

WORLDWIDE EMERGING ENVIRONMENTAL ISSUES AFFECTING THE U.S. MILITARY
Control No. (TCN) 08152 with Battelle Chapel Hill Operations for the U.S. Army Environmental Policy Institute

OCTOBER 2008 REPORT

Note to Readers: Pages 1-15 comprise the summary and analysis of this report. Expanded details for some items are in the Appendix beginning on page 16.

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Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE OCT 2008		2. REPORT TYPE		3. DATES COVERED 00-00-2008 to 00-00-2008	
4. TITLE AND SUBTITLE Worldwide Emerging Environmental Issues Affecting the U.S. Military. October 2008				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) The Millennium Project ,4421 Garrison Street, N.W. ,Washington,DC,20016-4055				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 20	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

Item 1. 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.

Military Implications:

R&D results from the Defense Advanced Research Projects Agency (DARPA) and related research centers should be reviewed for potential inputs to the evolving investment road map. The road map should also be reviewed for potential investments and applications for the military and its contractors.

Sources:

"Global Green New Deal" - Environmentally-Focused Investment Historic Opportunity for 21st Century Prosperity and Job Generation

<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=548&ArticleID=5957&l=en>

Landmark New Report Says Emerging Green Economy Could Create Tens of Millions of New "Green Jobs"

<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=545&ArticleID=5929&l=en>

Item 2. 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.

Military Implications:

In view of the strategic aspect of underground fresh water, relevant military personnel should consult the draft Convention and eventually provide inputs for improved relevance and enforcement. Also, the military should be prepared to consider its stipulations in their planning and operations, as well as in water-related conflict prevention.

Sources:

UNESCO publishes first world map of underground transboundary aquifers

http://portal.unesco.org/en/ev.php-URL_ID=43767&URL_DO=DO_TOPIC&URL_SECTION=201.html

Global groundwater maps

http://www.whymap.org/cln_092/whymap/EN/Downloads/downloads_node_en.html?_nnn=true

Item 3. 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.

Military Implications:

Relevant military personnel should consider the eventual implications for their activities of the rules outlined by the Convention and its Annex.

Sources:

Convention on the Protection of the Underwater Cultural Heritage will enter into force in January 2009
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>

Item 4. 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. [See also *New Strategies Needed to Deal with Global Displacement and Migration* in October 2007 and other similar items in previous environmental security reports.]

Military Implications:

Since militaries around the world are likely to be called on to respond to (if not help prevent) increasing numbers of environmental migrants, the military community should participate in the design of an eventual international framework for addressing global displacement and migration; continue to improve its ability to monitor possible causes of refugee flows and preventive measures; and continue to cooperate with civilian agencies in preparing contingency plans.

Sources:

Environmental Migrants: Conference Aims to Build Consensus on Their Definition, Support and Protection

<http://www.efmsv2008.org/file/Press+release+before+conference?menu=102>

Preliminary Findings of EACH-FOR Project

<http://www.efmsv2008.org/file/Preliminary+Findings+October>

Environment, Forced Migration and Social Vulnerability conference

<http://www.efmsv2008.org/?menu=41>

Item 5. 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. [See also *East African Environmental Projects to Fight Crime* in July-August 2008 environmental security report.]

Military Implications:

AFRICOM should consider contacting their counterparts in Uganda to explore potential for military-to-military aid and training to support this initiative.

Sources:

Environmental crime on the rise as Nema forms police unit

http://www.monitor.co.ug/artman/publish/news/Environmental_crime_on_the_rise_as_Nema_forms_police_unit_73245.shtml

Item 6. 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.

Military Implications:

Relevant military personnel should review the presentations and results from the IUCN Congress and contact participants in the Roundtable on Environment and Security to further explore collaboration, potentials for new regulations, and expanded application of the Army Strategy for the Environment.

Sources:

Roundtable Workshop Environment and Security. Challenges for Change

<http://www.envirosecurity.org/challengesforchange/>

Barcelona sets environment action agenda

http://www.iucn.org/news_events/events/congress/index.cfm?uNewsID=1946

High seas gems in the spotlight

http://www.iucn.org/news_events/events/congress/media/press_releases/index.cfm?uNewsID=1791

The Review of the 2008 Red List of Threatened Species

http://www.iucn.org/about/work/programmes/species/red_list/review/index.cfm

The conservation Olympics. On being green when the world has the blues

http://www.economist.com/daily/columns/greenview/displaystory.cfm?story_id=12405870

Living on the edge. More species of wildlife are under threat

http://www.economist.com/daily/chartgallery/displaystory.cfm?story_id=12332704&fsrc=rss

Time to invest in nature's capital

<http://news.bbc.co.uk/1/hi/sci/tech/7664280.stm>

Item 7. Technological Advances with Environmental Security Implications

7.1 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.

Military Implications:

The military should follow up on these techniques as they may become applicable to inexpensive devices that could be widely distributed for environmental surveillance for harmful organisms and chemicals.

Source:

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>

7.2 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”.

Military Implications:

The military should investigate this development to determine its applicability for environmental surveillance.

Sources:

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>

7.3 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.

Military Implications:

The military should follow this development for its application to power supplies for operational and environmental equipment.

Source:

Ion jelly could satisfy appetite for greener batteries

<http://technology.newscientist.com/article/dn14975-ion-jelly-could-satisfy-appetite-for-greener-batteries.html>

Item 8. Updates on Previously Identified Issues

8.1 Iraq Complains of After-conflict Environmental Hazards

“It will take centuries to restore the natural environment of Iraq” said Iraqi Environment Minister Nermeen Othman, referring to the environmental catastrophe caused by the conflict: unexploded bombs and 25 million land mines littering the land, hazardous waste and leaking poison of destroyed factories, chemical waste, rubble and trash, obliterated forests to remove the enemy’s hiding places, and chemical weapons and depleted uranium munitions that have created 105 contaminated areas. More than 60% of Iraq’s fresh water is polluted. Unless serious environmental remedial actions are performed, peace will be difficult even after the war ends. [See also *Iraqi Chemical Attack Victims Seek Compensation from Supplying Companies* in May 2006, *CCW Protocol V on Explosive Remnants of War Entered into Force* in November 2006, and other previous environmental security reports on similar issues.]

Military Implications:

Although the U.S. is not Party to Protocol V on Explosive Remnants of War, considering precedent liability and redress cases, some of the military contractors might be held responsible for various environmental damages caused during the Iraq war. Environmental restoration should be one of the top considerations in all military and their civilian contractors' withdrawal plans. Item 6, above, is also relevant.

Source:

Iraq scarred by war waste

<http://www.theglobeandmail.com/servlet/story/RTGAM.20081024.wiraqenvir1024/BNStory/International/home>

8.2 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.]

Military Implications:

Relevant military personnel should assess which areas would be affected by the EU export ban and an eventual global regulation on the use of mercury. Replacements will be needed.

Sources:

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>

8.3 Nuclear Security

8.3.1 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.]

8.3.2 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. [See also *IAEA Director's Recommendations to Improve Nuclear Safety* in September 2007 and other related items in previous environmental security reports.]

Military Implication:

The military should assess all the opportunities to facilitate the NPT negotiations and support the IAEA and international cooperation to improve global nuclear safety, as well as recommend policy, training, and institutional or physical changes needed to implement the recommendations.

Sources:

Joint Press Conference between Mr Gareth Evans and Ms Yoriko Kawaguchi, Co-Chairs, International Commission for Nuclear Non-proliferation and Disarmament

http://www.icnnd.org/media/joint_conf_211008.html

Statements of the Director General

<http://www.iaea.org/NewsCenter/Statements/2008/ebsp2008n010.html>

Rate of Nuclear Thefts 'Disturbingly High,' Monitoring Chief Says

http://www.nytimes.com/2008/10/28/world/28nuke.html?_r=1&ref=world&oref=slogin

IAEA Updates Nuclear Trafficking Database; Few Trends Seen in Information on Illicit Incidents

http://www.nti.org/d_newswire/issues/2008_9_29.html#802352F5

8.4 New Hazardous Substances to be Banned

8.4.1 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. [See also *New Chemicals Proposed to be Added to Stockholm Convention on POPs* in May 2005, and other related items in previous environmental security reports.]

The fourth meeting of the Conference of the Parties to the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (PIC COP-4) agreed on the inclusion of tributyltin compounds in Annex III of the Rotterdam Convention but did not reach consensus on the inclusion of chrysotile asbestos and endosulfan to the trade "watch list". Delegates also discussed implementation issues and cooperation among the Rotterdam, Basel and Stockholm Conventions. [See also *UN E-Waste Forum and Basel Convention's Conference of Parties* in December 2006 and other related items in previous environmental security reports.]

Military Implications

Although the U.S. is not Party to either the Stockholm or Rotterdam Conventions, it should be prepared to comply with their requirements when acting in countries Party. Thus, in addition to the preparation for phase-out of the already listed compounds, it should consider the military implications of the additional substances suggested for review and anticipate their replacement.

Sources:

New List of Hazardous Substances Spotlighted for International Action

<http://www.unep.org/Documents/Multilingual/Default.asp?DocumentID=548&ArticleID=5947&l=en>

Summary of the Fourth Meeting of the Persistent Organic Pollutants Review Committee of the Stockholm Convention (13-17 October 2008)

<http://www.iisd.ca/vol15/enb15161e.html>

Three Chemicals Considered for Trade 'watch list'

<http://www.unep.org/Documents.Multilingual/Default.asp?DocumentID=548&ArticleID=5953&l=en>

Rotterdam Convention COP4 Documents of the Conference of the Parties

<http://www.pic.int/home.php?type=b&id=138&sid=27&tid=41>

Rotterdam PIC COP 4 Highlights (Tuesday, 28 October 2008)

<http://www.iisd.ca/vol15/enb15165e.html>

8.4.2 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. [See also *Questions on Bisphenol A Risk Raised Again* in April 2008 environmental security report.]

Military Implications:

The military should institute or continue preparations for possible further restrictions on the use of these compounds.

Sources:

U.S. National Toxicology Program. Bisphenol A Evaluation

<http://cerhr.niehs.nih.gov/chemicals/bisphenol/bisphenol-eval.html>

3rd Largest U.S. Supermarket Chain to Ban Baby Bottles with Bisphenol-A

<http://www.thedailygreen.com/environmental-news/latest/bisphenol-a-47102204?src=rss>

Plastics industry behind FDA research on bisphenol A, study finds

<http://www2.jsonline.com/story/index.aspx?id=809282>

Male, interrupted

http://www.philly.com/inquirer/magazine/20081027_Male_interrupted.html

8.5 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 (SOx), nitrogen oxide (NOx), 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 NOx 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.]

Military Implications:

The Navy should be prepared to comply with new international anti-pollution regulations that may not exempt military craft. Transportation contract managers will need to prepare for these changes, with respect to bidder selection.

Sources:

Major progress on air pollution, ship recycling and ballast water management at IMO environment meeting

http://www.imo.org/Newsroom/mainframe.asp?topic_id=1709&doc_id=10268

IMO environment meeting finalizes ships recycling convention for adoption in 2009

http://www.imo.org/Newsroom/mainframe.asp?topic_id=1709&doc_id=10263

IMO environment meeting adopts revised regulations on ship emissions

http://www.imo.org/Newsroom/mainframe.asp?topic_id=1709&doc_id=10262

Tough Global Limits Imposed on Air Pollution from Large Ships

<http://www.ens-newswire.com/ens/oct2008/2008-10-13-01.asp>

8.6 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.]

Military Implications:

Military stationed on EU territory should prepare to comply with the new Batteries Directive under the respective national Status of Forces Agreements.

Source:

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>

8.7 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. [See also *Arctic Needs New International Regulations* in September 2008 and other related items in previous environmental security reports.]

Military Implications:

[Similar to previous on the same issue] Negotiations for clear international regulations concerning the Arctic region are accelerating. The likelihood of potential new military roles in the region increases, for both national security and protection of the ecosystems. Relevant military personnel should cooperate with their counterparts in other countries and international organizations for developing adequate strategies, regulations, and enforcement procedures.

Sources:

European Parliament resolution of 9 October 2008 on Arctic governance

<http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+TA+P6-TA-2008-0474+0+DOC+XML+V0//EN&language=EN>

Arctic governance: European Parliament deeply concerned about the effects of climate change
http://www.europarl.europa.eu/news/expert/briefing_page/39049-282-10-41-20081008BRI39048-08-10-2008-2008/default_p001c014_en.htm

Consensus on Arctic initiatives

http://arctic-council.org/article/2008/9/consensus_on_arctic_initiatives

8.8 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." [See also *International Alliance of Forest Peoples* in April 2008 and other related items in previous environmental security reports.]

Military Implications:

The military should assist anti-deforestation efforts wherever possible, and should be careful to remain aware of the rights of the inhabitant populations in its own forest-related activities.

Sources:

Forest Peoples' Rights Key To Reducing Emissions From Deforestation

<http://www.sciencedaily.com/releases/2008/10/081015110238.htm>

Barcelona sets environment action agenda

http://www.iucn.org/news_events/events/congress/index.cfm?uNewsID=1946

8.9 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. [See also *Micronesian Nations Sign Coral Reef Protection Document* in September 2007 environmental security report.]

Military Implications:

The military should stay in contact with this program, in order to take possible future related environmental restrictions into account in planning and conducting activities in the area.

Source:

Asia's Coral Triangle could get protection

<http://www.msnbc.msn.com/id/27340356/>

8.10 Climate Change

8.10.1 Scientific Evidences

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.

8.10.2 Food and Water Security

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.

8.10.3 Migration

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.

8.10.4 Melting Glaciers and Sea Ice

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.

8.10.5 Rising Sea Levels

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.

8.10.6 Post-Kyoto Negotiations

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 14th Conference of the Parties to U.N. Framework Convention on Climate Change (COP14)

Military Implications:

The military should identify all its resources and programs for reducing GHGs and responding to effects of climate change, update information continuously, forecast how it may be called upon for both mitigation and adaptation, and perform a gap analysis in anticipation for future requests. International discourse over climate change increases the emergence of international policies trying to tackle the causes and develop strategies to mitigate climate change effects.

Sources: (see a more expanded list in the [Appendix](#))

Vital Signs Update: Weather-Related Disasters Dominate

<http://www.worldwatch.org/node/5452>

Climate Change: faster, stronger, sooner

http://assets.panda.org/downloads/wwf_science_paper_october_2008.pdf

Three billion Asians face food crisis threat

<http://www.manchester.ac.uk/aboutus/news/display/?id=4097>

Thais to barter rice for oil with Iran

<http://www.ft.com/cms/s/0/c47190fe-a452-11dd-8104-> (Free, limited subscription required.)

Financial Meltdown Worsens Food Crisis. As Global Prices Soar, More People Go Hungry

<http://www.washingtonpost.com/wp-dyn/content/article/2008/10/25/AR2008102502293.html>

(Free subscription available.)

First council since Second World War set up to look at food security

<http://www.telegraph.co.uk/earth/main.jhtml?view=DETAILS&grid=&xml=/earth/2008/10/06/eafood106.xml>

Sinking Tuvvalu wants our help as ocean levels rise

<http://www.news.com.au/perthnow/story/0,21598,24446057-948,00.html>

Arctic Report Card 2008

<http://www.arctic.noaa.gov/reportcard/index.html>

State of the World's Cities Report 2008/09: Harmonious Cities

<http://www.unhabitat.org/content.asp?cid=5964&catid=7&typeid=46&subMenuId=0>

The heat is on – climate change gathers pace faster than scientists expected

http://www.panda.org/about_wwf/where_we_work/europe/news/index.cfm?uNewsID=148141

8.11 Nanotechnology Safety Issues

Detailed descriptions of the following nanotechnology safety issues are in the [Appendix](#)

- Russia launched NANOCERTIFICA, the Russian Federation's first certification system for industrial nanotechnology production. ([more](#))
- New batteries raise health/safety worries about lithium nanoparticles, warns the Project on Emerging Nanotechnologies at the Wilson Center ([more](#))
- Environmental effects from nanomaterial production may outweigh its benefits, found some scientists ([more](#))
- An Indian National Conference on Nanotechnology and Regulatory Issues is scheduled for January 2009 to debate issues relating to nanotechnology regulation in India. ([more](#))

Military Implications:

[Same as previous on this issue] Relevant military personnel should review the information generated by such activities to improve military and contractor practices, as well as to assist and cooperate with the organizations working on those issues for enriching their studies.

Sources:

Russia introduces NANOCERTIFICA, its own nanotechnology certification system

<http://www.nanowerk.com/news/newsid=7893.php>

Lithium-ion Nanomaterial Batteries: Our new hope with a dose of caution

<http://www.nanotech-now.com/columns/?article=250>

Nanomaterials May Have Large Environmental Footprint

<http://www.physorg.com/news143907040.html>

National Conference on Nanotechnology and Regulatory Issues

<http://www.scidev.net/en/announcements/national-conference-on-nanotechnology-and-regulato.html>

Item 9. Reports and Information Suggested for Review

9.1 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.

Military Implications:

The military should use the ecological footprint tools to assess and reduce their ecological impact.

Sources:

Global Footprint Network, World Footprint

http://www.footprintnetwork.org/en/index.php/GFN/page/world_footprint/

September 23 is Earth Overshoot Day

http://www.footprintnetwork.org/gfn_sub.php?content=overshoot

The heat is on – climate change gathers pace faster than scientists expected

http://www.panda.org/about_wwf/where_we_work/europe/news/index.cfm?uNewsID=148141

Where the wild things are

http://www.economist.com/research/articlesBySubject/displayStory.cfm?story_id=12332923&subjectID=348924&fsrc=nwl

Database:

<http://biodiversityinfo.org/ibat/>

9.2 *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.

Military Implications:

Juxtaposing the maps of the human security atlas with the environmental stress-prone zones, might give important planning information on regions likely to suffer future conflict situations.

Source:

miniAtlas of Human Security

<http://www.miniatlasofhumansecurity.info/en/>

9.3 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.

Military Implications:

The military should consider consulting the conference outcomes to obtain information on possible wearable environmental sensing systems.

Sources:

International Symposium on Wearable Computing

<http://www.iswc.net/>

APPENDIX

Reference Details

This Appendix contains expanded background information on some items.

8.10 Climate Change

Sources: (a more expanded list)

Vital Signs Update: Weather-Related Disasters Dominate

<http://www.worldwatch.org/node/5452>

Climate Change: faster, stronger, sooner

http://assets.panda.org/downloads/wwf_science_paper_october_2008.pdf

The heat is on – climate change gathers pace faster than scientists expected

http://www.panda.org/about_wwf/where_we_work/europe/news/index.cfm?uNewsID=148141

World Rice Demand to Climb on Credit Crisis, Slowdown

<http://www.bloomberg.com/apps/news?pid=20601087&sid=aZp21kqyJD.U&refer=home>

Somalia: Poor rains intensify human suffering and deprivation

<http://www.irinnews.org/Report.aspx?ReportId=80971>

Food Crisis- A National Disaster

http://www.radiovop.com/index.php?option=com_content&task=view&id=4212&Itemid=755

Food and water shortages trigger conflict in Kenya

<http://www.alertnet.org/thenews/fromthefield/218926/f28a4a33af5d0af760c1086041fcff72.htm>

Three billion Asians face food crisis threat

<http://www.manchester.ac.uk/aboutus/news/display/?id=4097>

Spiking food prices erase years in the fight against hunger

<http://www.thestar.com/News/World/article/525609>

Thais to barter rice for oil with Iran

<http://www.ft.com/cms/s/0/c47190fe-a452-11dd-8104->

Spiking food prices erase years in the fight against hunger

<http://www.thestar.com/News/World/article/525609>

Financial Meltdown Worsens Food Crisis. As Global Prices Soar, More People Go Hungry

<http://www.washingtonpost.com/wp-dyn/content/article/2008/10/25/AR2008102502293.html>

Abdullah: Tackle global food crisis with urgency

http://www.nst.com.my/Current_News/NST/Sunday/Frontpage/2385749/Article/index_html

Asia, Europe Seek Stronger Int'l Efforts to Fight Crisis

http://www.istockanalyst.com/article/viewiStockNews+articleid_2738431.html

First council since Second World War set up to look at food security

<http://www.telegraph.co.uk/earth/main.jhtml?view=DETAILS&grid=&xml=/earth/2008/10/06/eafood106.xml>

Sea of Galilee drought threat

http://news.bbc.co.uk/2/hi/middle_east/7652184.stm

Water everywhere but not enough to drink. (Dhaka New Nation. 27 October 2008)

<http://nation.ittefaq.com/issues/2008/10/27/news0311.htm>

Water wars hit rural Zimbabwe.

<http://www.ipsnews.net/africa/nota.asp?idnews=44294>

Greenpeace: Climate change threatens China's food safety.

http://www.chinadaily.com.cn/china/2008-10/16/content_7110613.htm

Sinking Tuvalu wants our help as ocean levels rise

<http://www.news.com.au/perthnow/story/0,21598,24446057-948,00.html>

Tuvalu refugees 'last resort'

<http://www.news.com.au/adelaidenow/story/0,27574,24553193-2682,00.html>

Arctic Report Card 2008

<http://www.arctic.noaa.gov/reportcard/index.html>

Arctic air temperatures climb to record levels

<http://www.alertnet.org/thenews/newsdesk/N16418704.htm>

Report says Arctic temperatures at record highs

http://seattlepi.nwsource.com/national/1501ap_sci_state_of_the_arctic.html

Arctic sea ice thinning at record rate

http://www.esa.int/esaEO/SEMTGPRTKMF_planet_0.html

The heat is on – climate change gathers pace faster than scientists expected

http://www.panda.org/about_wwf/where_we_work/europe/news/index.cfm?uNewsID=148141

How green was my valley? Climate change will only intensify problems in Kashmir

http://www.economist.com/world/asia/displaystory.cfm?story_id=12480378

The heat is on – climate change gathers pace faster than scientists expected

http://www.panda.org/about_wwf/where_we_work/europe/news/index.cfm?uNewsID=148141

State of the World's Cities Report 2008/09: Harmonious Cities

<http://www.unhabitat.org/content.asp?cid=5964&catid=7&typeid=46&subMenuId=0>

Few coastal cities to be spared by climate change according to UN-HABITAT's new State of the World's Cities Report 2008/9: Harmonious Cities

<http://www.unhabitat.org/downloads/docs/presskitsowc2008/PR%204.pdf>

Coastal areas facing danger—UN. The Citizen, October 27th

<http://thecitizen.co.tz/newe.php?id=8337>

Sea-level rise threat to coast. Sydney Morning Herald. 29 October 2008

<http://www.smh.com.au/news/environment/global-warming/sealevel-rise-threat-to-coast/2008/10/28/1224956039688.html?page=fullpage#contentSwap1>

Rising sea could flood 700,000 homes.

<http://www.theage.com.au/environment/rising-sea-could-flood-700000-homes-20081016-52es.html>

Climate change could affect Dubai coast radically

<http://www.gulfnews.com/nation/Environment/10254502.html>

Bangladesh: a floating future.

<http://www.alertnet.org/thenews/newsdesk/IRIN/ba24b5890afb932506997d5ef105cac9.htm>

BANGLADESH: When climate change gives you a sinking feeling

<http://www.irinnews.org/Report.aspx?ReportId=81079>

Jakarta sinks as citizens tap groundwater

<http://www.reuters.com/article/homepageCrisis/idUSSP132560>. CH .2400

RPT-FEATURE-Shanghai highrises could worsen rising seas threat

<http://www.reuters.com/article/homepageCrisis/idUSSP280958>. CH .2400

Japan drafts replacement for Kyoto Protocol

<http://mdn.mainichi.jp/mdnnews/news/20080927p2a00m0na001000c.html> (alternate link

<http://www.zibb.com/article/4055041/Japan+drafts+replacement+for+Kyoto+protocol>)

8.11 Nanotechnology Safety Issues

Detailed descriptions of the nanotechnology safety issues:

8.11.1 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".

Military Implications:

Appropriate military representatives in Moscow should contact the Russian Corporation of Nanotechnologies to establish liaison with this new institution in order to exchange ideas on nanotechnology risk assessment.

Source:

Russia introduces NANOCERTIFICA, its own nanotechnology certification system

<http://www.nanowerk.com/news/newsid=7893.php>

8.11.2 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.

Military Implications:

The military should closely follow any investigations into this problem, and take results into account in risk assessment for these units.

Source:

Lithium-ion Nanomaterial Batteries: Our new hope with a dose of caution

<http://www.nanotech-now.com/columns/?article=250>

8.11.3 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.

Military Implications:

The military should closely follow any investigations into this problem, and take it into account the risk assessments.

Source:

Nanomaterials May Have Large Environmental Footprint

<http://www.physorg.com/news143907040.html>

8.11.4 Indian Conference on Nanotechnology and Regulatory Issues (MEETING)

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.

Military Implications:

Members of the military in South Asia and concerned with environmental and regulatory aspects of nanotech should consider attending this meeting, to learn about the current state of these topics in India.

Source:

National Conference on Nanotechnology and Regulatory Issues

<http://www.scidev.net/en/announcements/national-conference-on-nanotechnology-and-regulato.html>