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WORLDWIDE EMERGING ENVIRONMENTAL ISSUES AFFECTING THE U.S. MILITARY

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U.S. Army Environmental Policy Institute

DECEMBER 2005 REPORT

Note to Readers: Pages 1-16 comprise the summary and analysis of this report. Expanded details for some items that might not be available via the Internet are in the Appendix.

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Item 1. Montreal Conference on Climate Change Reached New Agreements

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 million 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/enbots/.

Military Implications:
Although the U.S. is a Party to the UN Framework Convention on Climate Change, it is not a Party to the Kyoto Protocol; nevertheless, the U.S. has agreed to be more engaged in the forthcoming international policy discussions on climate change. COP 12 and COP/MOP 2 to be held November 6-17, 2006 would be an opportunity to present the Army Strategy for the Environment and increase international cooperation. For more information, contact: the UNFCCC Secretariat; tel: +49-228-815-1000; fax: +49-228-815-1999; e-mail: secretariat@unfccc.int; Web: http://www.unfccc.int. Kenya has offered to host the two conferences.

Military personnel should study their respective host countries' addresses at the conference to identify areas for cooperation. Complete webcast records of these speeches are available online at: http://unfccc.streamlogics.com/unfccc/agenda.asp. Relevant military personnel should follow the negotiations for emission reduction targets for the second commitment period of the Kyoto Protocol (2013-2017) to anticipate potential changes in domestic and international policy. The Five Year Plan of Action on Adaptation should be studied to anticipate potential requests for assistance from developing countries to cope with the impacts of climate change. The decisions from COP 11 and COP/MOP 1, including subsidiary body reports and NGO sessions, should be studied for opportunities to further implement the Army Strategy for the Environment.

Sources:
United Nations Climate Change Conference (COP 11 and COP/MOP 1)
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

Item 2. 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.

Military Implications:
Environmental issues can be both a contributing cause and consequence of conflicts. Military personnel involved in environmental matters should liaise with those involved with the new Peacebuilding Commission to help add the environmental dimension to any conflict avoidance and/or country reconstruction plan.

Sources:
UN establishes new body to prevent countries from sliding back into war
http://www.un.org/apps/news/story.asp?NewsID=16990&Cr=reform

Secretary-General's remarks on the General Assembly endorsement of the Peacebuilding Commission— New York, 20 December 2005
http://www.un.org/apps/sg/sgstats.asp?nid=1846

The Peacebuilding Commission—Draft resolution submitted by the President of the General Assembly. A/60/L.40, 14 December 2005
http://www.un.org/News/Press/docs/2005/gaab3717.doc.htm

Item 3. Technological Breakthroughs with Environmental Security Implications

3.1 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.

Military Implications
If not already in process, relevant military personnel should consider this technology (or its variations) for use in environmental toxicity monitoring, post conflict cleanup operations, and for treaty monitoring applications.

Source:
Cheap Chemical Sensors. Electronic "noses" made from printed electronics could detect toxic chemicals inexpensively
By Kevin Bullis, MIT Technology Review, December 1, 2005
http://technologyreview.com/NanoTech-Devices/wtr_15947,303,p1.html

3.2 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.

Military Implications:

Equipped with sensitive environmental sensors, these miniature robot helicopters might be considered for military use such as battlefield surveillance and environmental scanning.

Sources:

USF mini-helicopters go "Back to Katrina"
http://usfnews.usf.edu/page.cfm?link=article&aid=1111

Robotics Researchers Return to Examine Katrina Devastation With Small Unmanned Helicopters
http://www.nsf.gov/news/news_summ.jsp?cntn_id=105603

Isensys website http://www.isensys.com

3.4 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.

Military Implications

The use of phthalates is already considerably restricted, e.g. in toys. This research, if further work confirms its findings, is likely to result in even more stringent regulations. The military should prepare for eventual new regulations and consider phthalate alternatives.

Source:

Phthalate Linked to Lupus in Mice
http://ehp.niehs.nih.gov/docs/2005/113-12/forum.html#phtl

Item 4. 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.]

Military Implications

Military personnel with environmental rehabilitation experience and responsibilities (in addition to those who might already be involved in the establishment of this advisory group) should be notified of this development so they can offer their experience.

Sources:
Kuwait to host talks on clean-up
http://www.tradearabia.com/tanews/newsdetails_snENV_article97493.html

Kuwait to host talks on Gulf environment clean-up
Reuters, 06 Dec 2005
http://www.alertnet.org/thenews/newsdesk/L0660604.htm

Item 5. 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.

Military Implications:
The military should review, and if necessary, revise, their OOTW (Operations Other Than Warfare) epidemic plans to make sure that they are adequate to handle possible epidemics in the areas subject to these diseases, which include Africa and Southeast Asia.

Source:
Deadly New Virus Draws Experts to "Hot Zones"
Bijal P. Trivedi, National Geographic Today, January 21, 2003
http://news.nationalgeographic.com/news/2003/01/0121_030121_tvvirushunter.html

Hendra and Nipah viruses: different and dangerous
Nature Reviews Microbiology 4, 23-35 (January 2006) | doi:10.1038/nrmicro1323
http://www.nature.com/nrmicro/journal/v4/n1/abs/nrmicro1323.html (abstract; full article by subscription only)

Item 6. 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.

Military Implications:
These developments denote that China – a permanent member of the UN Security Council – is likely to take a more pro-environment stand in international discussions. Military liaison officers in Beijing should explore a range of possible environmental security related areas for mutual cooperation with the People's Liberation Army and present the *Army Strategy for the Environment.*

Source:
Environmental awareness and anger grow in China. Poisoned river had affected many directly
By Jehangir S. Pocha, Globe Correspondent. December 4, 2005
http://www.boston.com/news/world/asia/articles/2005/12/04/environmental_awareness_and_anger_grow_in_china/

China to Monitor Economy-Wide Energy Efficiency
http://www.planetark.com/dailynewsstory.cfm/newsid/34254/story.htm

Army Strategy on the Environment
https://www.asaie.army.mil/Public/ESOH/doc/ArmyEnvStrategy.pdf

Item 7. Updates on Previously Identified Issues

7.1 Climate Change

7.1.1 Melting Permafrost Releases Methane Twenty Times More Dangerous for Global Warming than CO_2
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_2. 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.

7.1.2 The Year 2005 Hits the Record Books for Climate Extremes
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.

7.1.3 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.

7.1.4 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 polices were successfully implemented.

Military Implications:

[Similar to previous on this topic] The incredible amount of research providing compelling evidence of the effects of climate change, as well as the increased number and quality of tools providing information for policy making, will increase action to curb current environmental trends as evidenced by the first item in this report. The military and its contractors should continue to develop technologies to reduce its environmental impact and coordinate with others on forecasting future impacts and roles for military responsiveness.

Sources:

Most of Arctic's Near-Surface Permafrost May Thaw by 2100
National Center for Atmospheric Research, December 19, 2005
http://www.ucar.edu/news/releases/2005/permafrost.shtml

Arctic Feels the Heat from Climate Change
http://www.planetark.com/dailynewsstory.cfm/newsid/33854/story.htm

2005 - A year of record climate extremes
http://www.cbc.ca/news/background/kyoto/2005_record.html

2005 on the way to becoming second warmest year ever
http://www.wmo.int/web/Press/Press743_E1.doc

Vanuatu Villagers May Be First Climate Change 'Refugees'
http://www.news.vu/en/news/environment/051221-Vanuatu-Villagers-May-Be-First-Climate-Change-Refugees.shtml

Tuesday 06 December 2005-Pacific Island villagers may be first climate change refugees: UNEP
http://radio.un.org/story.asp?NewsID=3513 (Audio)

UK study warns on Kyoto targets
Business Day, December 28, 2005
http://www.businessday.co.za/articles/world.aspx?ID=BD4A131870

7.2 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.]

Military Implications:
Military personnel with a responsibility for, or legitimate interest in, issues covered by the BWC should be involved in the process of development, dissemination, and adoption of codes of conduct designed to improve international controls, and to counter terrorist access to biological weapons. Also, since the Review Conference is supposed to address concrete implementation issues, relevant military personnel should also consider contributing expertise and know-how for developing the enforcement framework.

Source:
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

7.3 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.]

Military Implications:
Military authorities should keep track of which chemicals the Europeans may propose to be banned, and seek substitutes. Military-to-military assistance might include technical assistance to help developing countries achieve their compliance with the Montreal Protocol and the Vienna Convention.

Sources:
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
http://hq.unep.org/ozone/Meeting_Documents/mop/17mop/17mop-11.e.pdf

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.htmlLINE

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

Montreal Protocol Web site
http://www.unep.org/ozone/Treaties_and_Ratification/2B_montreal%20protocol.asp

7.4 Integration of Chemical Regulations (REACH) Approved by European Council

With minor modifications, the EU ministers have approved the proposed Registration, Evaluation and Authorization of Chemicals (REACH) regulation. The Council's position should be formally approved in May 2006, followed by a second reading by the European Parliament, and final decision expected in autumn 2006, for entry into force in spring 2007. Operational requirements of REACH are expected to start to be applied from 2008 onwards. REACH creates a single system for all chemicals (replacing about 40 existing legal acts) and will establish a new European Chemicals Agency headquartered in Helsinki, Finland, to manage the evaluation, authorization, and registration of the substances database. REACH will require manufacturers and importers of chemicals produced or imported in volumes over 1 metric tonne per year to submit a registration dossier to the European chemicals agency with comprehensive information concerning the safe use of those substances. Failure to register will prohibit manufacture or import to the EU. [See also *REACH Draft Voted by the European Parliament* and other related items listed in November 2005 environmental security report.]

Military Implications:
[Similar to previous on the same issue] Assessment of the REACH system's latest proposed changes and their impacts on military operations in Europe in relation to existing SOFAs and other agreements remains important. As currently proposed, the REACH system still implies the registration of all compounds in volumes over 1 metric tonne per year in use within the EU.

Sources:
REACH: Commission welcomes Council's agreement on new EU chemical legislation
http://europa.eu.int/rapid/pressReleasesAction.do?reference=IP/05/1583&format=HTML&aged=0&language=EN&guiLanguage=en

REACH http://europa.eu.int/comm/environment/chemicals/reach.htm

Stavros Dimas, Member of the European Commission, Responsible for Environment policy Speaking notes – political agreement on REACH http://europa.eu.int/rapid/pressReleasesAction.do?reference=SPEECH/05/787&format=PDF&aged=0&language=EN&guiLanguage=en

7.5 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.]

Military Implications:

[Same as previous on similar issues] Military commands deployed in EU Member States should be prepared to comply (in accord with Status of Forces Agreements) with the new directives and consider substitutes for hazardous substances, if not already in place.

Sources:

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 [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)]

7.6 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.]

Military Implications:
Relevant military personnel should study the Consolidated Report to find implications for military cooperation. They should also review the warnings from the WMO about implementation of the new systems and how the military might help the system be more coherent. [Similar to previous on the same issue: Military logistics personnel should continue to cooperate and make recommendations for national preparedness plans and eventually update previous military plans to support disaster responses for the Indian Ocean basin. If not involved yet, military liaison officers with the Department of State and the National Oceanic and Atmospheric Administration (including other government systems linked to NOAA) should consider contributing in the development of the Indian Ocean early warning system and also follow its developments to assure best cooperation in case of necessity.]

Sources:
Assessment of Capacity Building Requirements or an Effective and Durable Tsunami Warning and Mitigation System in the Indian Ocean: Consolidated Report for Countries Affected by the 26 December 2004 Tsunami
http://ioc3.unesco.org/indotsunami/nationalassessments.htm

WMO Natural Disaster Prevention and Mitigation
http://www.wmo.int/disasters/tsunamiprojects.htm

Tsunami Warning System on Track For Mid-2006 – UN
http://www.planetark.com/dailynewsstory.cfm/newsid/34228/story.htm

A year on from the Asian tsunami, satellites are aiding regional rebuilding
http://www.esa.int/esaEO/SEMF2J8A9HE_environment_0.html

Asian Nations Fail to Agree on Regional Tsunami Warning Alerts
http://www.bloomberg.com/apps/news?pid=10000080&sid=ajwWayeTVxTs&refer=asia

Researchers Warn of More Quakes in Southeast Asia
By Axel Bojanowski, Spiegel online, December 23, 2005
http://service.spiegel.de/cache/international/0,1518,392020,00.html

7.7 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.]

Military Implications:
Developing an integrated environmental monitoring capability to provide informed data to the public, and policy- and decision-makers, would considerably improve the assessment of potential environmental impacts of different actions, enforce international treaties worldwide, and could help mitigate environmental and social consequences induced by conflict or natural disasters. The military should consider full cooperation in all the phases—from development to implementation and use of such a space-based observation system.

Sources:
Integration Of New EU Member Countries Into GMES Programme Commences
http://www.spacedaily.com/news/disaster-management-05zzzzzm.html

Providing GMES services at the ends of the Earth – interview with Dr Charles Randell
http://www.esa.int/esaCP/SEMGHVVLWFE_index_0.html

ESA Council meeting at ministerial level
http://www.esa.int/esaCP/SEMTNPULWFE_index_0.html

Montreal outcomes: forest focus could enhance role of space in combating climate change
http://www.esa.int/esaEO/SEMZC68A9HE_environment_0.html

7.8 Nanotechnology

7.8.1 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.]

7.8.2 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.

7.8.3 Buckyballs Could Damage 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.

7.8.4 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.

Military Implications

The military should consider cooperation with and/or observe the work of different programs in addressing nanotech environmental and health implications, and eventually incorporate relevant findings into its own nanotech planning and research.

Sources:

Nanotech risks: UK launches US$8.5m research plan
http://www.scidev.net/content/news/eng/nanotech-risks-uk-launches-us85m-research-plan.cfm

Nanotechnology. Health and Environmental Implications. An inventory of current research
http://www.nanotechproject.com/index.php?id=18

Too Tiny for Trouble? Scientists Take a Look
By Barnaby J. Feder, New York Times, November 29, 2005
http://www.nytimes.com/2005/11/29/science/29nano.html (by subscription only; full text in the Appendix)

Buckyballs could disrupt functioning of DNA
NewScientist.com News Service Dec. 9, 2005
http://www.newscientist.com/article.ns?id=dn8439

External Review Draft Nanotechnology White Paper
http://www.epa.gov/OSA/nanotech.htm

Item 8. Reports to Review

8.1 Latest Reports of the Millennium Ecosystem Assessment Series

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.

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 affaires, 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'.

Military Implications
[Same as previous on the MA reports] The findings of this report reinforce and add to the previous reports of this kind. The military should review them and analyze their probable effects on military planning, training and operations. It is likely that these findings will lead to new international restrictions protecting the biosphere from human-caused damage.

Sources:
"Ecosystems & Human Well-being: Wetlands & Water Synthesis" launched at Ramsar COP9
http://www.millenniumassessment.org/en/article.aspx?id=71

Ecosystems & Human Well-being: Wetlands & Water Synthesis
http://www.maweb.org/proxy/Document.358.aspx

Ecosystems and Human Well-being: General Synthesis
http://www.millenniumassessment.org//proxy/Document.357.aspx

Human Health Under Threat from Ecosystem Degradation: WHO releases "Ecosystems and Human Well-being: Health Synthesis"
http://www.millenniumassessment.org/en/article.aspx?id=72

Human Health Under Threat from Ecosystem Degradation WHO Media Release
http://www.millenniumassessment.org/proxy/Document.764.aspx

Ecosystem assessment wins top environment award
http://www.scidev.net/News/index.cfm?fuseaction=readNews&itemid=2561&language=1

8.2 *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.

Military Implications:
Europe is already a leader—a position it wants to keep—in environmental conservation and therefore adoption of adequate regulations. Reports like this one are likely to reinforce some existing policies and bring about others to fill the eventual gaps, as well as strengthening the enforcement procedures.

Source:
The European environment - State and outlook 2005
http://reports.eea.eu.int/state_of_environment_report_2005_1/en

8.3 *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.

Military Implications:
This IEA study might help relevant military personnel as they consider actions for achieving diversity of the energy supply, solving transportation requirements, and reducing emissions.

Source:
Prospects for Hydrogen and Fuel Cells, 256 pages, ISBN 92-64-10957-9 (2005)
http://www.iea.org/bookshop/add.aspx?id=308 (Press releases and summaries; book available for purchase)

8.4 *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.

Military Implications:
The report might be a good information and guiding source for military personnel involved in S&T assessment and addressing eventual social, health, and environmental implications of new technologies.

Source:
The Future of Technology Assessment
http://wilsoncenter.org/index.cfm?fuseaction=news.item&news_id=161052

APPENDIX

Reference Details

This Appendix contains the full text for the articles that are not available on the Internet or are usually stored for a limited time on the respective Web sites.

Item 7. Updates on Previously Identified Issues

7.8 Nanotechnology

Too Tiny for Trouble? Scientists Take a Look
By BARNABY J. FEDER, NY Times, November 29, 2005
http://www.nytimes.com/2005/11/29/science/29nano.html (by subscription only)

As nanotechnology research explodes, the much smaller field that investigates the technology's possible risks is also growing.
The primary worry about the potential health and safety risks of nanotechnology is simply that far too little is known about the behavior of the tiny nanoscale materials in various environments. But enough risk research is under way, for example on effects on the lungs, that keeping track of it has become a challenge in its own right.
The most comprehensive effort yet to provide such a research database is to go online today at nanotechproject.org, according to the Woodrow Wilson International Center for Scholars, the Washington-based policy research institute that created it.
"We believe we have 90 percent to 95 percent of the federally funded research projects in the inventory," said Andrew D. Maynard, chief science adviser to the Wilson Center's Project on Emerging Nanotechnologies.
The database, which includes just over 200 research programs, also has a small number of projects financed by the European Union, Germany, Britain, Canada and Taiwan, as well as some work that has been paid for by the private sector.
The term nanotechnology comes from the nanometer, which is a billionth of a meter, or roughly the diameter of a relatively small molecule. The term is usually used to describe engineered materials - and the processes to manipulate them - for which at least one dimension is less than 100 nanometers and the small size produces traits like unusual strength or electrical performance.
Nanotechnology is already embodied in hundreds of products. Businesses usually argue to regulators that nano-materials are not different enough from known substances to require special restrictions on their development or use.
Mr. Maynard said roughly $38 million has been allocated to the studies in the risk research database, a small proportion of overall nanotechnology spending. The federal government alone allocated more than $1 billion for nanotechnology research and development in the fiscal year that ended Sept. 30, and the Bush administration has requested a similar sum for fiscal 2006.
Industry and environmental groups hope the database will spur more investment in the assessment of environmental risks and spotlight areas that are largely overlooked. Mr. Maynard noted, for example, that many of the animal toxicology studies in the database had focused on the lungs, and

that some had dealt with the skin or brain, but that none had looked at what happens to various nano-materials in the digestive system.