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Environmental Security Rising on the International Agenda

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Abstract

Security threats are changing: natural disasters are increasing in frequency and impacts; synthetic biology gives rise to new forms of biological weapons and laboratory accidents; nuclear waste continues to mount, often with little protection; untested chemicals proliferate; shortages of water, increasing food prices, and dwindling energy supplies threaten human security; and other environmental and social problems cannot be addressed by conventional military force. New security strategies are needed. Although transborder nation-state wars are decreasing, intrastate ethnic conflicts and environmental problems are increasing, a situation which the UN and conventional military forces were not designed to address. Since environmental degradation and social conflicts exacerbate each other, their incidence and severity could expand unless they are addressed together. Therefore, environmental security is increasingly dominating national and international agendas. The Millennium Project defines environmental security as environmental viability for life support, with three sub-elements: a) preventing or repairing military damage to the environment; b) preventing or responding to environmentally caused conflicts, and c) protecting the environment due to its inherent moral value. This article presents some emerging environmental security–related issues and strategies organized around this definition, including international environmental legal frameworks and potential changes.

Key words: environmental security; nontraditional security threats; multilateral environmental agreements; military action; pollution

Introduction

The landmark U.S.-China agreement to set targets for reducing greenhouse gas emissions represents much more than a bilateral engagement and collaboration. It is highly symbolic, revealing the growing role of environmental diplomacy. Increasingly, environmental security –related concerns are becoming factors in international negotiations, including political and military discussions. Since these challenges are so complex and changing so fast, it is increasingly difficult to design realistic long-term strategies and impossible for any single nation to address them alone. As the forces shaping national and international security become more complex, so do the options that the military, political, and social strategists should consider.

Interstate wars may be disappearing, which reduces the need for deterrence policies; nevertheless, China and India are adding aircraft carriers to their military forces, and long-range

multi-state tensions over energy resources in the South China Sea continue. The warming of the Arctic will give access to new sources of oil and natural gas, which adds a potential conflict zone for nation-states with overlapping jurisdictions; Russia is building bases on its northern coast.

Security paradigms are changing and the world's vulnerabilities are being raised to new levels by globalization, environmental degradation, the deepening gap between those who could cope with the effects of climate change and those who could not, as well as by nuclear, biological, and chemical (t)error. These are further exacerbated by the expansion of organized crime and terrorist groups, and increasing access of individuals to natural, technological and social resources, combined with outdated institutional, legal and governance systems.

After land, sea, air, and space, cyberspace has become the "fifth battlespace". Synthetic biology, future desktop molecular and pharmaceutical manufacturing, plus access (possibly via organized crime) to nuclear materials, increase the threat of Single Individuals Massively Destructive (SIMAD) (Glenn and Gordon 2003).

Environmental security adds a new dimension to the global security landscape, focusing on non-traditional threats, new perceptions of safety, but most of all on new social and legal perspectives. As a glocalized phenomenon, it needs a global framework with local actions. Sometimes, defense and moral approaches provide very different answers. The military approach might not always be the appropriate one to security challenges. We need more dynamic political systems to face the present and emerging security challenges.

The UN Security Council's focus on the environment-security-development nexus is increasing, as several countries are urging that climate change be addressed as a global security threat, with issues ranging from loss of livelihoods and illegal exploitation of minerals to the impacts of climate change on national sovereignty. The UN Secretary-General's report on "Climate Change and its Possible Security Implications" (United Nations 2009a), the Security Council (United Nations Security Council 2011), and most security organizations highlight the potential threat multiplying effects of environmental conditions. NATO specifically notes that "Key environmental and resource constraints, including health risks, climate change, water scarcity and increasing energy needs will further shape the future security environment in areas of concern to NATO and have the potential to significantly affect NATO planning and operations" (NATO 2010).

Yet, the legal, diplomatic, and military systems to address the new non-traditional security challenges have so far not been set. The UN, NATO and other security structures are based on the nation-state as primary decision-making entity, which is becoming increasingly inadequate. Nevertheless, the efforts for adapting the international law systems and organizations to better support environmental security—from the protection and management of natural resources to liability for environmental damages—are increasing. The ability to identify environmental threats and crimes is being strengthened by increasingly powerful

detection and monitoring technologies and by environmental jurisprudence supported by improved enforcement mechanisms. Environmental damages that people and organizations got away with in the past are less likely to escape exposure and punishment in the future.

Although regularly used in the academic, political, and military vocabulary, there is no internationally agreed-upon definition for environmental security. The Millennium Project (The Millennium Project 1998) defines environmental security as environmental viability for life support, with three sub-elements:

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

This article presents an analysis based on events and emerging environmental security–related issues organized around this definition.

Note: The Millennium Project produced monthly reports on international emerging issues of environmental security for over a decade, with support from the U.S. Army Environmental Policy Institute. The text of the items and their sources, as well as other Millennium Project studies related to environmental security are available on The Millennium Project's Web site, www.millennium-project.org. Much of this article is drawn from that work.

Preventing or Repairing Military Damage to the Environment

Internal conflicts have become the primary type of war today. Although traditional wars are becoming less frequent, according to the 2014 Global Peace Index (Vision of Humanity 2014), the world has become less peaceful every year since 2008. Similarly, the 2014 Fragile States Index (The Fund for Peace 2014) shows that of the 178 countries rated for susceptibility to destabilization, 126 are in the alert or warning category. A comparison with the 2014 Environmental Performance Index (Yale University 2014) reveals that most lower-ranked nations are also fragile states. The rapidly changing political atmosphere and the increasing threat of "violent extremism and sectarian conflict, especially in fragile states" (Department of Defense 2014a) top the security agenda.

The UNEP estimates that 40% of the internal conflicts over the past 60 years were natural-resources–related (United Nations Peacekeeping 2014). It also notes that since the mid-twentieth century more than 90% of major armed conflicts took place in countries that contained biodiversity hotspots and over 80% occurred directly within a hotspot area, further threatening biodiversity and the livelihood of local people. Although conflicts involving natural resources are twice as likely to relapse in the five years following a peace agreement, fewer than 25% of relevant peace agreements address environmental or resource aspects.

Including environmental factors in military actions gives strategic advantages in combat and post-conflict operations, protects the health, safety, and security of the troops, and develops diplomatic relations and the confidence of local populations and neighboring countries, thus increasing any mission's chance of success.

Water and agricultural land scarcity are considered significant factors in the Darfur and Yemen conflicts. Not only does water scarcity contribute to conflict, it also prolongs it, impeding multinational peacekeepers deployment in the area. Also, large peacekeeping deployments could exert extra pressure on already scarce resources.

In Yemen and Afghanistan, water scarcity was identified as a factor with direct influence on terrorists' recruiting, as well as on the choice of cultivation of drug-source crops. Hence, addressing water scarcity and agricultural patterns might weaken organized crime and terrorism, while also improving water security. An analysis of Yemen's desperate water situation points out that an estimated 80% of conflicts in Yemen are over water. The Sana'a aquifer is dropping about 6.6 feet per year, and in the capital, Sana'a, water extraction rates are about four times those of replenishment. At this rate Sana'a could become the first waterless capital in the world (Moutot 2010). Replacing drone and other attacks with delivery of desalination units and development assistance to help job-creation might increase the chances to counter militant propaganda and reduce conflict in the region. If violence for changing regimes in different countries would be replaced with building the backbone for economic and democratic development, the extremism trend might be reversed.

Although Protocol 1 of the Geneva Conventions contains text protecting the natural environment, UNEP notes that there are no mechanisms in place to protect natural resources during armed conflict and no permanent international authority to monitor violations and to address liability and redress claims for environmental damage in those situations. UNEP recommends that the Permanent Court of Arbitration and its "Optional Rules for Conciliation of Disputes Relating to the Environment and/or Natural Resources" should be considered for addressing disputes related to environmental damage during armed conflict and that a summary report on the environmental impacts of armed conflicts be presented annually to the UN General Assembly.

The Rome Statute of the International Criminal Court has one paragraph that refers to environmental damages as war crimes: Article 8(2)(b)(iv): "Intentionally launching an attack in the knowledge that such attack will cause incidental loss of life or injury to civilians or damage to civilian objects or widespread, long-term and severe damage to the natural environment which would be clearly excessive in relation to the concrete and direct overall military advantage anticipated" (ICRC 1998). The first Review Conference on the Rome Statute added the criminalization of the use of certain weapons in non-international conflicts under Article 8 (paragraph 2, e) and includes poison, poisoned weapons, asphyxiating, poisonous or other gases and all analogous liquids, materials, or devices, as well as

the use of bullets that expand or flatten in the body. It also reached agreement on the definition of the crime of aggression and the framework for the Court's jurisdiction over this type of crime (Coalition for the International Criminal Court 2010). In 2012, INTERPOL has restructured the Environmental Crime Committee to become the Environmental Compliance and Enforcement Committee (Interpol 2013), with three working groups: wildlife crime; pollution crime; and fisheries crime. It includes executive leaders and decision makers from all 190 INTERPOL member countries, assuring global support. INTERPOL also created a Radiological and Nuclear Terrorism Prevention Unit for expanding its current anti-bioterrorism activities to address chemical, biological, radiological, and nuclear threats. The IAEA's Incident and Trafficking Database (ITDB) shows that a total of 2,477 incidents of illicit trafficking and other unauthorized nuclear and radioactive material activities and events were reported by participating and non-participating States from January 1993 to December 2013 (International Atomic Energy Agency 2014).

Meantime, with the entry into force of the Pelindaba Treaty for an African Nuclear-Weapon-Free Zone, nuclear weapons are being banned throughout the entire southern hemisphere. The Strategic Arms Reduction Treaty signed by the U.S. and Russia (together holding more than 90% of the world's nuclear weapons) requires each to reduce their strategic nuclear arsenal, although critics note that the treaty does not address the disposal of the nuclear material contained in the weapons. The UN Security Council resolution aiming to advance global nuclear disarmament stipulates that noncompliance with the Nuclear Nonproliferation Treaty would be referred directly to the Security Council rather than to the IAEA. Environmental degradation and ordnance leftovers in many post-conflict areas around the world are contaminating the soil, fresh water, and oceans, endangering the ecosystem and threatening the livelihoods and health of current and future generations, thus hindering lasting peace.

Reportedly, "American and American-trained Iraqi troops repeatedly encountered, and on at least six occasions were wounded" in the period 2004–2011 (Chivers 2014), by chemical weapons—such as nerve or mustard agents, remaining from Saddam Hussein's era. "In five of six incidents in which troops were wounded by chemical agents, the munitions appeared to have been designed in the United States, manufactured in Europe and filled in chemical agent production lines built in Iraq by Western companies." The Islamic State took over the center of Iraqi chemical agent production (the Muthanna State Establishment used in the 1980s) in mid-2014.

According to the Organization for the Prohibition of Chemical Weapons (OPCW) report at the 16th International Chemical Weapons Disarmament Conference held in June 2013, almost 81% of Category 1 chemical weapons, 52% of Category 2 weapons, and all Category 3 weapons have been destroyed. In February 2014, Libya confirmed the destruction of its remaining Category 1 chemical weapons, and in June, the OPCW announced the final removal of Syria's chemical stockpile—to be destroyed at facilities in Finland, Germany, the United Kingdom, and the U.S. (The Nuclear Threat Initiative (NTI) 2014).

Four countries: China, Italy, Panama, and Poland have declared that they have abandoned chemical weapons on their territories (The Nuclear Threat Initiative (NTI) 2014). Japan's nuclear and environmental disasters might further delay efforts to complete its obligations to dispose of the chemical munitions abandoned in China since WWII.

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

Cybersecurity is a new challenge, including cybercrime, cyberespionage and reconnaissance, and cyber-leveraged and information warfare. Governments and businesses are under cyberattacks daily (espionage or sabotage) from other governments, competitors, hackers, and organized crime. Cloud computing, generation and storage of data in cyberspace, and increasingly cyber-enabled systems expand vulnerability of critical infrastructure and the scope of attacks, warns Farnam Jahanian of NSF (Jahanian 2014). The EU is creating a cyber-defense unit to share intelligence and address attacks on all EU bodies. The U.S. has released its plan to protect the nation's cyber infrastructure, while the Pentagon's strategy stipulates that a cyber-attack from a foreign nation could qualify as an act of war that may result in military retaliation. While surveillance partnerships are intrinsic to global security, the level of surveillance acceptable between friends and allies is questioned, and even more so the cooperation with countries outside the "Five Eyes" or the enlarged UKUSA community, for example.

The Convention on Cluster Munitions, which entered into force in August 2010, two years after its adoption, could set a precedent on how a "coalition of the willing" can successfully lead to international regulations, and it might trigger similar negotiations and be emulated for other weapons. This Convention bans the use, production, and transfer of cluster munitions and sets deadlines for stockpile destruction and clearance of contaminated land, as well as prescribing responsibilities toward affected communities. As of January 2, 2015 a total of 116 states have joined the Convention—89 States parties and 27 Signatories.

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

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

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

The U.S. Department of Defense mentions climate change as a threat to national security for the first time in the 2010 *Quadrennial Defense Review*, noting that "While climate change alone does not cause conflict, it may act as an accelerant of instability or conflict, placing a burden to respond on civilian institutions and militaries around the world" (Department of Defense 2010). In 2014, it further warns that "Climate change will affect the Department of Defense's ability to defend the Nation and poses immediate risks to U.S. national security [...] and reaffirms the Department's position: The impacts of climate change may increase the frequency, scale, and complexity of future missions, including Defense Support to Civil Authorities (DSCA), while at the same time undermining the capacity of our domestic installations to support training activities." These are further aggravated by weak governance, which "can create an avenue for extremist ideologies and conditions that foster terrorism," states the DoD's *2014 Climate Change Adaptation Roadmap* (Department of Defense 2014b). It notes that in view of climate change, the U.S. military already began the vulnerability assessment of its more than 7,000 bases, installations, and other facilities; "places like the Hampton Roads region in Virginia, which houses the largest concentration of US military sites in the world" and already experiences recurring flooding, should prepare for a projected sea-level rise of 1.5 feet over the next 20 to 50 years.

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

Preventing or Responding to Environmentally Caused Conflicts

"We do not carelessly call climate change a security threat. When we are told by scientists to prepare for humanitarian crisis, including exodus, in our lifetimes, how can it be different from preparing for a threat like war?" (United Nations 2009b) asked Palau's representative at the UN General Assembly in 2009.

Half of the world has the potential to become violently unstable due to combinations of social, environmental, and governance factors (Glenn, Gordon, and Florescu 2014). The *2014 National Intelligence Strategy of the USA*, warning that the "risk of conflict and mass atrocities may increase," underlines the importance of identifying and monitoring the effects of threat multipliers such as demographic changes, poverty, environmental degradation, and scarcity of basic resources, since they could cause further political instability and social tensions—"conditions that can enable terrorist activity and other forms of violence" (Director of National Intelligence 2014).

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

World population is expected to grow from 7.2 billion today to 9.6 billion (mid-projection) in 2050 and between 9.6 and 12.3 billion in 2100 (Madsen 2014), creating unprecedented demand for food, water, energy, and employment. By 2030, demographers expect an additional 3 billion middle-class consumers draining the ecosystem eve more. Humanity has been in ecological overshoot since the 1970s and now it takes the Earth one year and six months to regenerate what we use in a year (Global Footprint Network 2014).

Asia and Oceania has half of the world's megacities and the majority of the world's poor people, many of whom live in densely populated slums vulnerable to climate change. Rapid applications of urban systems ecology will be vital for sustainable development of the region. China's solid waste is expected to grow from about 573,000 tons a day in 2005 to 1.5 million tons in 2025. Coal dust air pollution has caused riots in China.

Africa's population is projected to grow from today's 1 billion to 2.7 billion in 2060, and possibly 3.6 billion by 2100. By 2050, almost one in three children under the age of 18 will be African. Assuring food, water, and livelihood to this young population will be crucial for world stability. The Social Conflict in Africa Database includes over 6,300 social conflict events for the period 1990–2009. The pattern reveals more social conflicts in years that were extremely wet or dry than in years of normal rainfall.

The Pacific Institute's Water Conflict Chronology List identifies some 200 conflicts over the past 20 years that were water-related (Water Conflict Chronology List 2014). If current trends continue, most glaciers in the mountains of tropical Africa (Mount Kilimanjaro, Mount Kenya, and the Rwenzori) will disappear by 2030, and those in the Pyrenees will be gone by 2050.

Since 70% of fresh water is trapped in glaciers, ice caps, and snowfields, once these are gone, the situation for human survival will become critical. Global water withdrawals have tripled over the last 50 years. By 2030 global water demand could be 40% more than the current supply. According to OEDC, half the world could be living in areas with severe water stress by 2030. Africa and the Middle East, especially countries on the Persian-Arabian Gulf, are most vulnerable to serious water shortages, according to the MIT Water Resource System's simulation (Schlosser et al. 2014). Hence, water-based conflicts are most likely to occur in these areas. The World Bank estimates that up to 30 million hectares of farmland are lost each year due to severe degradation, conversion to industrial use, and urbanization. Additionally, large-scale land acquisitions in regions that are already food- and water-scarce, as well as the allocation of land to produce agrofuels rather than food, risk increasing poverty and social unrest.

Keeping world food prices under control becomes increasingly important for stability. World food prices have more than doubled since 1990. Oxfam predicts that the average cost of key crops could further increase by 120–180% by 2030. While genetically engineered seeds adapted to a harsher climate could help increase yields, some analysts warn that increasing corporate control over seeds is reducing the diversity of traditional seed varieties and traits that help farmers adapt to the effects of climate change. This can jeopardize poor farmers' livelihoods and strongly influence food prices.

In China, land degradation triggered complete or partial abandonment of some 24,000 villages and the cropland surrounding them (Brown 2009). Drought and increasing desertification in Africa would probably exacerbate the problem of migration to Europe, as well as migrations within the African continent.

Changes of political and economic power could also fuel new waves of migration triggered by "land and water grabbing". Food-importing countries are increasingly buying or leasing agricultural land in other countries, which sometimes are unable to adequately feed their own people, thus setting the stage for potential future tensions. China and India (by far the top freshwater withdrawing countries) are increasingly expanding their economic activity abroad, often accompanied by population relocation (e.g. Chinese in Africa and Latin America). This could collide with local populations who are in most cases living in abject poverty. Disproportionate economic and military power might result in violent local conflicts.

In Afghanistan, military observers report that poverty induced by water scarcity increases terrorism. Since the opium poppy is a drought-resistant plant, it is easier to cultivate by the poor farmers in the dry areas, consequently supporting the illegal heroin trade and local warlords. Approximately 98% of Afghanistan's opium is produced in regions allegedly under Taliban control (Rollins, Wyler, and Rosen 2010).

Food and water issues are also considered having been the exacerbating factors in the 2011 Arab Spring uprisings. The continuous political turmoil further affects the living

standard in the region, fueling tension in an already conflict-prone region. As the scope and spectrum of the conflicts expanded, energy security concerns around the world increased, driving up prices. Unreliable production and exports of oil from the region could cause greater demand on oil supplies from the North Sea and other environmentally-sensitive regions.

Disputes over deep-water oil territorial claims in the South China Sea and the Arctic are potential areas for conflict. The Arctic is warming faster than forecast, and human activities—from navigation to exploitation of natural resources— are increasing. The Seventh Ministerial Meeting of the Arctic Council, in May 2011, adopted the Agreement on Cooperation on Aeronautical and Maritime Search and Rescue in the Arctic, the first legally binding agreement negotiated by the Council. Depending on the rate of melting of the Arctic and Greenland's ice sheets, by 2100 sea level could rise 0.9–1.6 meters, and new research found that ice loss from Antarctica and Greenland has accelerated over the last 20 years and is occurring faster than models predicted. The IPCC reports (IPCC 2014) that each decade of the past three were consecutively warmer, that the past 30 years was likely the warmest period in the Northern Hemisphere over the last 1,400 years, and that even if all CO_2 emissions are stopped, "Most aspects of climate change will persist for many centuries." Sea level rose 19 cm from 1901 to 2010, and could rise an additional 26 to 98 cm by the end of this century.

This puts in danger the very existence of small island states such as Kiribati, the Marshall Islands, and Tuvalu in the Pacific and the Maldives and Seychelles in the Indian Ocean, which might be submerged over the next 50 years. However, in most cases the inhabitants will have to leave the islands before that happens, due to water salination and complete lack of fresh water. Their relocation raises sovereignty and security-related concerns. The President of Kiribati says that in the country's outer islands the situation is already critical, as an increasing number of coastal villagers need to be relocated. "Do these people relocate as a 'nation' or as individual refugees who are then subsumed into the host nation as their own citizens, or would they enjoy 'sovereign rights'? Would they continue to have claim to the territory of the land they had vacated? If not, who would have claim on it, if at all?" questioned Ambassador Abdul Ghafoor Mohamed, the permanent representative of Maldives to the UN (Deen 2010).

Meantime, other countries could also see large movements of people: Bangladesh, Kenya, Papua New Guinea, Somalia, Yemen, Ethiopia, Chad, and Rwanda (Environmental Justice Foundation 2009). Millions of Bangladeshis will cross the border into India as Bangladesh's coastal area becomes uninhabitable. This might raise concerns with India. Future effects of climate change could create up to 400 million migrants by 2050, which could further increase conditions for conflict.

Thus, strategies for adaptation to climate change, building resilience, and improving capabilities to deal with threats from environmental conditions are increasingly becoming

an integral part of the priority strategies to reduce risks of terrorism, piracy, regional instability, and cyber attacks. Less dangerous but with potential of escalating into larger action is eco-terrorism and eco-activism, which threatens mainly water-intensive industrial and energy plants. Examples include public outrage against Coca Cola plants in India, pulp mills in Argentina, and the oil sands in Canada. These are easier to contain by appropriate government intervention and cooperation of the business community.

Protecting the Environment Due to its Inherent Moral Value

The legal frameworks and security strategies have to adapt to the complexity of new geopolitical developments and technological advancements. Without norms and standards enforced by liability and redress measures, and the security organizations being a step ahead, environmental security will continue to become a more and more serious problem. In order to keep up, clean-up and surveillance techniques have to evolve at an ever accelerating rate. Nevertheless, new tools have to be carefully disclosed and explained to the public and developed in a legal framework to avoid distrust.

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

There are more than 700 multilateral environmental agreements, and increasingly, the focus of international negotiations is shifting from designing new treaties to reinforcing existing ones and strengthening international environmental governance. These synchronizations would improve global environmental governance by increasing coherence in decisionmaking and monitoring at international, regional, and national levels. Following the successful synergies developed among the three conventions on chemicals and waste—the Basel, Rotterdam, and Stockholm Conventions—a framework for coordination of all biodiversity-related MEAs and UN bodies is being created. Considering impediments, six conventions form a potentially manageable and coherent cluster: Convention on Biological Diversity (CBD), the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the Convention on the Conservation of Migratory Species of Wild Animals (CMS), the Convention on Wetlands of International Importance Especially as Waterfowl Habitat (Ramsar), the World Heritage Convention (WHC), and the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA), while the CBD, the United Nations Framework Convention on Climate Change (UNFCCC), and the United Nations Convention to Combat Desertification (UNCCD) cluster would assure a better integration of biodiversity with climate change.

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

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

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

Bolivia is calling for a UN treaty on the Rights of Mother Earth, similar to that on human rights. The treaty aims to institute 11 rights protecting nature from human intervention, ranging from the right to clean water and air to unaltered vital cycles and equilibrium and the right to not be genetically modified. It builds on President Evo Morales's proposal in January 2010 for an international court for environmental crimes and the "Rights of Mother Earth," as well as a Bolivia-led UN resolution in 2009 that proclaimed April 22nd International Mother Earth Day. In December 2014, the Global Alliance intends to host its second International Rights of Nature Tribunal (Global Alliance for the Right of Nature 2014). India's National Green Tribunal, established in 2010 is an example of national judicial forum for defending water, air, land, and general environmental security and public safety (Ministry of Environment Forest and Climate Change Government of India 2010).

The latest draft for the Sustainable Development Goals (Sustainable Development Knowledge Platform 2014) proposes 17 goals and 169 associated indicators, which some critics consider too many and difficult for countries to effectively manage. While they are supposed to apply globally, many developing countries advocate for the Principle of Common but Differentiated Responsibilities. The legal foundations are being laid to sue for damages caused by GHGs, and

climate change adaptation and mitigation policies are increasingly being considered in overall sustainable development strategies.

The 2011–2020 Strategic Plan for Biodiversity identifies 20 goals—the Aichi targets—such as expanding the world's protected areas to include 17% of terrestrial surface and 10% of the marine surface; the restoration of a minimum 15% of ecosystems already degraded; and halving, or bringing as close as possible to zero, the rate of loss of the world's natural habitats. Supplementary new protocols to the CBD provide international rules and procedures for liability and redress related to living modified organisms, geoengineering, and use of genetic resources. The 2014 CBD Conference of Parties noted the gaps between investments needed to meet the 20 targets and the resources currently allocated, although the long-term benefits outweigh the costs (United Nations News Service Section 2014).

The UN General Assembly declared access to clean water and sanitation a human right and the Marseille Ministerial Declaration, adopted at the 6th World Water Forum, called for accelerating the implementation of human rights obligations relating to access to safe drinking water and sanitation.

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

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

New technologies are offering unprecedented possibilities for better security systems, advanced warfare, and tools to handle dangerous situations. However, increasingly, their development and use is not covered by the existing international legal frameworks and standards, raising the potential of voluntary or involuntary incidents.

When asked to identify the most difficult issue facing the U.S. Supreme Court, reportedly, Chief Justice Roberts said that he thinks "the fundamental principle underlying what constitutional protection is and apply[ing] it to new issues and new technology [… will be the] real challenge for the next 50 years" (Harman 2013).

Biotechnology and the creation and manipulation of novel potential pandemic pathogens make the headlines regarding the acceptability of risks of accidental or deliberate release and global spread. The Nuremberg Code requests that experiments that could be a threat to human life be undertaken only if proven justified by a risk–benefit assessment. Given globalization, such a risk assessment should be international, involving independent multiple stakeholders (Lipsitch and Galvani 2014).

With the Internet of Things security will be a growing and ongoing challenge, making people vulnerable in their own homes. New legal and policy frameworks are needed for addressing cybersecurity, but there is no international consensus on how and under what umbrella they should be negotiated. Russia, China, and some other countries prefer the negotiations in the UN framework, while the U.S. and most EU countries prefer a neutral system. The Internet could only enable a more secure world with shared values if those values emerge collectively and are respected as such.

Although more than 70 countries have or are developing drones and other devices for remote-control warfare and other uses, there are no international laws regulating their use, let alone enforcement mechanisms. As with other new technologies, the use of these devices is two-faceted—it can help in defense and reconnaissance, but could also become a tool of destruction if used by malicious actors.

Geoengineering is considered by many as a potential response to reducing CO_2 from the atmosphere and the oceans (e.g. by iron-seeding), or addressing drought (with rain-cloud seeding), or control global warming (by deploying solar mirrors). However, some experts warn that there is no real understanding of these technologies yet, nor on who could deploy or evaluate them. Their development is ongoing outside international norms and regulations and the negotiations might face some challenges in the new geopolitical arena (Null 2014).

Public debate is necessary for citizens to understand the framework of the new threats and the required safeguards and security policies, the functions of science, and the changing influences in global politics and the position of global actors. This would also help create a climate of trust and develop social relations that could decrease the root causes of the threats themselves. Full engagement of the population and collaborative work of security, civil society, and government structures are sine qua non for successful new security regimes.

However, the changes in political powers plus the complexity of new asymmetric security threats, as well as the panoply of stakeholders and organizations that should be involved in the negotiations and implementation of relevant regulatory systems make progress in creating an effective environmental security strategy very difficult.

Conclusions

The new security paradigm requires innovative strategies by both security organizations and society. To counter potential conflict situations, it is necessary to rethink our approaches and develop effective "community-based" programs; the security strategies and methods should match the stated goals and consider the root-causes of conflicts and response policies, in order to avoid aggravating circumstances. In a globalized world, sustainable development and security imply shared perceptions of socio-economic justice and security, as well as accountability.

Environmental security should be an integral part of both security and sustainable development agendas and they should be interconnected. In regions with severe environmental problems, sometimes, the very lack of perceived attention to the loss of livelihood is enough to lead to radicalization or trigger conflict. Young people (mainly men) should have objectives and opportunities and not feel alienated within their or the global society. "Unemployment is not only an economic challenge. It is also a social, psychological and political problem," (Eliasson 2014) remarks UN Deputy Secretary-General Jan Eliasson. Since environmental degradation and conflict exacerbate each other, their severity could expand unless they are addressed together. Yet global military expenditure is more than 12 times the world's Official Development Assistance (Institute for Economics and Peace 2014).

The military will have to focus on social and environmental conditions as well as battlefields and soldiers, forcing new financial prioritization. Military power has yet to prove effective in asymmetrical warfare without genuine cultural engagement. Genuine international cultural and social engagement, empathy, and trust, through trans-sectoral and trans-national collaboration are needed to address the underlying causes of present and future conflicts.

While non-traditional security factors are increasingly included on the security agenda, they have yet to be effectively considered in operations. Preemptive military action should include cooperation with other organizations to counter the triggering factors through continued international efforts to discourage recruitment.

There should be an internationally-transparent audit system for each weapon type, and flow of finances. The stockpiles of biological and chemical weapons should be destroyed and a tracking system created for potential bioweapons, along with a network of CDC-like centers to counter impacts of potential bioterrorism.

The concept of "the responsibility to protect" should be broadened to also include the environment, and a shared agreement reached on what constitutes legitimate involvement in the affairs of other countries and what environmental "crime" means.

Increasing number and intensity of natural and manmade disasters such as superstorms, droughts, pandemics, and the Fukushima nuclear meltdown are calling for the development of safety and resilience strategies together. In an increasingly complex,

interconnected world, both the public and private sectors should come together to discuss what steps governments, corporations, and communities can take to adapt to disasters.

In countries that face technical and expertise issues with respect to data collection and assessment, capacity building for leveraging the scientific and infrastructure basis should be prioritized. The UN sourced a large number of datapoints globally through its MyWorld initiative to crowdsource feedback on global SDG priorities.

The media are crucial to increasing awareness among citizens about environmental security. Correctly informed citizens about the potential consequences of climate change could lead to better public support of policies, aid to addressing the underlying factors, as well as pressure leaders to be more cooperative in efforts to create a relevant global legal and security regime. Present policy frameworks that set the stage for national and international policies are generally backed by financial aspects. Taxpayers should be aware that the costs for addressing environmental degradation and climate change effects could skyrocket over time, if no measures are in place.

Response to environmental security and building resilience should be a requirement to all local and national security and administrative organizations. The corporate sector and insurance industry should also take an interest, given the potential impact on infrastructure.

A collective intelligence system is needed to harness knowledge and wisdom of people of all walks of life for building a society on shared values. Let's not fight cruelty with increased violence, but with good knowledge and good deeds!

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