

**WORLDWIDE EMERGING ENVIRONMENTAL ISSUES AFFECTING THE U.S. MILITARY**  
Subcontract No: 1048, LMI Task No: MAN0B.04, for the U.S. Army Environmental Policy Institute

**APRIL 2011 REPORT**

Note to Readers: Pages 1-14 comprise the summary and analysis of this report. Expanded details for some items are in the Appendix beginning on page 15.

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### **Item 1. Gordon Brown Calls for Reform of Global Bodies to Address 21<sup>st</sup> Century Challenges, including Climate Change**

UK former prime minister (and allegedly aspiring IMF Director) Gordon Brown said that global bodies, including the UN and the World Bank, should be reformed and adapted to the challenges of the 21<sup>st</sup> century, including those induced by climate change. He is calling for a new “global ethic” and international institutions with a greater democratic mandate, able to address environmental problems and economic and political structures that threaten to lead to mass migration, conflict, and terrorism. [Related item: *UK Initiates UN Security Council Debate on Climate Change and Security* in the April 2007 report.]

#### **Military Implications:**

The military should begin to develop its preferred environment security roles within potential changes in the international governance systems.

#### **Source:**

Gordon Brown calls for reform of global bodies including IMF and UN  
<http://www.guardian.co.uk/politics/2011/apr/19/gordon-brown-reform-imf-un>

### **Item 2. Draft UN Treaty for “Rights of Mother Earth”**

Bolivia is preparing a draft UN treaty on the Rights of Mother Earth, similar to that on human rights. The treaty aims to institute 11 rights protecting nature from human intervention, ranging from the right to clean water and air, to unaltered vital cycles and equilibrium, and the right of not being genetically modified. It builds upon President Morales’s proposal in January 2010 for an international court for environmental crimes and the “Rights of Mother Earth”, as well as a Bolivia-led UN resolution in 2009 that proclaimed April 22<sup>nd</sup> International Mother Earth Day

#### **Military Implications:**

Bolivia’s proposal might result in at least a resolution with moral pressures for voluntary compliance. This is another step in rising world environmental consciousness and illustrates reasons to support the Army Strategy for the Environment.

#### **Sources:**

Bolivia enshrines natural world’s rights with equal status for Mother Earth  
<http://www.guardian.co.uk/environment/2011/apr/10/bolivia-enshrines-natural-worlds-rights>  
UN resolution looks to give “Mother Earth” same rights as humans  
<http://www.nationalpost.com/m/story.html?id=4597992>  
UN Press Release (International Mother Earth Day 2011)  
<http://www.un.org/apps/news/story.asp?NewsID=38157&Cr=sustainable+development&Cr1>

### **Item 3. International Database to Help Protect the Public and Environment in Conflicts**

The International Committee of the Red Cross (ICRC) has begun updating an online database of national practices related to customary international humanitarian law (*unwritten rules derived from a general or common State practice generating a custom, which is regarded as legally binding*). The database is being built by identifying national practices in military manuals, national legislation, case law, and official statements and reports. The first selection of 30

countries has been updated. Another 100 countries are expected to be available by mid-2012. The updates cover state rules relevant to a range of issues from the use of weapons to use of the environment in military operations. Since conflicts are increasingly more likely to be internal then transborder, customary law (rather than international treaties) becomes increasingly important for improving protection of the public and the environment in military operations. [Related item: *International Guidance on the Treatment of Individuals in War May Eventually Guide International Standards on the Treatment of the Environment in War* in June 2009 report.]

### **Military Implications:**

Commanders in foreign operations should be made aware of this database to inform local planning and for potential additions to the database. The ICRC database might also be used to identify national and international patterns that could lead to new regulations. Part of the database is organized into 161 rules of customary international humanitarian law. Rules 43, 44, and 45 refer to protection of the natural environment in military operations. These should be monitored by military personnel with environmental security responsibilities.

### **Sources:**

Improving people's protection in war

<http://www.icrc.org/eng/resources/documents/news-release/2011/customary-law-news-2011-03-28.htm>

Practice by country

[http://www.icrc.org/customary-ihl/eng/docs/v2\\_cou](http://www.icrc.org/customary-ihl/eng/docs/v2_cou)

## **Item 4. Earthquake Monitoring and Models to aid Developing Country Policy**

Several initiatives to improve environmental security in developing countries were presented during the annual meeting of the Seismological Society of America in Memphis, April 13–15. One was a draft guide for networks of seismological monitoring centers in developing countries to help reduce risks to humans and environment. The AfricaArray has 40 stations in 15 countries collecting seismic data. It is expected to expand its recording to weather and GPS data, which would help monitor groundwater levels and collect atmospheric data for improving climate modeling. The Earthquake Model of the Middle East Region (EMME) is expected to be finished by early 2013. It will offer an assessment of potential earthquake risks and damages.

### **Military Implications:**

Relevant military personnel should explore use of these tools and consider collaboration with policymakers for engaging them in using the seismological monitoring networks and earthquake vulnerability models in collaboration with policymakers in developing countries to improve environmental security.

### **Sources:**

'How-to' guide will boost seismic networks in Africa

<http://www.scidev.net/en/news/-how-to-guide-will-boost-seismic-networks-in-africa.html>

Earthquake model could help reduce risks in Middle East

<http://www.scidev.net/en/agriculture-and-environment/earth-science/news/earthquake-model-could-help-reduce-risks-in-middle-east-1.html>

Chinese satellite seeks to predict earthquakes

<http://www.scidev.net/en/news/chinese-satellite-seeks-to-predict-earthquakes.html>

### **Item 5. Improving S&T Collaboration in Latin America and the Caribbean**

The second high-level meeting on Science and Technology in Latin America was held in Guanajuato, Mexico, March 24-25, 2011. Science ministers and representatives of 18 Latin American and Caribbean countries adopted a plan for pilot programs on climate change, energy and food security, and biodiversity issues. Other objectives are expected to be discussed at the third meeting, to be held in Rio de Janeiro, Brazil, in March 2012. In the meantime, the European Union–Latin America and Caribbean Joint Initiative for Research and Innovation held its first meeting of senior officials from 20 Latin American and Caribbean countries and 12 European countries as well as of the European Commission and the European External Action Service in Brussels, March 28-29. In the framework of developing the EU-LAC Knowledge Area, participants agreed on three thematic working groups: bioeconomy including food security, biodiversity and climate change, and ICTs, and are exploring a possible fourth group on energy.

#### **Military Implications:**

SOUTHCOM and other relevant military personnel should consider seeking collaboration with EU-LAC innovation programs for encouraging research that could address environmental and other security issues. One focus could be improving safeguards over poorly regulated labs that could pose environmental threats.

#### **Sources:**

Latin American countries join forces on innovation

<http://www.scidev.net/en/news/latin-american-countries-join-forces-on-innovation.html>

Policy framework. Latin America, the Caribbean, the European Union’s Member States and the European Commission (EU-LAC/ALCUE)

<http://ec.europa.eu/research/iscp/index.cfm?lg=en&pg=latin-america-carib-2>

### **Item 6. Potential Nightmare in Antibiotic-Resistant Bacteria in New Delhi Water Supply**

A team of researchers from Cardiff University has discovered New Delhi metallo-beta-lactamase 1 (NDM-1)-producing bacteria in New Delhi’s water supply; reportedly, the first time found outside a hospital. NDM-1 is a gene enabling some types of bacteria to be resistant to a large variety of antibiotics, and has the ability to jump from one bacterium to another. Its transmission is dramatically increased in public water supply and open sewers. The NDM-1 gene was also found in Puna, India. The World Health Organization has described the spread of such ‘superbugs’ as a “nightmare scenario” and that it might return the world to the pre-penicillin era. However, PolyMedix, Inc. claims its drug, PMX-30063, “has shown activity in an *in vitro* laboratory test against the NDM-1 drug resistant strain of *Klebsiella pneumoniae*.”

#### **Military Implications:**

Considering India’s falling water tables, increasing water pollution, decreasing river flows, and increasing population density, contamination of drinking water sources with antibiotic-resistant bacteria is a serious environmental security issue. As possible, military biosecurity personnel should liaise with counterparts in India along with relevant WHO and CDC officials to assist in preventing NDM-1 spread.

**Sources:** (an expanded list is available in the [Appendix](#))

Dissemination of NDM-1 positive bacteria in the New Delhi environment and its implications for human health: an environmental point prevalence study

[http://www.thelancet.com/journals/laninf/article/PIIS1473-3099\(11\)70059-7/abstract](http://www.thelancet.com/journals/laninf/article/PIIS1473-3099(11)70059-7/abstract)

UK could face a 'nightmare scenario' due to rise of superbugs

<http://www.thisislondon.co.uk/standard/article-23939284-uk-could-face-a-nightmare-scenario-due-to-rise-of-superbugs.do>

PolyMedix Defensin-Mimetic Antibiotic PMX-30063 Active Against NDM-1 Drug-Resistant Bacteria

<http://www.businesswire.com/news/home/20110428005220/en/PolyMedix-Defensin-Mimetic-Antibiotic-PMX-30063-Active-NDM-1-Drug-Resistant>

## **Item 7. Conferences Reflect Increasing International Efforts to Prevent the Militarization of Space**

As the world marked the 50<sup>th</sup> anniversary of Russian cosmonaut Yuri Gagarin's first manned flight into outer space, and the retiring of the U.S. space shuttle program, dual conferences hosted at the United Nations Institute for Disarmament Research focused on space-security. Both were largely dedicated to debating the need for international instruments to prevent the weaponization of space. While the Russian Duma released a statement warning against the use of space-based WMDs, some conference attendees went further, calling for the existing definition of 'space weapons' to be broadened from strictly WMDs, to include conventional armaments and acts that interfere with other space objects. International consensus is converging around a Russian-led initiative to elicit concrete proposals for Transparency and Confidence Building Measures (TCBMs), which some consider an intermediary step toward a more comprehensive and verifiable international treaty. Moscow has called upon the UN Secretary-General to establish an international consortium of governmental experts to study the issue commencing in 2012. China, by contrast, issued a white paper on March 31, 2011, "China's National Defense in 2010," as a comprehensive public statement of its defense posture. In it, Beijing asserts that TCMBs do not substitute for a non-weaponization treaty and called for a more stringent and enforceable international regime. In the meantime, the People's Republic unveiled plans to build a 60-ton space station to be completed in 2020 and to develop a cargo spaceship to transport supplies. Pakistan also declared space security an "imperative" saying the militarization of space must be prevented. Additionally, civil society activists, NGOs, and other advocacy groups have begun to take up the cause of space security and are attempting to reframe the debate away from traditional military aspects and focus, instead, on implications for human security and development.

### **Military Implications:**

Russia's openness to the establishment of TCBM's in contrast to China's insistence on an enforceable treaty may signal a weakening of Sino-Russian cooperation on space policy. However, should the UN take up Russia's call to establish a working-group to craft new TCBM's by 2013, the military can expect further international rallying around proposals that will seek to diminish the U.S.'s lead in space. Coupled with strategic public awareness campaigns fielded by international NGOs and others, the policy climate that currently benefits the U.S. is likely to become increasingly constrained.

Technical capabilities that will enable monitoring of space assets and more accurately pin-point satellite orbits—such as global ground-based reference emitters and payloads on commercial geostationary satellites—were proposed as tools to support an international

disarmament verification regime. This opens the door for commercial space initiatives to be brought further under the rubric of international controls, potentially impacting future commercial-military defense partnerships, or for commercial efforts by other nations to circumvent international constraints on military-led space efforts.

**Sources:**

UNIDIR seminar on The Conference on Disarmament and the Prevention of an Arms Race in Outer Space

[http://www.unidir.ch/bdd/fiche-activite.php?ref\\_activite=59](http://www.unidir.ch/bdd/fiche-activite.php?ref_activite=59)

UNIDIR annual conference on space security

[http://www.unidir.ch/bdd/fiche-activite.php?ref\\_activite=599](http://www.unidir.ch/bdd/fiche-activite.php?ref_activite=599)

Countdown begins for space station program

[http://www.chinadaily.com.cn/china/2011-04/26/content\\_12393158.htm](http://www.chinadaily.com.cn/china/2011-04/26/content_12393158.htm)

Russian Lawmakers to Warn Against Space-Based WMD

[http://gsn.nti.org/gsn/nw\\_20110411\\_2563.php](http://gsn.nti.org/gsn/nw_20110411_2563.php)

## **Item 8. Technological Advances with Environmental Security Implications**

### **8.1 New Detection and Cleanup Techniques**

#### 8.1.1 New Coating Detects and Deactivates Peroxide-based Explosives

A team led by Prof. Allen Apblett of the Dept. of Chemistry, Oklahoma State Univ., has reported on the development of a spray-on coating that changes color and conductivity in the presence of vapors (as low as 50 ppm) from peroxide-based explosives, such as the triacetone triperoxide (TATP) liquids favored by terrorists posing as aircraft passengers. The material, which contains molybdenum oxide nanoparticles, also neutralizes the explosive.

**Military Implications:**

This development adds a valuable tool to the set of detectors for hazards in the environment.

**Source:**

New nanomaterial can detect and neutralize explosives

[http://portal.acs.org/portal/PublicWebSite/pressroom/newsreleases/CNBP\\_026970](http://portal.acs.org/portal/PublicWebSite/pressroom/newsreleases/CNBP_026970)

#### 8.1.2 Battery-less Chemical Detector

Lawrence Livermore Laboratory researcher Yinmin “Morris” Wang and colleagues and collaborators have developed a chemical sensor technology in which semiconductor nanowire structures develop characteristic output voltages when exposed to organic chemical reagents, thereby eliminating the need for batteries in a sensing device. Testing has been done with 15 different types of solvents.

**Military Implications:**

This technology, if developed sufficiently for field use, could yield simpler and highly portable detection devices.

**Source:**

Livermore researchers develop battery-less chemical detector

<http://www.llnl.gov/news/newsreleases/2011/Apr/NR-11-04-02.html>

### 8.1.3 Potable Water Purification Techniques

Jonathan Liow, now a Product Designer at Kincrome Australia Pty Ltd, Victoria, Australia, has developed an ingenious plastic device, which uses sunlight to evaporate water from any source. He then collects the condensed contaminant-free vapor in a container, for drinking or other use. The unit is reportedly capable of producing 3 liters of potable water per day.

Prof. Joel Pawlak, of the Dept. of Forest Biomaterials at NC State Univ., and colleagues have reported on the development of a foam product that removes contaminants such as heavy metals or salt from water. According to an announcement, the material is, "...a combination of hemicellulose, a byproduct of forest materials, and chitosan, crustacean shells that have been crushed into a powder".

#### **Military Implications:**

These techniques could provide very simple and inexpensive water purification in areas where clean drinking water is a problem.

#### **Sources:**

Student-designed Solarball creates drinkable water

<http://www.gizmag.com/solarball-creates-drinkable-water/18270/>

NC State Develops Material To Remove Radioactive Contaminants From Drinking Water

<http://news.ncsu.edu/releases/cbpawlakwater/>

### 8.2 New Battery Runs on Saline and Fresh Waters

Researchers, led by Dr. Yi Cui of Stanford Univ., have announced the development of a battery that generates electricity from the imbalance of salinity in fresh water and seawater, such as can be found at river mouths. The unit is based on nanorod electrodes, one silver, containing  $\text{Cl}^{-1}$  ions, and one of manganese dioxide, containing  $\text{Na}^{+1}$  ions. Their design, by eliminating membranes, improves costs compared to previous devices.

#### **Military Implications:**

This development should be explored for its potential as an efficient source of renewable energy.

#### **Sources:**

New entropy battery pulls energy from difference in salinity between fresh water and seawater

<http://www.physorg.com/news/2011-03-entropy-battery-energy-difference-salinity.html>

Batteries for Efficient Energy Extraction from a Water Salinity Difference

<http://pubs.acs.org/doi/abs/10.1021/nl200500s>

### 8.3 New Modeling Tool Provides Urban Air Quality Prediction

A recent paper reports on a new technique for comparing and predicting air quality in cities (Helsinki and Thessaloniki were studied). The study combines principal component analysis and artificial neural networks to analyze atmospheric data (e.g., particulate matter, nitrogen oxides, and ozone) and to make air quality predictions. The study is funded by the European Seventh Framework Programme (EU FP7) under the COST ES0602 and TRANSPHORM projects, while the modeling tool should support enforcing the Clean Air for Europe (CAFE) initiative and directive.

**Military Implications:**

The modeling tool could be of assistance in assessing causes and tackling problems of urban air pollution and hence could be used to assess alternative ways to help reduce military activities' footprint on air quality.

**Source:**

Improved prediction of urban air quality through 'neural' networks

<http://ec.europa.eu/environment/integration/research/newsalert/pdf/236na5.pdf>

**Item 9. Updates on Previously Identified Issues****9.1 Climate Change**9.1.1 Scientific Evidence and Natural Disasters

The oceans capture around 30% of CO<sub>2</sub> emissions, therefore apparently slowing global warming caused by GHGs. However, as temperatures rise and the world's oceans warm, CO<sub>2</sub> might bubble back into the atmosphere, amplifying the greenhouse effect. A new study based on climate records from the end of the last ice age found that this phenomenon is likely to begin in 200 years or even less, compared to 400-1300 years as previously thought, says Tas van Ommen from the Australian Antarctic Division, in Hobart, who led the study.

9.1.2 Food and Water Security

"Food security is becoming more and more also an issue of national security," says Franz Fischler, former EU agriculture commissioner and candidate to head FAO.

The FAO calls for food security to be included as an indicator of vulnerability to climate change and for the global adaptation architecture to have a greater emphasis on slow-onset impacts of climate change. The submission to the United Nations Framework Convention on Climate Change (UNFCCC) secretariat highlights the impacts of slow-onset climate change on food production. It also highlights the need for climate-resilient staple food varieties to be developed and for the collection and sharing of plant genetic materials, while at the same time respecting breeders' and farmers' rights. The submission will be considered by the 14<sup>th</sup> session of the Ad Hoc Working Group on Long-term Cooperative Action under the Convention (AWG-LCA 14).

Food prices in Asia have increased an average of about 10% already in this calendar year. If prices remain at current levels, an additional 64 million people could be pushed below the poverty income threshold of \$1.25 per person a day, warns the Asian Development Bank (ADB). ADB also notes that economic growth in the region could be reduced by up to 1.5% should the global food and oil price hikes seen in early 2011 persist for the remainder of the year.

The availability of phosphorus and nitrogen fertilizers needed for sustained commercial agriculture is threatened by steadily diminishing resources of natural gas and phosphate rock. A recent study suggests that to secure a long-term affordable food supply, policy intervention is needed to conserve these essential resources. Experts warn that access problems or shortages of these resources may lead to future conflicts. Although reserves of phosphate rock are thought to be available for another 300-400 years, alternatives and regulations concerning their ownership and use should be considered, suggests a study on fertilizers' availability.

### 9.1.3 Migration

The UN High Commissioner for Refugees estimates that the total number of refugees worldwide at the end of 2009 was 15.2 million, while the total number of people displaced (including within their own countries) was about 43.3 million. It turned out that the forecast of 50 million climate refugees by 2010 was a high overestimate. Hence, the prediction by Professor Myers of the up to 200 million people potentially uprooted by climate change by 2050 is also questioned. However, new long-term forecasts are not yet available, since behavior and demographic patterns are still being studied. A Humanitarian Emergency Response Review estimates that around 375 million people will be affected by climate-related disasters every year by 2015 and many more by other ‘rapid onset’ emergencies and the impact of conflicts.

The Social Conflict in Africa Database (SCAD) launched by the Climate Change and African Political Stability program aims to help researchers and policymakers assess conflict patterns and intervention strategies. It includes over 6,300 social conflict events from the period 1990-2009 with details on the, “...location, timing, and magnitude of the events, as well as the actors, targets, issues of contention, and government response.” The pattern shows more social conflicts in years that were extremely wet or dry than in years of normal rainfall.

### 9.1.4 Adaptation

"Boots on the Ground" is a new initiative of UNDP to train Least Developed Country leaders in climate-resilient development. Along the same lines, the UN report “Compact for Inclusive Growth and Prosperity” finds that in order to close the gap between LDCs and the rest of the world, structural limitations of LDCs must be addressed. It outlines objectives and targets for a new Programme of Action, including Small Island developing States and climate change.

The African Working Group on Disaster Risk Reduction, the UN International Strategy for Disaster Reduction, and the African Union agreed to accelerate implementation of the extended program of action for the implementation of the Africa Regional Strategy for Disaster Risk Reduction (2006-2015), in line with the Hyogo Framework for Action. The extended program of action covers emerging trends and challenges, linking disaster risk reduction and climate change adaptation.

### 9.1.5 Negotiations for a Post-Kyoto GHG-emissions Reduction Treaty

Delegates at the Climate Change talks held in Bangkok, Thailand, April 3-8, 2011, adopted an agenda and organization of work for 2011, to enable the Ad Hoc Working Groups to exercise their mandates in preparing the COP 17, to be held in December 2011, in Durban, South Africa.

China’s chief negotiator to UN climate change talks said that his country is drafting a special law dedicated to climate change suitable for China. Similarly, India’s Environment and Forests Minister Jairam Ramesh said that actions taken domestically and internationally should be “delinked.” He underlined that environmental security is important due to domestic concerns rather than growing international pressures, and noted, “...there are environmental laws and legislations in the country but the onus is on the corporate sector to adhere to them”, and, “while growth brings development at the macro level, it incurs costs at the micro level”.

#### **Military Implications:**

[Same as previous on this issue] 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 might be called upon for both mitigation and adaptation, and perform a gap

analysis in anticipation of future requests. International discourse over climate change is increasing the development of international policies and strategies to mitigate and adapt to climate change.

**Sources:** (see an expanded list in the [Appendix](#))

Warmer oceans release CO<sub>2</sub> faster than thought

<http://www.newscientist.com/article/dn20413-warmer-oceans-release-co2-faster-than-thought.html>

Food security key to global peace: FAO candidate

<http://www.reuters.com/article/2011/04/26/us-usa-fao-chief-idUSTRE73P7I120110426>

Soaring Food Prices Again Threaten to Push Millions of Asians into Poverty – ADB

<http://www.adb.org/Media/Articles/2011/13534-asian-food-prices/>

Fertiliser resource limitations: recycling for food security

<http://ec.europa.eu/environment/integration/research/newsalert/pdf/236na2.pdf>

The origins of the 50 million climate refugees prediction

<http://asiancorrespondent.com/53023/the-origins-of-the-50-million-climate-refugees-prediction/>

Humanitarian Emergency Response Review

<http://www.dfid.gov.uk/emergency-response-review>

Social Conflict in Africa Database: [www.scaddata.org](http://www.scaddata.org)

UNDP Project Builds Capacity of Climate Policy Advisors in LDCs

<http://climate-1.iisd.org/news/undp-project-builds-capacity-of-climate-policy-advisors-in-lDCs/>

African Working Group agrees to implement the Strategy for disaster risk reduction

<http://www.unisdr.org/news/v.php?id=18754>

Summary of the Bangkok Climate Talks. 3-8 APRIL 2011

<http://www.iisd.ca/vol12/enb12499e.html>

China drafting special law on climate change: official

[http://news.xinhuanet.com/english2010/china/2011-04/27/c\\_13847244.htm](http://news.xinhuanet.com/english2010/china/2011-04/27/c_13847244.htm)

Environment not a cost but intrinsic to biz: Ramesh

<http://www.indianexpress.com/news/environment-not-a-cost-but-intrinsic-to-biz/773956/>

## 9.2 Arctic Ozone Depletion Highest on Record

Ozone loss over the Arctic has reached a record 40% from the beginning of the winter to late March 2011, reveals a UNEP-WMO Ozone depletion assessment. Continuing presence of ozone-depleting substances in Earth's atmosphere and extremely cold temperatures in the stratosphere are the main causes, says the WMO. Although this winter the Arctic was warmer than average at ground level, it was colder in the stratosphere than in a normal Arctic winter. The European Space Agency (ESA) also announced that its Envisat satellite has measured record low levels of ozone over the Euro-Atlantic area during March. The Eighth Meeting of the Ozone Research Managers of the Parties to the Vienna Convention for reviewing ongoing national and international research and monitoring programmes to ensure the proper coordination of these programmes and to identify gaps that need to be addressed will occur May 2-4, 2011, in Geneva, Switzerland. [Related item: *More Aggressive Action Needed to Curb Ozone Depletions* in January 2011 report.]

### Military Implications:

It is likely that the new record ozone depletion will trigger better implementation and enforcement of regulations banning ozone-depleting chemicals. The military and its contractors should prepare to comply with new strictures and other chemicals' phase-outs. Also, since

military presence in the Arctic is increasing and lower levels of ozone are dangerous for human skin, increased attention should be paid to related health issues and UV protection worldwide.

**Sources:**

First North Pole Ozone Hole Forming?

<http://news.nationalgeographic.com/news/2011/03/110321-ozone-layer-hole-arctic-north-pole-science-environment-uv-sunscreen/>

Revealing the hole truth on our wacky weather

<http://www.smh.com.au/national/revealing-the-hole-truth-on-our-wacky-weather-20110422-1drgo.html>

Record loss of ozone over Arctic

[http://www.esa.int/esaCP/SEMIF24SZLG\\_index\\_0.html](http://www.esa.int/esaCP/SEMIF24SZLG_index_0.html)

Eighth Meeting of the Ozone Research Managers of the Parties to the Vienna Convention

<http://climate-l.iisd.org/events/eighth-meeting-of-the-ozone-research-managers-of-the-parties-to-the-vienna-convention/>

### 9.3 New Chemicals to Be Added to Stockholm and Rotterdam Conventions

The fifth Conference of the Parties to the Stockholm Convention on Persistent Organic Pollutants was held in Geneva, Switzerland, April 25-29, 2011. It considered numerous issues including: adding endosulfan to Annex A of the Convention; polychlorinated biphenyls (PCBs) elimination; exemptions, effectiveness evaluation, and non-compliance issues; unintentionally released POPs reduction; and information exchange and reporting.

The seventh meeting of the Rotterdam Convention Chemical Review Committee, held in Rome, Italy, March 28-April 1, 2011, recommended inclusion in the Rotterdam Convention's Prior Informed Consent procedure of two pesticides (endosulfan and azinphos methyl), one severely hazardous pesticide formulation (Gramoxone Super), as well as three industrial chemicals: perfluorooctane sulfonate (PFOS), its salts and precursors; pentaBDE commercial mixtures; and octaBDE commercial mixtures. The three industrial chemicals were recently included in the Stockholm Convention, thus improving the consistency of the two treaties' requirements. [Related item: *First Joint Meeting of the Main Conventions on Hazardous Chemicals to Improve International Environmental Governance* in February 2010 report].

**Military Implications:**

[Similar to previous on these issues] Although the U.S. is not Party to the Stockholm and Rotterdam Conventions, it should be prepared to comply with the requirements when acting inside Countries Party. Thus, military personnel should consider the implications of the new listing of substances, and—if the cases require—find replacements.

**Sources:**

Fifth Meeting of the Conference of the Parties (COP5) to the Stockholm Convention on Persistent Organic Pollutants (POPs)

<http://www.iisd.ca/chemical/pops/cop5/>

Rotterdam Convention Chemical Review Committee Recommends Listing of Three Chemicals

<http://uncsd.iisd.org/news/rotterdam-convention-chemical-review-committee-recommends-listing-of-three-chemicals/>

#### **9.4 The Offshore and Integrated Coastal Zone Management Protocols of the Barcelona Convention for the Protection of the Mediterranean Entered into Force in March 2011**

The Protocols aim to protect the Mediterranean Sea from impacts of offshore and coastal exploration and exploitation, as well as to create a framework for assistance in cases of emergency. [Related item: *New Construction on Mediterranean Coastlines to be Banned* in January 2008 report.]

##### **Military Implications:**

The military and its contractors in the Mediterranean arena should ensure compliance with the new regulations of the Barcelona Convention in accordance with other agreements, such as Status of Forces Agreements.

##### **Source:**

Legal Instruments reducing risks from offshore exploration activities and protecting the Mediterranean coasts' degradation enter into force today

<http://www.unepmap.org/index.php?module=news&action=detail&id=110>

#### **9.5 Kenyan Government Requests Assistance with Refugees**

Kenya's Internal Security Permanent Secretary Francis Kimemia has warned that refugee facilities in the northeast of his country are overstretched, posing both an environmental and security threat. Kimemia stated that up to 500 Somali refugees enter Kenya every day and asked the UN to investigate securing space inside Somalia for refugee centers. Kimemia also expressed concern that some refugees are terror suspects posing a challenge to the Kenyan's undermanned and porous border. [Related item: *Food and Water Security* in March 2011 and other similar items in previous environmental security reports.]

##### **Military Implications:**

Opportunities should be sought through AFRICOM to assist Kenya in improving security and environmental conditions within its refugee camps and for improving its border security. Support might include contributions of military-developed water processing and waste removal systems, low-cost and sustainable energy technologies, and population monitoring solutions deployed both in the camps and along the border.

##### **Source:**

Refugee-burdened Kenya wants UN camps in Somalia

<http://insidesomalia.org/201104203119/News/Human-Rights/Refugee-burdened-Kenya-wants-UN-camps-in-Somalia.html>

#### **9.6 China's Energy Needs Influence Foreign Policy**

In the Asia-Pacific region and the South China Sea, tensions among China, Japan, and Southeast Asian nations is increasing because of conflicting interpretations of what constitutes territorial and international waters. China's energy needs are beginning to influence how it is dealing with contested land claims over islands in the East and South China Seas. Hotly contesting are the foreign claims of ownership of the Spratly and Paracel Islands in the South and the Diayou/Senkaku Islands in the East. Although merely rock outcrops breaking the surface of the sea, the political importance of these islands is growing due to the potentially large deposits of oil in the seabed around them. According to the Chinese Foreign Ministry, China's sovereign control over these islands is indisputable and any exploration of the areas for gas and oil, without

the permission of the Chinese government, constitutes a violation of China's sovereignty and would be considered a threat to Chinese interests. [Related item: *Arctic and South China Sea Resource Issues Causing U.S. to Review Law of the Sea* in October 2010 report.]

**Military Implications:**

“Many of China's maritime policy statements and claims stand in contrast to the United Nations Convention on the Law of the Sea (UNCLOS),” noted Adm. Robert F. Willard, Commander of Pacific Command, testifying before the Senate Armed Services Committee on April 12<sup>th</sup>, 2011. Nevertheless, since the U.S. did not ratify the Law of the Sea, China disputes its right to have a “seat at the table” in addressing issues related to claims over some new territories in the ocean. Regardless of the ratification prospects for UNCLOS, relevant military personnel should continue to work with allies Party to UNCLOS for minimizing the security risks in the Asia-Pacific region and the South China Sea.

**Sources:**

China's Maritime Disputes Fueled by Need for Energy

<http://www.voanews.com/english/news/asia/east-pacific/Chinas-Maritime-Disputes-Fueled-by-Need-for-Energy-119589449.html>

China to become world's biggest energy consumer

[http://usa.chinadaily.com.cn/business/2011-04/14/content\\_12323503.htm](http://usa.chinadaily.com.cn/business/2011-04/14/content_12323503.htm)

Statement of Admiral Robert F. Willard, U.S. Navy commander, U.S. Pacific Command before the Senate Armed Services Committee on U.S. Pacific Command Posture 12 April 2011

<http://armed-services.senate.gov/statemnt/2011/04%20April/Willard%2004-12-11.pdf>

**9.7 Cyber-WMD Dangers Increasing, While Regulations Still Missing**

The *In the Dark: Crucial Industries Confront Cyberattacks* report by McAfee and the Center for Security and International Studies documents that the world is unprepared to deal with cyber threats. Based on a survey of 200 IT security executives in 14 countries, it documents the gap between threats and security readiness. It discusses cyberattacks by governments and crime groups and potential impacts on vital infrastructure systems, as well as cyber extortion and other cyber crimes. While the dangers increase, international and national regulations and preparedness are lacking. [Related items: *NATO Continues to Develop Cyber Defense Policies* in January 2011 and other items on this issue in previous environmental security reports.]

**Military Implications:**

While cybersecurity is already high on security organizations' agendas, efforts and international collaboration should increase for designing and enforcing, as soon as possible, international regulations. Reports such as *In the Dark* could offer military personnel and their contractors with cyber-security responsibilities additional inputs for improving their work in general and for assessing the needs for changes to policy, military-to-military programs, and training requirements.

**Sources:**

*In the Dark: Crucial Industries Confront Cyberattacks*

<http://www.mcafee.com/us/resources/reports/rp-critical-infrastructure-protection.pdf>

West is at Mercy of Stuxnet, German Analyst Hints

<http://www.israelnationalnews.com/News/News.aspx/143699>

## 9.8 Nanotechnology Safety Issues

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

- The World Health Organization is developing Guidelines to ‘Protecting Workers from Potential Risks of Manufactured Nanomaterials’ (WHO/NANO) ([more](#))
- NanoCode publishes Stakeholder Survey on EU Code of Conduct for Research ([more](#))
- New Lab Safety Guide from National Research Council adds nanotechnology ([more](#))
- US/EU workshop on coordinated strategies on engineered nanoparticles ([more](#))
- The Institute for Health and Consumer Protection (IHCP) of the EC’s Joint Research Centre (JRC) have performed basic risk assessments for four types of nanomaterials ([more](#))
- German Federal Institute for Risk Assessment (BfR) workshop does not recommend allowing use of nanosilver in consumer products due to insufficient reliable data ([more](#))
- Silver nanoparticles found very toxic to Arctic soils ([more](#))
- Nanomaterials barred from “organic” products ([more](#))
- Very low levels of gold nanoparticles cause subcellular damage in fish ([more](#))
- Public perceives low nanotech risk ([more](#))
- No need for a definition for nanomaterials for setting up regulations governing their safety, says Dr. Andrew Maynard ([more](#))
- 3<sup>rd</sup> ICPC Nanonet Annual Workshop to be held in St, Petersburg, 24-25 May 2011 ([more](#))

## Item 10. Reports and Information Suggested for Review

### 10.1 Energy Security and Environmental Change are the Main Drivers in Four Security Scenarios by the Canadian Military

Four alternative scenarios designed by a team from the Directorate of Land Concepts and Designs in the Canadian Forces show energy security and global environmental changes as the most unpredictable factors, although having the highest potential impact, for the future of society in general and for the role of Canada’s army specifically. The best-case scenario assumes that Canada would run a prosperous green economy, prioritizing clean energy and environmental protection, and that living standards would improve around the world. However, deteriorating energy security and inadequate addressing of climate change could trigger armed conflicts in parts of the world that are particularly vulnerable to these factors, underlines the research team leader Lt.-Col. Michael Rostek. The results are consistent with findings of recent studies by Royal Dutch Shell and countries such as the United Kingdom, which warn that excessive energy use can be an “Achilles heel.”

#### **Military Implications:**

These scenarios should be reviewed by military personnel with environmental security responsibilities and those who develop military-relevant scenarios for intermediate- and long-range planning.

**Sources:**

Energy security and environmental change could radically alter society: military report  
<http://www.globallethbridge.com/technology/Energy+security+environmental+change+could+radically+alter+society/4630821/story.html>

Oil shortages and environmental decline could create 'global quagmire': military report  
<http://www.vancouversun.com/technology/shortages+environmental+decline+could+create+global+quagmire+military+report/4630846/story.html>

**10.2 Critical Infrastructure for Ocean Research and Societal Needs in 2030**

The National Research Council has published a report, *Critical Infrastructure for Ocean Research and Societal Needs in 2030*, that, "...identifies major research questions anticipated ... in 2030, ..., defines categories of infrastructure that should be included in planning, ... provides advice on the criteria and processes that could be used to set priorities for the development of new ocean infrastructure or replacement of existing facilities, ... [and] recommends ways in which the federal agencies can maximize the value of investments in ocean infrastructure."

**Military Implications:**

Military personnel concerned with the ocean environment should review this report for information potentially useful for planning preparedness of its own current and eventual investments, as well as research and infrastructure types and placement that might impact military operations.

**Source:**

Critical Infrastructure for Ocean Research and Societal Needs in 2030  
<http://www.nap.edu/catalog/13081.html>

## APPENDIX

### Reference Details

This Appendix contains expanded background information on some items.

#### Item 6. Potential Nightmare in Antibiotic-Resistant Bacteria in New Delhi Water Supply

**Sources:** (an expanded list)

Dissemination of NDM-1 positive bacteria in the New Delhi environment and its implications for human health: an environmental point prevalence study

[http://www.thelancet.com/journals/laninf/article/PIIS1473-3099\(11\)70059-7/abstract](http://www.thelancet.com/journals/laninf/article/PIIS1473-3099(11)70059-7/abstract)

UK could face a 'nightmare scenario' due to rise of superbugs

<http://www.thisislondon.co.uk/standard/article-23939284-uk-could-face-a-nightmare-scenario-due-to-rise-of-superbugs.do>

'Superbug' found in New Delhi water: study

<http://www.independent.co.uk/life-style/health-and-families/superbug-found-in-new-delhi-water-study-2265089.html>

After Delhi, NDM-1 superbug found in Pune

<http://ibnlive.in.com/news/after-delhi-ndm1-superbug-found-in-pune/150713-3.html>

Cardiff University-led team finds New Delhi water bug

<http://www.bbc.co.uk/news/uk-wales-south-east-wales-12989782>

PolyMedix Defensin-Mimetic Antibiotic PMX-30063 Active Against NDM-1 Drug-Resistant Bacteria

<http://www.businesswire.com/news/home/20110428005220/en/PolyMedix-Defensin-Mimetic-Antibiotic-PMX-30063-Active-NDM-1-Drug-Resistant>

#### Item 9. Updates on Previously Identified Issues

##### 9.1 Climate Change

**Sources:** (an expanded list)

###### 9.1.1 Scientific Evidence and Natural Disasters

Warmer oceans release CO<sub>2</sub> faster than thought

<http://www.newscientist.com/article/dn20413-warmer-oceans-release-co2-faster-than-thought.html>

###### 9.1.2 Food and Water Security

Food security key to global peace: FAO candidate

<http://www.reuters.com/article/2011/04/26/us-usa-fao-chief-idUSTRE73P7I120110426>

Potentially catastrophic climate impacts on food production over the long-term. Food security merits greater space in the climate change agenda

<http://www.fao.org/news/story/en/item/54337/icode/>

Climate Change and Food Security in the Context of the Cancun Agreements

[http://foris.fao.org/meetings/download/\\_2011/sixteenth\\_session\\_of\\_the\\_ad\\_hoc\\_working\\_group\\_on\\_f/misc\\_documents/fao\\_submission\\_foodsecurity\\_cc2011.pdf](http://foris.fao.org/meetings/download/_2011/sixteenth_session_of_the_ad_hoc_working_group_on_f/misc_documents/fao_submission_foodsecurity_cc2011.pdf)

Slow-onset climate change a huge risk to food supply

<http://www.trust.org/alertnet/news/slow-onset-climate-change-a-huge-risk-to-food-supply-fao>

Soaring Food Prices Again Threaten to Push Millions of Asians into Poverty – ADB

<http://www.adb.org/Media/Articles/2011/13534-asian-food-prices/>

Bank Warns of Effects of Rising Food Prices on Asia

[http://www.nytimes.com/2011/04/26/world/asia/26food.html?\\_r=2](http://www.nytimes.com/2011/04/26/world/asia/26food.html?_r=2)

Fertiliser resource limitations: recycling for food security

<http://ec.europa.eu/environment/integration/research/newsalert/pdf/236na2.pdf>

Dawson, C.J. and Hilton, J. (2011) *Fertiliser availability in a resource-limited world: production and recycling of nitrogen and phosphorus*. Food Policy (Supplement 1), 36. S14-S22.

<http://eprints.icrisat.ac.in/1439/>

### 9.1.3 Migration

The origins of the 50 million climate refugees prediction

<http://asiancorrespondent.com/53023/the-origins-of-the-50-million-climate-refugees-prediction/>

What happened to the climate refugees?

<http://asiancorrespondent.com/52189/what-happened-to-the-climate-refugees/>

World still waiting for '50 million climate refugees by 2010'

<http://www.theaustralian.com.au/national-affairs/world-still-waiting-for-50-million-climate-refugees-by-2010/story-fn59niix-1226042490227>

UN Embarrassed by Forecast on Climate Refugees

<http://www.spiegel.de/international/world/0,1518,757713,00.html>

Humanitarian Emergency Response Review

<http://www.dfid.gov.uk/emergency-response-review>

Social Conflict in Africa Database: [www.scaddata.org](http://www.scaddata.org)

Climate Change, Rainfall, and Social Conflict in Africa:

[http://ccaps.strauscenter.org/system/research\\_items/pdfs/43/original.pdf?1299598361](http://ccaps.strauscenter.org/system/research_items/pdfs/43/original.pdf?1299598361)

### 9.1.4 Adaptation

UNDP Project Builds Capacity of Climate Policy Advisors in LDCs

<http://climate-1.iisd.org/news/undp-project-builds-capacity-of-climate-policy-advisors-in-ldcs/>

African Working Group agrees to implement the Strategy for disaster risk reduction

<http://www.unisdr.org/news/v.php?id=18754>

*Compact for Inclusive Growth and Prosperity Report of the United Nations Secretary-General's Eminent Persons Group on the Least Developed Countries*

<http://www.un.org/wcm/content/site/ldc/home/conference/pid/12904>

Marginalization of 48 Poorest Countries Leading to 'A Future We Cannot Afford', Says United Nations Report, Ahead of Conference on Least Developed Countries

<http://www.un.org/News/Press/docs/2011/dev2863.doc.htm>

### 9.1.5 Negotiations for a Post-Kyoto GHG-emissions Reduction Treaty

UN Climate Change Chief urges countries to push ahead with their work in 2011 as countries agree agenda for the year

[http://unfccc.int/files/press/press\\_releases\\_advisories/application/pdf/pr20110408bkk\\_close.pdf](http://unfccc.int/files/press/press_releases_advisories/application/pdf/pr20110408bkk_close.pdf)

Summary of the Bangkok Climate Talks. 3-8 APRIL 2011

<http://www.iisd.ca/vol12/enb12499e.html>

China drafting special law on climate change: official

[http://news.xinhuanet.com/english2010/china/2011-04/27/c\\_13847244.htm](http://news.xinhuanet.com/english2010/china/2011-04/27/c_13847244.htm)

EU Praises Chinese Action on Climate, Blames U.S. for Blocking Global Deal

<http://www.bloomberg.com/news/2011-04-15/eu-praises-chinese-action-on-climate-blames-u-s-for-blocking-global-deal.html>

Environment not a cost but intrinsic to biz: Ramesh

<http://www.indianexpress.com/news/environment-not-a-cost-but-intrinsic-to-biz/773956/>

Compromise on go, no-go areas suggested: Ramesh

<http://www.financialexpress.com/news/compromise-on-go-nogo-areas-suggested-ramesh/774159/1>

## 9.8 Nanotechnology Safety Issues

Detailed descriptions of the nanotechnology issues

### 9.8.1 WHO Preparing Guidelines for Protecting Nanoworkers' Health

According to an announcement, “To address occupational risks of nanomaterials, WHO [the World Health Organization] is developing Guidelines to 'Protecting Workers from Potential Risks of Manufactured Nanomaterials' (WHO/NANO). These Guidelines aim to facilitate improvements in occupational health and safety of workers potentially exposed to nanomaterials in a broad range of manufacturing and social environments. The guidelines will incorporate elements of risk assessment and risk management and contextual issues.”

#### **Military Implications:**

The selection process for scientific contributors to the Guidelines drafting is no longer accepting inputs, but appropriate ES agencies and personnel should consider offering WHO the benefit of their risk assessment and regulation experience.

#### **Source:**

WHO Guidelines on Nanomaterials and Worker's Health

[http://www.who.int/occupational\\_health/topics/nanotechnologies/en/](http://www.who.int/occupational_health/topics/nanotechnologies/en/)

### 9.8.2 NanoCode Publishes Stakeholder Survey on EU Code of Conduct for Research

NanoCode, an EU FP7 project, has published a Synthesis Report on its Stakeholder Survey on the opinions of the interested parties about the *European Code of Conduct for Responsible Nanosciences and Nanotechnologies Research* (EU-CoC). According to *Nanowerk News*, its results, “...give insights into stakeholder’s patterns of awareness, their expectations, attitudes and appraisals... [and it] analyses the degree of compliance and commitment, identifies recommendations for the communication, possible incentives, disincentives and monitoring of the EU-CoC.” There was a high level of agreement with the EU-CoC but a very low level of adoption (20%) in practice in their organizations.

**Military Implications:**

This report provides useful insights into the prevailing EU attitudes toward nanotech hazards, and possible future actions in that area.

**Source:**

NanoCode publishes synthesis report of stakeholder survey on EU Code of Conduct

<http://www.nanowerk.com/news/newsid=20944.php>

*European Code of Conduct for Responsible Nanosciences and Nanotechnologies Research*

<http://www.nanocode.eu/files/reports/nanocode/nanocode-consultation-synthesis-report.pdf>

**9.8.3 New Lab Safety Guide from National Research Council Adds Nanotechnology**

The National Research Council has issued a new edition of *Prudent Practices in the Laboratory*, its reference guide for the safe handling, storage, and disposal of hazardous chemicals; the new version adds handling of nanomaterials as a topic.

**Military Implications:**

Military organizations concerned with nanotechnology should review this new material.

**Source:**

Guidelines for Working With Hazardous Chemicals Released

<http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=12654>

**9.8.4 US/EU Workshop Discusses Coordinated Strategies on Engineered Nanoparticles**

A two-day US/EU workshop resulted in the recognition of a need to coordinate nanotechnology research strategies to answer key questions about engineered nanoparticles (NP). Examples were: are workers exposed to NPs; are NPs released into the environment, and if so, are they harmful; and what are techniques for measuring NP concentrations in various media, such as soil and water. One speaker suggested introducing for nanoparticles a category system similar to the one in existence for pharmaceuticals. Proceedings will be available on-line later in the year; a useful summary is provided in the first newspaper article cited in the Sources

**Military Implications:**

ES personnel concerned with nanotechnology risk assessment and its planning should review the cited article, and the proceedings when they become available at [www.nano.gov](http://www.nano.gov).

**Source:**

First, Cooperation. Next, Nano Action?

[http://newhavenindependent.org/index.php/archives/entry/first\\_cooperation\\_next\\_nano\\_action/](http://newhavenindependent.org/index.php/archives/entry/first_cooperation_next_nano_action/)

Consultant: Nano Products Need Risk “Categories”

[http://www.newhavenindependent.org/index.php/archives/entry/nano-categories\\_as\\_a\\_safety\\_sto\\_pgap/id\\_34929](http://www.newhavenindependent.org/index.php/archives/entry/nano-categories_as_a_safety_sto_pgap/id_34929)

**9.8.5 European Center Does Basic Risk Assessments For Four Types Of Nanomaterials:**

Scientists from the Institute for Health and Consumer Protection (IHCP) of the EC's Joint Research Centre (JRC) have performed basic risk assessments for four types of nanomaterials: fullerenes, carbon nanotubes, nanosilver, and metal-oxides. They used REACH methodology and based work on a review of the health and environmental safety concerns of these specific nanomaterials, as laid out in the ENRHES Final Report, Engineered Nanoparticles - Review of

Health and Environmental Safety. The results are summarized: "The results of the studies show that the main risk for human health may arise from chronic occupational inhalation exposure, especially during activities of high particle release and uncontrolled exposure."

**Military Implications:**

Personnel concerned with nanotech risk assessment should review the massive amount of work represented in the papers and the ENRHES Report.

**Sources:**

JRC contributes to risk assessment of selected engineered nanomaterials to human health and the environment. Lessons learned from four case studies

[http://ihcp.jrc.ec.europa.eu/our\\_activities/nanotechnology/jrc-ihcp-health-safety-results-nanomaterials](http://ihcp.jrc.ec.europa.eu/our_activities/nanotechnology/jrc-ihcp-health-safety-results-nanomaterials)

Engineered Nanoparticles - Review of Health and Environmental Safety-- Final Report

<http://ihcp.jrc.ec.europa.eu/whats-new/enhres-final-report>

9.8.6 German Agency Continues Negative View of Nanosilver in Consumer Goods

A recent German Federal Institute for Risk Assessment (BfR) workshop has confirmed the earlier view that there is insufficient reliable data on nanosilver toxicity to recommend allowing its broad use in consumer products.

**Military Implications:**

This determination makes it unlikely that nanosilver will be approved for general use in the EU in the foreseeable future, until better information on it is available.

**Source:**

Safety of Nano Silver in Consumer Products: Many Questions Remain Open

[http://www.bfr.bund.de/en/press\\_information/2011/10/safety\\_of\\_nano\\_silver\\_in\\_consumer\\_products\\_many\\_questions\\_remain\\_open-70234.html](http://www.bfr.bund.de/en/press_information/2011/10/safety_of_nano_silver_in_consumer_products_many_questions_remain_open-70234.html)

9.8.7 Silver Nanoparticles Found Very Toxic to Arctic Soils

Prof. Virginia Walker of the Dept. of Biology at Queen's Univ., Kingston ON, Canada, and colleagues have carried out a study showing that nanoparticles may have irreparably damaging effects on soil systems and the environment. Analysis of an Arctic soil sample six months after the addition of silver nanoparticles showed negligible quantities of an important nitrogen-fixing microbe remaining.

**Military Implications:**

These findings should be taken into account in assessment of the risk of silver nanoparticles remaining in soil at the end of their life cycles.

**Source:**

Common nanoparticles found to be highly toxic to Arctic ecosystem

<http://www.queensu.ca/news/articles/common-nanoparticles-found-be-highly-toxic-arctic-ecosystem>

9.8.8 Nanomaterials Barred from “Organic” Products

According to Meridian *Nanotechnology and Development News*, “The United States National Organic Program (NOP) ... [has] voted to accept the recommendation of the U.S. National Organic Standards Board (NOSB) to prohibit engineered nanomaterials from the production,

processing and packaging of certified organic products.” A major basis for the decision was the lack of a definition for “nanomaterials”.

**Military Implications:**

Personnel concerned with nanotech regulation should closely follow the course of this continuing problem and discussions about nanotech definitions

**Source:**

U.S. national organic program approves ban on engineered nanomaterials from organic products  
<http://www.environmental-expert.com/resultEachArticle.aspx?cid=4280&codi=230184&lr=1>

9.8.9 Very Low Levels of Gold Nanoparticles Cause Subcellular Damage in Fish

Researchers at the Univ. of Bordeaux have conducted tests on zebrafish that showed that daily ingestion of 36-106 ng of gold nanoparticles “resulted in various dysfunctions at the sub cellular scale, including alteration of genome composition, and the modulation of the expression of genes involved in DNA repair, detoxification processes, apoptosis, mitochondrial metabolism and oxidative stress”, according to Meridian *Nanotechnology and Development News*. Results varied with size, concentration and exposure time.

**Military Implications:**

These findings should be considered when evaluating the body of results on the biological effects of nanoparticles.

**Source:**

Impact of Dietary Gold Nanoparticles in Zebrafish at Very Low Contamination Pressure: The Role of Size, Concentration and Exposure Time  
<http://sites.merid.org/ndn/more.php?articleID=3207>

9.8.10 Public Perceives Low Nanotech Risk

A study conducted by Prof. David Berube, of NC State Univ. has indicated that the general public places nanoparticles at 20th place in a list of 24 possible environmental hazards to human health, ranking above only cell phones, blood transfusions, air travel, and X-rays.

**Military Implications:**

This result can serve as guidance in planning communication programs on nanotechnology directed at the public.

**Source:**

Comparing nanoparticle risk perceptions to other known EHS risks  
<http://www.springerlink.com/content/324m53j140vj1236/>  
Public relatively unconcerned about nanotechnology risks  
<http://www.nanowerk.com/news/newsid=20974.php>

9.8.11 Regulatory Definition for Nanomaterials not Needed, Yet, Believes Dr. Andrew Maynard

Dr. Andrew Maynard, formerly Science Advisor for the Project on Emerging Nanotechnologies at the Woodrow Wilson Center and currently Director of the Risk Science Center at the Univ. of Michigan, has written an article setting forth his reasons for believing that there is no current need for a definition for nanomaterials, to be used in setting up regulations governing their safety. He argues that regulation should be evidence-based – driven by the possibility that any

new material might pose a health risk, rather than by an arbitrary class definition, a definition which cannot be comfortably done now, considering the limited state of our knowledge on the relationship between material characteristics and effects.

**Military Implications:**

ES personnel dealing with nanotech regulation should read the article and accompanying comments for their insights into one opinion on the definition question.

**Source:**

Why We Don't Need a Regulatory Definition for Nanomaterials

<http://sites.merid.org/ndn/more.php?articleID=3260>

9.8.12 3<sup>rd</sup> ICPC Nanonet Annual Workshop To Be Held in St, Petersburg

The 3rd Nanonet Annual Workshop, sponsored by the EU FP7 project ICPC Nanonet, will be held in St, Petersburg, 24-25 May 2011, focusing on Nanotechnology for Biomedical and Ecological Applications. Registration for the Webcast and a DVD of the proceedings is available at <http://www.icpc-nanonet.org/>.

**Military Implications:**

Personnel concerned with nanotech should consider registering for this event and receiving the DVD.

**Source:**

The Third ICPC Nanonet Annual Workshop takes place on 24th-25th May 2011 in St Petersburg, Russia

[www.icpc-nanonet.org](http://www.icpc-nanonet.org)