Environmental Change Institute started development of “software that is free and easy to download, which will make networked computers more energy-efficient and reduce carbon emissions by saving on electricity needs.” The software will eventually be available from the project website: <http://projects.oucs.ox.ac.uk/lowcarbonict>. (March 2008) Ref.2284

#### **Energy/Performance Benchmark for Workstations under Development**

A new, environmentally-oriented project of the Standard Performance Evaluation Corporation (SPEC) Graphics and Workstation Performance Group is “working on the benchmark for performance in relation to power consumption, incorporating current benchmarks for 3D graphics as well as looking at workloads for rendering, financial modeling, video encoding and other processes” announced a *Greener Computing* news story. SPEC will be submitting the benchmark to EPA for use in its Energy Star rating system. (March 2008) Ref.2285

#### **New Environmentally Friendly City in UAE Offers Cooperation Opportunity**

A new mini-municipality, Masdar City, being built adjacent to Abu Dhabi, is intended as a hub for academic and corporate research on nonpolluting energy technologies, according to an article in the International Herald Tribune. The walled city of 2.3 square miles will be car-free and produce all its own energy from sunlight. (February 2008) Ref.2286

#### **Switching to Green: A renewable energy guide for office and retail companies**

The World Resources Institute (WRI) published a guidebook, *Switching to Green: A renewable energy guide for office and retail companies*, to provide organizations with easily understandable information on how to switch to renewable energy. (October 2006) Ref. 2287

#### ***Cleantech Report*<sup>TM</sup> by Lux Research**

*Cleantech Report*<sup>TM</sup> by Lux Research is a comprehensive analysis of emerging energy and environmental technologies with information ranging from statistics to funding and policies on cleantech. It notes that cleantechs are rapidly expanding; 1,500 cleantech start-ups operate worldwide, there were 29,874 cleantech-related scientific journal articles published in 2006, and 4,093 patents issued in the U.S. alone. (June 2007) Ref.2288

#### **Idle Nighttime Computers Cited as Energy Wasters**

A new report released by the energy management firm 1E and the Alliance to Save Energy points out the large amount of energy now being wasted by idle computers left running at night. The study calculated that 14.4 million tons of CO<sub>2</sub> could be eliminated annually from atmospheric pollution in the U.S. if all of these machines were turned off when not being used for extended periods. (June 2007) Ref.2289

#### **Efforts for Increasing Corporate Eco-responsibility**

The “Responsible Investment Initiative” launched by the United Nations Environment Programme (UNEP) aims to develop by September 2005 a set of globally recognized principles for responsible investment to be considered by the major institutional investors. The initiative is framed in support of the Global Compact, a U.N. effort to enlist the support of the public and private sector for 10 key principles relating to human rights, labor and the environment, and is based on the recent study, “The Materiality of Social, Environmental and Corporate Governance Issues to Equity Pricing,” launched at the UN Global Compact Leaders Summit on 24 June in New York. The new principles will protect both the planet and long-term shareholder value by integrating environmental, social and governance concerns into investor and capital market considerations.

The World Resources Institute (WRI) and World Business Council for Sustainable Development (WBCSD) recently published the revised edition of The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard, a framework for corporate GHG accounting and reporting, and a tool for helping companies more efficiently manage their GHG emissions. The next steps are: developing of Web-based GHG calculation tools; establishing complementary sector-specific protocols; and working on a new standard focused on the quantification of GHG mitigation projects. (July 2004) Ref.2290

### **UN Envisaging a Treaty for Multinational Corporations**

The UN began a feasibility study and eventual steps for the implementation of an international treaty regulating multinational corporations’ activities. One of those closely involved in the process is Harvard professor John Gerard Ruggie, appointed by Secretary-General Kofi Annan as his special representative on the issue of human rights and transnational corporations. The special representative position was created for identification and clarification of "standards of corporate responsibility and accountability for transnational corporations and other business enterprises with regard to human rights." STRATFOR (Strategic Forecasting, Inc.) comments that the “appointment is important because it will galvanize a global social movement, which will in turn accelerate the changing systems of public policy development.” It might take five years until a draft treaty will be drawn. (August 2005) Ref.2291

### **Climate Change Dialogue Initiative Launched**

Government officials and business leaders of G8 and five major developing countries (India, China, Brazil, Mexico, and South Africa) launched the Climate Change Dialogue initiative to campaign for more aggressive action to tackle climate change. Part of the new group are also institutions such as the World Bank, International Energy Agency, and oil giant BP. The group hopes to attain some concrete policy proposals for the G8 summit in Japan in 2008. (February 2006) Ref. 2292

### **Second Australia-New Zealand Climate Change and Business Conference**

“Climate change responses are going to be delivered by business, responding to Government policy-setting,” said Gary Taylor, Environmental Defence Society chairman at the second Climate Change and Business Conference held in Adelaide, February 20–21. Over 300 delegates representing business, environmental, and governmental organizations, discussed how individual businesses could help in coping with climate change and greenhouse gas emission issues. Many suggested that Australia would continue to get hotter while New Zealand would continue to get

wetter. The problem posed for Australia would be lower crop outputs and higher pest problems, with consequent food security implications. (February 2006) Ref.2293

### **Two Global Alliances for “Greener” Buildings Around the World**

The UN Environment Programme (UNEP) and major companies worldwide in the construction industry launched the Sustainable Building and Construction Initiative (SBCI), whose purpose is to promote environment-friendly practices throughout the industry. According to Monique Barbut, director of UNEP’s Division of Technology, Industry and Economics (DTIE), which hosts the SBCI secretariat, the project's objectives include the worldwide adoption of sustainable building and construction practices that can help deal with problems like climate change, waste disposal, and depletion of natural resources; the development of pilot projects that embody its recommendations; and the inclusion of sustainability considerations in legislation and building standards. Another alliance initiated by the World Business Council for Sustainable Development (WBCSD) of such companies as United Technology and Lafarge Group is promoting construction standards that would make new buildings energy self-sufficient (no dependency on external power grids) and carbon-neutral. Their initial focus is on new buildings in China, India, Brazil, the United States and the EU. Ref. 2294

### **UNEP and 150 Labor Unions Agree on Environmental Objectives**

The Trade Unions’ Assembly on Labour and the Environment, a joint meeting of UNEP and representatives from over 150 trade unions, set forth "a wide ranging strategy to mainstream environment and sustainable development within the trade unions movement", embodied in the "Workers’ Initiative for a Lasting Legacy". The unions agreed to support the UN Millennium Development Goals, the Johannesburg Plan of Implementation, action on climate change, and promotion of sustainable production and consumption patterns. According to the UNEP announcement, "Other areas include working for the ratification and implementation of key treaties that promote important social, economic and environmental objectives alongside monitoring of governments so that their purchasing, regulation and land-use policies meet sound social and environmental targets." (January 2006) Ref.2295

### **Prospects for Hydrogen and Fuel Cells**

*Prospects for Hydrogen and Fuel Cells*, a study by the IEA, assesses the present state of affairs in research and potentials of hydrogen and fuel cells, and investigates several aspects related to future energy markets, innovative technologies and policies needed to promote the use of hydrogen as an energy carrier and fuel cells as motive devices in transportation and energy distribution systems for the next half century. Additionally to the analysis, it also provides four scenarios for a hydrogen and fuel cells transition, along with governance and decision-making suggestions for addressing the world’s energy problems. (December 2005) Ref.2296

### **The Future of Technology Assessment**

*The Future of Technology Assessment* is a collection of three essays published by The Foresight and Governance Project of the Woodrow Wilson International Center for Scholars. It explores the issue of science and technology assessment and related policymaking from multiple perspectives and with a look towards a future that will be fundamentally influenced by the way science and technology will evolve and be addressed. It highlights the importance of making a clear distinction between handling basic and applied science. The first essay, *Back to the Future:*

*Revisiting OTA Ten Years Later*, by Michael Rodemeyer, reviews technology assessment issues in the U.S. after the dissolution of the Office of Technology Assessment (OTA), pointing out that the rate of change and globalization make policy- and decision-making difficult to assess and to react to all possible implications of new technologies. Concluding that there is no institutional arrangement for technology analysis, the author contemplates the eventual necessity of an internal or external technology assessment capability. The second essay, *This Won't Hurt a Bit: Assessing and Governing Rapidly Advancing Technologies in a Democracy* by Daniel Sarewitz, analyzes the transition from conventional to real time technology assessment in the condition of democracy, of complex social settings, when S&T should reflect and serve the system of values of the whole community. The third essay, *Paddling Upstream: New Currents in European Technology Assessment*, by James Wilsdon, analyzes the science-society relationship, outlining the need and process of public participation in decision-making concerning science. (December 2005) Ref.2297

### **UK Analysis of Current Green Energy Options**

The *Which Energy?* report by the Institute of Science in Society is an assessment of many energy options regarding accelerating global warming and depleting fossil fuels. Bringing together the science, ethics, economics, safety, and politics of available energy options, the report puts forward recommendations for cleaner energy policies and actions, including ruling out nonrenewable sources and techniques that are not environmentally friendly and/or safe for society (e.g. nuclear), and advocating energy self-sufficiency as the best guarantee for energy security. Although this report does not include such high tech items as genetically engineered photosynthesis to produce hydrogen or orbital solar power satellites for base load electricity, it is nevertheless a very good review of current alternative “green” energy solutions. (April 2006) Ref.2298

### **Renewables 2005: Global Status Report**

*Renewables 2005: Global Status Report* published by Worldwatch Institute, is a comprehensive overview of today's global renewable energy status and provides trends and estimations, as well as a look at emerging renewable energy technologies and policies. According to the report, government support for renewable energy is growing rapidly, with at least 48 countries (including 14 developing ones) already having some type of renewable energy promotion policy. (November 2005) Ref.2299

### **Target 2020: Policies and measures to reduce greenhouse gas emissions in the EU**

*Target 2020*, a new report by the Wuppertal Institute in Germany, outlines concrete steps that would allow the EU to cut its greenhouse gas emissions to a third of their 1990 level, by 2020. The recommendations include adoption of comprehensive climate policy strategies at regional and national levels, consisting of mandatory regulations promoting energy efficiency and renewables. To illustrate the analysis, the report compares two scenarios over the period 1990–2020: The “Business-as-usual” scenario—to be avoided, and the recommended “The Policies and Measures (Target 2020)” scenario, which implies high energy-efficiency strategies and policies. (November 2005) Ref.2300

### **New REN21 Report Links Renewable Energy to Climate Change Solutions**

*Changing Climates, the Role of Renewable Energy in a Carbon-Constrained World*, a new report by Renewable Energy Policy Network for the 21st Century (REN21), was launched during the 9th Special Session of UNEP's Governing Council/Global Ministerial Environment Forum [see

Item 2 above]. Noting “emerging consensus” in both the scientific and political communities that renewable energy is a major player in meeting the growing global energy demand and the increasingly serious environmental and economic threats of climate change, the report highlights the need for more aggressive strategies and specific economic and policy tools adapted to local circumstances. Also, remarks the report, with the current development of the global market for renewable energy, “it is not necessary to wait for strengthened global agreements before taking action at the national level.” (February 2006) Ref.2301

### **China and India Sign Precedent-Setting Energy Agreement**

How the world prepares for the advent of “peak oil,” will be a major factor in determining the future of war and peace. Will the major consumers and producers plan for the peaceful decline in oil and gas supplies or...? India and China have decided to cooperate and have signed the "Memorandum for Enhancing Cooperation in the Field of Oil and Natural Gas" which outlines comprehensive cooperation concerning hydrocarbons, including trading and joint bidding in third countries; research and development; exploration and production; conservation; and promotion of environment-friendly energy. A joint committee will be established to monitor implementation and facilitate dialogue and information sharing. This new agreement is in addition to the two nations' previous commitments to cooperate for accelerating the development of new energy sources. (January 2006) Ref.2302

### **Chinese Popular and Government Support for Environmental Concerns**

Environmental awareness and anger seem to be increasing among the Chinese people, and even certain segments of the government are taking up environmental causes. Pocha (Dec 2005) writes, "A growing section of the Chinese leadership, led by Deputy Environment Minister Pan Yue, has been vocal in calling for China to make its economic policies more environmentally sensitive... Earlier this year, China's State Environmental Protection Administration took the unprecedented step of suspending work on 30 projects, worth more than \$10 billion collectively, after they failed to meet environmental standards." There are now more than 2,000 grass-roots environmental NGOs in the country, many of which are now learning how to organize and empower themselves. Although the government is still focusing on high economic growth with little regard to environmental impacts, there are signs that this situation is changing. China recently announced that it would begin monitoring energy efficiency and encouraging cleaner energy production and use as its national income surges. Its National Bureau of Statistics is compiling an index to show each region's energy consumption per unit of GDP for publication every six months. (December 2005) Ref.2303

### **Chinese Automobile Industry's Potential Environmental Emphases**

China is the world's fastest-growing car market and may surprise the world at how fast it becomes a major automobile producer of next generation cars (as it surprised the world at how fast it became the world leader in mobile phone usage). 150 experimental and advanced-technology vehicles were on display at the Challenge Bibendum, an exhibition of eco-friendly cars held in Shanghai. The China Daily speculates that the rising cost of oil and the forthcoming Olympics (2008) and World Expo (2010) are strong incentives to make China a green car leader, rather than following the gasoline model. (October 2004) Ref.2304

**New Israeli Venture Capital Fund for "Clean Tech" Enterprises**

Israeli entrepreneurs and venture capitalists are fueling a burgeoning new crop of "clean technology" enterprises devoted to cleaning up the environment. A "cleantech" venture capital (VC) fund is being formed by the Millennium VC firm. Water management is a central element of many of these efforts. The fund's manager says that, "In five years it [Israel] will be the only country to use all of its wastewater, mainly for agriculture." (June 2005) Ref.2305

**Green Buildings in North America Project Started**

The Commission for Environmental Cooperation (CEC) officially begins its study, *Green Building in North America: Opportunities and Challenges*, hoping to increase the role of environmental considerations in the design of buildings across the continent. A 20-member interdisciplinary and international advisory group will assess the current status and prospects for green building, and identify eventual obstacles as well as potentials—including environmental benefits. Green building is very weak in North America, although it is estimated that U.S. buildings consume 65% of all electricity generated, 40% of raw materials and generate about 30% of all greenhouse gas emissions. The advisory group will present a report and provide the CEC Secretariat with recommendations for the final report, expected in the fall of 2007. [See also *Two Global Alliances for "Greener" Buildings Around the World* in April 2006 environmental security reports] Ref.2306

**Global Greenhouse Gas Register creates a global standard for the disclosure of corporate greenhouse gas emissions and reduction targets**

Ten multinational companies that are responsible for 5% of the global carbon dioxide emission have already agreed to participate in the new effort. The Global Greenhouse Gas Register (GHR) launched at the recent World Economic Forum meeting in Davos, Switzerland, creates a global standard for the disclosure of corporate greenhouse gas emissions and reduction targets. This is a voluntary system with a Web site to be accessible in February. This common platform will allow the participating companies to enter data on their emissions and promote transparency. Ten multinational companies that are responsible for 5% of the global carbon dioxide emission have already agreed to participate in the new effort. The Register was first announced on 9 December 2003 in Milan, Italy, during the United Nations Framework Convention on Climate Change (UNFCCC) Conference of the Parties (COP9) meeting. (January 2004) Ref.2307

**UNCTAD Manual for the Preparers and Users of Eco-efficiency Indicators contains new guidelines on corporate environmental accounting**

In February the United Nations Conference on Trade and Development (UNCTAD) released the *Manual for the Preparers and Users of Eco-efficiency Indicators*, containing guidelines on eco-efficiency indicators that link the financial achievement of a corporation to its environmental performance. The Manual helps to standardize the presentation and disclosure of a company's environmental performance and how to relate it to its financial results. The Ciba Specialty Chemicals multinational is the first company to base its environmental reporting on the UNCTAD model. (February 2004) Ref.2308

**European Pollutant Emission Register (EPER) gives access to information on annual industrial emissions into air and water of about 10 thousand industrial facilities**

The European Pollutant Emission Register (EPER) gives access to information on annual industrial

emissions into air and water—mostly since 2001—of 9256 industrial facilities in the 15 Member States of the EU as well as Norway. The information can easily be searched and/or grouped by pollutant, activity (sector), air and water (direct or via a sewerage system) or by country. It is searchable by name or by clicking on a map, or by sources of a particular pollutant. (February 2004) Ref.2309

**UN Economic Commission for Europe (UNECE) Catalogue of Environmental Networks and Data Sources for EECCA**

The UNECE Working Group on Environmental Monitoring in cooperation with the European Environment Agency has developed a catalogue of environmental expert networks and data sources for Eastern Europe, Caucasus and Central Asia (EECCA). (February 2004) Ref.2310

**Online Database of Sustainable Consumption Initiatives in North America Launched**

The Commission for Environmental Cooperation (CEC) launched on 21 April 2004 a new online database cataloguing information about sustainable consumption and production initiatives in North America: <http://nasca.icspac.net/db/> (April 2004) Ref.2311

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Belgian Senate to Consider Nuclear-Weapon Ban

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Annan calls for expanded laws against environmental damage in war

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<http://www.nanowerk.com/news/newsid=12864.php#>**337 Microcantilevers Provide Ultrasensitive Detection**

Novel sensor exploits traditional weakness of nano-devices

[http://www.nanowerk.com/news/newsid=14813.php?utm\\_source=feedburner&utm\\_medium=email&utm\\_campaign=Feed%3A+nanowerk%2FagWB+%28Nanowerk+Nanotechnology+News%29](http://www.nanowerk.com/news/newsid=14813.php?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+nanowerk%2FagWB+%28Nanowerk+Nanotechnology+News%29)**338 New Color Matrix Sensor Array Warns of Toxic Gases**

Postage stamp-sized electronic nose sniffs out poisonous gases

<http://www.nanowerk.com/news/newsid=12593.php>

An optoelectronic nose for the detection of toxic gases

<http://www.nature.com/nchem/journal/vaop/ncurrent/abs/nchem.360.html>**339 New Material Will Aid Radioactive Cleanup**

Snag radioactive waste like a Venus flytrap

<http://futurity.org/science-technology/snag-radioactive-waste-like-a-venus-flytrap/>

Selective incarceration of caesium ions by Venus flytrap action of a flexible framework sulfide

<http://www.nature.com/nchem/journal/vaop/ncurrent/abs/nchem.519.html>**340 Silicon-on-insulator Microring Resonator Provides High Sensitivity Gas Detection**

Optical ethanol vapor sensor shows potential of SOI-based integrated gas sensors

<http://www.nanowerk.com/news/newsid=16809.php>**341 Genetically Engineered Bacteria Might Provide Landmine Detection**

Bacteria make light work of detecting landmines

<http://www.scidev.net/en/news/bacteria-make-light-work-of-detecting-landmines.html>**342 Chemical Vapor Deposition Creates Nano Filters, Catalyst Scaffolds**

Scientists build better catalyst with nanotube membranes

<http://www.nanowerk.com/news/newsid=15986.php>

Three-Dimensional Carbon Nanotube Scaffolds as Particulate Filters and Catalyst Support Membranes

<http://pubs.acs.org/doi/abs/10.1021/nn100150x>

**343 Review and Map of Use of Nanomaterials for Environmental Cleanup**

Contaminated Site Remediation: Are Nanomaterials the Answer? First Map of Global Nanoremediation Sites Available Online

<http://www.nanotechproject.org/news/archive/8267/>

Nanotechnology and In situ Remediation: A Review of the Benefits and Potential Risks

<http://www.ehponline.org/docs/2009/0900793/abstract.html>

Nanoremediation Map

[http://www.nanotechproject.org/inventories/remediation\\_map/](http://www.nanotechproject.org/inventories/remediation_map/)

**344 Nanotechnology Applications for Clean Water**

Nanotechnology Applications for Clean Water

[http://www.elsevier.com/wps/find/bookdescription.cws\\_home/715798/description](http://www.elsevier.com/wps/find/bookdescription.cws_home/715798/description)

Book Review of Nanotechnology Applications for Clean Water

<http://www.nanolabweb.com/index.cfm/action/main.default.viewArticle/articleID/294/CFID/3843948/CFTOKEN/94277499/index.html>

**345 Nanotube-impregnated Paper Provides Sensitive Biosensor for Aqueous Toxins**

Simple nanotechnology paper sensor for detecting toxins in water

[http://www.nanowerk.com/spotlight/spotid=13913.php?utm\\_source=feedburner&utm\\_medium=email&utm\\_campaign=Feed%3A+nanowerk%2FagWB+%28Nanowerk+Nanotechnology+News%29](http://www.nanowerk.com/spotlight/spotid=13913.php?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+nanowerk%2FagWB+%28Nanowerk+Nanotechnology+News%29)

Simple, Rapid, Sensitive, and Versatile SWNT–Paper Sensor for Environmental Toxin Detection Competitive with ELISA

<http://pubs.acs.org/doi/abs/10.1021/nl902368r>

**346 Genetically Engineered Tobacco Plant May Clear Polluted Water**

Genetically engineered tobacco plant cleans up environmental toxin

<http://www.physorg.com/news186660152.html>

Generation of transgenic plants expressing antibodies to the environmental pollutant microcystin-LR

<http://www.fasebj.org/cgi/content/abstract/24/3/882?maxtoshow=&hits=10&RESULTFORMAT=&fulltext=tobacco&searchid=1&FIRSTINDEX=0&volume=24&issue=3&resourcetype=HWCIT>

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University of Twente Develops Catalysts For Clean Drinking Water

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Purer water made possible by Sandia advance

<http://www.sandia.gov/news/resources/releases/2009/waterpurity.html>

Enhanced Water Purification: A Single Atom Makes a Difference

<http://pubs.acs.org/doi/abs/10.1021/es803683t>**349 New Ultra-sensitive Detector for Water-borne Hazards**

Cheap, sensitive carbon nanotube sensors could detect explosives, toxins in water

<http://www.nanowerk.com/news/newsid=12779.php>

Sorted and Aligned Single-Walled Carbon Nanotube Networks for Transistor-Based Aqueous Chemical Sensors

<http://pubs.acs.org/doi/abs/10.1021/nn900808b>**350 New Water Purifying Filter Requires No Energy or Running Water**

Tata Chemicals launches 'Tata Swach'

<http://www.tata.com/media/releases/inside.aspx?artid=TtOdcNuSRk=>**351 Ozone Bubbles Provide New Cleansing Technique**

Tiny Bubbles Clean Oil from Water. New Method Targets Oil Sheen, Other Pollutants

<http://unews.utah.edu/p/?r=111209-1>**352 New Nature-based Filter Allows Utilization of Gray Water**Love that dirty water: Scientists find low-tech way to recycle H<sub>2</sub>O<http://www.physorg.com/news193945696.html>**353 Water Treatment Technologies for the Removal of High-Toxicity Pollutants**

Water Treatment Technologies for the Removal of High-Toxicity Pollutants.

[http://www.springerlink.com/content/978-90-481-3495-3?sa\\_campaign=email/NBA](http://www.springerlink.com/content/978-90-481-3495-3?sa_campaign=email/NBA)**354 New Technique Helps Reduce Nanoparticle Wastewater Pollution**

Centre for Ecology &amp; Hydrology

New discovery may help manage nanoparticle wastes from consumer products

<http://www.ceh.ac.uk/news/press/Managenanoparticlewastesfromconsumerproducts.asp>**355 Project Developing Sensors for Engineered Nanoparticles**

Chemist monitors nanotechnology's environmental impact

<http://www.nanowerk.com/news/newsid=15415.php>



**356 Variable Heating Provides New Flexibility for Gas Sensors**

Sniffing Out a Better Chemical Sensor

[http://www.nist.gov/public\\_affairs/techbeat/tb2008\\_1028.htm#nose](http://www.nist.gov/public_affairs/techbeat/tb2008_1028.htm#nose)**357 Review and Map of Use of Nanomaterials for Environmental Cleanup**

Contaminated Site Remediation: Are Nanomaterials the Answer? First Map of Global Nanoremediation Sites Available Online

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[http://www.nanotechproject.org/inventories/remediation\\_map/](http://www.nanotechproject.org/inventories/remediation_map/)**358 FAO/IAEA Meeting Discusses Portable Disease Detection Devices**

Portable lab could revolutionize bird flu detection

<http://www.fao.org/newsroom/en/news/2007/1000517/index.html>**359 Portable Mass Spectrometer and Gas Chromatograph**

BYU Scientists Create Portable Spectrometer

<http://newsnet.byu.edu/story.cfm/63705>**360 Single-electron Transistors (SETs) and NEMS Make for New High-performance Sensor**

World's Smallest, High-Performance and Low-Power Sensor in Silicon

<http://www.azonano.com/news.asp?newsID=6740>**361 New Substrate Preparations Make for Inexpensive “Labs on a Chip”**

Paper lab-on-a-chip makes disease tests affordable

<http://technology.newscientist.com/channel/tech/dn14790-paper-labonachip-makes-disease-tests-affordable.html>

FLASH: A rapid method for prototyping paper-based microfluidic devices

<http://www.rsc.org/publishing/journals/LC/article.asp?doi=b811135a>

Soft lithography: masters on demand

<http://www.rsc.org/publishing/journals/LC/article.asp?doi=b804050h>**362 Miniature Radiation Sensors Could Implement Detection Network**

My Blackberry As A Bomb Sniffer? (NEWSWEEK, Oct 6, 2008)

<http://www.newsweek.com/id/161056>

Cell phone sensors detect radiation to thwart nuclear terrorism

<http://www.purdue.edu/UNS/x/2008a/080122FischbachNuclear.html>**363 New Air Quality Evaluation Tool**

New Tool For Study Of Air Quality Developed

<http://www.sciencedaily.com/releases/2009/03/090311085406.htm>

The evaluation of the air quality impact of an incinerator by using MM5-CMAQ-EMIMO

modeling system: North of Spain case study (abstract)

[http://www.sciencedirect.com/science?\\_ob=ArticleURL&\\_udi=B6V7X-4SBYYGS-1&\\_user=10&\\_rdoc=1&\\_fmt=&\\_orig=search&\\_sort=d&view=c&\\_acct=C000050221&\\_version=1&\\_urlVersion=0&\\_userid=10&md5=7cd8a3dfb80125e265f078e654526891](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V7X-4SBYYGS-1&_user=10&_rdoc=1&_fmt=&_orig=search&_sort=d&view=c&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=7cd8a3dfb80125e265f078e654526891)

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Nanosensors Made Easy. A trick to assemble nanowires on silicon could lead to cheap, tiny sensing devices

<http://www.technologyreview.com/computing/21974/?a=f>

Practical Nanowire Devices. A way to align nanowires could lead to better sensors and flexible displays

<http://www.technologyreview.com/computing/18802/?a=f>

Easy-to-Make Nanosensors. Tiny electronics-based detectors could provide simple tests for cancer or bioterror agents

<http://www.technologyreview.com/biomedicine/18127/>

### **365 Nanotube-based Biosensor Sensitive to Trace Amounts**

NASA Nanotechnology-Based Biosensor Helps Detect Biohazards

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Early Warning (the company)

<http://www.earlywarninginc.com/early-warning-profile.php>

### **366 Isotope Ratio Evaluates Decontamination Success**

A Guide for Assessing Biodegradation and Source Identification of Organic Ground Water Contaminants using Compound Specific Isotope Analysis (CSIA)

<http://www.epa.gov/ada/pubs/reports/600r08148/600r08148.pdf>

EPA Ground Water and Ecosystems Restoration Research

[www.epa.gov/ada](http://www.epa.gov/ada)

New technique put to use to test clean up of contaminated groundwater

<http://www.physorg.com/news152539505.html>

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Early Warning, Inc.

<http://www.earlywarninginc.com/>

Biohazard Water Analyzer Employs a Revolutionary Nanotechnology-Based Biosensor

<http://www.azonano.com/news.asp?newsID=10982>

### **368 New Biological Discovery Should Bring More Efficient Water Treatment**

Natural slime control aids desalination

<http://www.sciencealert.com.au/news/20072410-16490-2.html>

**369 New Membrane for Energy-efficient Water Filtration**

IBM Makes Water Clean With Smarter, More Energy-Efficient Purification

<http://www-03.ibm.com/press/us/en/pressrelease/26921.wss>**370 Improved Techniques for Water Treatment**

Clean Water for a Crowded, Contaminated World

[http://www.nsf.gov/discoveries/disc\\_summ.jsp?cntn\\_id=112996&govDel=USNSF\\_1](http://www.nsf.gov/discoveries/disc_summ.jsp?cntn_id=112996&govDel=USNSF_1)**371 Inverse Fluidization of Aerogels Removes Oil from Water**

Removal of Oil from Water by Inverse Fluidization of Aerogels

<http://pubs.acs.org/doi/abs/10.1021/ie800022e>**372 Simple New Technique Supplies Chlorine for Water Purification**

International Water Management Systems

<http://www.iwmsystems.com/>

Iowan makes tainted water fit to drink

<http://www.desmoinesregister.com/article/20090222/NEWS02/902220344/1001/NEWS>**373 Water Filter Effective Against Parasites**

Simple Filter Delivers Clean, Safe Drinking Water, Potentially To Millions

<http://www.sciencedaily.com/releases/2009/03/090309211938.htm>**374 NanoRadio Offers Low Impact Environmental Monitoring and Communications**

TR10: NanoRadio

[http://www.technologyreview.com/read\\_article.aspx?ch=specialsections&sc=emerging08&id=20244](http://www.technologyreview.com/read_article.aspx?ch=specialsections&sc=emerging08&id=20244)**375 New Technique Might Power Nano-based Environmental Devices**

Microfibre–nanowire hybrid structure for energy scavenging

<http://www.nature.com/nature/journal/v451/n7180/abs/nature06601.html>**376 Ionic Liquids Provide Safe Alternative to Mercury**

New ionic liquid in thermometers beats mercury on range, performance and safety

<http://www.rsc.org/AboutUs/News/PressReleases/2008/ILThermometers.asp>**377 Single-walled Carbon Nanotubes Give Support to Antimicrobial Enzyme**

Strong Antimicrobial Coatings: Single-Walled Carbon Nanotubes Armored with Biopolymers

<http://pubs.acs.org/cgi-bin/sample.cgi/nalefd/asap/html/nl080522t.html>

Super strong antimicrobial coatings for medicine, defense

<http://www.physorg.com/news134652009.html>

Engineering team recognized for breakthrough antimicrobial research

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Carbon Nanotubes with Nanoscopic Paraffin Coating Form Self-Cleaning Surfaces

<http://www.azonano.com/news.asp?newsID=6912>**379 Emerging Contaminants: Most Effective Treatment Strategies**

Oppenheimer, J., R. Stephenson, and J. Decarolis, Emerging contaminants: Insights to the most effective EDC and PPCP treatment strategies, AWWA Opflow, May 2008, pp. 12-16.

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<http://www.awwa.org/publications/MainStreamArticle.cfm?itemnumber=35946>**380 Synthetic Biology to Combat Harmful 'Biofilms'**

Team builds viruses to combat harmful 'biofilms'

<http://www.physorg.com/news102951008.html>**381 Nanowire "Paper" Selectively Absorbs Oils in Water**

Researchers develop nanowire 'paper towel' for oil spills

<http://www.physorg.com/news131372301.html>**382 Energy-saving Communications for Underwater Environmental Sensing Networks**

Toward cheap underwater sensor nets

<http://www.physorg.com/news162640918.html>**383 Carbon-gold Nanoparticle Sacs Trap Oil Droplets**

Elongated Nanoparticles Called Nanobats Self Assemble Around Oil Droplets for Cleaning Oils Spills and Polluted Water

<http://www.azonano.com/news.asp?NewsID=6521>**384 More New Improvements in Nanotube-based Environmental Sensors**

Using carbon nanotubes, MIT chemical engineers have built the most sensitive electronic detector yet for sensing deadly gases such as the nerve agent sarin

<http://www.physorg.com/news131977245.html>**385 Tiny Cantilevers Detect Contaminants**

Using Nanotechnology to Detect Contaminants in Food and Water

News story: <http://www.azonano.com/news.asp?newsID=4535>

Rapid molecular detection of food- and water-borne diseases

[http://www.sgm.ac.uk/pubs/micro\\_today/pdf/080703.pdf](http://www.sgm.ac.uk/pubs/micro_today/pdf/080703.pdf)**386 Chemical Agent Cleanser Developed in Canada**

"Green" method decontaminates deadly nerve agents

[http://qnc.queensu.ca/story\\_loader.php?id=47fb870ea02f1](http://qnc.queensu.ca/story_loader.php?id=47fb870ea02f1)

New nerve agent cleansing method created

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Mongoose-robot duo sniff out landmines on the cheap

<http://technology.newscientist.com/channel/tech/mg19826535.900?DCMP=NLC-nletter&nsref=mg19826535.900>

Video of the mongoose and robot pair sniffing our landmines

<http://uk.youtube.com/watch?v=fSQpzh02JaA>

Giant Hero Rats Being Trained to Sniff Out Land Mines

<http://www.buzzle.com/articles/giant-hero-rats-being-trained-to-sniff-out-land-mines.html>

Trained Rats Sniff out TB, Land Mines in Tanzania

<http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/AFRICAEXT/TANZANIAEXTN/0,,contentMDK:21462478~menuPK:287357~pagePK:141137~piPK:141127~theSitePK:258799,00.html>

**388 Portable Sensor to Detect Exposure to Chemical or Nerve Agents**

Truly sick or simply scared?

<http://www.pnl.gov/topstory.asp?id=265>

**389 Miniature Chemical Agent Sensor**

MIT gas sensor is tiny, quick. Energy-efficient device could quickly detect hazardous chemicals

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**390 New Rapid Portable Chemical Sensor**

BYU scientist creates chemical detector

<http://www.deseretnews.com/article/1,5143,695263396,00.html>

**391 Model Helps Evaluate Performance of Biosensors**

Model Is First to Compare Performance of 'Biosensors'

<http://www.sciencedaily.com/releases/2008/01/080102134121.htm>

**392 Antibody-bearing Gel Can Disinfect Biologically Contaminated Areas**

Anadis receives \$480k Government grant for biohazard "Ectoplasm" project

<http://64.233.169.104/search?q=cache:VUs7GqNm4JQJ:www.anadis.com.au/admin/managedFiles/4/Government%2520grant%2520for%2520biohazard%2520Ectoplasm%2520project.pdf+anadis+ectoplasm&hl=en&ct=clnk&cd=1&gl=us>

Antibody-laden gel can clean up after anthrax attacks

<http://www.newscientist.com/channel/health/mg19526156.500?DCMP=NLC-nletter&nsref=mg19526156.500>

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Degradation of diesel oil in a polluted soil using *Bacillus subtilis*

<http://www.academicjournals.org/AJB/PDF/pdf2008/17Jun/Nwaogu%20et%20al.pdf>

Isolation and characterization of diesel oil degrading indigenous microorganisms in Kwazulu-Natal, South Africa

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**394 New Bacterium Can Provide Arsenic Cleanup and Possibly Detection**

Bacteria Found That Cleans Up Arsenic Contamination

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<http://www.ens-newswire.com/ens/sep2008/2008-09-08-01.asp>

Researchers find cold-loving, arsenic-eating bacteria in Yellowknife gold mine

<http://canadianpress.google.com/article/ALeqM5hWVrCjSf09VceYbYMPwdLAetyBgg>

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Antibody-recognition force microscopy shows that outer membrane cytochromes OmcA and MtrC are expressed on the exterior surface of *Shewanella oneidensis* MR-1

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Common Soil Bacteria Could Clean Up Nuclear Contamination

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Applying nanotechnology to water treatment

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Berkeley chemists pioneer low-cost water testing devices

<http://www.physorg.com/news149261463.html>

### **398 New Deep Water Marine Sensors Being Developed**

World's first deep-sea 'lab-on-a-chip' sensors proved to work

[http://www.soton.ac.uk/mediacentre/news/2008/dec/08\\_233.shtml](http://www.soton.ac.uk/mediacentre/news/2008/dec/08_233.shtml)

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IIT uses nanotech for cheap textile wastewater cleanup

<http://www.cleantech.com/news/4271/iit-uses-nanotech-cheap-textile-was>

Catalyx develops two-way osmosis to purify wastewater

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Researchers claim chemistry breakthrough for environmental cleanup

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Improved biodegradation of Congo Red by using *Bacillus* sp

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### **401 Reusable Carbon Aerogel Adsorbs Organic Solvent Pollutants**

Creation of a new material capable of eliminating pollutants by the hydrocarbon industry

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**Humans**

Identification and Quantification of 1-Nitropyrene Metabolites in Human Urine as a Proposed Biomarker for Exposure to Diesel Exhaust

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Measurement of 1-Nitropyrene Metabolites in Human Urine: A Potential Marker for Exposure to Diesel Exhaust (email newsletter)

**403 Landmine Detection by Using Ground-penetrating Radar Technique**

Ground-breaking antilandmine radar

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**404 Porous Semiconducting Aerogels Purify Water and Hydrogen**

New aerogels could clean contaminated water, purify hydrogen for fuel cells

[http://www.anl.gov/Media\\_Center/News/2007/news070727.html](http://www.anl.gov/Media_Center/News/2007/news070727.html)

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Bacteria and nanofilters — the future of clean water technology

<http://research.nottingham.ac.uk/NewsReviews/newsDisplay.aspx?id=444>

Cleaner water through nanotechnology

<http://www.physorg.com/news122733688.html>

**406 Millimeter-wave Spectroscopy Provides Environmental Sensing**

New instrument covertly detects signals from illicit chemicals

<http://www.physorg.com/news108047021.html>

**407 New Chemical Helps Protect Burned-over Soil from Erosion**

PAM-12 Erosion Granules

<http://www.encap.net/ProductGuide/PAM12ErosionGranules/tabid/79/Default.aspx>

Product Could Heal Soil After Fires

<http://www.physorg.com/news107534416.html>

**408 New Technique Promises Ultra-sensitive Biosensors**

Mass-Producing 3-D Particles

<http://www.technologyreview.com/Nanotech/19786/page1/>

**409 EU Launches Mobile Carbon Tracking**

European Commission scientists launch first mobile application that uses your mobile phone to track your carbon footprint

<http://www.europa.eu/rapid/pressReleasesAction.do?reference=IP/07/1822&format=HTML&aged=0&language=EN&guiLanguage=en>

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‘Pac-Man’ molecule chews up uranium contamination

<http://environment.newscientist.com/article/mg19726396.200?DCMP=NLC->

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Compound removes radioactive material from power plant waste  
[http://www.anl.gov/Media\\_Center/News/2008/news080313a.html](http://www.anl.gov/Media_Center/News/2008/news080313a.html)

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A handheld DNA detector may soon be a reality  
<http://www.topnews.in/health/handheld-dna-detector-may-soon-be-reality-21411>

#### **413 DNA Spotted Microarrays Provide Faster Pathogen Identification**

Rapid test for pathogens developed by K-State researchers  
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Researchers Developing Diagnostic 'Lab On A Chip'  
<http://www.sciencedaily.com/releases/2007/08/070806160105.htm>

#### **414 Chemical Tests on Cells Rather than Animals**

Agencies to Change How Chemicals are Tested for Safety  
<http://nationalacademies.org/headlines/20080219.html>  
NIH Collaborates with EPA to Improve the Safety Testing of Chemicals  
<http://www.nih.gov/news/health/feb2008/nhgri-14.htm>  
*Toxicity Testing in the 21st Century: A Vision and a Strategy*  
[http://www.nap.edu/catalog.php?record\\_id=11970](http://www.nap.edu/catalog.php?record_id=11970)

#### **415 Nanotech-based Explosives Detector**

Portable, cheap and fast explosives detector built with nanotechnology  
<http://www.nanowerk.com/spotlight/spotid=1138.php>

#### **416 Detector Materials for Cyanogen Halides from Chemical Weapons**

Out of the dark. Highly sensitive chemosensors for cyanogen halides. 14 December 2006  
<http://www.nature.com/materials/news/news/061214/portal/m061214-1.html> (by subscription only)

#### **417 New Spectroscopy Technique Speeds Up Virus Detection**

Researchers use laser, nanotechnology to rapidly detect viruses  
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Clemson Researchers Develop Nanotechnology to Stop Weaponized Anthrax in Its Tracks

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UW Invention Targets Terrorist Weapons

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Biodegradable napkin could quickly detect biohazards

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Fish Used to Detect Terror Attacks

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New water-purification method promises radical improvement

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Cranfield Leads The Development Of Next Generation Anti-Land Mine Device

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Nano-engineered Powders Tackle Toxic Chemicals

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Microbial fuel cell: High yield hydrogen source and wastewater cleaner

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Measuring mercury with nanotechnology

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Hydroxy Oximes as Organophosphorus Nerve Agent Sensors

<http://www3.interscience.wiley.com/journal/122597479/abstract?> (abstract)

Ring closure as warning - new, extremely fast detection of neurotoxins

<http://www.nanowerk.com/news/newsid=12678.php>**519 New Laser-based Gas Sensor Is Tunable over Wide Wavelength Range**

NEMIS (New Mid-Infrared Sources for Photonic Sensors)

<http://www.nemis.eu/>

Huge long-term potential for new breed of gas sensors

<http://www.nanowerk.com/news/newsid=13823.php>**520 New On-the-spot Test for Avian Flu and Other Influenza Strains**

New "chip" could provide quick bird flu test

<http://go.reuters.com/newsArticle.jhtml?type=technologyNews&storyID=10190863&src=rss/technologyNews> (article available for a limited time on the website)**521 Chinese Find 16 Native Toxin-absorbing Plants**

China's five-year hunt for toxin-absorbing plants ends

<http://www.scidev.net/dossiers/index.cfm?fuseaction=dossierReadItem&type=1&itemid=2485&language=1&dossier=11&CFID=5187246&CFTOKEN=73c840a863493c12-427E991D-B0D0-F03F-734651F39BDA904D>**522 Faster and Cheaper Virus Detector Uses Indium Nanowires, Synthetic Antibodies**

Label-Free, Electrical Detection of the SARS Virus N-Protein with Nanowire Biosensors

Utilizing Antibody Mimics as Capture Probes

<http://pubs.acs.org/doi/abs/10.1021/nn900086c>

A quicker, cheaper SARS virus detector benefits from advances in nanodesign

<http://www.nanowerk.com/news/newsid=10908.php>**523 Anti-anthrax Protein Found**

Newly Discovered Protein Kills Anthrax Bacteria

<http://www.emaxhealth.com/39/5607.html>

Protein Found That Explodes Anthrax Bacteria on Contact

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Transistor-Cantilever Combo Detects Biomolecules with High Sensitivity

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China's five-year hunt for toxin-absorbing plants ends

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G-7 and WHO Meet to Discuss WMD, Avian Flu Threats

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Globalization, Biosecurity, and the Future of the Life Sciences

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Maps Point the Way to Fighting the Flu Virus

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Google.org Announces Core Initiatives to Combat Climate Change, Poverty and Emerging Threats

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Google.org expands funding to attack world crises

<http://www.reuters.com/article/latestCrisis/idUSN17226771>

\$25 Million Begins Google's Charity

<http://www.washingtonpost.com/wp-dyn/content/article/2008/01/17/AR2008011703049.html>

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Peptide nanotubes for highly sensitive pathogen sensors chips

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System created to make paper biosensors

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Printing toxin-detecting paper

<http://dailynews.mcmaster.ca/story.cfm?id=6280>

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US company envisions chameleon camouflage

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Sandia research points way toward chameleon-like camouflage

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Salt Rejection and Water Transport Through Boron Nitride Nanotubes

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Saltworks Technologies Company

<http://www.saltworkstech.com>

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A fresh way to take the salt out of seawater

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### **535 New Membranes Claim to Cut Desalination Energy Requirements**

NanoH<sub>2</sub>O to Change the Economics of Desalination

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A system that's worth its salt: New approach to water desalination could lead to small, portable units

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Cement-like creation could help the environment

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New clues in quest for liquid methane

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<http://www.sciencemag.org/cgi/content/abstract/sci;326/5952/553>

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Scientists Develop Self-Cleaning Material

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Spray-on liquid glass is about to revolutionize almost everything

<http://www.physorg.com/news184310039.html>

Liquid Glass is probably the world's most versatile new technology?

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Incorporating biofunctionality into nanomaterials for medical, health devices

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Pulling the Plug on Phantom Power

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Agilewaves Marries Monitoring and Control in New Smart System

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Towards a Self-organizing Stochastic-Communications Paradigm for Wireless Ad-hoc Networks

Los Alamos National Laboratory, Los Alamos, NM 87545, USA ([sami@lanl.gov](mailto:sami@lanl.gov))

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'Nanohybrid' Plastic May Expand Use Of Biodegradable Plastic

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Vietnamese scientists come up with natural plastic

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Advanced membrane technology for water treatment research

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A Low-Energy Water Purifier. A Yale spinoff hopes to solve the big problem with desalination

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Purer water made possible by Sandia advance

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Architecture in Italy goes green



<http://www.iht.com/articles/2006/11/22/news/smog.php>

**556 New Power Sources Needed for the Soldiers of the Future**

Meeting the Energy Needs of Future Warriors (full report)

[http://books.nap.edu/catalog/11065.html?onpi\\_newsdoc09102004](http://books.nap.edu/catalog/11065.html?onpi_newsdoc09102004)

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Sandia researchers develop unique 'surfactant' material

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New Nano-Fabrics to Safeguard Agricultural, Medical, and Military Workers

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Blast of sound turns liquid to jelly

NewScientist.com news service, Celeste Biever, 25 June 2005

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Scientists to Develop Textiles with Permanent Antibacterial Properties

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Long Life Battery

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Self-healing protection for plastic electronics

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Pollution-Cutting Infrared System for De-Icing Aircraft Tested at Oslo Airport

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BAE Uses Fuzzy Logic to Make Wind Farms Vanish

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A turn for the better. Wind turbines are ugly and no one wants to live near one. Right? Wrong.

By Steve Rose, Guardian, Monday July 18, 2005

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High hopes for space elevator

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Green breakthrough for nanoscience

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Rice finds 'on-off switch' for buckyball toxicity

Public release date: 24-Sep-2004. Contact: Jade Boyd, [jadeboyd@rice.edu](mailto:jadeboyd@rice.edu), Rice University

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Crystal Options for Nuclear Waste

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Researchers compost old mobile phones & transform them into flowers

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Clues to Breaking Down Plastics

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Strong, lightweight green material could replace concrete, but contains no cement

<http://www.physorg.com/news146851488.html>

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Ekocrete Launches 'Green' Concrete That Uses 90% Recycled and By-Product Materials

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Information: [info@ekocrete.com](mailto:info@ekocrete.com) (Email address for obtaining more information.)

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Improving construction site runoff quality with fiber check dams and polyacrylamide

<http://www.jswnonline.org/content/64/2/144.abstract>

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**576 Techniques Provide Improved Lithium-ion Battery Performance**

Nanowire Advance for Lithium Batteries

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Superior cathode material for electrochemical energy storage devices

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Next Alternative Introduces Car Battery With Carbon Nanotube Technology

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Stanford's nanowire battery holds 10 times the charge of existing ones

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An Electrifying Startup. A new lithium-ion battery from A123 Systems could help electric cars and hybrids come to dominate the roads (note: requires free registration to access article)

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Battery materials for ultrafast charging and discharging

<http://www.nature.com/nature/journal/v458/n7235/full/nature07853.html>

Batteries now included

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Lithium battery technology breakthrough could triple their power

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New battery could change world, one house at a time

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New photocatalytic method for the clean production of hydrogen from water

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Water Splitting by Visible Light: A Nanophotocathode for Hydrogen Production

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Catalyst could power homes on a bottle of water, produce hydrogen on-site (w/ Video)

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Water oxidation advance boosts potential for solar fuel

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Scientists turn light into electrical current using a golden nanoscale system

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The Car That Makes Its Own Fuel

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University of Denmark Scientists Develop Hydrogen Tablet

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Growing hydrogen for the cars of tomorrow

By Peter Aldhous, *New Scientist*, 25 February 2006

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Making Gasoline from Bacteria

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Sandia researchers seek ways to make lithium-ion batteries work longer, safer

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Sandia researchers collaborate to understand phenomena controlling PEM fuel cell performance, durability

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New battery could change world, one house at a time

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More-Powerful Fuel Cells

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Chemical Engineer Discovers Way of Increasing Battery Life with Environmentally Friendly Fuel Cells

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Going platinum: New catalyst could boost cleaner fuel use  
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Pure Driving: The Revolutionary Compressed Air Vehicle  
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Better Batteries Charge Up  
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Growth of Manganese Oxide Nanoflowers on Vertically-Aligned Carbon Nanotube Arrays for High-Rate Electrochemical Capacitive Energy Storage  
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New process generates hydrogen from aluminum alloy to run engines, fuel cells

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Simple biofuel cells with nanotechnology

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Printing Fuel Cells

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Cheaper Fuel Cells. Carbon nanotubes could replace expensive platinum catalysts and help finally make fuel cells economical

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Europe paves way for hydrogen economy

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Sandia's Sunshine to Petrol project seeks fuel from thin air

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Unique Material May Allow Capacitors to Store More Energy

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Beyond Batteries: Storing Power in a Sheet of Paper

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Halting methane squanderlust

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For New Energy Options to Work, Better Storage Methods Needed

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Pickin' Up Good Vibrations to Produce Green Electricity

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Mini generators make energy from random ambient vibrations

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Turning your T-shirt into a battery

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Energy-harvesting rubber sheets could power pacemakers, mobile phones

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Researchers solve two 20-year old problems that could transform solar cell technology

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Silicon nanohole solar cells aim to make photovoltaics cost-competitive

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Glitter-sized solar photovoltaics produce competitive results

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Better way to harness waste heat with quantum dot devices

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Nanotube Thermocells Hold Promise as Energy Source

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Researchers engineer bacteria to turn carbon dioxide into liquid fuel

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A greener way to get electricity from natural gas

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Researchers Develop Nanofiber-Based Technology to Make Energy-Efficient Lighting

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Cheaper materials could be key to low-cost solar cells

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Enhancing solar cells with nanoparticles

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Super Battery

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Hydrogen Fuel from Formic Acid

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High-Rate Solar Photocatalytic Conversion of CO<sub>2</sub> and Water Vapor to Hydrocarbon Fuels

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Microchip sets low-power record with extreme sleep mode

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Cutting the last cord could resonate with our increasingly gadget-dependent lives

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New World Record Achieved in Solar Cell Technology

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Cheaper, More Efficient Solar Cells

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Ancient diatoms lead to new technology for solar energy

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Virus battery could 'power cars'

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Virus-Assembled Batteries

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£25 fridge gadget that could slash greenhouse emissions

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Taking nature's cue for cheaper solar power

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Gadget recharges itself -- shocking!

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Scientists develop pee-powered battery

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Long Life Battery

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Putting power into battery research

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General Assembly Adopts Resolutions On Marine Protection

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Environmentalists urge action on ship ballast water

ENN, Wednesday, February 04, 2004, By Reuters

[http://www.enn.com/news/2005-02-04/s\\_12753.asp](http://www.enn.com/news/2005-02-04/s_12753.asp) (Article stored for a limited time on ENN web site)

**1296 Ratification began for the International Convention for the Control and Management of Ships' Ballast Water and Sediments**

Australia Signs Treaty to Limit Hitchhikers in Ballast Water

<http://www.ens-newswire.com/ens/jun2005/2005-06-02-03.asp>

International Convention for the Control and Management of Ships' Ballast Water and Sediments adopted in 2004 [http://www.imo.org/Environment/mainframe.asp?topic\\_id=548](http://www.imo.org/Environment/mainframe.asp?topic_id=548)

**1297 The Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter entered into force on March 24, 2006**

Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter 1972 and 1996 Protocol Thereto

<http://www.londonconvention.org/>

**1298 New International Agreement on Recycling of Ships**

New international convention adopted to ensure safe and environmentally sound ship recycling

[http://www.imo.org/About/mainframe.asp?topic\\_id=1773&doc\\_id=11368](http://www.imo.org/About/mainframe.asp?topic_id=1773&doc_id=11368)

Agreement on Ship Recycling Wins Wide Support

<http://www.nytimes.com/2009/05/15/business/energy-environment/15ship.html>

**1299 EU Integrated Maritime Policy**

EC unveils new EU maritime policy

[http://www.esa.int/esaEO/SEM6DE2PL7F\\_environment\\_0.html](http://www.esa.int/esaEO/SEM6DE2PL7F_environment_0.html)

### **1300 European Directive on Ship-Source Pollution Became Effective on April 1, 2007**

New EU rules to crack down on sea pollution come into effect

<http://europa.eu/rapid/pressReleasesAction.do?reference=IP/07/442>

Europe Tightens the Screws on Vessels Polluting Ocean Waters

<http://www.ens-newswire.com/ens/mar2007/2007-03-29-05.asp>

Maritime safety, prevention of pollution caused by ships: penalties for infringements

<http://www.europarl.europa.eu/oeil/file.jsp?id=230932>

### **1301 European Parliament Passed the Marine Strategy Directive**

A Marine Strategy to save Europe's seas and oceans

[http://ec.europa.eu/environment/water/marine/index\\_en.htm](http://ec.europa.eu/environment/water/marine/index_en.htm)

Environment: Commission welcomes EP vote on the Marine Strategy Directive

<http://europa.eu/rapid/pressReleasesAction.do?reference=IP/07/1894&format=HTML&aged=0&language=EN&guiLanguage=en>

### **1302 EU Waste Shipment Legislation Came into Force in July 2007**

Environment: new EU waste shipment legislation comes into force today

<http://europa.eu/rapid/pressReleasesAction.do?reference=IP/07/1078&format=HTML&aged=0&language=EN&guiLanguage=en>

Regulation (EC) No 1013/2006 of the European Parliament and of the Council

[http://eur-lex.europa.eu/LexUriServ/site/en/oj/2006/l\\_190/l\\_19020060712en00010098.pdf](http://eur-lex.europa.eu/LexUriServ/site/en/oj/2006/l_190/l_19020060712en00010098.pdf)

Waste shipments

<http://ec.europa.eu/environment/waste/shipments/legis.htm>

### **1303 Anti-Fouling Systems on Ships Convention to Enter into Force in September 2008**

Harmful ships' paint systems to be outlawed as international convention meets entry-into-force criteria

[http://www.imo.org/Newsroom/mainframe.asp?topic\\_id=1472&doc\\_id=8473](http://www.imo.org/Newsroom/mainframe.asp?topic_id=1472&doc_id=8473)

International Convention on the Control of Harmful Anti-fouling Systems on Ships

[http://www.imo.org/Conventions/mainframe.asp?topic\\_id=529](http://www.imo.org/Conventions/mainframe.asp?topic_id=529)

### **1304 Single-hull Oil Tanker Phase-out Entered into Force**

Single-hull oil tanker phase-out - implementation of MARPOL Annex I regulations 13G and 13H [http://www.imo.org/Newsroom/mainframe.asp?topic\\_id=1052](http://www.imo.org/Newsroom/mainframe.asp?topic_id=1052)

### **1305 UN Maritime Agency to Accelerate Phase-Out Of Single-Hull Tankers**

IMO meeting adopts accelerated single-hull tanker phase-out, new regulation on carriage of heavy fuel oil

Marine Environment Protection Committee (MEPC) - 50th session: 1 and 4 December 2003

IMO Newsroom, [http://www.imo.org/Newsroom/mainframe.asp?topic\\_id=758&doc\\_id=3341](http://www.imo.org/Newsroom/mainframe.asp?topic_id=758&doc_id=3341)

### **1306 Proposals to the EU to cut sulfur emissions from ships**

Environmental News Service, February 18, 2003

**1307 Oil Spills Fines Increase—effective March 2005**

New fund heralds better deal for oil pollution victims

Supplementary Fund for Compensation for Oil Pollution Damage to enter into force

[http://www.imo.org/Newsroom/mainframe.asp?topic\\_id=848&doc\\_id=4531](http://www.imo.org/Newsroom/mainframe.asp?topic_id=848&doc_id=4531)

EU Agrees Deal on Punishing Ship Pollution

Reuters News Service, December 10, 2004

<http://www.planetark.com/dailynewsstory.cfm/newsid/28516/story.htm>

**1308 Political Agreement Reached on the European Marine Strategy Directive**

Environment: Commission welcomes Council action on REACH, climate change and marine protection

<http://europa.eu/rapid/pressReleasesAction.do?reference=IP/06/1826&type=HTML&aged=0&language=EN&guiLanguage=en>

Strategy for the marine environment

<http://europa.eu/scadplus/leg/en/lvb/l28164.htm>

A Marine Strategy to save Europe's seas and oceans

<http://ec.europa.eu/environment/water/marine.htm>

Regionalization of the EU waters

<http://www.eurocean.org/contents.php?id=392>

**1309 European Parliament Resolution to Protect Whales From Sonar**

European Parliament Calls For Halt To High Intensity Naval Sonar Use

<http://www.nrdc.org/media/pressreleases/041028a.asp>

**1310 Commercial Whaling Ban Strengthened by International Whaling Commission (IWC)**

Commercial whaling ban strengthened at Anchorage whaling meeting

<http://www.greenpeace.org/international/news/commercial-whaling-ban-strengt>

Draft Resolution CITES, IWC/59/19 Agenda Item 14.3

[http://www.iwcoffice.org/\\_documents/commission/IWC59docs/59-19.pdf](http://www.iwcoffice.org/_documents/commission/IWC59docs/59-19.pdf)

**1311 Shipwrecks Removal Treaty Received First Signature**

Estonia the first to sign UN-backed sea wreck treaty

<http://www.un.org/apps/news/story.asp?NewsID=26130&Cr=maritime&Cr1=>

New international treaty on wreck removal adopted in Nairobi

[http://www.imo.org/About/mainframe.asp?topic\\_id=1472&doc\\_id=8070](http://www.imo.org/About/mainframe.asp?topic_id=1472&doc_id=8070)

**1312 South-west Pacific Islands Might “Localize” Environment-protection Legislation**

Local taboos could save the seas

New Scientist, April 04

<http://www.newscientist.com/news/news.jsp?id=ns99994883> (article accessible for a limited time for non-subscribers)

**1313 Marine Protection to Increase**

2008 Scientific Committee report

[http://www.iwcoffice.org/sci\\_com/screport.htm](http://www.iwcoffice.org/sci_com/screport.htm)

Oxygen-starved oceans rapidly dying

<http://canberra.yourguide.com.au/news/local/news/general/oxygenstarved-oceans-rapidly-dying/796215.aspx>Ministry of the Environment, New Zealand's ocean: [http://www.mfe.govt.nz/issues/oceans/Legislation to safeguard ocean ecosystems](http://www.mfe.govt.nz/issues/oceans/Legislation%20to%20safeguard%20ocean%20ecosystems)<http://www.scoop.co.nz/stories/PA0806/S00460.htm>**1314 UN Convention on the Protection of the Underwater Cultural Heritage will Enter into Force in January 2009**

Convention on the Protection of the Underwater Cultural Heritage will enter into force in January 2009

[http://portal.unesco.org/en/ev.php-](http://portal.unesco.org/en/ev.php-URL_ID=43663&URL_DO=DO_TOPIC&URL_SECTION=201.html)[URL\\_ID=43663&URL\\_DO=DO\\_TOPIC&URL\\_SECTION=201.html](http://portal.unesco.org/en/ev.php-URL_ID=43663&URL_DO=DO_TOPIC&URL_SECTION=201.html)

Convention on the Protection of the Underwater Cultural Heritage

<http://unesdoc.unesco.org/images/0012/001260/126065e.pdf>**1315 New Marine Protected Areas Proposed**

Whale Protections Proposed for Strait of Gibraltar

<http://www.ens-newswire.com/ens/mar2007/2007-03-05-02.asp>

Urgent protection proposed for whale and dolphin habitats in the Mediterranean and Black Seas

[http://www.cetaceanhabitat.org/view\\_all\\_news.php#](http://www.cetaceanhabitat.org/view_all_news.php#)

The state of World Fisheries and Aquaculture 2006

<http://www.fao.org/docrep/009/A0699e/A0699e00.htm>

Slow Down and Watch Out for Whales, Spain Tells Ships in Strait of Gibraltar

<http://www.enn.com/today.html?id=12286>

WWF launches marine protection campaign in the Southern Ocean

[http://www.panda.org/news\\_facts/newsroom/index.cfm?uNewsID=95080](http://www.panda.org/news_facts/newsroom/index.cfm?uNewsID=95080)**1316 Roadmap for Establishing the Global System of Marine Protected Areas**

New road map for establishing marine protected area networks

[http://www.iucn.org/en/news/archive/2007/04/11\\_marine\\_protected\\_areas.htm](http://www.iucn.org/en/news/archive/2007/04/11_marine_protected_areas.htm)

Establishing Networks of Marine Protected Areas – Making It Happen

<http://www.iucn.org/themes/wcpa/biome/marine/mpanetworks/networks.html>**1317 New Pacific Marine Protected Area Is World's Largest**

Kiribati creates world's largest marine reserve

<http://uk.reuters.com/article/idUKSP23110320080214?pageNumber=3&virtualBrandChannel=0&sp=true>**1318 IMO Establishes First “Mandatory Area to be Avoided” in New Zealand**

Poor Knights Islands Shipping Ban

Clare Trevett, New Zealand Herald, 19 May 2004

<http://www.nzherald.co.nz/storydisplay.cfm?storyID=3567263&thesection=news&thesubsection>



=general

### **1319 Stronger Guidelines for UN Fish Stocks Agreement**

At UN, countries agree on guidelines to better manage the world's fish stocks

<http://www.un.org/apps/news/story.asp?NewsID=17937&Cr=fish&Cr1=>

Review Conference on the Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks

[http://www.un.org/Depts/los/convention\\_agreements/review\\_conf\\_fish\\_stocks.htm](http://www.un.org/Depts/los/convention_agreements/review_conf_fish_stocks.htm)

### **1320 IMO Establishes First “Mandatory Area to be Avoided” in New Zealand**

Poor Knights Islands Shipping Ban

Clare Trevett, New Zealand Herald, 19 May 2004

<http://www.nzherald.co.nz/storydisplay.cfm?storyID=3567263&thesection=news&thesubsection=general>

### **1321 World Database on Marine Protected Areas**

World Database on Marine Protected Areas: <http://www.wdpa-marine.org>

UNEP launches new online system to view and study the world's marine protected areas

<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=589&ArticleID=6212&l=en&t=long>

### **1322 French Create 90-mile Mediterranean Ecological Zone**

OIL SPILLS: France Steps Up Coastal Protections; UN Wire, April 8, 2003

[http://www.unfoundation.org/unwire/util/display\\_stories.asp?objid=33045](http://www.unfoundation.org/unwire/util/display_stories.asp?objid=33045)

OIL SPILLS: EU To Ban Old Tankers, Push For Global Ban; UN Wire, March 31, 2003

[http://www.unfoundation.org/unwire/util/display\\_stories.asp?objid=32905](http://www.unfoundation.org/unwire/util/display_stories.asp?objid=32905)

### **1323 Micronesian Nations Sign Coral Reef Protection Document**

Three Presidents of Micronesian Nations Sign Reef Check 'International Declaration of Reef Rights' - Pledge to Protect Coral Reefs

[http://www.enn.com/press\\_releases/2153](http://www.enn.com/press_releases/2153)

Reef Check's International Declaration of Reef Rights Receives Presidential Attention

[http://www.reefcheck.org/news/news\\_detail.php?id=252](http://www.reefcheck.org/news/news_detail.php?id=252)

### **1324 Coral Triangle May Get Regional Protection**

Asia's Coral Triangle could get protection

<http://www.msnbc.msn.com/id/27340356/>

## **Biological Diversity and Safety**

### **1326 The First Meeting of the Conference of the Parties to the Cartagena Protocol on Biosafety adopted procedures and mechanisms to implement and promote compliance with the Protocol aiming to protect biological diversity**

The First Meeting of the Parties to the Cartagena Protocol on Biosafety:

<http://www.biodiv.org/meetings/mop-01/press/default.asp>

Biosafety Protocol now operational as governments agree documentation rules for GMO trade.

Press release: <http://www.biodiv.org/doc/press/2004/pr-2004-02-27-bs-en.pdf>

Biosafety Protocol: Transgenic Shipments Must Be Identified

<http://www.ens-newswire.com/ens/feb2004/2004-02-27-03.asp> (by subscription only)

### **1327 Cartagena Protocol on Biosafety Enters Into Force**

Cartagena Protocol On Biosafety Takes Effect 11 September

<http://www.un.org/News/Press/docs/2003/envdev735.doc.htm>

Entry into force of the Cartagena Protocol on Biosafety: Convention on Biological Diversity – Press kit

UNEP Press Release 157, June 13, 2003; *Cartagena Protocol On Biosafety Enters Into Force In September*

<http://www.un.org/News/Press/docs/2003/unep157.doc.htm>

Reuters, September 24, 2002, EU Parliament Backs Right to Reject GM Organisms

### **1328 EU Commission Seeks to Increase Biotech Food Safety**

EU Commission Seeks to Increase Biotech Food Safety. Planet Ark, 19/1/2004

<http://www.planetark.com/dailynewsstory.cfm/newsid/23492/story.htm>

### **1329 Convention on Biological Diversity and the Cartagena Protocol**

Third meeting of the Conference of the Parties serving as the meeting of the Parties to the Cartagena Protocol on Biosafety <http://www.biodiv.org/doc/meeting.aspx?mtg=MOP-03>

Summary of The Third Meeting of The Parties to The Cartagena Protocol on Biosafety

<http://www.iisd.ca/vol09/enb09351e.html>

Africans missing at key biosafety talks [http://www.panos.org.uk/global/cbd2006\\_summit1.asp](http://www.panos.org.uk/global/cbd2006_summit1.asp)

Eighth Ordinary Meeting of the Conference of the Parties to the Convention on Biological Diversity <http://www.biodiv.org/doc/meeting.aspx?mtg=COP-08>

*Global Biodiversity Outlook 2* <http://www.enn.com/today.html?id=10107>

Conserving Biological Diversity Becomes a Sacred Quest

<http://www.unep.org/Documents/Multilingual/Default.asp?DocumentID=471&ArticleID=5162&l=en>

Eighth Conference of the Parties to the Convention on Biological Diversity (COP-8)

<http://www.iisd.ca/biodiv/cop8/>

### **1330 UN Convention on Biological Diversity 7th Conference of the Parties (COP 7)**

Europe Agrees on Proposals to Save Species

Planet Ark, January 22, 2004

<http://www.planetark.com/dailynewsstory.cfm/newsid/23534/story.htm>

Official documents for the COP 7 meeting: <http://www.biodiv.org/meetings/cop-07/>

The Latest News on Activities and Events at COP 7 available at COP 7 Press Room:

<http://www.biodiv.org/meetings/cop-07/press/default.asp>

### **1331 New Mechanisms for Enforcing Biosafety and Biological Diversity Treaties**

Fourth meeting of the Parties to the Cartagena Protocol on Biosafety (COP-MOP 4)

<http://www.cbd.int/mop4/>

Agreement Reached to Work towards a Legally Binding Instrument on Liability and Redress with Regard to GMOs

<http://www.cbd.int/doc/press/2008/pr-2008-05-16-mop4-en.pdf>

Rules, Procedures and Mechanisms Applicable to Processes under the Cartagena Protocol on Biosafety

<http://www.cbd.int/doc/publications/bs-rules-en.pdf>

Loss of Animal Species and Crops Is ‘Devastating’ - Secretary-General Ban

<http://www.un.org/apps/news/story.asp?NewsID=26756&Cr=biodiversity&Cr1=>

Ninth Meeting of the Conference of the Parties to the Convention on Biological Diversity

<http://www.iisd.ca/biodiv/cop9>

### **1332 International Body to Monitor Biodiversity Destruction**

Governments Give Green Light to International Body on Biodiversity

<http://ictsd.org/i/news/biores/77860/>

Summary of the third ad hoc intergovernmental and multi-stakeholder meeting on an intergovernmental science-policy platform on biodiversity and ecosystem services 7-11 June 2010

<http://www.iisd.ca/yimb/biodiv/ipbes3/html/yimbv01158num11e.html>

Integrated Solutions for Biodiversity, Climate Change and Poverty--UNEP Press Release:

<http://www.unep.org/ecosystemmanagement/Policy/UNEPOLICYSERIESBLOG/tabid/4564/language/en-US/Default.aspx>

Integrated Solutions for Biodiversity, Climate Change and Poverty--The Policy Brief

[http://www.unep.org/policyseries/Sustainable\\_intergrated\\_Solutions.pdf](http://www.unep.org/policyseries/Sustainable_intergrated_Solutions.pdf)

### **1333 Plant Genetic Resources for Food and Agriculture—FAO International Treaty—Entered into Force in June 2004**

Biodiversity for food security <http://www.fao.org/newsroom/en/news/2004/42621/index.html>

International plant genetic treaty becomes law

<http://www.fao.org/newsroom/en/news/2004/47027/index.html>

### **1334 Intensified Efforts Needed to Save Biodiversity**

International Conference “Biodiversity: Science And Governance”

<http://www.recherche.gouv.fr/biodiv2005paris/en/>

Toepfer Calls for Strong Science and Effective Governance at Paris Conference

<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=421&ArticleID=4709&l=en>

## **Protected Sites and Species**

### **1336 UNESCO Added 23 New Reserve Sites in 18 Countries**

Twenty-three new biosphere reserves join UNESCO’s Man and the Biosphere (MAB) network

<http://portal.unesco.org/en/ev.php->

[URL\\_ID=39480%26URL\\_DO=DO\\_TOPIC%26URL\\_SECTION=201.html](http://portal.unesco.org/en/ev.php-URL_ID=39480%26URL_DO=DO_TOPIC%26URL_SECTION=201.html)

**1337 New UNESCO World Heritage Sites**

Wonders Of Russia, South Africa Up For World Heritage List

The Committee will consider the inscription of 33 cultural and eight natural sites this Monday  
<http://www.ens-newswire.com/ens/jun2004/2004-06-29-04.asp> (by subscription only)

**1338 New Sites Added to World's Protected Biosphere Reserves**

New Strategy of UNESCO World Heritage Committee for Heritage Sites and Climate Change  
biosphere reserves added to UNESCO's Man and the Biosphere (MAB) Network

<http://portal.unesco.org/en/ev.php->

[URL\\_ID=35389&URL\\_DO=DO\\_TOPIC&URL\\_SECTION=201.html](http://portal.unesco.org/en/ev.php-URL_ID=35389&URL_DO=DO_TOPIC&URL_SECTION=201.html)

World Heritage Committee adopts strategy on heritage and climate change

<http://whc.unesco.org/en/news/262>

Swiss Map Permafrost After Signs Alps Crumbling

<http://www.planetark.com/dailynewsstory.cfm/newsid/37442/story.htm>

Global Warming Puts 12 US Parks at Risk – Report

<http://www.planetark.com/dailynewsstory.cfm/newsid/37391/story.htm>

**1339 Nineteen new Biosphere Reserves Added to UNESCO's MAB Network**

The MAB Programme. New Biosphere Reserves

<http://www.unesco.org/mab/news/newbr2004.htm>

18th Session of the MAB International Co-ordinating Council

<http://www.unesco.org/mab/mabicc/2004/eng/docs.htm>

**1340 New Protected Ecological Sites**

Seven New Sites Added to World Heritage List

UN Ecological Reserves Network Adds 22 New Sites

Seven Natural Wonders Inscribed on World Heritage List

<http://www.ens-newswire.com/ens/jul2005/2005-07-15-06.asp>

Twenty-three New Biosphere Reserves Added to UNESCO's Man and the Biosphere (MAB) Network

[http://portal.unesco.org/unesco/ev.php?URL\\_ID=28229&URL\\_DO=DO\\_TOPIC&URL\\_SECTION=201&reload=1120062522](http://portal.unesco.org/unesco/ev.php?URL_ID=28229&URL_DO=DO_TOPIC&URL_SECTION=201&reload=1120062522)

**1341 Nine New Hotspots Added to World's Protected Areas**

Website with all the hotspots <http://www.biodiversityhotspots.org/xp/Hotspots>

Nine more crisis areas for biodiversity. By Jessica Ebert, News@nature.Com, 2 February 2005

<http://www.nature.com/news/2005/050131/full/050131-10.html#B1> (article available free for a limited time)

**1342 First species selected to be protected under a NAFTA Commission**

Three wildlife species chosen for trilateral protection

<http://www.cec.org/news/details/index.cfm?varlan=english&ID=2600>

**1343 Europe Declares Thousands of Protected Natural Sites**

Nature protection: Commission establishes largest ever list of protected areas in the EU

<http://europa.eu.int/rapid/pressReleasesAction.do?reference=IP/04/1449&format=HTML&aged=0&language=EN&guiLanguage=en>

### **1344 UN Convention on Biological Diversity 7th Conference of the Parties (COP 7)**

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Planet Ark, January 22, 2004

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The Latest News on Activities and Events at COP 7 available at COP 7 Press Room:

<http://www.biodiv.org/meetings/cop-07/press/default.asp>

### **1345 New Ecological Network Has Environmental Implications**

NEON Design Consortium and Project Office to Coordinate Design of Ecological Observatories

[http://www.nsf.gov/news/news\\_summ.jsp?cntn\\_id=100445](http://www.nsf.gov/news/news_summ.jsp?cntn_id=100445)

### **1346 World Parks Congress Adopts Conservation Accord**

Vth IUCN World Parks Congress Sets Agenda for Next Decade, Spurs Conservation Initiatives for Africa

<http://www.iucn.org/themes/wcpa/wpc2003/pdfs/newsevents/day10/finalwpcpr170903.pdf>

Over 700 Threatened Species Not Protected – Study;

<http://www.planetark.com/dailynewsstory.cfm/newsid/22195/story.htm>

World's Protected Areas Top 100,000, Exceed Size Of India And China – UN Report; UN News Service, New York, Sep 9 2003 10:00AM

### **1347 International Year of Deserts and Desertification—2006**

2006 International Year of Deserts and Desertification

<http://www.iydd.org/>

Life Saving Anti-Drought Measures Must Include Investment in Nature

<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=467&ArticleID=5077&l=en>

INTERVIEW: Advancing deserts fuel African conflicts

<http://www.alertnet.org/thefacts/reliefresources/113804548788.htm>

In Kenya, 'Why Does This Keep Happening?'

By Emily Wax, Washington Post Foreign Service, January 8, 2006; Page A20

<http://www.washingtonpost.com/wp-dyn/content/article/2006/01/07/AR2006010701024.html>  
(subscription required)

## **Chemicals and other Hazardous Compounds**

### **1349 Montreal Protocol**

**First Extraordinary Meeting of the Parties to the Montreal Protocol Gives One Year Extension to Ban on Methyl Bromide to 11 Developed Countries**

Methyl bromide approved for temporary uses

<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=389&ArticleID=4397&l=en>

US, others delay elimination of damaging pesticide

<http://www.planetark.com/dailynewsstory.cfm/newsid/24470/story.htm>

Montreal Protocol Web site:

[http://www.unep.org/ozone/Treaties\\_and\\_Ratification/2B\\_montreal%20protocol.asp](http://www.unep.org/ozone/Treaties_and_Ratification/2B_montreal%20protocol.asp)

IISD: Extraordinary Meeting of the Parties to the Montreal Protocol

Montreal, Quebec, Canada, 24-26 March 2004

<http://www.iisd.ca/ozone/exmp/>

Earth Negotiations Bulletin

<http://www.iisd.ca/vol19/enb1934e.html>

### **1350 Ozone Continues to Thin over Antarctica Casting Doubt on Success of the Montreal Protocol**

The world we avoided

<http://www.nature.com/news/2008/080905/full/news.2008.1081.html>

Ozone hole 8% larger this year, meteorologists say

<http://www.chron.com/disp/story.mpl/headline/nation/6004433.html>

The ozone hole of 2008 is larger than in 2007

[http://www.wmo.int/pages/mediacentre/press\\_releases/pr\\_829\\_en.html](http://www.wmo.int/pages/mediacentre/press_releases/pr_829_en.html)

### **1351 Powerful Greenhouse Gas HFCs Might be banned under the Montreal Protocol**

Ozone Treaty May Hold Key to Halting Climate Change

<http://www.ipsnews.net/news.asp?idnews=48211>

### **1352 North American Proposal to Phase Down HFC's**

Recent International Developments in Saving the Ozone Layer

<http://www.epa.gov/ozone/intpol/mpagreement.html>

### **1353 Rotterdam Convention on PIC for Certain Hazardous Chemicals and Pesticides in International Trade to be Expanded**

COP 1. Documents of the Conference of the Parties at its First meeting (COP 1), Geneva, 20-24 September 2004 <http://www.pic.int/en/ViewPage.asp?id=354>

14 hazardous substances added to UN-backed treaty on pesticides

UN Press Release, September 24, 2004

<http://www.un.org/apps/news/story.asp?NewsID=12028&Cr=pesticide&Cr1=>

### **1354 Two New Pesticides Added to the Rotterdam Convention on the Prior Informed Consent (PIC) Watch List**

New Chemicals Recommended for Listing Under the Rotterdam Convention

<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=617&ArticleID=6503&l=en>

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U.N. Panel Adopts Global Classification, Labeling System

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A New Global Classification And Labelling System For Chemicals (GHS)

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Intergovernmental Forum on Chemical Safety VI: Global Partnership in Chemical Safety  
Contributing to the 2020 Goal

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Parliament on chemicals review: vote before summer?

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EU Press Release, March 31, 2003

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European Chemicals Bureau <http://ecb.jrc.it/>

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New European Chemicals Agency starts operations as REACH enters into force

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<http://europa.eu/rapid/pressReleasesAction.do?reference=IP/06/1799&format=HTML&aged=0&language=EN&guiLanguage=en>

Environment: Commission welcomes Council action on REACH, climate change and marine protection

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Japan Chemical Industry Concerned over New EU Rules

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EU law has Del. companies watching

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Nanotech Worries Push EU To Seek Full Safety Data For Carbon

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EU Member States approve world-wide rules for labelling of chemicals

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No thanks, we're European

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EU Lawmakers Ease Chemicals Rules, Fight Looms

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Towards Belgrade-2007

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Feature - Reaching Balance: Europe Weighs Health Verses Industry

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US, Others Press EU to Re-Think Chemicals Bill

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Prepare now for REACH compliance

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*Leading Cancer Specialists call for REACH Strengthening*

Reaching for Control of Carcinogenic Chemicals

ENS, May 5, 2004

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REACH: An Unprecedented European Initiative For Regulating Industrial Chemicals report by Dr. Epstein, Chairman of the Cancer Prevention Coalition

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U.S. should follow Europe and put the brakes on nanotech food and other products

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Protocol to control heavy metals to enter into force

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Environment: Commission welcomes adoption of legislation to ban EU mercury exports  
<http://europa.eu/rapid/pressReleasesAction.do?reference=IP/08/1399&format=HTML&aged=0&language=EN&guiLanguage=en>

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Ottawa's refusal to join protocol cutting mercury draws critics' fire

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Health experts call on EU to impose total ban on use of mercury

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<http://www.physorg.com/news82736827.html>

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Commission proposes to ban mercury in fever thermometers

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A group of 60 scientists backed by environmental, health

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French lawmakers ban baby bottle chemical

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Plastic bag ban

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China bans plastic shopping bags

<http://www.cbc.ca/consumer/story/2008/01/08/china-bags.html>

Retailers oppose bag ban

<http://www.stuff.co.nz/4354751a13.html>

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Plastic Bags Banned, Blamed for West India Floods

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Heavy baggage. India's urban environment

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UN adopts new International Agreement to protect world's forests

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Non-legally Binding Instrument on All Types of Forests

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Québec, Canada, September 28th, 2003

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Forests play key role against climate change, UN tells African-Near East meeting

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Sixth Session of the United Nations Forum on Forests (UNFF-6)

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International Alliance will unite the forest peoples of the world

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Forest Peoples' Rights Key To Reducing Emissions From Deforestation

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African leaders sign landmark forest treaty

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UN's Kyoto treaty against global warming comes into force

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Deadlock at climate talks mars Kyoto hopes

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Australia Cuts Sulfur Content in Transport Fuels

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**Health (pandemics)**

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World Health Assembly adopts new International Health Regulations

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Will We Be Able to Identify and Prevent the Next Pandemic Before It is Too Late?

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New Tool Launched in Fight Against Infectious Disease Outbreaks; Expanded Global System

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Europe Drafts New Law to Prevent Bird Flu Epidemics

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**Mountains**

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Mountain Region in the Heart of Europe gets Legal Protection

<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=467&ArticleID=5072&l=en>

The Convention on the protection and sustainable development of the Carpathians

<http://www.carpathianconvention.org/index.htm>

**1412 The Framework Convention on the Protection and Sustainable Development of the**



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<http://www.unece.org/env/wgso/welcome.html>

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Prospective International Agreements for Mountain Regions", by Wolfgang E. Burhenne

**Waste Management****1415 Waste Reduction and Recycling Regulations and Laws Spreading Around the World**

Draft National Waste Policy Framework - less waste more resources

<http://www.environment.gov.au/wastepolicy/consultation/index.html>

S.F. OKs toughest recycling law in U.S.

<http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2009/06/10/MN09183NV8.DTL>

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Trade and environment. Shipment of non-hazardous waste to certain non-OECD countries:

Green list waste

<http://ec.europa.eu/trade/issues/global/environment/waste.htm>

Regulation (EC) No 1418/2007

<http://trade.ec.europa.eu/doclib/html/136966.htm>

Waste exports: better protection for developing countries

<http://www.defra.gov.uk/news/2008/080111a.htm>

Improved protection on waste exports for developing countries

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New recycling law takes effect in the European Union

<http://www.physorg.com/news5795.html>

Commission Decision of 18 August 2005

amending Directive 2002/95/EC of the European Parliament and of the Council for the purpose of establishing the maximum concentration values for certain hazardous substances in electrical and electronic equipment

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New obligations for end-of-life IT equipment

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The IT Chief's Guide to WEEE

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**1419 EU New Strategy on Waste Recycling**

Thematic Strategy on the prevention and recycling of waste

<http://europa.eu.int/comm/environment/waste/strategy.htm>

EU Waste Policy – The Story behind the Strategy

[http://europa.eu.int/comm/environment/waste/pdf/story\\_book.pdf](http://europa.eu.int/comm/environment/waste/pdf/story_book.pdf) [Note: the parts of the strategy that might be of most interest: 6.6. Simplification: fine tuning to improve implementation—Box 13. Changes to the regulation structure. (Pp. 22), Box 14. How the “end of waste” criteria work. (pp. 23), and 6.6.3. The distinction between recovery and disposal—Box 15. How to distinguish between recovery and disposal (pg 24)]

**1420 EU Batteries Directive Entered into Force**

New EU legislation requiring collection and recycling of spent batteries applies from today

<http://europa.eu/rapid/pressReleasesAction.do?reference=IP/08/1411&format=HTML&aged=0&language=EN&guiLanguage=en>

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China Targets Rising Mountain of High-Tech Junk

<http://www.enn.com/today.html?id=11121>

**1422 India Further Loosens Already Lax Rules on Waste Importing**

Is India a global trash can?

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Got hazardous waste? Send it to India

<http://www.livemint.com/2010/04/25233450/Got-hazardous-waste-Send-it-t.html>

**Weapons****1424 UN Convention against Nuclear Terrorism**

General Assembly Adopts Convention On Nuclear Terrorism; Will Open For Signature At Headquarters 14 September

Also Adopts 16 Budget Committee Texts; Peacekeeping Finance, Reform of UN Justice System among Issues Addressed

<http://www.un.org/News/Press/docs/2005/ga10340.doc.htm>

New Convention Against Nuclear Terrorism Bolsters Global Framework

[http://www.iaea.org/NewsCenter/News/2005/conv\\_nuclterror.html](http://www.iaea.org/NewsCenter/News/2005/conv_nuclterror.html)

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Russia to be the first to sign nuclear terrorism convention

<http://en.rian.ru/russia/20050907/41321867.html>

Heads of State sign convention on nuclear terrorism

<http://www.un.org/apps/news/story.asp?NewsID=15807&Cr=world&Cr1=summit>

Ninety-nine nations participate in UN treaty event during 2005 World Summit

<http://www.un.org/apps/news/story.asp?NewsID=15898&Cr=world&Cr1=summit>

Nuclear Trafficking Latest Statistics Released

<http://www.iaea.org/NewsCenter/News/2005/traffickingstats.html>

### **1426 Ocean Dumping of Chemical Weapons a Continuous Threat**

Hitler's chemical weapons a seeping menace

Alister Doyle, Reuters, 23 Jan 4

### **1427 Preventing Terrorist Access to Weapons of Mass Destruction—UN resolution**

Security Council To Tackle Draft Resolution On Spread Of WMDs, President Says

New York, Apr 2 2004 5:00PM press release

Security Council Unanimously Votes To Keep WMDs Out Of Terrorist Hands

New York, Apr 28 2004 6:00PM press release

Threats From Non-State Users Of WMDs Discussed In UN Security Council

New York, Apr 22 2004 8:00PM press release)

### **1428 Sweden Initiates New Commission to Cooperate with the UN to Reduce Proliferation of Weapons of Mass Destruction**

Annan hails establishment of panel on weapons of mass destruction

UN News Center, December 16, 2003

Proliferation of 'Non-Strategic' Nuclear Weapons, New Agenda For Disarmament; Among Issues, As General Assembly Adopts 52 First Committee Texts

UN Press Release, December 8, 2003

<http://www.un.org/News/Press/docs/2003/ga10217.doc.htm>

Targeting Spread of Deadliest Arms

U.S. Proposes U.N. Resolution Curbing Transfer of Weapons

By Colum Lynch, Washington Post Staff Writer, December 17, 2003; Page A37

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Russia Lauds U.S. Resolution on Weapons

By Edith M. Lederer, The Associated Press, December 19, 2003

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UN in Dark About Looted Iraq Dirty Bomb Material

Story by Louis Charbonneau, Reuters News Service, Austria, July 17, 2003,

<http://www.planetark.com/dailynewsstory.cfm/newsid/21536/story.htm>

Implementation of the Safeguards Agreement between the Republic of Iraq and the International Atomic Energy Agency pursuant to the Treaty of Non-Proliferation of Nuclear Weapons

Report by the Director general, 14 July 2003,

**Russia signs treaty to track nuclear waste**

Russia signs treaty to track nuclear waste

<http://www.planetark.org/dailynewsstory.cfm/newsid/20906/story.htm>**1429 New European Union Law Controls Radioactive Sources**

New European Law Controls Radioactive Sources

December 24, 2003 (ENS)

<http://www.ens-newswire.com/ens/dec2003/2003-12-24-19.asp#anchor5> (by subscription only)**Tightened Nuclear Security Needed to Overcome ‘Dirty Bombs’**

IAEA Calls For Urgent Measures To Stop Terrorists From Obtaining ‘Dirty Bomb’, UN Newsletter, New York, Mar 11 2003 12:00PM

Nuclear security too poor to stop dirty bombs - UN

<http://www.planetark.org/dailynewsstory.cfm/newsid/20127/story.htm>**Commercial radioactive components recognized as “dirty bomb” hazard**Monterey Institute news release: <http://cns.miis.edu/pubs/week/030113.htm>Monterey Institute paper: <http://cns.miis.edu/pubs/opapers/op11/index.htm>Australian study: [http://www.arps.org.au/Dirty\\_Bombs.htm](http://www.arps.org.au/Dirty_Bombs.htm)**1430 OSCE document on Stockpiles of Conventional Ammunition is a politically binding international instrument that addresses risks arising from ammunition stockpiles**

OSCE document foresees action against risks of ammunition stockpiles

OSCE, December 1, 2003

[http://www.osce.org/news/show\\_news.php?ut=2&id=3734](http://www.osce.org/news/show_news.php?ut=2&id=3734)**1431 Protocol on Prohibitions or Restrictions on the Use and Transfer of MOTAPM**

Group of Experts Concludes Negotiations on a Protocol on Explosive Remnants of War

<http://www.unog.ch/news2/documents/newsen/dc0345e.htm>**1432 Protocol V on Explosive Remnants of War (ERW) of the Convention on Certain Conventional Weapons came into force on 12 November 2006**

CCW Protocol V on Explosive Remnants of War Enters into Force

[http://www.icbl.org/layout/set/print/news/ccw\\_protocl\\_v](http://www.icbl.org/layout/set/print/news/ccw_protocl_v)Protocol on Explosive Remnants of War (Protocol V to the 1980 Convention), 28 November 2003 <http://www.icrc.org/ihl.nsf/INTRO/610>Portfolio of Mine Action Projects <http://www.mineaction.org/section.asp?s=projects>

Annan hails entry into force of new pact on speedy clearance of unexploded weaponry

<http://www.un.org/apps/news/story.asp?NewsID=20588&Cr=landmine&Cr1>

The need for urgent international action on cluster munitions

<http://www.icrc.org/web/eng/siteeng0.nsf/htmlall/cluster-munition-statement-061106?opendocument>

Perils of unexploded remnants of war stressed in UN mine report

<http://www.un.org/apps/news/story.asp?NewsID=20601&Cr=mines&Cr1>

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## PROPOSED TREATIES AND/OR CHANGES TO EXISTING ONES

### Air Pollution

#### **1435 Seventh Conference Of The Parties To The Vienna Convention For The Protection Of The Ozone Layer and Seventeenth Meeting Of The Parties To The Montreal Protocol On Substances That Deplete The Ozone Layer**

Report of the Seventh Meeting of the Conference of the Parties to the Vienna Convention for the Protection of the Ozone Layer and the Seventeenth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer

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Summary Of The Seventh Conference Of The Parties To The Vienna Convention For The Protection Of The Ozone Layer And Seventeenth Meeting Of The Parties To The Montreal Protocol On Substances That Deplete The Ozone Layer: 12-16 December 2005

<http://www.iisd.ca/vol19/enb1947e.html>LINE

With ozone layer as fragile as ever, governments agree sharp cuts in methyl bromide plus \$470 million package for phasing out harmful chemicals (Press release)

[http://hq.unep.org/ozone/Public\\_Information/press\\_releases/cop7mop17\\_press\\_release161205.e.pdf](http://hq.unep.org/ozone/Public_Information/press_releases/cop7mop17_press_release161205.e.pdf)

Montreal Protocol Web site

[http://www.unep.org/ozone/Treaties\\_and\\_Ratification/2B\\_montreal%20protocol.asp](http://www.unep.org/ozone/Treaties_and_Ratification/2B_montreal%20protocol.asp)

#### **1436 Call for Expanding Montreal Protocol on Ozone-Depleting Substances**

Secretary-General lauds push to hasten phase-out of ozone-depleting compounds

<http://www.un.org/apps/news/story.asp?NewsID=23939&Cr=climate&Cr1=change>

Ozone Treaty's Role in Combating Climate Change Tops Environment Ministers Meeting in Canada

<http://www.ec.gc.ca/default.asp?lang=En&xml=AB3B558A-48EF-4E3B-83FA-BDAA2B7D76AF>

Greenhouse gases could aggravate ozone loss and slow recovery, UN agency says

<http://www.un.org/apps/news/story.asp?NewsID=23827&Cr=ozone&Cr1=>

UN-backed conference ends with push to protect ozone, combat climate change

<http://www.un.org/apps/news/story.asp?NewsID=23918&Cr=climate&Cr1=change>

Ozone Day- 16 September [http://ozone.unep.org/Events/ozone\\_day\\_2007/index.shtml](http://ozone.unep.org/Events/ozone_day_2007/index.shtml)

#### **1437 EU Thematic Strategy on Air Pollution for the CAFE Programme**

Commission proposes clean air strategy to protect human health and the environment

<http://europa.eu.int/rapid/pressReleasesAction.do?reference=IP/05/1170&format=HTML&aged=0&language=EN&guiLanguage=en>

The CAFE Programme. Implementation of the Thematic Strategy on Air Pollution

<http://europa.eu.int/comm/environment/air/cafe/>

Environment 2010: Our Future, Our Choice. The Sixth Environment Action Programme of the

European Community

<http://europa.eu.int/comm/environment/newprg/index.htm>

### **1438 Vehicle Emissions in Europe**

All-Terrain Pollution

Julio Godoy, Interpress News Service Agency, 16 July 2004

<http://www.ipsnews.net/interna.asp?idnews=24664>

### **1439 European Commission Proposed Binding Legislation for Vehicle Emissions Cuts**

Commission proposal to limit the CO<sub>2</sub> emissions from cars to help fight climate change, reduce fuel costs and increase European competitiveness

<http://europa.eu/rapid/pressReleasesAction.do?reference=IP/07/1965&format=HTML&aged=0&language=EN&guiLanguage=en>

EU unveils controversial plans to make cars greener

<http://euobserver.com/9/25367/?rk=1>

The European car industry. Collision course

[http://www.economist.com/business/displaystory.cfm?story\\_id=10329196](http://www.economist.com/business/displaystory.cfm?story_id=10329196)

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Cleaner Trucks and Buses to Roll across Europe

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Air Pollution Goes Global

<http://www.ipsnews.net/news.asp?idnews=33482>

Convention on Long-range Transboundary Air Pollution

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ICJ Set to Hear Argentina-Uruguay Pulp Mills Case

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### **1441 Clean Air for Europe Initiative to Limit Air Pollution**

Questions and Answers on new EU limits for air pollution

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Gallon Newsletter (By e-mail)

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The Ozone Hole <http://www.theozonehole.com/montreal.htm>

NASA and NOAA Announce Ozone Hole is a Double Record Breaker

[http://www.nasa.gov/vision/earth/environment/ozone\\_resource\\_page.html](http://www.nasa.gov/vision/earth/environment/ozone_resource_page.html)

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Factbox - UK Response to Stern Review on Climate Change

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<http://www.planetark.com/dailynewsstory.cfm/newsid/38709/story.htm>  
Australia to Push for "New Kyoto" in Asia  
<http://www.planetark.com/dailynewsstory.cfm/newsid/38807/story.htm>  
Australia plans world's largest carbon storage system  
<http://www.terradaily.com/2006/061123072009.p1jncbk1.html>

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#### **1444 A New Step Toward Preventing Water Wars**

International Law Commission Adopts Draft Articles of a Transboundary Aquifers Convention  
<http://www.asil.org/insights/2008/08/insights080827.html>  
International Law Commission sixtieth session; summary of the session  
<http://untreaty.un.org/ilc/sessions/60/60sess.htm#summary>  
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[http://www.panda.org/news\\_facts/newsroom/press\\_releases/index.cfm?uNewsID=143643](http://www.panda.org/news_facts/newsroom/press_releases/index.cfm?uNewsID=143643)  
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<http://www.worldwaterweek.org/press/index.asp>  
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#### **1445 Draft Agreement for Management of International Aquifers**

UNESCO publishes first world map of underground transboundary aquifers  
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#### **1447 Could large-scale ocean zoning prevent conflicts?**

Zoning Rules to Protect Marine Resources  
by Daniel Hendrick  
<http://www.emagazine.com/view/?2300> (by subscription only)

#### **1448 Increased Protection Needed for the Marine Environment**

East Asia's economy could suffer if seas are not protected, says UN report  
<http://www.un.org/apps/news/story.asp?NewsID=33829&Cr=unep&Cr1>  
Oceans' acidity rate is soaring, claims study  
<http://www.independent.co.uk/environment/nature/oceans-acidity-rate-is-soaring-claims-study-1899536.html>  
World's coral reefs could disintegrate by 2100  
<http://www.guardian.co.uk/environment/2010/feb/23/worlds-coral-reefs-disintegrate-2100>

**1449 Proliferation of Sensors in and on Oceans Requires an International Legal Framework, but Might Affect Freedom to Conduct Ocean Research**

Climate Change and Guidelines for Argo Profiling Float Deployment on the High Seas

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NOAA chief says new ocean uses creating conflicts

<http://www.physorg.com/news167373736.html>

Scientists Map West Coast Areas Most Affected by Humans

<http://www.ia.ucsb.edu/pa/display.aspx?pkey=2009>

**1451 Factors to Consider in Establishing and Operating Marine Protected Areas**

Placement of marine reserves is key. Focusing on the heaviest-fished areas can help meet conservation goals

[http://www.sciencenews.org/view/generic/id/56511/title/Placement\\_of\\_marine\\_reserves\\_is\\_key](http://www.sciencenews.org/view/generic/id/56511/title/Placement_of_marine_reserves_is_key)

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Integrated Water Management Key to Cleaning-up Oceans

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<http://www.gpa.unep.org/bin/php/home/index.php>

*The State of the Marine Environment: Trends and Processes*

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Further Rise in Number of Marine 'Dead Zones'

<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=486&ArticleID=5393&l=en>

Curbing Coastal Pollution Aids Recovery of Heat-Stressed Corals

<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=486&ArticleID=5392&l=en>

**1453 Marine Biodiversity Protection Regulations Need Improvement**

17 Governments Ask Japanese to Stop Antarctic Whaling

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Whaling Protest: Greenpeace Knocked Overboard, Sea Shepherd Out of Fuel

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Whaling Battle Heats Up the Icy Southern Ocean

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UN Law Of Sea Tribunal Extends Deadline In Case Of Chile v. European Community  
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#### **1454 Tougher Law of the Sea Regulations Suggested for Marine Genetic Resources**

United Nations Open-ended Informal Consultative Process on Oceans and the Law of the Sea  
[http://www.un.org/Depts/los/consultative\\_process/consultative\\_process.htm](http://www.un.org/Depts/los/consultative_process/consultative_process.htm)  
 States Reach Partial Agreement on Marine Genetic Resources at UN Talks  
<http://www.newsletterarchive.org/2007/06/30/180929-STATES+REACH+PARTIAL+AGREEMENT+ON+MARINE+GENETIC+RESOURCES+AT+UN+TALKS>  
 Countries Address Marine Genetic Resources at UN Talks  
<http://www.un.org/apps/news/story.asp?NewsID=23037&Cr=Law&Cr1=Sea>  
 Uncertainty Hindering Management of Marine Genetic Resources, UN Meeting Told  
<http://www.un.org/apps/news/story.asp?NewsID=23072&Cr=law&Cr1=sea>

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Shipping must act on air emissions  
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<http://uk.reuters.com/article/environmentNews/idUKL0754092020070907>  
 World Maritime Day 2007. IMO's response to current environmental challenges. A message from the Secretary-General of the International Maritime Organization, Mr. Efthimios E. Mitropoulos  
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 EPA Hauled into Court over Ship Smokestack Pollution  
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#### **1456 Concerns over Maritime Air Pollution Increase**

BLG Sub-Committee agrees technical proposals for reduction of air pollution from ships  
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<http://www.planet2025news.net/ntext.rxml?id=6196&photo=>  
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[http://www.charleston.net/news/2008/feb/23/pollution\\_from\\_ships\\_big\\_worry31612/](http://www.charleston.net/news/2008/feb/23/pollution_from_ships_big_worry31612/)  
 True scale of CO<sub>2</sub> emissions from shipping revealed  
<http://www.guardian.co.uk/environment/2008/feb/13/climatechange.pollution>  
 Shipping boom fuels rising tide of global CO2 emissions  
<http://www.guardian.co.uk/environment/2008/feb/13/climatechange.pollution1?gusrc=rss&feed=uknews>  
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US and Canada Request IMO Create Emissions Control Area Around Coastlines

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**1458 EPA Plan for Reducing Ship Emissions**

EPA Cracks Down on Ship Emissions

<http://www.thegreenitreview.com/2009/07/epa-cracks-down-on-ship-emissions.html>

Regulators cracking down on ship emissions

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U.S. Commission on Ocean Policy Emphasizes Ecosystem-Based Management

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Forum V; Chemical Safety for Sustainable Development

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Health and environmental concerns associated with heavy metals; global needs for further action?

[http://www.who.int/ifcs/documents/forums/forum5/side\\_events/en/index.html](http://www.who.int/ifcs/documents/forums/forum5/side_events/en/index.html)**1509 First Simultaneous ExCOPs for Improving MEAs' Synergies and Coordination**

Simultaneous Extraordinary Meetings of the Conferences of the Parties to the Basel, Rotterdam

and Stockholm Conventions

<http://excops.unep.ch/>

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UN launches global campaign to strengthen synergies in chemicals and waste management

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[http://unfccc.int/meetings/intersessional/awg-lca\\_1\\_and\\_awg-kp\\_5/items/4288.php](http://unfccc.int/meetings/intersessional/awg-lca_1_and_awg-kp_5/items/4288.php)

Europe for aviation, shipping cuts

<http://howrah.org/World/8720.html>

**1589 Conferences, Reports**

Vienna Climate Change Talks 2007. AWG4 and the Dialogue 4

<http://www.iisd.ca/climate/awg4/> (This site might be slow in opening, owing to many graphics.)

Kyoto Protocol Parties move closer to trading emission allowances

[http://unfccc.int/files/press/news\\_room/press\\_releases\\_and\\_advisories/application/pdf/070830\\_press\\_rel\\_itl.pdf](http://unfccc.int/files/press/news_room/press_releases_and_advisories/application/pdf/070830_press_rel_itl.pdf)

Countries agree on need of global response at UN climate change conference

<http://www.un.org/apps/news/story.asp?NewsID=23671&Cr=climate&Cr1=>

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BURKINA FASO: Innovation and education needed to head off water war

<http://www.irinnews.org/Report.aspx?ReportId=74308>

Environment: Parliaments Said to be "Weak" in Fighting Desertification

<http://www.ipsnews.net/africa/nota.asp?idnews=39242>

The eighth Conference of the Parties to the United Nations Convention to Combat Desertification (UNCCD COP8) kicked off on Monday in Madrid and will conclude on 14 September.

<http://allafrica.com/stories/200709040686.html>

Annan's aid forum tackles natural disasters

[http://www.swissinfo.org/eng/front/detail/Annan\\_s\\_aid\\_forum\\_tackles\\_natural\\_disasters.html?siteSect=105&sid=8225163&cKey=1190040507000&ty=st](http://www.swissinfo.org/eng/front/detail/Annan_s_aid_forum_tackles_natural_disasters.html?siteSect=105&sid=8225163&cKey=1190040507000&ty=st)

Climate change tops future humanitarian challenges: Annan

[http://afp.google.com/article/ALeqM5jcSVcpxl\\_Gb8aL1rNmai6Xh63\\_w](http://afp.google.com/article/ALeqM5jcSVcpxl_Gb8aL1rNmai6Xh63_w)

Annan's humanitarian forum to start work in October

<http://www.iht.com/articles/ap/2007/09/17/europe/EU-GEN-Switzerland-Annans-Forum.php>

Climate change affecting Pakistan's environment: Faisal Saleh

[http://www.dailytimes.com.pk/default.asp?page=2007%5C09%5C26%5Cstory\\_26-9-2007\\_pg7\\_45](http://www.dailytimes.com.pk/default.asp?page=2007%5C09%5C26%5Cstory_26-9-2007_pg7_45)

**1591 Conferences, Reports**

Environment ministers target 2009 climate treaty

<http://www.alertnet.org/thenews/newsdesk/JAK103022.htm>

Contributions to accelerating atmospheric CO<sub>2</sub> growth from economic activity, carbon intensity, and efficiency of natural sinks

<http://www.globalcarbonproject.org/activities/AcceleratingAtmosphericCO2.htm>

A clog in the world's carbon dioxide 'sinks'

<http://www.theglobeandmail.com/servlet/story/RTGAM.20071023.wclimate23/BNStory/Science/home>

Carbon sinks failing to keep up with emissions. mongabay.com, October 22, 2007

<http://news.mongabay.com/2007/1022-carbon.html>

The President announces that the Maldives was going to open a resident diplomatic mission in Singapore shortly

[http://www.maldivesinfo.gov.mv/info/include/news.php?id\\_news=854](http://www.maldivesinfo.gov.mv/info/include/news.php?id_news=854)

### **1592 Conferences, Reports**

The President grants an interview to BBC Radio's World Today programme, on the human dimension of global climate change

[http://www.presidencymaldives.gov.mv/pages/eng\\_news.php?news:4419:1](http://www.presidencymaldives.gov.mv/pages/eng_news.php?news:4419:1)

Radio Interview with Maldives President, Maumoon Abdul Gayoom:

<http://www.presidencymaldives.gov.mv/videos/20071114-01-128kbps.wma> (Windows Media Player)

Climate change conference opens in Maldives

[http://news.xinhuanet.com/english/2007-11/14/content\\_7068743.htm](http://news.xinhuanet.com/english/2007-11/14/content_7068743.htm)

President Gayoom calls on the international community to grant universal recognition to the fact that environmental protection, preservation and security are part of an individual's basic human rights.

[http://www.presidencymaldives.gov.mv/pages/eng\\_news.php?news:4417:1](http://www.presidencymaldives.gov.mv/pages/eng_news.php?news:4417:1)

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*Delivering Climate Security: International Security Responses to a Climate Changed World*

<http://www.informaworld.com/smpp/title~content=g792406239~db=mass>

Climate change 'may put world at war'

<http://www.telegraph.co.uk/earth/main.jhtml?xml=/earth/2008/04/23/eacclimate123.xml>

### **1594 UN Climate Change Conference with 5,900 Explores Post-Kyoto Regulations**

Summary of the Twelfth Conference of The Parties To The UN Framework Convention On Climate Change and Second Meeting of The Parties To The Kyoto Protocol

<http://www.iisd.ca/vol12/enb12318e.html>

United Nations Climate Change Conference - Nairobi 2006

[http://unfccc.int/meetings/cop\\_12/items/3754.php](http://unfccc.int/meetings/cop_12/items/3754.php)

### **1595 Moves Forward on the Post-Kyoto Negotiations**

Environment: Commission welcomes Council action on REACH, climate change and marine protection

<http://europa.eu/rapid/pressReleasesAction.do?reference=IP/06/1826&type=HTML&aged=0&language=EN&guiLanguage=en>

Secretary-General Welcomes G-8 Agreement on 'Strong and Early Action' To Combat Climate Change

<http://www.un.org/News/Press/docs//2007/sgsm11029.doc.htm>

Australia's Howard Plans Asia-Pacific Kyoto Successor

<http://www.planetark.com/dailynewsstory.cfm/newsid/42494/story.htm>

Denmark seeks global climate deal in 2009

<http://euobserver.com/877/24147/?rk=1>

Climate Change ‘Defining Issue of Our Era,’ Says Ban Ki-Moon, Hailing G8 Action

<http://www.un.org/apps/news/story.asp?NewsID=22836&Cr=&Cr1=>

Struggling to save the planet. *The Economist*, May 31st 2007

[http://www.economist.com/world/international/displaystory.cfm?story\\_id=9261663](http://www.economist.com/world/international/displaystory.cfm?story_id=9261663)

Call For “Disaster Diplomacy” as Millions Are Affected

<http://www.worldwatch.org/node/5127>

### **1596 Possible Tougher Policies Concerning Climate Change**

Dangerous climate change is hitting Africa hard say top aid and environment groups

<http://www.neweconomics.org/gen/africaupinsmoke.aspx>

Africa—Up in Smoke 2. The second report on Africa and global warming from the Working Group on Climate Change and Development

[http://www.neweconomics.org/gen/z\\_sys\\_PublicationDetail.aspx?pid=232](http://www.neweconomics.org/gen/z_sys_PublicationDetail.aspx?pid=232)

Merkel to Target Climate Change as G8, EU Leader

<http://www.dw-world.de/dw/article/0,2144,2188336,00.html>

### **1597 G20 climate summit advocates “clean technologies” Rather than targets to tackle climate change**

G20 climate summit pushes technology not targets

<http://www.scidev.net/News/index.cfm?fuseaction=readNews&itemid=2454&language=1>

Global Warming Appears to Double Rate of Sea Level Rise

<http://www.ens-newswire.com/ens/nov2005/2005-11-25-09.asp#anchor1>

United Nations Climate Change Conference (COP 11 and COP/MOP 1)

[http://unfccc.int/meetings/cop\\_11/items/3394.php](http://unfccc.int/meetings/cop_11/items/3394.php)

### **1598 Post-Kyoto Strategies**

Bonn Talks To Promote Progress On Climate Change Convention

<http://www.un.org/News/Press/docs/2005/envdev849.doc.htm>

Post-2012 climate talks stalled at UN conference

<http://www.euractiv.com/Article?tcaturi=tcm:29-139557-16&type=News>

Greenhouse Gas Trade Growing Sharply - World Bank

<http://www.planetark.com/dailynewsstory.cfm/newsid/30772/story.htm>

EU Ministers Want Tough Post-Kyoto Emissions Target

<http://www.planetark.com/dailynewsstory.cfm/newsid/29895/story.htm>

EU Leaders Drop 2050 Emissions Reduction Target

<http://www.planetark.com/dailynewsstory.cfm/newsid/30074/story.htm>

In larger freedom: towards development, security and human rights for all

Report of the Secretary-General

<http://www.un.org/largerfreedom/contents.htm>

EU Environment Ministers Limit Most Destructive Climate Gases

<http://www.ens-newswire.com/ens/oct2004/2004-10-14-03.asp>

### **1599 Second European Climate Change Program and post-Kyoto Negotiations**

Stavros Dimas, Member of the European Commission, Responsible for Environment



Developing the European Climate Change Programme, Stakeholder conference launching the Second European Climate Change Programme, Brussels, 24 October 2005  
<http://europa.eu.int/rapid/pressReleasesAction.do?reference=SPEECH/05/635&format=HTML&aged=0&language=EN&guiLanguage=en>  
 EU Must do More to Fight Climate Change—Dimas  
<http://www.planetark.com/dailynewsstory.cfm/newsid/33141/story.htm>

### **1600 G8 Environmental Results Are Limited to Post-2012 Concerns**

More than hot air. The G8 summit made quiet progress on climate change  
*The Economist*, Science & Technology, Global warming. Jul 14th 2005  
[http://www.economist.com/research/articlesBySubject/displayStory.cfm?amp;emailauth=%2527%25290%253A04%255COOV1%25254%250A&fsrc=nwl&subjectid=348924&story\\_id=4174286&login=Y](http://www.economist.com/research/articlesBySubject/displayStory.cfm?amp;emailauth=%2527%25290%253A04%255COOV1%25254%250A&fsrc=nwl&subjectid=348924&story_id=4174286&login=Y) (by subscription only)  
 Investment in Forests, Rivers and Wetlands Will Pay Dividends, UN Environment Chief Tells G8 Leaders  
[http://www.enn.com/aff\\_PF.html?id=739](http://www.enn.com/aff_PF.html?id=739)  
 G8 Climate Plan Of Action Delivers Little Change  
<http://www.ens-newswire.com/ens/jul2005/2005-07-08-02.asp>

### **1601 Montreal Conference on Climate Change Reached New Agreements**

United Nations Climate Change Conference (COP 11 and COP/MOP 1)  
[http://unfccc.int/meetings/cop\\_11/items/3394.php](http://unfccc.int/meetings/cop_11/items/3394.php)  
 Summary Of The Eleventh Conference Of The Parties To The UN Framework Convention On Climate Change And First Conference Of The Parties Serving As The Meeting Of The Parties To The Kyoto Protocol: 28 November – 10 December 2005 (The report begins on the third page of this source at the heading “REPORT OF COP 11 AND COP/MOP 1”)  
<http://www.iisd.ca/vol12/enb12291e.html>  
 UN conference agrees on future steps to tackle climate change  
<http://www.un.org/apps/news/story.asp?NewsID=16889&Cr=climate&Cr1=change>  
 Climate change: successful conclusion of UN Conference in Montreal - statement by Environment Commissioner Stavros Dimas  
<http://europa.eu.int/rapid/pressReleasesAction.do?reference=MEMO/05/473&format=HTML&aged=0&language=EN&guiLanguage=en>

### **1602 UN Meeting Fails to Agree on Post-Kyoto Strategy**

Bonn Talks To Promote Progress On Climate Change Convention  
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 Post-2012 climate talks stalled at UN conference  
<http://www.euractiv.com/Article?tcaturi=tcm:29-139557-16&type=News>  
 Greenhouse Gas Trade Growing Sharply - World Bank  
<http://www.planetark.com/dailynewsstory.cfm/newsid/30772/story.htm>

### **1603 Regulations Might be Needed for New Greenhouse Gases**

New Greenhouse Gas Identified  
[http://www.terraily.com/reports/New\\_Greenhouse\\_Gas\\_Identified\\_999.html](http://www.terraily.com/reports/New_Greenhouse_Gas_Identified_999.html)

New greenhouse gas identified. Early detection may permit 'nipping it in the bud'

<http://web.mit.edu/newsoffice/2009/prinn-greenhouse-tt0311.html>

US wants to move on climate change

[http://www.bostonherald.com/news/us\\_politics/view/2009\\_04\\_29\\_US\\_wants\\_to\\_move\\_on\\_climate\\_change](http://www.bostonherald.com/news/us_politics/view/2009_04_29_US_wants_to_move_on_climate_change)

New greenhouse gases targeted by UN talks

[http://www.spacedaily.com/reports/New\\_greenhouse\\_gases\\_targeted\\_by\\_UN\\_talks\\_999.html](http://www.spacedaily.com/reports/New_greenhouse_gases_targeted_by_UN_talks_999.html)

#### **1604 Reducing GHG Emissions Using the Montreal Protocol and other Regulatory Systems**

Reducing abrupt climate change risk using the Montreal Protocol and other regulatory actions to complement cuts in CO<sub>2</sub> emissions

<http://www.pnas.org/content/early/2009/10/19/0902568106.full.pdf+html>

Climate scientists suggest revisiting the 1987 Montreal Protocol

<http://www.canada.com/technology/Climate%20scientists%20suggest%20revisiting%201987%20Montreal%20Protocol/2103810/story.html>

Ozone protocol squares up to climate

<http://www.nature.com/news/2009/091028/full/4611184a.html>

#### **1605 New Decisions Adopted for Strengthening the Montreal Protocol**

Documents of the 21st Meeting of the Parties to the Montreal Protocol, 4-8 November, 2009

[http://ozone.unep.org/Meeting\\_Documents/mop/21mop/index.shtml](http://ozone.unep.org/Meeting_Documents/mop/21mop/index.shtml)

Twenty-first meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer

<http://www.iisd.ca/ozone/mop21/>

#### **1606 Powerful Greenhouse Gas HFCs Might be banned under the Montreal Protocol**

Ozone Treaty May Hold Key to Halting Climate Change

<http://www.ipsnews.net/news.asp?idnews=48211>

#### **1607 North American Proposal to Phase Down HFC's**

Recent International Developments in Saving the Ozone Layer

<http://www.epa.gov/ozone/intpol/mpagreement.html>

#### **1608 Aviation and Shipping should be Subject to Emissions Cuts**

Aviation and shipping cannot trade away emissions, scientist warns

<http://www.guardian.co.uk/environment/2008/sep/24/carbonemissions.emissionstrading>

EU Lawmaker Demands Shipping Included in CO<sub>2</sub> Caps

<http://www.planetark.com/dailynewsstory.cfm/newsid/50188/story.htm>

EU Lawmaker Warns CO<sub>2</sub> Caps in Danger, Eyes Shipping

<http://www.planetark.com/dailynewsstory.cfm/newsid/50185/story.htm>

Ports gear up for Clean Trucks Program

[http://www.dailybreeze.com/ci\\_10580651](http://www.dailybreeze.com/ci_10580651)

**1609 Aviation to be included in the EU Emissions Trading System from 2012**

Aviation to be included in the European Trading System from 2012 as MEPs adopt legislation

[http://www.europarl.europa.eu/news/expert/infopress\\_page/064-33577-189-07-28-911-20080707IPR33572-07-07-2008-2008-false/default\\_en.htm](http://www.europarl.europa.eu/news/expert/infopress_page/064-33577-189-07-28-911-20080707IPR33572-07-07-2008-2008-false/default_en.htm)

Aviation industry attacks EU emissions plan that effects airlines worldwide

<http://euobserver.com/9/26511>

**1610 EU Advances the Inclusion of Airlines into the Emissions Trading System to 2010**

MEPs back cuts in air travel CO2 emissions

<http://euobserver.com/9/25134/?rk=1>

EU body adopts strict rules for airline emissions

<http://www.reuters.com/article/governmentFilingsNews/idUSL1365000020071113>

**1611 EU Advances the Inclusion of Airlines into the Emissions Trading System to 2010**

Europe stands firm on ambitious action to cut Aviation Emissions

<http://europa.eu/rapid/pressReleasesAction.do?reference=IP/07/1420&format=HTML&aged=0&language=EN&guiLanguage=en>

Written statement of reservation on behalf of the member states of the European Community (EC) and the other states members of the European Civil Aviation (ECAC) [made at the 36th Assembly of the International Civil Aviation Organization in Montreal, 18-28 September 2007]

<http://europa.eu/rapid/pressReleasesAction.do?reference=MEMO/07/391&format=HTML&aged=0&language=EN&guiLanguage=fr>

Lawmakers say airline emissions have to be cut

<http://www.neurope.eu/articles/78405.php>

MEPs vote to tighten emission limits on aircraft

<http://www.euractiv.com/en/transport/meps-vote-tighten-emission-limits-aircraft/article-167332>

**1612 Europe to Begin Penalizing Jet Pollution in 2011**

Climate change: Commission proposes bringing air transport into EU Emissions Trading Scheme

<http://europa.eu/rapid/pressReleasesAction.do?reference=IP/06/1862&format=HTML&aged=0&language=EN>

Europe Acts to Penalize Jet Pollution

<http://www.nytimes.com/2006/12/21/business/worldbusiness>

**1613 Europe to Propose Emissions Targets for All Flights To/From or Within Europe**

EU wants cap on airline emissions as of 2011

<http://www.euractiv.com/en/environment/article-159741>

EU takes aim at airline emissions

<http://iht.com/articles/2006/11/14/business/emit.php>

**1614 Europe Considers Aviation Policies to Reduce Greenhouse Gases**

EU Parliament Wants Aviation Tax, Emissions Trade

<http://www.planetark.com/dailynewsstory.cfm/newsid/37117/story.htm>

WTTC reacts to EU aviation tax debate

<http://www.breakingtravelnews.com/article/2006071407510441>

### **1615 EC Proposed Strategy to Curb Greenhouse Gas Emissions from Air Travel**

Climate change: Commission proposes strategy to curb greenhouse gas emissions from air travel

<http://europa.eu.int/rapid/pressReleasesAction.do?reference=IP/05/1192&format=HTML&aged=0&language=EN&guiLanguage=en>

### **1616 Airline Group Supports Including Aviation in Global Emissions Trading Scheme**

Airline group backs global emissions trading scheme

<http://uk.reuters.com/article/governmentFilingsNews/idUKSP41096120090406>

### **1617 Draft International Standards for Measuring Greenhouse Gas Emissions for Cities**

Cities Get Common Standard for Measuring Greenhouse Gas Emissions

<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=617&ArticleID=6508&l=en&t=long>

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[http://www.unep.org/urban\\_environment/PDFs/InternationalStd-GHG.pdf](http://www.unep.org/urban_environment/PDFs/InternationalStd-GHG.pdf)

UN-HABITAT Annual Report

<http://www.unhabitat.org/pmss/listItemDetails.aspx?publicationID=2938>

Executive Order 13514—Federal Leadership in Environmental, Energy, and Economic Performance

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Report of the Secretary-General

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<http://www.ens-newswire.com/ens/oct2004/2004-10-14-03.asp>

### **1619 National and Regional Initiatives**

Japan Considers Emissions Cap And Trade System

<http://www.planetark.com/dailynewsstory.cfm/newsid/47080/story.htm>

Secretary-General says environment ministers can offer ‘new generation of solutions’ in message to Monte Carlo global forum

<http://www.un.org/News/Press/docs/2008/sgsm11434.doc.htm>

### **1620 National and Regional Initiatives**

G8 Environment Ministers Agree on 2050 Climate Goal

<http://www.ens-newswire.com/ens/may2008/2008-05-27-04.asp>

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[http://unfccc.int/meetings/intersessional/awg-lca\\_1\\_and\\_awg-kp\\_5/items/4288.php](http://unfccc.int/meetings/intersessional/awg-lca_1_and_awg-kp_5/items/4288.php)

Latest Round of UN Climate Talks to Start Next Week

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Global climate talks in Bangkok to set stage for future pact

<http://www.terraily.com/2007/080328025105.qidheipz.html>

Growth in China's CO2 Emissions Double Previous Estimates

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Climate change action delayed by decade's debate

<http://business.smh.com.au/climate-change-action-delayed-by-decades-debate/20080312-1yux.html>

### **1622 National And Regional Initiatives**

Australia 2020 <http://www.australia2020.gov.au/>

Australia 2020 Summit a powerful symbol: editorial

<http://www.news.com.au/couriermail/story/0,23739,23575926-13360,00.html>

Governors Call for Federal-State Climate Change Partnership

<http://www.ens-newswire.com/ens/apr2008/2008-04-18-01.asp>

Do global warming pledges matter?

<http://www.terraily.com/2007/080403023938.mw16xxva.html>

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<http://www.state.gov/g/oes/climate/c16054.htm>

Charter for the Asia-Pacific Partnership on Clean Development and Climate

<http://www.state.gov/g/oes/rls/or/2006/59162.htm>

Communiqué for the Asia-Pacific Partnership on Clean Development and Climate

<http://www.state.gov/g/oes/rls/or/2006/59158.htm>

World's Big Polluters Fund Cleaner Fossil Fuels

<http://www.planetark.org/dailynewsstory.cfm/newsid/34475/story.htm>

Why NZ wasn't at the Climate Change Conference

<http://www.scoop.co.nz/stories/SC0601/S00013.htm>

### **1624 U.S., Australia, and Asia-Pacific Countries Coalition for Clean Development**

Australia Joins New Asia-Pacific, Partnership On Clean Development And Climate

[http://www.pm.gov.au/news/media\\_Releases/media\\_Release1482.html](http://www.pm.gov.au/news/media_Releases/media_Release1482.html)

Asia-Pacific Countries Join U.S., Australia to Control Climate

<http://www.ens-newswire.com/ens/jul2005/2005-07-28-04.asp>

### **1625 New Zealand Adopts Carbon Trading Scheme in 2009**

Climate Change (Emissions Trading and Renewable Preference) Bill

[http://www.parliament.nz/en-NZ/PB/Legislation/Bills/c/0/4/00DBHOH\\_BILL8368\\_1-Climate-Change-Emissions-Trading-and-Renewable.htm](http://www.parliament.nz/en-NZ/PB/Legislation/Bills/c/0/4/00DBHOH_BILL8368_1-Climate-Change-Emissions-Trading-and-Renewable.htm)

New Zealand Parliament Passes Carbon Trading Scheme

<http://www.planetark.com/dailynewsstory.cfm/newsid/50193/story.htm>

### **1626 EU Potential New Measures For Reducing CO<sub>2</sub> Emissions**

EU mulls carbon tax to fight climate change

<http://english.cctv.com/20091003/102119.shtml>

Commission unveils van CO<sub>2</sub> emissions standards proposal

<http://euobserver.com/9/28904/?rk=1>

Europe Suggests Emissions Limits on Small Trucks

[http://www.nytimes.com/2009/10/29/business/energy-environment/29vans.html?\\_r=1](http://www.nytimes.com/2009/10/29/business/energy-environment/29vans.html?_r=1)

### **1627 France Proposes Carbon Tax Across EU and on Imports**

Paris wants pan-European carbon tax

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The Coming Battles Over Green Trade - by Mac Margolis

<http://www.eu-digest.com/2010/01/coming-battles-over-green-trade-by-mac.html>

France to tax big polluters under revised scheme

<http://www.reuters.com/article/idUSTRE60J4FA20100120>

### **1628 British Group Outlines Plan for Zero Emissions by 2030**

ZeroCarbonBritain2030

<http://www.zcb2030.org/>

Zero carbon Britain: how to get there in 10 steps

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### **1629 China and U.S. Announce Climate Change Goals**

China announces carbon reduction targets

<http://english.cctv.com/program/bizchina/20091126/104112.shtml>

President to Attend Copenhagen Climate Talks

<http://www.whitehouse.gov/the-press-office/president-attend-copenhagen-climate-talks>

Big Developing Countries Form Climate Change Front

<http://planetark.org/wen/55688>

### **1630 China Adopting Pollution Tax Systems**

China Mulls Green Tax to Curb Pollution – Report

<http://www.planetark.com/dailynewsstory.cfm/newsid/50226/story.htm>

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Speakers Regret Conference’s Inability to Adopt a Programme of Work for Seven Years;

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Deadly toxic waste dumping in Côte d'Ivoire clearly a crime – UN environmental agency

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Smuggling Europe's Waste to Poorer Countries

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Commission welcomes EP vote on revision of waste directive

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Council Conclusions. Green Paper on the management of bio-waste in the European Union

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EU biowaste directive moves a step closer

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New Commission strategy aims to get even more from bio-waste

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New Commission strategy aims to get even more from bio-waste

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COP7 (25 – 29 October 2004)

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Governments seek to avoid radioactive catastrophe in Central Asia

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Basel Convention website <http://www.basel.int/>

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Commission welcomes EP vote on revision of waste directive

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Prevention and recycling of waste: EU ministers confirm life-cycle approach

EurActiv, 18 May 04

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Rocket Fuel in our Food

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EarthVision Environmental News, June 2, 2003

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Flushing Unused, Outdated Medications 'Mixed Concern' Says Kansas State Professor

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<http://www.yomiuri.co.jp/dy/national/20080424TDY02307.htm>

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Chemical weapons still causing concern

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Biodefense Research Could Violate Weapons Conventions, Report Warns

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National Strategy for Countering Biological Threats

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Custom-Built Pathogens Raise Bioterror Fears

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From Adjacency To Synergy: Meeting of States Parties to Biological Weapons Convention Concludes

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Enforcement Needed for BWC, Russian General Says

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Biodefense Research Could Violate Weapons Conventions, Report Warns

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Recommendations for the Biological Weapons Convention and other International Mechanisms to Prevent Terrorists from Getting Pathogens (at the International Symposium on Securing High Consequence Pathogens and Toxins, Sandia National Laboratories)  
<http://www.sandia.gov/news-center/news-releases/2004/all/biosci-workshop.html>

**International Convention on Cluster Munitions**

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Dublin Diplomatic Conference, May 19-30, 2008  
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<http://www.icrc.org/Web/Eng/siteeng0.nsf/html/cluster-munitions-news-290508>

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Negotiations Continue for an International Instrument to Ban Cluster Munitions  
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<http://jurist.law.pitt.edu/paperchase/2007/03/belgium-criminalizes-investment-in.php>  
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Strong Landmark African Declaration to Ban Cluster Bombs - Only South Africa Calls for Exceptions to the Ban

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**IMPROVED ENFORCEMENT OF ENVIRONMENTAL REGULATIONS**

**1719 Likelihood of Climate Lawsuits Increasing**

Science paves way for climate lawsuits

<http://www.guardian.co.uk/environment/2008/dec/09/oil-business-climate-change-flooding>  
Beyond Adaptation

[http://www.wwf.org.uk/research\\_centre/index.cfm?uNewsID=2505](http://www.wwf.org.uk/research_centre/index.cfm?uNewsID=2505)

New U.N. pact may be needed for climate victims: WWF

<http://www.alertnet.org/thenews/newsdesk/L3148346.htm>

**1720 First Simultaneous ExCOPs for Improving MEAs' Synergies and Coordination**

Simultaneous Extraordinary Meetings of the Conferences of the Parties to the Basel, Rotterdam and Stockholm Conventions

<http://excops.unep.ch/>

Basel Convention National reporting

<http://www.basel.int/natreporting/index.html> (direct link to the Guidance Document on

Improving National Reporting by Parties to the Basel Convention:

<http://www.basel.int/natreporting/GuidFinal-22102009.doc>)

**1721 First Joint Meeting of the Main Conventions on Hazardous Chemicals to Improve International Environmental Governance**

UN launches global campaign to strengthen synergies in chemicals and waste management

<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=612&ArticleID=6466&l=en&t=long>

Simultaneous Extraordinary Meeting of the Conferences of the Parties to the Basel, Rotterdam, and Stockholm Conventions (ExCOPs), and Eleventh Special Session of the UN Environment Programme (UNEP) Governing Council/ Global Ministerial Environment Forum (GCSS-



11/GMEF) <http://www.iisd.ca/unepegc/unepps11/>

### **1722 New UN-linked Body Proposed to Protect Biodiversity and Ecosystem Services**

Ad hoc Intergovernmental and Multi-Stakeholder Meeting on an Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services

<http://ipbes.net/en/index.aspx>

Summary of the Ad Hoc Intergovernmental and Multi-Stakeholder Meeting on an Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services

<http://www.iisd.ca/ymb/ipbes/html/yymbvol158num1e.html>

How Best to Put 'Nature-Based Assets' at the Top of the International Political Agenda Focus of Malaysia Meeting

<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=550&ArticleID=5972&l=en>

### **1723 UK Could Seize Planes to Enforce European Emissions Trading Scheme**

Airlines that break emission rules could have planes seized

<http://www.guardian.co.uk/business/2009/mar/04/carbon-emissions-airlines-climate-change>

### **1724 Central Asian Nations to Create Regulatory Frameworks for Reducing Nuclear and Toxic Waste Threat**

Governments seek to avoid radioactive catastrophe in Central Asia

<http://content.undp.org/go/newsroom/2009/june/governments-seek-to-avoid-radioactive-catastrophe-in-central-asia.en>

Central Asian Nations Seek to Reduce "Dirty Bomb" Threat

[http://gsn.nti.org/gsn/nw\\_20090630\\_8549.php](http://gsn.nti.org/gsn/nw_20090630_8549.php)

### **1725 Assessment of Toxicity Testing for Environmental Agents**

*Toxicity Testing for Assessment of Environmental Agents: Interim Report (2006)*

<http://darwin.nap.edu/books/0309100925/html>

### **1726 Software Toolkit for Control of Hazardous Chemicals**

Secretariat of the Basel Convention <http://www.basel.int/>

Launch of a PCB Inventory and Management Decision Supportive Tool

[http://www.basel.int/press/PCB\\_Toolkit.doc](http://www.basel.int/press/PCB_Toolkit.doc)

### **1727 EU to Introduce New Environmental Index**

Environment: Measuring progress in a changing world

<http://europa.eu/rapid/pressReleasesAction.do?reference=IP/09/1286>

Brussels wants wider measure of well-being than mere GDP

<http://news.my.msn.com/business/article.aspx?cp-documentid=3559371>

**1728 European Commission Creates New Directorate-General for Climate Action**

Commission creates two new Directorates-General for Energy and Climate Action

<http://europa.eu/rapid/pressReleasesAction.do?reference=IP/10/164&format=HTML&aged=0&language=EN&guiLanguage=en>

**1729 Calendar with Environmental Deadlines Compliance**

New Calendar Ends Hunt for Environmental Deadlines

<http://www.emediawire.com/releases/2007/9/emw553751.htm>

Compliance Calendar 2008 [http://www.ercweb.com/docs/compliance\\_calendar.pdf](http://www.ercweb.com/docs/compliance_calendar.pdf)

**1730 Inter-Linkages**

UNU Inter-Linkages Initiative

<http://www.unu.edu/inter-linkages/documents.htm>

**1731 UNU to discuss global integration of environmental assessments**GLEAM Forum <http://www.unu.edu/env/GLEAM/>**1732 Improving Environmental Governance, UNU Reports**

Experts weigh need to overhaul environmental governance system as world ecosystems worsen

United Nations University, 2 June 2004

[http://www.eurekalert.org/pub\\_releases/2004-06/unu-ewn060204.php](http://www.eurekalert.org/pub_releases/2004-06/unu-ewn060204.php)

Emerging Forces in Environmental Governance

Edited by: Norichika Kanie and Peter M. Haas

<http://www.unu.edu/unupress/new/ab-EmergingForces1095.html>

Reforming International Environmental Governance: From Institutional Limits to Innovative Reforms. Edited by W. Bradnee Chambers and Jessica F. Green. UN University, May 2005

<http://www.unu.edu/unupress/2005/reforming-ieg.html>

**1733 International Conference on Environmental Compliance and Enforcement**

INECE Conference Program with interactive feature of draft results available by clicking on the

relevant section <http://inece.org/conference/7/program.html> and conference proceedings at:

<http://www.inece.org/conference/7/vol1/index.html>

Marrakech Statement (Co-Chair and Executive Planning Committee Final Conference Statement) <http://www.inece.org/conference/7/statement.html>

**1734 Improving Effectiveness of Multilateral Environmental Agreements**

Envisioning the Next Steps for MEA Compliance and Enforcement

[http://www.unep.org/dec/support/mdg\\_meeting\\_col.htm](http://www.unep.org/dec/support/mdg_meeting_col.htm)

MEA Enforcement and Compliance Meeting Bulletin

<http://www.iisd.ca/yimb/unepmea/yimbvol121num1e.html>

**1735 Environmental Performance Index to Help Improve Policymaking**

Pilot 2006 Environmental Performance Index

<http://www.yale.edu/epi/>

**1736 First International Research Center for “Creeping” Environmental Issues**

Chinese centre to study 'creeping' environment issues

<http://www.scidev.net/News/index.cfm?fuseaction=readNews&itemid=2128&language=1>

**1737 East African Projects to Fight Environmental Crime and Link Journalists**

Stakeholders Meeting and Launch of ISS-EAPCCO Environmental Crime Project

[http://www.issafrica.org/index.php?link\\_id=6299&link\\_type=12&tmpl\\_id=3](http://www.issafrica.org/index.php?link_id=6299&link_type=12&tmpl_id=3)

Launch of the Environmental Crime Project in Eastern Africa

<http://www.necjogha.org/node/86>

NECJOGHA

<http://www.necjogha.org>

**1738 Conviction in Transborder Electromagnetic Pollution Case**

Cardinal Convicted in Environmental Case

By Frances D'emilio, May 9, 2005 6:01 PM

<http://www.guardian.co.uk/worldlatest/story/0,1280,-4993374,00.html>

**1739 Developing countries' compliance with environmental regulations is expected to improve via new modes of international assistance**

Judges Ad Hoc Meeting For The Development Of A Plan Of Work As A Follow-Up To The Global Judges Symposium Relating To Capacity Building Of Judges, Prosecutors, And Other Legal Stakeholders, Nairobi, Kenya - 30-31 January 2003,

<http://www.unep.org/dpdl/symposium/>

**1740 IAEA to Improve Nuclear Security in 35 Countries**

Nuclear Security in Africa Gets €7 Million Boost

<http://www.iaea.org/NewsCenter/News/2007/nuclsecafrica.html>

**1741 IAEA Nuclear Terror Prevention Guide**

IAEA Publishes Advisory Guide to Address Nuclear Terror Threat

<http://www.iaea.org/NewsCenter/News/2008/guideterrorthreat.html>

**1742 Comprehensive Test Ban Treaty Organization to be Restructured**

Report Of The Twenty-Second Session Of The Preparatory Commission For The Comprehensive Nuclear-Test-Ban Treaty Organization

<http://www.ctbto.org/bin/DeliverDoc?cmd=DisplayPDFFile&docid=1029>

Twenty-Second Session of the Preparatory Commission concludes

Press Release, Vienna, Austria, 30 June 2004 <http://www.ctbto.org>

Changes Anticipated At Test Ban Treaty Organization

U.N. Wire, Thursday, July 22, 2004, By David Ruppe

[http://www.unwire.org/News/328\\_426\\_26084.asp](http://www.unwire.org/News/328_426_26084.asp)

**1743 The UN Security Council Increased its Role in Preventing Terrorist Access to Weapons of Mass Destruction**

Security Council To Tackle Draft Resolution On Spread Of WMDs, President Says

New York, Apr 2 2004 5:00PM press release  
Security Council Unanimously Votes To Keep WMDs Out Of Terrorist Hands  
New York, Apr 28 2004 6:00PM press release  
Threats From Non-State Users Of WMDs Discussed In UN Security Council  
New York, Apr 22 2004 8:00PM press release

#### **1744 Problems with Destruction of Chemical Weapons and Potential Proliferation**

Chemical Weapons' Convention Deadline of 2012 for Destruction of Remaining Chemical Weapons Stockpiles 'Enormous Challenge', First Committee Told  
<http://www.un.org/News/Press/docs/2007/gadis3348.doc.htm>  
1-2 November: A global convention to ban chemical weapons  
<http://www.cefic.be/Templates/shwNewsFull.asp?HID=1&NSID=662&P=1&NID=1>  
EU Presidency Statement - United Nations 1st Committee: Other Weapons of Mass Destruction  
[http://www.europa-eu-un.org/articles/en/article\\_7424\\_en.htm](http://www.europa-eu-un.org/articles/en/article_7424_en.htm)

#### **1745 Progress in the Elimination of Chemical Weapons Stockpiles**

Thirteenth Session of the Conference of the States Parties  
<http://www.opcw.org/documents-reports/conference-of-the-states-parties/thirteenth-session/>  
Ban calls for continued efforts to eliminate scourge of chemical weapons  
<http://www.un.org/apps/news/story.asp?NewsID=29166&Cr=disarmament&Cr1=chemical+weapon>  
U.N. Chief Promotes Chemical Disarmament  
[http://www.globalsecuritynewswire.org/gsn/nw\\_20081203\\_7682.php](http://www.globalsecuritynewswire.org/gsn/nw_20081203_7682.php)

#### **1746 PrepCom to Set Agenda for the BWC Review Conference**

At UN, parties to Biological Weapons Convention plan to review effectiveness  
<http://www.un.org/apps/news/story.asp?NewsID=18286&Cr=biological&Cr1=weapon>  
Biological Weapons Convention Meeting To Prepare For 2006 Comprehensive Review  
[http://www.unog.ch/unog/website/news\\_media.nsf/%28httpNewsByYear\\_en%29/4C9CAE0B7A909C4FC125715A002FDB60?OpenDocument](http://www.unog.ch/unog/website/news_media.nsf/%28httpNewsByYear_en%29/4C9CAE0B7A909C4FC125715A002FDB60?OpenDocument)

#### **1747 The Meeting of Experts to Strengthen a Global Ban on Biological Weapons**

Experts meet at UN headquarters in Geneva to strengthen biological arms ban  
<http://www.europaworld.org/week141/expertmeet22803.htm>  
<http://www.globalsecurity.org/wmd/library/news/un/un-030819-unnews01.htm>

#### **Strengthen a global ban on Biological Weapons**

States seek to salvage global ban on germ weapons  
<http://www.planetark.org/avantgo/dailynewsstory.cfm?newsid=18561>  
Press Release of Fifth Review Conference of the BWC

**Strengthening the Biological and Toxin Weapons Convention (BTWC) Return to Geneva: A Comprehensive List of Measures. Review Conference Paper No 7;** Series Editors: Graham  
Return to Geneva: A Comprehensive List of Measures. Editors: Graham S Pearson and Malcolm R Dando, [http://www.brad.ac.uk/acad/sbtwc/briefing/RCP\\_7.pdf](http://www.brad.ac.uk/acad/sbtwc/briefing/RCP_7.pdf)

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Bradford Project on Strengthening the BTWC and Preventing Biological Warfare

<http://www.brad.ac.uk/acad/sbtwc/home.htm>

SIPRI Chemical and Biological Warfare Project: <http://projects.sipri.se/cbw/cbw-mainpage.html>

**1748 Recommendation for a Biosecurity Watchdog**

*Globalization, Biosecurity, and the Future of the Life Sciences* (prepublication copy)

<http://newton.nap.edu/books/0309100321/html>

Working together against bioterror

[http://www.utoronto.ca/jcb/home/news\\_bioterror.htm](http://www.utoronto.ca/jcb/home/news_bioterror.htm)

Talks to Prepare for BWC Negotiations Conclude

[http://www.nti.org/d\\_newswire/issues/2006\\_2\\_15.html#809EF5F4](http://www.nti.org/d_newswire/issues/2006_2_15.html#809EF5F4)

**1749 Codes of Conduct for Scientists to Strengthen the Biological Weapons Convention**

States Parties To Biological Weapons Convention Conclude Meeting After Discussing Scientific Codes Of Conduct. UN News, 9 December 2005

[http://www.unog.ch/unog/website/news\\_media.nsf/\(httpNewsByYear\\_en\)/3BBAC5D174CFA3EFC12570D1005C756C?OpenDocument](http://www.unog.ch/unog/website/news_media.nsf/(httpNewsByYear_en)/3BBAC5D174CFA3EFC12570D1005C756C?OpenDocument)

**1750 Sixth Review Conference of the Biological Weapons Convention**

BWC Review Conference Hailed as Success

[http://www.nti.org/d\\_newswire/issues/2006\\_12\\_11.html#60E54D1D](http://www.nti.org/d_newswire/issues/2006_12_11.html#60E54D1D)

Draft Declaration

[http://www.unog.ch/80256EDD006B8954/\(httpAssets\)/1CEE7A27069559C5C125723E00647FBF/\\$file/BWC+CONF.VI+CRP.4-altered+as+ammended.pdf](http://www.unog.ch/80256EDD006B8954/(httpAssets)/1CEE7A27069559C5C125723E00647FBF/$file/BWC+CONF.VI+CRP.4-altered+as+ammended.pdf)

Biological and Toxin Weapons Convention (BTWC) website <http://www.opbw.org/>

**1751 Overview of Explosive Remnants of War Protocol**

Arms Control Today September 2004. Contending With Explosive Remnants of War  
Ambassador Chris C. Sanders

[http://www.armscontrol.org/act/2004\\_09/Sanders.asp](http://www.armscontrol.org/act/2004_09/Sanders.asp)

**1752 Improved Cooperation Among International Organizations to Fight Marine Pollution**

Basel Convention on Hazardous Wastes and UNEP Regional Seas Programme to fight coastal pollution together

<http://www.basel.int/press/presrel010305.doc>

Secretary-General Mitropoulos and EC Commissioner Dimas focus on marine pollution issues at a productive meeting

[http://www.imo.org/Newsroom/mainframe.asp?topic\\_id=1018&doc\\_id=4775](http://www.imo.org/Newsroom/mainframe.asp?topic_id=1018&doc_id=4775)

**1753 Global Map of Human Impacts to Marine Ecosystems**

A Global Map of Human Impact on Marine Ecosystems, *Science*, 15 February 2008

<http://www.sciencemag.org/cgi/content/abstract/319/5865/948> (abstract)

A Global Map of Human Impacts to Marine Ecosystems

<http://www.nceas.ucsb.edu/GlobalMarine>

**1754 New Measure to Enforce Maritime Environmental Protection**

IMO environment Committee makes progress. MEPC – 60th session: 22-26 March, 2010

[http://www.imo.org/Newsroom/mainframe.asp?topic\\_id=1859&doc\\_id=12724](http://www.imo.org/Newsroom/mainframe.asp?topic_id=1859&doc_id=12724)

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UK sets up Chagos Islands marine reserve

<http://news.bbc.co.uk/2/hi/science/nature/8599125.stm>

Ministers Launch Rejuvenated Nairobi Convention to Protect the Western Indian Ocean's Environment

<http://www.unep.org/environmentalgovernance/News/Press-Release/tabid/427/language/en-US/Default.aspx?DocumentID=620&ArticleID=6521&Lang=en>**1756 Observation and Information System for the World's Oceans to be Created**

'Assessment of Assessments' (of the oceans)

[http://www.unga-regular-process.org/index.php?option=com\\_content&task=view&id=18&Itemid=20](http://www.unga-regular-process.org/index.php?option=com_content&task=view&id=18&Itemid=20)

OceanObs'09 Conference

<http://www.oceanobs09.net/>

Ocean Observatories Initiative Receives Award

<http://www.oceanleadership.org/2009/ocean-observatories-initiative-receives-award/>**1757 Water Footprint Measuring System**

World's Water Needs Grow More Urgent

<http://www.ens-newswire.com/ens/mar2008/2008-03-17-01.asp>

Experts Seek Answers on Water Footprint

<http://www.washingtonpost.com/wp-dyn/content/article/2008/03/27/AR2008032702567.html>Waterfootprint <http://www.waterfootprint.org>

Water Trade—A Virtual Reality? UNESCO-IHE symposium

<http://legacy.citg.tudelft.nl/wmg/dispuut/symposium/index.html>**1758 New Air Quality Evaluation Tool**

New Tool For Study Of Air Quality Developed

<http://www.sciencedaily.com/releases/2009/03/090311085406.htm>

The evaluation of the air quality impact of an incinerator by using MM5-CMAQ-EMIMO modeling system: North of Spain case study (abstract)

[http://www.sciencedirect.com/science?\\_ob=ArticleURL&\\_udi=B6V7X-4SBYYGS-1&\\_user=10&\\_rdoc=1&\\_fmt=&\\_orig=search&\\_sort=d&view=c&\\_acct=C000050221&\\_version=1&\\_urlVersion=0&\\_userid=10&md5=7cd8a3dfb80125e265f078e654526891](http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V7X-4SBYYGS-1&_user=10&_rdoc=1&_fmt=&_orig=search&_sort=d&view=c&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=7cd8a3dfb80125e265f078e654526891)**1759 World Bank Development Indicators Database Available Free**WDI <http://data.worldbank.org/>

**1760 Compliance Body Set Up for Kyoto Protocol**

Groundbreaking Kyoto Protocol Compliance system launched

[http://unfccc.int/files/press/news\\_room/press\\_releases\\_and\\_advisories/application/pdf/20060303\\_compliance\\_committee\\_1st\\_meeting.pdf](http://unfccc.int/files/press/news_room/press_releases_and_advisories/application/pdf/20060303_compliance_committee_1st_meeting.pdf)

Economic Implications of the Kyoto Protocol

<http://europa.eu.int/comm/environment/integration/newsalert/pdf/14na4.pdf>

**1761 Lawsuits over Failure to Meet Kyoto Commitments**

Canada faces lawsuit over failure to meet Kyoto commitment

<http://www.terraily.com/2006/061031230116.bm84p217.html>

**1762 Global Warming Goes to Court**

Marsden B - A Bad Idea

<http://www.greenpeace.org.nz/campaigns/climate/MarsdenB.asp>

Update: Massachusetts v. EPA

[http://www.treehugger.com/files/2006/10/massachusetts\\_v\\_epa.php](http://www.treehugger.com/files/2006/10/massachusetts_v_epa.php)

Global Warming: Here Come The Lawyers

[http://www.businessweek.com/magazine/content/06\\_44/b4007044.htm](http://www.businessweek.com/magazine/content/06_44/b4007044.htm)

Climate Security: Risks and Opportunities for the Global Economy

[http://www.cfr.org/publication/11511/climate\\_security.html](http://www.cfr.org/publication/11511/climate_security.html)

**1763 Global Division of Financial Responsibility for Global Warming Impacts**

Rich must pay bulk of climate change bill: Oxfam

<http://www.reuters.com/article/topNews/idUSL2835543520070529>

**1764 EU Not On Track Meeting Kyoto Requirements**

UK study warns on Kyoto targets

Business Day, December 28, 2005

<http://www.businessday.co.za/articles/world.aspx?ID=BD4A131870>

**1765 Meeting of OECD Environment Ministers calls for more ambitious policies to meet the environmental targets**

European ECO-Forum News Digest, April 27, 2004 (email newsletter)

Meeting of the OECD Environment Policy Committee at Ministerial Level (Paris, 20-21 April 2004)

Implementation Of The OECD Environmental Strategy For The First Decade Of The 21st Century [http://www.oecd.org/site/0,2865,en\\_21571361\\_27379763\\_1\\_1\\_1\\_1\\_1,00.html](http://www.oecd.org/site/0,2865,en_21571361_27379763_1_1_1_1_1,00.html)

**1766 New Mechanisms for Enforcing Biosafety and Biological Diversity Treaties**

Fourth meeting of the Parties to the Cartagena Protocol on Biosafety (COP-MOP 4)

<http://www.cbd.int/mop4/>

Agreement Reached to Work towards a Legally Binding Instrument on Liability and Redress with Regard to GMOs

<http://www.cbd.int/doc/press/2008/pr-2008-05-16-mop4-en.pdf>

Rules, Procedures and Mechanisms Applicable to Processes under the Cartagena Protocol on Biosafety  
<http://www.cbd.int/doc/publications/bs-rules-en.pdf>

Loss of Animal Species and Crops Is ‘Devastating’ - Secretary-General Ban

<http://www.un.org/apps/news/story.asp?NewsID=26756&Cr=biodiversity&Cr1=>

Ninth Meeting of the Conference of the Parties to the Convention on Biological Diversity

<http://www.iisd.ca/biodiv/cop9>

### **1767 European Environmental Liability Directive Came Into Force**

Environment: Liability Directive ensures polluters pay

<http://europa.eu/rapid/pressReleasesAction.do?reference=IP/07/581&format=HTML&aged=0&language=EN&guiLanguage=en>

Environmental liability – Directive

<http://europa.eu/scadplus/leg/en/lvb/l28120.htm>

Directive 2004/35/CE of the European Parliament and of the Council

<http://eur->

[lex.europa.eu/smartapi/cgi/sga\\_doc?smartapi!celexplus!prod!DocNumber&lg=en&type\\_doc=Directive&an\\_doc=2004&nu\\_doc=35](http://lex.europa.eu/smartapi/cgi/sga_doc?smartapi!celexplus!prod!DocNumber&lg=en&type_doc=Directive&an_doc=2004&nu_doc=35)

### **1768 Environmental Damage to Be Criminalized in the EU**

Protection of the environment through criminal law

[http://www.consilium.europa.eu/uedocs/cms\\_Data/docs/pressdata/en/misc/100525.pdf](http://www.consilium.europa.eu/uedocs/cms_Data/docs/pressdata/en/misc/100525.pdf)

EU criminal law to protect the environment

[http://www.europarl.europa.eu/news/expert/infopress\\_page/064-29450-140-05-21-911-20080520IPR29449-19-05-2008-2008-false/default\\_en.htm](http://www.europarl.europa.eu/news/expert/infopress_page/064-29450-140-05-21-911-20080520IPR29449-19-05-2008-2008-false/default_en.htm)

EU agrees to outlaw 'green' crimes

<http://www.wbcsd.org/plugins/DocSearch/details.asp?type=DocDet&ObjectId=MzAxNTU>

### **1769 Environmental Crime Could Become a Felony in the EU**

Brussels seeks powers to put polluters in jail

<http://euobserver.com/9/23436/?rk=1>

EU may make harming environment a crime

[http://www.montereyherald.com/mld/montereyherald/news/breaking\\_news/16665802.htm](http://www.montereyherald.com/mld/montereyherald/news/breaking_news/16665802.htm)

Brussels in push for 'green crime' laws

[http://www.ft.com/cms/s/a5f881c0-b622-11db-9eea-0000779e2340,dwp\\_uuid=70662e7c-3027-11da-ba9f-00000e2511c8.html](http://www.ft.com/cms/s/a5f881c0-b622-11db-9eea-0000779e2340,dwp_uuid=70662e7c-3027-11da-ba9f-00000e2511c8.html)

### **1770 EC Enforces Compliance with EU Environmental Regulations**

Commission takes nine member states to Court over environmental liability

<http://europa.eu/rapid/pressReleasesAction.do?reference=IP/08/1025&format=HTML&aged=0&language=EN&guiLanguage=en>

### **1771 EC Legislation Reform First Targets Environment-related Rules**

Better regulation continued: Commission wants to simplify over 1,400 legal acts

<http://europa.eu.int/rapid/pressReleasesAction.do?reference=IP/05/1343&format=HTML&aged=0&language=EN&guiLanguage=en>



**1772 European Commission Enforces Environmental Pollution Legislation**

The European Community Has The Power To Require The Member States To Lay Down Criminal Penalties For The Purpose Of Protecting The Environment

<http://curia.eu.int/en/actu/communiqués/cp05/aff/cp050075en.pdf>

Better Regulation

<http://europa.eu.int/rapid/pressReleasesAction.do?reference=MEMO/05/340&format=HTML&aged=0&language=EN&guiLanguage=en>

**1773 EU Starts Legal Action Against Member States on Breaches of Environmental Law**

takes legal action over 11 breaches of environmental law (IP/05/1303)

<http://europa.eu.int/rapid/pressReleasesAction.do?reference=IP/05/1303&format=HTML&aged=0&language=EN&guiLanguage=en>

Water policy: Commission takes legal action against Italy, Spain and Greece over key directive (IP/05/1302)

<http://europa.eu.int/rapid/pressReleasesAction.do?reference=IP/05/1302&format=HTML&aged=0&language=EN&guiLanguage=en>

**1774 EU to Increase Environmental Regulations Enforcement**

Preparation Environment Council, 23 October 2006

<http://europa.eu/rapid/pressReleasesAction.do?reference=MEMO/06/389&format=HTML&aged=0&language=EN&guiLanguage=en>

**1775 EC Enforces Compliance of National Legislation with EU Environmental Regulations**

Ireland: Commission to bring environmental impact assessment case to the European Court of Justice

<http://europa.eu/rapid/pressReleasesAction.do?reference=IP/07/1524&format=HTML&aged=0&language=EN&guiLanguage=en>

United Kingdom: Commission takes legal action for non-compliance with Court decisions

<http://europa.eu/rapid/pressReleasesAction.do?reference=IP/07/1531&format=HTML&aged=0&language=EN&guiLanguage=en>

Waste water treatment: Commission gives Luxembourg final warning, seeks clarifications from Belgium

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ISBN 1-885350-09-0 Available from the Monterey Institute in California [publicaffairs@miis.edu](mailto:publicaffairs@miis.edu)

Phone: (831) 647-3545 or Fax: (831) 647-3585

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Institute of Nanotechnology Nano Masters Course Directory

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USPTO Poised to Ring in a New Era of Simplified Search and Better Visibility for Nano Patents

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ISO Nanotechnologies TC 229 Meets in London

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NIOSH To Form Field Research Team for Partnerships in Studying, Assessing Nanotechnology Processes

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**Managing the Effects of Nanotechnology**

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Nanoparticles from sunscreens damage microbes

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News Release: Foresight Nanotech Institute Launches Nanotechnology Roadmap

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<http://www.safenano.org/REFNANOSHFeature.aspx>

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Materials; an Interim Document for Public Comment

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SAFENANO - The UK's premier site for information on Nanotechnology health and safety

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European Commission adopts Code of Conduct for Responsible Nanosciences and Nanotechnologies Research

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European Commission gives grant to investigate transatlantic oversight of nanotechnology

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Federal Toxics Disclosure Law Could Help Inform Public Of Nanotechnology Risks

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What about explosivity and flammability of nanopowders?

<http://www.nanosafe.org/node/910>

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Project on Emerging Nanotechnologies – Risk Research Inventory Update Analysis

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Europe Spends Nearly Twice as Much as U.S. on Nanotech Risk Research

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Carbon nanotubes that look like asbestos, behave like asbestos

<http://www.physorg.com/news130510729.html>

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EPA Petitioned to Stop Sale of 260 Products Containing Nano-Silver

<http://www.ens-newswire.com/ens/may2008/2008-05-02-093.asp>

### **2128 Nanotechnology Risk Assessment**

Commission launches public dialogue on nanotechnologies

[http://cordis.europa.eu/fetch?CALLER=EN\\_NEWS&ACTION=D&SESSION=&RCN=29561](http://cordis.europa.eu/fetch?CALLER=EN_NEWS&ACTION=D&SESSION=&RCN=29561)

Commission starts public dialogue on nanotechnologies – tapping economic and environmental potential through safe products

<http://europa.eu/rapid/pressReleasesAction.do?reference=IP/08/947&format=HTML&aged=0&language=EN&guiLanguage=en>

Nanotechnology Homepage of the European Commission <http://cordis.europa.eu/nanotechnology/>

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Perturbational profiling of nanomaterial biologic activity (abstract; full text by subscription only)

<http://www.pnas.org/cgi/content/abstract/105/21/7387>

Testing the Toxicity of Nanomaterials. A fast screening method could help separate the good from the bad

<http://www.technologyreview.com/Nanotech/20861/>

### **2130 Nanotechnology Risk Assessment**

Assuring the Safety of Nanomaterials in Food Packaging. The Regulatory Process and Key Issues

[http://www.nanotechproject.org/publications/archive/nano\\_food\\_packaging/](http://www.nanotechproject.org/publications/archive/nano_food_packaging/)

Use of nanomaterials in food packaging poses regulatory challenges

[http://www.enn.com/top\\_stories/article/37487/print](http://www.enn.com/top_stories/article/37487/print)

### **2131 Nanoscience and Nanotechnologies: Opportunities and Uncertainties**

*Nanoscience and Nanotechnologies: Opportunities and Uncertainties* report text

<http://www.nanotec.org.uk/finalReport.htm>

pdf of the main report (3,511 KB) or a hard copy of either the main or summary reports can be ordered via email [nano@royalsoc.ac.uk](mailto:nano@royalsoc.ac.uk) or phone at +44 (0)20 74512585.

### **2132 Studies on Potential Environmental and Health Impacts of Nanotechnology**

Nanoscience and Nanotechnologies: Opportunities and Uncertainties report text

<http://www.nanotec.org.uk/finalReport.htm>

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NIOSH: [www.cdc.gov/niosh](http://www.cdc.gov/niosh)

OSHA: [www.osha.gov](http://www.osha.gov)

National Nanotechnology Initiative: [www.nano.gov](http://www.nano.gov)

Risks from military uses of nanotech [www.ep3.ruhr-uni-bochum.de/bvp/RiskMilNT\\_Lecce.pdf](http://www.ep3.ruhr-uni-bochum.de/bvp/RiskMilNT_Lecce.pdf)

Air Pollution Linked to Genetic Mutations

Lauran Neergaard, Associated Press, 14 May 04

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Air Pollution Causes Genetic Mutations

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Roundtable on Environmental Health Sciences, Research and Medicine.

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New research raises questions about buckyballs and the environment

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C60 in Water: Nanocrystal Formation and Microbial Response

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Book Review: Eco-Friendly And Nano Smart, In Theory

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NIOSH: [www.cdc.gov/niosh](http://www.cdc.gov/niosh)

OSHA: [www.osha.gov](http://www.osha.gov)

National Nanotechnology Initiative: [www.nano.gov](http://www.nano.gov)

Risks from military uses of nanotech [www.ep3.ruhr-uni-bochum.de/bvp/RiskMilNT\\_Lecce.pdf](http://www.ep3.ruhr-uni-bochum.de/bvp/RiskMilNT_Lecce.pdf)

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Book Review: Eco-Friendly And Nano Smart, In Theory

By Candace Stuart, Small Times Editor-in-Chief

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Air Pollution Causes Genetic Mutations

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Study links TiO<sub>2</sub> nanoparticles with potential for brain-cell damage

[http://pubs.acs.org/subscribe/journals/esthag-w/2006/jun/tech/lt\\_nanoparticles.html](http://pubs.acs.org/subscribe/journals/esthag-w/2006/jun/tech/lt_nanoparticles.html)

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**2135 New Paper Reviews Aspects of Public Perception of Nanotech**

Hearts and Minds and Nanotechnology

<http://www.merid.org/NDN/more.php?id=1757>

Public perceptions of nanotechnology

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**2136 New Study of Nanomaterials and Plant Toxicity**

Starting to explore nanotechnology's impact on major food crops

<http://www.nanowerk.com/spotlight/spotid=9516.php>

Nanoparticle uptake by plants

<http://www.nanowerk.com/spotlight/spotid=6331.php>

**2137 Nanotechnology Assessment Reports**

European Science Foundation Publishes Forward Look Report on Nanomedicine

ESF news release - issued 28/02/2005 -

[http://www.esf.org/esf\\_pressarea\\_page.php?section=6&language=0&newsrelease=83](http://www.esf.org/esf_pressarea_page.php?section=6&language=0&newsrelease=83)

*Response To The Royal Society And Royal Academy Of Engineering Report: 'Nanoscience and nanotechnologies: opportunities and uncertainties'*

[www.ost.gov.uk/policy/issues/nanotech\\_final.pdf](http://www.ost.gov.uk/policy/issues/nanotech_final.pdf)

*Potential Environmental Pollution and Health Hazards Resulting from Possible Military Uses of Nanotechnology with Implications for Research Priorities Helpful to Prevent and/or Reduce Such Pollution and Hazards* is available on request from the Millennium Project via email to [jglenn@igc.org](mailto:jglenn@igc.org)

**2138 Nanotechnology Assessment Reports**

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Down on the Farm: The Impact of Nano-scale Technologies on Food and Agriculture

(Summary) <http://www.etcgroup.org/article.asp?newsid=485> (article available for a limited time on the website)

Down on the Farm: The Impact of Nano-scale Technologies on Food and Agriculture (Full report) [http://www.etcgroup.org/documents/ETC\\_DOTFarm2004.pdf](http://www.etcgroup.org/documents/ETC_DOTFarm2004.pdf)

**2139 Nanotube Toxicity Results Vary with Test Context**

Nano World: Nanotube Toxicity Exams Differ

<http://www.upi.com/Hi-Tech/view.php?StoryID=20060601-111345-7376r>

**2140 Reports Addressing Nanotechnology Safety**

Assessing exposure to airborne nanomaterials: Current abilities and future requirements.

<http://www.informaworld.com/smpp/content~content=a776419006~db=all~order=page>

Nanotoxicology <http://www.informaworld.com/smpp/title~content=t716100760>

New methods and tools needed to measure exposure to airborne nanomaterials

<http://www.physorg.com/news96032587.html>

Nanotech Standards Workshop Report Released

An Issues Landscape For Nanotechnology Standards: Report of a Workshop

<http://ifas.msu.edu/NSWorkshopReport.pdf>

ICON website <http://icon.rice.edu>

RCRA Regulations of Wastes from the Production, Use, and Disposal of Nanomaterials

Report: <http://www.abanet.org/environ/nanotech/pdf/RCRA.pdf>

Technical Proceedings of the 2006 NSTI Nanotechnology Conference and Trade Show, Volume 1

Chapter 6: Environmental, Health and Societal Impacts of Nanotechnology. A Framework for Responsible Nanotechnology Standards

<http://nsti.org/procs/Nanotech2006v1/6/W37.06>

*Nanotechnology: A Research Strategy for Addressing Risk*

<http://www.nanotechproject.org/67/7-19-06-nanotechnology-a-research-strategy-for-addressing-risk>

A scoping study to identify gaps in environmental regulation for the products and applications of nanotechnologies

[http://www.defra.gov.uk/science/project\\_data/DocumentLibrary/CB01075/CB01075\\_3373\\_FRP.doc](http://www.defra.gov.uk/science/project_data/DocumentLibrary/CB01075/CB01075_3373_FRP.doc)

*Nanotechnology Risk Governance*

[http://www.irgc.org/irgc/\\_b/contentFiles/IRGC\\_white\\_paper\\_2\\_PDF\\_final\\_version.pdf](http://www.irgc.org/irgc/_b/contentFiles/IRGC_white_paper_2_PDF_final_version.pdf)

*The Ethics and Politics of Nanotechnology*

Report: <http://unesdoc.unesco.org/images/0014/001459/145951e.pdf>

SCIENTIFIC COMMITTEE ON EMERGING AND NEWLY IDENTIFIED HEALTH RISKS

(SCENIHR) modified Opinion (after public consultation) on The appropriateness of existing methodologies to assess the potential risks associated with engineered and adventitious products of nanotechnologies

[http://ec.europa.eu/health/ph\\_risk/committees/04\\_scenihhr/docs/scenihhr\\_o\\_003b.pdf](http://ec.europa.eu/health/ph_risk/committees/04_scenihhr/docs/scenihhr_o_003b.pdf)

NIOSH Update: NIOSH Releases Nanotechnology Research Progress Report

<http://www.cdc.gov/niosh/updates/upd-02-27-07.html>

Progress Toward Safe Nanotechnology in the Workplace (NIOSH Publication No. 2007-123)

<http://www.cdc.gov/niosh/docs/2007-123>

**2144 Review of Current Practices in the Nanotechnology Industry**

A Review of Current Practices in the Nanotechnology Industry

<http://cohesion.rice.edu/CentersAndInst/ICON/emplibrary/ICONNanotechSurveyFullReduced.pdf>

ICON website <http://icon.rice.edu>

**2145 Reports on nanotechnology**

RCRA Regulations of Wastes from the Production, Use, and Disposal of Nanomaterials

Report: <http://www.abanet.org/environ/nanotech/pdf/RCRA.pdf>

**2146 Reports on nanotechnology**

Technical Proceedings of the 2006 NSTI Nanotechnology Conference and Trade Show, Volume 1  
Chapter 6: Environmental, Health and Societal Impacts of Nanotechnology. A Framework for  
Responsible Nanotechnology Standards

<http://nsti.org/procs/Nanotech2006v1/6/W37.06>

**2147 Reports on nanotechnology**

*Nanotechnology: A Research Strategy for Addressing Risk*

<http://www.nanotechproject.org/67/7-19-06-nanotechnology-a-research-strategy-for-addressing-risk>

**2148 Reports on nanotechnology**

A scoping study to identify gaps in environmental regulation for the products and applications of  
nanotechnologies

[http://www.defra.gov.uk/science/project\\_data/DocumentLibrary/CB01075/CB01075\\_3373\\_FRP.doc](http://www.defra.gov.uk/science/project_data/DocumentLibrary/CB01075/CB01075_3373_FRP.doc)

**2149 Reports on nanotechnology**

*Nanotechnology Risk Governance*

[http://www.irgc.org/irgc/\\_b/contentFiles/IRGC\\_white\\_paper\\_2\\_PDF\\_final\\_version.pdf](http://www.irgc.org/irgc/_b/contentFiles/IRGC_white_paper_2_PDF_final_version.pdf)

*The Ethics and Politics of Nanotechnology*

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of nanotechnologies

[http://ec.europa.eu/health/ph\\_risk/committees/04\\_scenihhr/docs/scenihhr\\_o\\_003b.pdf](http://ec.europa.eu/health/ph_risk/committees/04_scenihhr/docs/scenihhr_o_003b.pdf)

**2150 Reports on nanotechnology**

*Nanotechnology Risk Governance*

[http://www.irgc.org/irgc/\\_b/contentFiles/IRGC\\_white\\_paper\\_2\\_PDF\\_final\\_version.pdf](http://www.irgc.org/irgc/_b/contentFiles/IRGC_white_paper_2_PDF_final_version.pdf)

*The Ethics and Politics of Nanotechnology*

Report: <http://unesdoc.unesco.org/images/0014/001459/145951e.pdf>

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[http://ec.europa.eu/health/ph\\_risk/committees/04\\_scenihhr/docs/scenihhr\\_o\\_003b.pdf](http://ec.europa.eu/health/ph_risk/committees/04_scenihhr/docs/scenihhr_o_003b.pdf)

**2151 NIOSH Releases Nanotechnology Research Progress Report**

NIOSH Update: NIOSH Releases Nanotechnology Research Progress Report

<http://www.cdc.gov/niosh/updates/upd-02-27-07.html>

*Progress Toward Safe Nanotechnology in the Workplace* (NIOSH Publication No. 2007-123)

<http://www.cdc.gov/niosh/docs/2007-123>

**2152 National Nanotech Initiative Issues Risk Assessment Report**

*Understanding Risk Assessment of Nanotechnology*  
[http://nano.gov/pdf/Understanding\\_Risk\\_Assessment.pdf](http://nano.gov/pdf/Understanding_Risk_Assessment.pdf)

**2153 EPA Publishes White Paper on Nanotechnology**

Industry should become familiar with EPA white paper on nanotechnology

<http://www.nanowerk.com/news/newsid=1512.php>

U.S. Environmental Protection Agency Nanotechnology White Paper (EPA 100/B-07/001)

<http://www.epa.gov/osa/pdfs/nanotech/epa-nanotechnology-white-paper-final-february-2007.pdf>

**2154 New Monthly Online Review Journal of Nanotech EHS Work**

Nano coalition launches virtual journal on risk research

[http://www.eurekalert.org/pub\\_releases/2007-03/ru-ncl032207.php](http://www.eurekalert.org/pub_releases/2007-03/ru-ncl032207.php)

**2155 Green Nanotechnology**

Institute of Nanotechnology Nano Masters Course Directory

<http://www.nano.org.uk/nanomasters/>

A nano Trojan horse

[http://pubs.acs.org/subscribe/journals/esthag-w/2007/apr/science/lt\\_nano.html](http://pubs.acs.org/subscribe/journals/esthag-w/2007/apr/science/lt_nano.html)

*Green Nanotechnology: It's Easier Than You Think*

<http://www.nanotechproject.org/116/4262007-green-nanotechnology-its-easier-than-you-think>

**2156 New Book Studies Media and Nanotechnology**

Nanotechnology, Risk and Communication

<http://www.palgrave.com/products/title.aspx?PID=277172>

**Conferences on Nanotechnology with Environmental Security Implications**

**2158 International Nanotech Workshop to Precede June Prague Meeting**

1st ICPC NanoNet Workshop

<http://www.icpc-nanonet.org/content/category/6/40/91/>

**2159 US/Africa/Caribbean Nanotech Conference to Be Held**

Invitation: US-African and Caribbean Nanotechnology Initiative (USACANI) Workshop.

<http://www.fonai.org/News.html>

**2160 EuroNanoForum 2009 to Be Held in Prague, June 2-5, 2009.**

EuroNanoForum 2009

<http://www.euronanoforum2009.eu/>

**2161 Indian Conference on Nanotechnology and Regulatory Issues**

National Conference on Nanotechnology and Regulatory Issues

<http://www.scidev.net/en/announcements/national-conference-on-nanotechnology-and-regulato.html>**2162 International Environmental Nanotechnology Conference: Applications and Implications**<http://emsus.com/nanotechconf/index.htm>**2163 Nanoparticle Warnings at Euroscience Open Forum**

Nanotech risk concerns 'must be addressed'

[http://www.enn.com/top\\_stories/article/37738](http://www.enn.com/top_stories/article/37738)**2164 European Nanotechnology Conference in Switzerland in September 2008**

Meeting Place for Innovations

[http://www.nanoeurope.com/wEnglisch/messen/nanoeurope/01\\_besucher/home/home.php](http://www.nanoeurope.com/wEnglisch/messen/nanoeurope/01_besucher/home/home.php)**2165 Conferences on Nanotechnology with Environmental Security Implications**

Public Meeting on Research Needs and Priorities Related to the Environmental, Health, and Safety Aspects of Engineered Nanoscale Materials

[https://nnco.nano.gov/public\\_ehs/](https://nnco.nano.gov/public_ehs/)

Nanotechnology - Products and Processes for Environmental Benefit

<http://www.nano.org.uk>

Success and Outcomes from the Finnish Presidency Conference on “Nanotechnologies – Safety for Success”

[http://www.fmnt.fi/ntss/FIN\\_Presidency\\_Nanotechnologies\\_report.pdf](http://www.fmnt.fi/ntss/FIN_Presidency_Nanotechnologies_report.pdf)

'Nanotechnology for Security and Crime Prevention', email

Health &amp; Environment Summit on Nano” at Nanotech 2007

[http://home.businesswire.com/portal/site/google/index.jsp?ndmViewId=news\\_view&newsId=20061026005829&newsLang=en](http://home.businesswire.com/portal/site/google/index.jsp?ndmViewId=news_view&newsId=20061026005829&newsLang=en)4th NanoSpain Workshop <http://www.nanospain.org/Workshop4>Finland Conference site: <http://www.fmnt.fi/ntss>Egypt Conference site: <http://www.nanoinsight.net>

Safety of Manufactured Nanomaterials

[http://www.oecd.org/department/0,2688,en\\_2649\\_37015404\\_1\\_1\\_1\\_1\\_1,00.html](http://www.oecd.org/department/0,2688,en_2649_37015404_1_1_1_1_1,00.html)**2166 Conferences on Nanotechnology with Environmental Security Implications**

Public Meeting on Research Needs and Priorities Related to the Environmental, Health, and Safety Aspects of Engineered Nanoscale Materials

[https://nnco.nano.gov/public\\_ehs/](https://nnco.nano.gov/public_ehs/)

Nanotechnology - Products and Processes for Environmental Benefit

<http://www.nano.org.uk>

Success and Outcomes from the Finnish Presidency Conference on “Nanotechnologies – Safety for Success”

[http://www.fmnt.fi/ntss/FIN\\_Presidency\\_Nanotechnologies\\_report.pdf](http://www.fmnt.fi/ntss/FIN_Presidency_Nanotechnologies_report.pdf)

'Nanotechnology for Security and Crime Prevention', email  
Health & Environment Summit on Nano” at Nanotech 2007  
[http://home.businesswire.com/portal/site/google/index.jsp?ndmViewId=news\\_view&newsId=20061026005829&newsLang=en](http://home.businesswire.com/portal/site/google/index.jsp?ndmViewId=news_view&newsId=20061026005829&newsLang=en)  
4th NanoSpain Workshop <http://www.nanospain.org/Workshop4>  
Finland Conference site: <http://www.fmnt.fi/ntss>  
Egypt Conference site: <http://www.nanoinsight.net>  
Safety of Manufactured Nanomaterials  
[http://www.oecd.org/department/0,2688,en\\_2649\\_37015404\\_1\\_1\\_1\\_1\\_1,00.html](http://www.oecd.org/department/0,2688,en_2649_37015404_1_1_1_1_1,00.html)

### **2167 Conferences on Nanotechnology with Environmental Security Implications**

Public Meeting on Research Needs and Priorities Related to the Environmental, Health, and Safety Aspects of Engineered Nanoscale Materials  
[https://nnco.nano.gov/public\\_ehs/](https://nnco.nano.gov/public_ehs/)  
Nanotechnology - Products and Processes for Environmental Benefit  
<http://www.nano.org.uk>  
Success and Outcomes from the Finnish Presidency Conference on “Nanotechnologies – Safety for Success”  
[http://www.fmnt.fi/ntss/FIN\\_Presidency\\_Nanotechnologies\\_report.pdf](http://www.fmnt.fi/ntss/FIN_Presidency_Nanotechnologies_report.pdf)  
'Nanotechnology for Security and Crime Prevention', email  
Health & Environment Summit on Nano” at Nanotech 2007  
[http://home.businesswire.com/portal/site/google/index.jsp?ndmViewId=news\\_view&newsId=20061026005829&newsLang=en](http://home.businesswire.com/portal/site/google/index.jsp?ndmViewId=news_view&newsId=20061026005829&newsLang=en)  
4th NanoSpain Workshop <http://www.nanospain.org/Workshop4>  
Finland Conference site: <http://www.fmnt.fi/ntss>  
Egypt Conference site: <http://www.nanoinsight.net>  
Safety of Manufactured Nanomaterials  
[http://www.oecd.org/department/0,2688,en\\_2649\\_37015404\\_1\\_1\\_1\\_1\\_1,00.html](http://www.oecd.org/department/0,2688,en_2649_37015404_1_1_1_1_1,00.html)

### **2168 Conferences on Nanotechnology with Environmental Security Implications**

'Nanotechnology for Security and Crime Prevention'  
Health & Environment Summit on Nano” at Nanotech 2007  
[http://home.businesswire.com/portal/site/google/index.jsp?ndmViewId=news\\_view&newsId=20061026005829&newsLang=en](http://home.businesswire.com/portal/site/google/index.jsp?ndmViewId=news_view&newsId=20061026005829&newsLang=en)  
4th NanoSpain Workshop <http://www.nanospain.org/Workshop4>

### **2169 Conferences on Nanotechnology with Environmental Security Implications**

Finland Conference site: <http://www.fmnt.fi/ntss>  
Egypt Conference site: <http://www.nanoinsight.net>

### **2170 OECD Meeting on Manufactured Nanomaterials**

Safety of Manufactured Nanomaterials  
[http://www.oecd.org/department/0,2688,en\\_2649\\_37015404\\_1\\_1\\_1\\_1\\_1,00.html](http://www.oecd.org/department/0,2688,en_2649_37015404_1_1_1_1_1,00.html)

**2171 Upcoming Conferences on Nanotechnology Safety**

Nanoparticles for European Industry –Manufacture, Scale-Up, Stabilization, Characterization and Toxicology <http://www.nano.org.uk/conferences/nanoparticles/flyer.pdf>  
International Symposium on Nanotechnology in Environmental Protection and Pollution  
<http://www.isnepp.org/>

**2172 Research Awards on Nanotech and Energy Presented to Nine Projects**

Research Awards on Nanotech and Energy  
<http://www.eon.com/en/unternehmen/21278.jsp>  
Accolade for solar-hydrogen project  
<http://www.physorg.com/news161870957.html>

**Electromagnetic Fields****2174 Growing Health Concerns over Electromagnetic Fields Might Trigger New Regulations**

Warnings on Possible Wi-Fi Dangers

Potential Magnetic Fields Regulations in Japan

Hi-tech horrors [http://comment.independent.co.uk/leading\\_articles/article2472074.ece](http://comment.independent.co.uk/leading_articles/article2472074.ece)

Danger on the airwaves: Is the Wi-Fi revolution a health time bomb?

[http://news.independent.co.uk/uk/health\\_medical/article2472140.ece](http://news.independent.co.uk/uk/health_medical/article2472140.ece)

Apiculture world abuzz over theory that cellphone radiation may be killing bees

<http://www.canada.com/topics/technology/news/gizmos/story.html?id=4734ad59-f543-4ac5-ae34-d33431e59be2&k=74835>

Industry ministry to regulate magnetic fields

<http://www.asahi.com/english/Herald-asahi/TKY200704260232.html> (article not available anymore on the website)

Power lines in new link to childhood leukaemia

<http://www.telegraph.co.uk/news/main.jhtml?xml=/news/2007/04/21/nleuk21.xml>

**2175 Growing Health Concerns over Electromagnetic Fields Might Trigger New Regulations**

Warnings on Possible Wi-Fi Dangers

Potential Magnetic Fields Regulations in Japan

Hi-tech horrors [http://comment.independent.co.uk/leading\\_articles/article2472074.ece](http://comment.independent.co.uk/leading_articles/article2472074.ece)

Danger on the airwaves: Is the Wi-Fi revolution a health time bomb?

[http://news.independent.co.uk/uk/health\\_medical/article2472140.ece](http://news.independent.co.uk/uk/health_medical/article2472140.ece)

Apiculture world abuzz over theory that cellphone radiation may be killing bees

<http://www.canada.com/topics/technology/news/gizmos/story.html?id=4734ad59-f543-4ac5-ae34-d33431e59be2&k=74835>

Industry ministry to regulate magnetic fields

<http://www.asahi.com/english/Herald-asahi/TKY200704260232.html> (article not available anymore on the website)



Power lines in new link to childhood leukaemia

<http://www.telegraph.co.uk/news/main.jhtml?xml=/news/2007/04/21/nleuk21.xml>

**2176 Study Says Mobile Phones Raise Tumor Risk**

Long mobile phone use raises brain tumor risk

<http://go.reuters.com/newsArticle.jhtml?type=technologyNews&storyID=11714735>

Heavy Use of Mobile Phones Increases Cancer Risk, Study Finds

<http://environment.about.com/od/healthenvironment/a/cancerphones.htm> (Article stored for a limited time on the website)

**2177 Cell Phones damage rat brains**

Neuroscience: A Swedish study links mobile phones to brain damage

Elizabeth Svoboda, Popular Science, February 2004

<http://www.popsci.com/popsci/medicine/article/0,12543,573349,00.html>

**2178 Microwave Frequencies used for Environment-sensing are in Jeopardy**

Forecasters face losing key tools

By Alex Kirby, BBC News, December 17, 2004

<http://news.bbc.co.uk/2/hi/science/nature/4104355.stm>

**Underwater Sounds from Human Sources Endangering Marine Life**

**2180 Underwater Sounds from Human Sources Endangering Marine Life**

Sounding the Depths II. The Rising Toll of Sonar, Shipping and Industrial Ocean Noise on Marine Life

<http://www.nrdc.org/wildlife/marine/sound/contents.asp>

Fishing Nets Major Risk for Small Cetaceans

<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=457&ArticleID=5044&l=en>

**2181 Research Confirms Military and Industry Sonar Harms Whales**

Whale Sonar Deaths Bring Threat of Navy Lawsuit

<http://www.planetark.com/dailynewsstory.cfm/newsid/26066/story.htm>

Accord Is Sweet Music for Sonar-Afflicted Marine Life

<http://www.hsus.org/ace/19848?pg=1>

Military, industry sonar harms whales - IWC report

Story by Robin Pomeroy, 23/7/2004, Reuters News Service

<http://www.planetark.org/dailynewsstory.cfm/newsid/26196/story.htm>

**2182 Sonar**

The Debate over Use of Sonar by the Navy Continues; Legal Settlement Approved

Court Allows Sonar in RIMPAC War Games With New Restrictions

<http://www.ens-newswire.com/ens/jul2006/2006-07-09-01.asp>

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**2183 U.S. Supreme Court Rules in Favor of Navy in Sonar Case**

Navy Wins, Whales Lose U.S. Supreme Court Sonar Case

<http://www.ens-newswire.com/ens/nov2008/2008-11-12-10.asp>**2184 U.S. to Study Sonar Impact on Marine Mammals**

Military R&amp;D worth \$72M

<http://www.honoluluadvertiser.com/apps/pbcs.dll/article?AID=/20070526/NEWS08/705260353/1018/NEWS>

Navy Disappointed with Sonar Lawsuit

<http://www.military.com/features/0,15240,136479,00.html>

Navy sued over sonar testing off Hawaii

<http://www.msnbc.msn.com/id/18721001/>**2185 Sonar Restrictions Debate Continues**

Ruling curbs Navy sonar off Calif. Coast

[http://www.upi.com/NewsTrack/Top\\_News/2008/01/04/ruling\\_curbs\\_navy\\_sonar\\_off\\_calif\\_coast/3754/](http://www.upi.com/NewsTrack/Top_News/2008/01/04/ruling_curbs_navy_sonar_off_calif_coast/3754/)

Judge orders Navy to stay 12 miles off coast when using sonar

<http://www.signonsandiego.com/news/metro/20080103-1643-bn03sonar.html>

Bush exempts Navy from no-sonar rule

[http://www.usatoday.com/news/washington/2008-01-16-navysonar\\_N.htm?csp=34](http://www.usatoday.com/news/washington/2008-01-16-navysonar_N.htm?csp=34)

State files another challenge to Navy's sonar training off coast

<http://www.signonsandiego.com/news/military/20080122-2122-bn22sonar.html>

Navy resumes sonar training off SD coast as legal battle goes on

<http://www.sfgate.com/cgi-bin/article.cgi?f=/n/a/2008/01/27/state/n162935S45.DTL>**2186 International Convention for the Evaluation of New Technologies needed**

Nanotech Meets the Environment

<http://www.etcgroup.org/article.asp?newsid=412>

Mulch ado about nothing?...Or the "Sand Witch?"

<http://www.etcgroup.org/documents/ComSandWitchFINAL.pdf>**2187 Publication of Data Dangerous to the Environment**

Ray Kurzweil calls for 1918 flu genome to be 'un-published'

[http://www.kurzweilai.net/news/frame.html?main=news\\_single.html?id%3D4934](http://www.kurzweilai.net/news/frame.html?main=news_single.html?id%3D4934)**2188 Toxicogenomic Technologies and Risk Assessment of Environmental Carcinogens: A Workshop Summary***Toxicogenomic Technologies and Risk Assessment of Environmental Carcinogens: A Workshop Summary*<http://www.nap.edu/catalog/11335.html>**2189 Leading Cancer Specialists call for REACH Strengthening**

Reaching for Control of Carcinogenic Chemicals

ENS, May 5, 2004

<http://www.ens-newswire.com/ens/may2004/2004-05-05-02.asp> (by subscription only)

*REACH: An Unprecedented European Initiative For Regulating Industrial Chemicals* report by Dr. Epstein, Chairman of the Cancer Prevention Coalition  
[http://www.preventcancer.com/publications/pdf/REACH\\_Tab\\_050304.pdf](http://www.preventcancer.com/publications/pdf/REACH_Tab_050304.pdf)

### **GMO Issues**

#### **2191 GMO debate (continue)**

WTO GE Crop Ruling a Setback for National Safeguards

<http://www.iatp.org/>

WTO ruling's conclusions and recommendations

<http://www.tradeobservatory.org/library.cfm?refid=78475>

Monsanto May Commercialize Terminator

<http://etcgroup.org/article.asp?newsid=544>

New report considers co-existence of GM and non-GM crops and seeds

<http://europa.eu.int/rapid/pressReleasesAction.do?reference=IP/06/230&format=HTML&aged=0&language=EN&guiLanguage=en>

*New case studies on the coexistence of GM and non-GM crops in European agriculture*

<http://www.jrc.es/home/pages/eur22102enfinal.pdf>

#### **2192 Tougher Systems to Control GMO Suggested**

Greenpeace and GeneWatch UK call for urgent adoption of international biosafety standards

<http://www.genewatch.org/Press%20Releases/pr85.htm>

*GM Contamination Report 2005*

[www.genewatch.org/publications/reports/contamination report final.doc](http://www.genewatch.org/publications/reports/contamination%20report%20final.doc) (might take longer to download)

#### **2193 The Debate over Genetically Modified Organisms (GMOs) Continues**

EU Environment Ministers Let Five States Keep GM Crop Bans

<http://www.ens-newswire.com/ens/jun2005/2005-06-27-03.asp>

Italy Calls for Independent EU Research on GMOs

<http://www.planetark.com/dailynewsstory.cfm/newsid/31035/story.htm>

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New Crisis Management Centre launched by FAO

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