Environmental Security: Metaphor for the Millennium

by Kheryn Klubnikin and Douglas Causey

Introduction

The 1899 Hague Peace Conference captured the optimism of its time and place in history. Hopes were high for the dawning modern age, and lasting peace appeared to be within reach. Initiated by Czar Nicholas II of Russia, who well understood the economic burden and social costs of military buildup, and Queen Wilhemina of the Netherlands, the meeting was the first convocation of its kind to approximate a universal forum. One hundred delegates and actors from civil society, including three who were among the first recipients of the Nobel Peace Prize, convened the Conference. In all they represented twenty-six countries that encompassed 75 percent of the world's people and its resources, including many colonies that provisioned the economies of delegate countries with forests, lands, labor, wildlife and minerals.[1]

The Conference addressed issues of conflict and comity in vogue among the participating nations. It was silent, however, on issues of availability and exploitation of natural resources, civil disinvestments, links between inequities of environmental wealth and violent conflict, and the implications for peace.[2] For instance, ruthless resource exploitation of the Congo between 1880 and 1920 while under the absolute control of King Leopold of Belgium led directly to the deaths of half of the area's population, or 10 million people.[3] The empires represented in 1899 shattered into approximately 200 nation states, many of which became mired in world war and other conflicts. Despite earlier expectations, the twentieth century became the most violent 100 years in human history. More than 200 million people were confirmed casualties of interstate wars alone.[4]

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Explication of the intersection of environment, security, and sustainable development with conflict did not emerge until much later. First came a better understanding of the multidimensional aspects of the natural world ("the environment") and its role in local, national, and global economics, particularly the potential value of natural resources ("environmental wealth"), the different classes of resources (e.g., renewable, non-renewable, biodiversity), the short-term and long-term stability of those resources ("environmental health"), and how sustainable development of the environment might be possible.[5]

The basis of our knowledge to fully address environmental issues is incomplete, and lesser still, on how environment, human behavior, and future options for society are intertwined. During the Cold War era the environment was generally acknowledge as a presence in the affairs of states, encoded in various treaties in limited fashion. The Migratory Bird Treaty is an example of one that, written for an earlier time and an earlier understanding of nature, is now presenting various new challenges. It originated in 1916 between the United States and Great Britain, and was enlarged with several other nations in 1918 to address the large-scale commercial taking of migratory birds, but it did not clearly address their domestic and international ecosystem linkages and services.[6] Today, extensive habitat problems or diminishing populations are not easily addressed under the limited concept of the Treaty.

Greater comprehension of the intersection of states and transboundary dimensions of natural resources, or how that role may influence the trajectory of human affairs, especially relative to peace and security, only began to emerge in the seventies. A 1972 report of the United Nations Conference on Human Development and Environment held in Founex, Switzerland anticipated the scope of these linkages with in-depth discussions about the role of poverty-related environmental change, increased social anxiety, and its nexus with violent conflict.[7] In 1982 the Independent Commission on Disarmament and Security Issues, also referred to as the Palme Commission, published its report, *Common Security*.[8] It underscored a commitment to joint survival and an awareness of the impacts from the numerous civil wars that had occurred in non-nuclear countries since World War II. The members emphasized the need for health and safety of citizens, including a concept of environmental health, as key to greater freedom and a better life. At that time diplomat George Kennan had also realized that environmental degradation was one of the major threats to human existence, along with nuclear weapons, and Jessica Mathews was one of the first to clearly articulate the necessary interest of a state in the environment.[9]

Almost 100 years after the Hague Peace Conference, in another hopeful moment, the World Commission on Environment and Development (WCED, or the Brundtland Commission) issued its landmark 1987 report, *Our Common Future*, launching an era of global environmental thought and action.[10] Chaired by Gro Brundtland, then-Prime Minister of Norway (also a member of the Palme Commission) and a doctor who understood the relationship of human health and environment, the WCED addressed the relationship between human security and the environment. The Commission fully recognized that sustainable development is possible only in an

atmosphere of peace and security. Geographic inequities of natural resource endowments were identified by the Commission and others as a potential and potent element in conflict.[11] The WCED viewed environmental stress as both cause and effect of political tension and armed aggression. Since transboundary and global resources transcend the limits of the nation-state, the Commission also predicted the need for the development of new governance approaches, multilateral agreements, joint management regimes, and sophisticated early warning networks.

There are major signs indicating a need for society's cross-sectoral attention to the environment as an underlying security issue. Between 1945 and 1995 the world has lost 25 percent of its topsoil, increased atmospheric carbon dioxide by 25 percent, depleted 8 percent of the atmospheric ozone, and cut about one-third of existing forests without replacement. Whole regions of the world have been severely damaged by human activities with little hope for restoration, and others are sinking into greater and greater dysfunction. A notorious example of significant environmental destruction is the present wasteland in Uzbekistan and Tajikistan that was once the Aral Sea. A result of the Soviet belief that rivers could be easily manipulated to irrigate Central Asia, the area is now badly desertified and plagued with concentrated pollutants, loss of most ecosystem services, and widespread new health problems. Similarly, there has been a catastrophic loss of the Mesopotamian wetlands, historically known as the Fertile Crescent, formed by the drainage of the Tigris and Euphrates Rivers, where control and access of water flow is highly contentious among Iraq, Syria, and Turkey. Since the 1970's, both Syria and Iraq have experienced a 50 percent reduction in average flow of the Euphrates, and at least twenty additional dams are planned or under construction for the river.[12] Reduction of water flow in the Tigris is expected to follow a similar pattern.[13] Dr. Klaus Toepfer, Executive Director of the United Nations Environment Program, has compared the situation of the Mesopotamian wetlands to that of the Aral Sea.

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Overall, about 90 percent of the water in the Middle East crosses international boundaries. Most of the world's major rivers are transnational, and escalating needs for freshwater means that water rights, access, and environmental quality are global concerns.[14] The trends also do not bode well for the biological communities of freshwater habitats that provide some of the most important ecosystem services to people, including cheap protein sources such as fishes for the poor.

Human domination over ecosystems expanded rapidly in the twentieth century.[15] Over the next 100 years, one-third of current global land cover will be transformed, with the world facing increasingly hard choices among consumption, ecosystem

services, restoration, and conservation and management.[16] The "ecological footprint", or the total areal extent of land drawn upon for ecosystem services, of people in the Baltic Sea Basin area was estimated. They use an area almost ten times the actual resource expanse of the Baltic and its watershed, with human dependence on water vapor flows to maintain ecosystem services about fifty-four times the amount of freshwater available.

As in other parts of the world, there is a lack of correspondence between sovereign boundaries and natural resources in the Baltic Sea watershed. Security and governance that encompasses a healthy environment and adequate measures for natural resource utilization and conservation can be critical confidence building measures for the region.[17] The regional Baltic environment impacts the lives of approximately 80 million people in fourteen countries (Belarus, Czech Republic, Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Norway, Poland, Russian Federation, Slovak Republic, Sweden and the Ukraine) on a daily basis.[18]

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Ecosystem appropriations are increasingly critical to urban areas and development overall. In the United States, New York City is overdrawing its closed watershed to support continued growth, struggling now with water appropriations in ways that no one anticipated until recently. Similarly, Los Angeles and many cities in the southwest of North America are struggling with water appropriations. Singapore depends upon Malaysia for its freshwater, an issue of continuing conflict and difficult negotiations. The expanding "ecological footprints" of concentrated urban areas underscore how sustaining economic benefits is dependent upon ecosystem services and environmental "capital."[19] We use the term capital advisedly because key elements, such as arable land, water, forests, fisheries and oil are the products of long-term geological and biological processes, but are nevertheless finite and not subject to proportionate capital growth. Moreover, the ecosystems upon which we all depend are subject to sudden shifts and adverse changes from poor management and destructive uses that diminish their resilience and unravels their functioning.[20] While many aspects of living systems recover from human impacts there are nevertheless limits to economic growth:

> *…for the rest of the world to reach the United States levels of consumption with existing technology would require four more planet earths.*[21]

The environment is the most transnational of transnational issues, and its security is an important dimension of peace, national security, and human rights that is just now being understood.[22] We intend to show in this analysis that protection of the global environment, resource management, and new concepts of national security

relate proximally to ecological practice and global policy, ultimately reflecting a calculus about who has access to, and control of, the essential support functions of the natural world.[23] We believe that the nexus of conflict and the environment is already shaping the trajectory of societies and rapidly shaping our common planetary future.

Evolution of the Concept of Environmental Security

The role of the environment has been traditionally considered in various international forums largely in the context of development and conservation. However, environmental security initially was initially shaped by the military as it became increasingly based in technology. Environmental damages have long been part of human conflict, but only during the twentieth century has the effect been evident on a global scale, especially with the toxic by-products of military activities. Three examples illustrate how military conflict, environmental health, and national security are related and perceived in international contexts: Vietnam, the Gulf States of the Middle East, and Kosovo.

The Vietnam War raised critical issues about environmental damage as a deliberate tool of aggression. About two million hectares of South Vietnam were estimated to have sustained physical damages and alteration, as well as contamination. Extensive bombing and use of the defoliant Agent Orange had serious environmental impacts: Vietnam's terrestrial tropical forests were repeatedly sprayed with defoliants over nine years of violent conflict, impacting as much as 60 percent of the country.[24] In 1943 there were approximately 400,000 hectares of viable mangrove forests in Vietnam, among the most productive habitats on Earth. Mangroves are critical insurance against coastline erosion, are nursery grounds for fishes and other aquatic organisms, and are important in carbon and nitrogen fixation, oxygen production, and nutrient generation.

During the war, about 38 percent of the mangrove forests were sprayed, rendering them effectively lifeless.[25] By 1983 it was clear that few original mangrove forests had naturally regenerated, and that restoration would occur only with human intervention and investment by the world community. There were attempts at shrimp farming and agriculture in the degraded areas, but extensive destruction of ecosystems couldn't support such efforts.

Terrestrial and other aquatic environments were also damaged. It took a decade after the conflict to realize that restoration of soil and vegetation would take longer than originally understood. Old, complex, inland natural forests will not reach their pre-war state for a century or more.[26] Even Asian elephants, often used as transport vehicles by the Vietnamese, were bombed and populations impacted. The same strategy is being used in civil wars throughout Asia today.[27] Adverse effects on human health from Agent Orange are still a source of controversy, with consequences on public health funding and policy in both Vietnam and the US. Similarly, Afghanistan was doused with highly effective defoliants by the Russians during the Afghan-Soviet War. There has also been serious environmental damage and loss of wildlife in the conflicts

that were still active in spring 2002.[28] The Indonesian military also used napalm and Agent Orange in the fighting in East Timor. Defoliants accelerated deforestation and serious flooding occurs in the area today as it begins its independence

Calculated environmental damage was a hallmark of the Gulf War. Iraqi troops ignited more than 700 Kuwaiti oil wells, creating oil lakes that continued to burn long after the war was over and that still contaminate groundwater. Smoke precipitated black rain in Iran and Turkey, with effects that probably extended as far east as India. Oil was dumped into the marine environment, and weapon debris, including reprocessed uranium, was scattered in the desert.[29]

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The UN Security Council created the United Nations Compensation Commission to address the international claims from the Gulf War. Environmental destruction was evaluated with the United Nations Environment Program, the first damage assessment ever done for a war. Iraq was found clearly liable. As of 2002, filed claims have totaled US $287 billion, approximately $57 billion of which are environmental claims (category F4). Of the $15 billion in compensation awarded as of 2001, however, none was disbursed for environmental damages. Determination of damage, remediation, and compensation is proving to be a daunting process for the international body.

As a final example, in late 1999 the United Nations Environment Program and the United Nations Center for Human Settlements evaluated the environmental damages from NATO actions in Kosovo. International experts evaluated the regional effects of military actions in the Balkans, particularly the assessment and clean-up activities related to the controversial use of both spent and reprocessed uranium shells in the Danube Basin.[30] At the same time, the experts underscored the importance of the former Yugoslavia as a center of European biological diversity that encompasses more than one-third of all European flowering plants, about half of the fishes, and two-thirds of the mammal and bird species.

Environmental health and stability is not restored with the cessation of conflict, since environmental damages initiated during war continue well into the post-conflict era. For instance, after the civil war in Rwanda the population lost several agricultural cycles at a great cost of human suffering and starvation. In Kosovo, the bombing of fertilizer and chemical plants released tremendous quantities of pollutants, now resident in the Danube drainage, with cascading human health and environmental impacts.

Some governments have broadened the role of the military with controversial new missions related to the environment.[31] Throughout the world the military are increasingly assuming police responsibilities, while in other circumstances they represent an important source of assistance in the new security of disasters, other threats, and

human needs. During the 1960's few sovereign states could have imagined their military acting to referee disputes among clans in Somalia, provide humanitarian relief in Bosnia, assist flood victims in Bangladesh, stabilize both the political and environmental situations in Haiti, or deal with difficult ethnic conflicts in Kosovo.[32]

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Subsequent linkages emerged between the military as an agent of national security and the military as an actor in environmental issues. For example, in 1994 the Hungarian Ministry of Defense established a military training school for environmental education.[33] More recently, international military were assigned to Mozambique where massive flood damage, augmented by upper watershed deforestation, washed out and redistributed land mines that are lingering remnants of recent and protracted civil war. Bulgarian and Cuban soldiers have been used to plant trees and create national parks and reserves. Moreover, UN peacekeeping forces were deployed into Haiti from 1994 to 2000. The situation was not characterized by war in any traditional sense, internal or external, but it was volatile politically and environmentally had widespread damage and soil erosion from massive deforestation. Their mission was referred to as "nation building", an activity more commonly associated with development.[34] There has also been discussion about certain war zones as serving as wildlife refuges because habitat often is maintained in certain situations, such as the demilitarized zone (DMZ) between the two Koreas.[35]

International recognition of the connection between military actions and the state of the environment was articulated by the United Nations in 1999:[36]

> *The United Nations force is prohibited from employing methods of warfare which may cause superfluous injury or unnecessary suffering, or which are intended, or may be expected to cause, widespread, long-term and severe damage to the natural environment.*

Secretary General Annan subsequently addressed the UN Security Council on the need for early warning of and preventive measures for national destabilization. He said the Council should give specific attention to States that were suffering acute economic, *environmental* and security strains.[37]

In its 1999 report on environmental security, the Committee on the Challenges of Modern Society (CCMS, a civilian group that advises NATO) acknowledged the changing nature of security and the need to manage environmental stress in the areas of concern. The CCMS concluded that, although NATO is a military alliance, it was clear that sustainable use of the environment and international cooperation (e.g., World Bank) in development were significant elements in furthering the essential

mission of NATO.[38] The CCMS met in March 2002, where discussions were undertaken about new studies to explore emerging security threats. They will be unified by the theme of "prevention and mitigation of societal disruption" and will also address environmental issues.

Characterizing Environmental Security

Environmental security has been viewed through many lenses, with no commonly agreed definition. Parameters usually include assessment, resource access, equity, economics, the nature of land tenure, property rights, and border security. The articulation of the global meaning of environmental security has been cast largely within the context of traditional international theory that evolved largely in the post-World War II era, since biologists and ecologists historically have not had interest or participated in that topic.[39] In that context, security still equated roughly to military intervention, and the environment was regarded as a sector equal with other interacting policy sectors to be protected by traditional means.

We believe that these previous efforts at definitions are insufficient because the biophysical world is neither a "sector" nor capital in any neoclassical sense, and consequently problems do not lend themselves to resolution with the tools of traditional diplomacy. Moreover, the concept of security in the environment is not just about conflicts or shortages for people, it encompasses the very existence of the natural world and its processes, some of which are directly involved with human activities, but much of which supports nothing less than life on earth. The causes for lack of success are manifold, but seem related to a shallow characterization of issues, and misunderstanding and omission of the biology, socioeconomics, and realm of human values invested in or dependent upon biotic resources.

The integration of ecological and other scientific information into international and security affairs, social issues, population, and development is a relatively new concept, despite proliferation of international environmental law and policy since 1991.[40] International policy and diplomacy has not integrated environment in a satisfying manner:

> *By reading the various peace treaties (Angola, Rwanda, Bosnia, Croatia, etc.) trade agreements (GATT, NAFTA, Euro-Me, Lomé, etc.), cooperation declarations and other documents that bilateral and multilateral diplomatic efforts have produced the last 10 years, one notes that the environmental dimension is absent in the majority of those documents and that in the others environment is at most an after thought, and, in all cases a grudgingly accepted political dimension in the traditional world of diplomacy.*[41]

Modern international diplomacy, developed during the formative years of the United Nations in the Cold War period, does not seem well-tooled for many of the issues of today's world.[42] Attempts to "retrofit" environmental considerations to treaties are uneven. Problems such as environmental degradation, the impacts of free trade on specific environments, emerging diseases, terrorism and technology, and all those

that require knowledgeable interaction with science in general—the ecological sciences specifically—seem most intractable and will require new approaches to achieve viable tradeoffs among competing interests, and to establish peaceful resolution.[43] The kinds of problems to be solved require greater intellectual diversity than commonly encountered in international diplomacy. Biological systems are nested hierarchies, not autonomous components with linear interactions; treating them as such abstracts a complexity that further alienates them from orthodox international practices and instruments.[44]

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Biological systems are also multidimensional, and interact with the physical world in ways we still are discovering. Moreover, environmental security and cultural security are increasingly considered to be global public goods essential to human well-being that transcend sovereignty.[45] This is perhaps one of the most significant changes that has appeared in the concept of security, a concept that is now less focused on sovereign states and more focused directly on people and the world's natural resource base.[46]

The Brundtland Commission concluded that the environment is the common thread that runs through everyone's common future.[47] The linkages among environment, development, and conflict are complex and, in many cases, poorly understood. But a comprehensive approach to international and national security must transcend the traditional emphasis on military power and armed competition. The real sources of insecurity also encompass unsustainable development, and its effects can become intertwined with traditional forms of conflict in a manner that can extend and deepen the latter.

Environmental security is mutually reinforced by of the welfare the individual:[48]

> *In essence…security applies most at the level of the citizen. It amounts to human well-being: not only protection from harm and injury, but access to water, food, shelter, health, employment, and other basic requisites that are due every person on earth. It is the collectivity of these citizen needs- overall safety and quality of life- that should figure prominently in the nation's view of security…*

In 1994 the United Nations Development Programme published its first Human Development Index, which defined human security, including environment as a component. The HDI is widely used by the United Nations and other donors to assess the development progress of countries. However, the measures of environment are limited.[49] Other indices have been developed to broaden the concept of environment in measuring human development. For instance, the "Human Security Index", a

framework developed by the Global Change and Human Security Project (GECHS) further expands environmental indicators and the linkage to human welfare.[50] The GECHS group approached the environment as a non-linear, cumulative causality that leads to human insecurity and broader social concerns. There are other indices under development to similarly incorporate more indicative measures of environment, such as forest cover and birds, into measures of development.

Additionally important concepts of intergenerational and intragenerational equity are also implicit in environmental security:

> *Environmental sustainability is also closely connected with intragenerational equity. While the wealthy consume more resources overall, the poor tend to rely more heavily on the direct exploitation of natural resources than the rich. If they have no access to non-environmental resources—and so have limited capacity to adapt—they may have no choice but to engage in unsustainable uses of environmental resources.*[51]

A definition of environmental security continues to evolve. Currently it is increasingly encompassing not only all of the parameters associated with the physical and biological components of the natural world, but also the imperatives of national security and individual well-being. Environmental security, however broadly and imperfectly defined, has been viewed as the "master metaphor" for an emerging post-industrial civilization.[52] As the source from which services such as water, air, natural capital and other basic attributes emanate, the environment enables all human activity, and can serve as the fulcrum for preventive action and further initiate development activities in support of a "culture of peace" as envisioned by UNESCO in its Decade of Peace. A program endorsed by all living Nobel Laureates, it recognizes the role of environment. The culture of peace has not been yet attained, however, and environmental security potentially has dual roles as both the force and the target of conflict and national destabilization.

War and Uneasy Peace

International security in the twentieth century traditionally addressed sovereign states in relationship to one another, and looked to how alliances and interests come together or apart on that premise.[53] The end of the Cold War has given way to a "hot peace" in which most sovereign nations are at peace with each other, but are at war within. Since World War II there have been approximately 111 civil wars. Between 1989 and 1997 conflict became more fluid, and only seven of 108 active armed conflicts were international in scope.[54] Civilians are more directly engaged in conflict than in previous times, in part due to the easy, global availability of small arms. The canon of von Clausewitz in the first Geneva Convention of 1864, differentiating civilians from military, is no longer valid, a major shift from violent events earlier in the twentieth century.[55] In the 1990's alone, approximately 5 million people became casualties, and 35 million people were displaced by civil wars. Women and children comprised a disproportionate number of the casualties, up to 90 percent in some circumstances.[56]

The origins of the intrastate conflicts are complex and perplexing. Many of them have no clear beginning, last for years, drain resources, quickly become international, and destroy the potential of societies. The internal wars now last almost twice as long as conventional wars (33 months versus 18.5) and they resist settlement. The root cause of war itself is difficult to empirically pinpoint. Some studies have found that per capita scarcity of resources and their over-use damages resource capital, and leads ultimately to human mortality; another idea is that in the post-colonial world well-distributed economic opportunity tends to diminish the probability of conflict. Territorial disputes have been found by others to increase the probability of war, and, in at least one study, the occurrence of civil conflict in Africa is linked to the failure of states to provide public services such as health and education.[57]

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Many problems reflect economic opportunism rather than grievance, with tangible primary commodities, such as natural forests, viewed as liquid assets for the taking. Clearly important in the cauldron of civil conflict, it is unclear if primary resources are causative or collateral factors in conflict. The trend in rapid, expansive environmental changes seems to parallel the growth of global civil conflicts and destabilization, but potential links have not yet been fully explored.[58] Little is known of how the accumulating changes, fast and slow, of environmental services are impacting people and their social, emotional and mental security on a daily basis that can be observed.[59]

There are indications that the interrelationships among environment, cultural, and spiritual institutions are important in successful sustainable development.[60] For instance, indigenous and subsistence societies have collective, intergenerational understanding and traditional governance that enables them to maintain resilient and productive ecosystems over time. Moreover, there is a direct relationship between human linguistic diversity and biological diversity throughout the world. Loss of linguistic diversity significantly contributes to the destruction of traditional ecological knowledge, a profound loss of place and of spiritual and psychological continuity for traditional people. At the same time, there is a renewed interest in traditional knowledge as adaptive management, important tools for sustainable development.[61] Losses of traditional knowledge and linguistic diversity can be socially and culturally destabilizing—when people lose personal relationship and spiritual contact and context with a particular region, leaving for a possibly better circumstance elsewhere in an urban area which just amplifies the adverse changes.

The destruction of the traditional knowledge library stored in people over centuries creates gaps in critical knowledge about restoration of diverse habitats, biodiversity, adaptive management and ecosystem functions, and diminishes intellectual diversity.

These consequences are particularly problematic following environmental destruction after violent conflicts and disasters. As has been evident in Nicaragua and other parts of Central America, however, many small communities have the knowledge, skills, and social organization to be central in healing damaged ecosystems and appropriately managing resources—but only if there is a community in place.[62]

Human communities are under intense stress from the changing world precipitated by the globalization of economic and environmental affairs. Superficially, the stresses may appear to be religious or ethnic, but ultimately are often undelain by gross inequities and a rapid, overwhelming loss of their ecosystem life supports. Multilateral institutions such as the World Bank have lost billions of dollars to civil war, and are now having to invest additional billions in post-conflict and post-disaster reconstruction. For instance, direct economic costs to outside powers as a result of the civil war and subsequent economic aid in Cambodia during the Cold War and the post-Cold War era have been estimated at US$14.9 billion.[63] In Rwanda the total costs to external entities from 1994 to 1998 for humanitarian, economic and military aid, plus other assistance from individual nations, approximated US$4.5 billion. If preventive actions had been taken in Rwanda, the massive state failure might have been avoided and lives saved, along with an estimated US$3.2 billion. Economic losses from the Guatemalan civil war have been estimated at $10 billion between 1980 and 1989. This figure does not include estimates for other losses, such as lives, physical injuries or loss of foreign investment.[64]

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Destructive land use practices are interacting with natural events to wreak massive environmental failures, an increasing challenge in the new security equation. The costs of natural disasters in 1998 alone exceeded the cost of all such disasters in the entire decade of the 1980's. Damages overall were greatly amplified by the increased ecological marginalization of the poor.[65]

The linkages between the health and well-being of individuals are increasingly thought to reflect the true viability of the state, in part attributable to the state of its resources.[66] Most of the population classified by the World Bank as low-income/ biomass-based subsistence economies are rural and highly dependent upon local economies and resources.[67] For instance, biodiversity in the Andes and Amazonia is both a crucial local process and a local and global public good—encompassing food security, health care and environmental resilience for the communities in the region, and an important area for biodiversity globally.[68] Viewing biodiversity, however, as only a global resource or for primarily economic good alone, can fail to account for the important local uses and meanings critical for peace and stability among indigenous,

traditional, and subsistent peoples. In turn, this can precipitate global problems as well. Economics is said to be at its most luminous when it emerges directly from life's experience, especially if it reflects the facets of social good and worth. Absent these qualities, the character of economics can have unanticipated adverse impacts on ecosystems and their stability and resilience.[69] Thus, the impacts to local values and local stability have global implications if the security of ecosystem structure and services is viewed as a security issue at several scales.

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Moreover, environmental security, food security, and political conditions are all further linked by subtle, interrelated natural processes that are not usually visible and grossly undervalued. For instance, agriculture is heavily reliant on ecosystem services.[70] As ecosystems are degraded and services impaired, suites of pollinator species are being lost worldwide, and the interlocking threads are unraveling. The trend indicates a threat of new dimensions to both food security and the continuation of native flora in general.[71] More than thirty genera of animals are needed to pollinate the 100 or so crops that essentially feed the world. More than 100,000 to 200,000 different animal species are important for pollinating 250,000 wild plant species.[72]

Insects, including 40,000 wild bee species, and other invertebrates are critical to pollination. Forest fragments in Costa Rica were found to have lost almost 50 percent of their wild bee species, important pollinators in those forests, in just fourteen years.[73] Many of the pollinating species are migratory, and their environmental interactions are unknown, or known only for a very few. In the tropics, animals are also key pollinators, and even fishes in streams are important to seed dispersal.[74] Inequities, conflict, and declines in the fabric of biodiversity are significant contributing factors to food insecurity. Food, environment, and social conditions are inseparable.[75]

Ecosystem Security: Examples of Forests

Forests have been a difficult topic for the world community since the first United Nations Conference on Environment and Development in 1992. The "Forest Principles" were a non-binding product of the 1992 meeting, an international acknowledgement that forests are very important. Depending upon the perspective, the Principles could also be viewed as reflecting the difficulty in bridging the divide between forests as a product sector, and forests providing essential ecosystem services and the conservation of biological diversity. The underlying causes of deforestation have accelerated since 1992, multifaceted and deeply interconnected with other aspects

of communities and states.[76]

In this paper, the term forests broadly refers to a diverse set of ecosystems with distinct geographies, evolutionary history, climate, and extent of human impact. Natural forests are essential to the life of the planet, and determine the continuity and stability of major biogeochemical cycles. Covering 40 percent of the earth's terrestrial surface, forests harbor 80 percent of the world's biodiversity, and are crucial to generation and maintenance of freshwater flows. Moreover, they are key to atmospheric maintenance, and have become central in international debates about climate change, greenhouse gas emissions and carbon sequestration. About three times the amount of carbon than currently present in the atmosphere occurs in forests.[77]

We are just beginning to understand the services of biodiversity in different kinds of forests and what the accumulating loss of species may mean in terms of ecosystem functions and different timeframes.[78] About 80 percent of the earth's original forests were cleared, fragmented or otherwise degraded, primarily in the twentieth century.[79] The largescale landscape degradation and subsequent biological devaluation forest resources, including loss of old growth, has led to major watershed disruption. Water quality has declined and aquatic organisms used by the poor have disappeared.

Changes in forest ecosystem health and composition beneath the tree tops are often overlooked because they are not readily apparent from satellite imagery. Consequently, global measures of deforestation by the United Nations Food and Agriculture Organization do not necessarily reflect the degradation of forest ecosystems where there is still cover.[80] The sub-canopy impacts to structure and other ecological facets of forests have been referred to as "cryptic deforestation."[81] It is the result of multiple cumulative adverse changes, including ground fires set by people, accelerated poaching, defaunation, mining, poor management practices, and overgrazing. Subsequent changes in sub-canopy structure and composition erode the services of natural forest ecosystems, such as habitat for neotropical migratory birds throughout the Américas.[82]

Forest loss and fragmentation may be contributing to higher incidences of disease. For instance, increases of malaria and leishmaniasis are attributable in part habitat changes that are the result of deforestation, creating new habitat that promotes the disease-carrying insects.[83] Other diseases are emerging from ecosystem fragmentation that impacts wildlife but which may or may not directly impact people. Pathogens are on the rise across all ecosystems, including oceans and aquatic ecosystems. Episodes of toxic algal blooms have increased, and there is increasing transport of cholera as well as development of conditions for variants that are drug resistant.[84] The emergence of 30 or so new diseases since 1990 is viewed as evidence of the increasingly heavy human footprint that is rapidly changing ecological conditions, aiding the ability of emerging diseases to evolve in step with maximum impacts to people and perhaps even other species.[85] Emerging diseases are a security "threat" that require a whole different knowledge and approach than traditional security threats faced by countries.[86]

A different but related consequence of ecosystem fragmentation and transformation includes invasive species—non-native species accidentally or deliberately introduced

into new environments where they impact or wipeout native species—with increasing consequent economic losses from their presence. Forests and almost all other ecosystems are further compromised by increasing non-native species as fragmentation and degradation occur. Agricultural losses worldwide from bioinvasions have been estimated to range from $55 billion to $248 billion yearly.[87] Also, many people who are subsistent rely on native plants as part of their medical system. Loss of native plants, their nutrients and medical benefits, confer further degradation to human security.

There are concerns even for the still expansive forest ecosystems. For instance, boreal forests are the most extensive forests of the Northern Hemisphere, and heavily relied upon for timber. Boreal forest will be affected by small rises in temperature from climate change. Many of the world's northern rivers flow wholly or in part through boreal forest, and the lakes are estimated to contain about 80 percent of the world's unfrozen freshwater.[88] Birds comprise about 70 to 75 percent of the vertebrate fauna. Many of the species are long-distance, seed-dispersing migrants to other regions, but in order to live they must have boreal forest in their lifecycle. The diversity of birds is being reduced through logging and other human impacts. The ecosystem services provided by birds, such as control of insect populations, are declining. Generalized and opportunistic species that do not provide many services are increasing.[89] Moreover, boreal aquatic systems are showing increasing acidification and toxic pollutants with declines in fisheries.

Similar landscape impacts can be found in all types of forests.[90] For instance, approximately 50 percent of temperate "ruil" forest, a unique broadleaved, moist forest now restricted to a narrow band of fragmented landscape in coastal south-central Chile, was lost from 1981 to 1991 primarily because of the expansion of Monterrey pine plantations.[91] The deforestation rate to accommodate the plantations is very high, approximately eight percent per year. Fifty percent or more of the plants, insects, and amphibian species in ruil are found only in that forest. Loss of habitat and further fragmentation are having a significant impact on biodiversity in the region, and even beyond if one considers migratory species.[92] Ruil harbors many unique birds and about 20 percent of the endangered trees in Chile. As in other forest systems, seed dispersal and pollination have been impaired, severely curtailing the chances of tree reproduction.[93] The pine plantation, with basically only one species of tree, does not replace the diverse biological services of the intact native forest. It is a highly simplified, industrial forest that requires greater energy input, maintenance, and human intervention. The expansion of the plantations is also associated with social conflict in the area.

Examples of deforestation and biological debts can be seen all over the world. Lake Tanganyika, one of the Great Lakes of Africa, is the largest body of water in Africa, thought to be the most diverse lake on earth. Four countries (Burundi, Tanzania, Zaire, and Zambia) form its immediate watershed of 250,000 km2, with 7 to 10 million people living within its reaches. The African Great Lakes region encompasses extraordinary biodiversity that has high priority for international conservation. However, deforestation is extensive. The diverse, endemic forest ecosystems outside

of protected areas have been largely transformed to cassava and banana cultivation. The Lake has been inundated with sediments from hillside erosion, and lake organisms have been adversely affected.[94] Suspended sediments in the water may be causing bacterial growth, which depletes oxygen in the water, and organisms along the shorelines are disappearing, affecting birds and small mammals. The Lake's reserve of biodiversity is being eroded and the livelihoods of people who depend upon on lake resources are impacted.

As a final example, patterns of deforestation and serious biological debt are also evident in the Northwest Frontier Province of Pakistan (NWFP). Essentially arid and mountainous, the NWFP had diverse forest types from blue pine to xeric oak. It is still an important wildlife area, with populations of snow leopard and brown bear, many endemic fishes, important portions of the Asian migratory flyway, and other biodiversity in the forests of the Siran Valley. Indus dolphins have been known in the upper reaches of the Indus River. There is also hunting pressure in the area.

One of the ways the British colonial past impacted the NWFP was through heavy historical emphases on logging. This legacy of bad economic practices has continued, and is characterized by graft, corruption, forest exploitation, and extensive deforestation.[95] Ironically, per capita timber use in NWFP is the lowest in the world but deforestation is the second highest because of exploitative logging. Today, 90 percent of traditional forest rights, most which are customary, are in dispute. At least one study has confirmed the strong influence of poverty and environmental insecurity on the high internal rate of migration within Pakistan.[96]

Forests are important for subsistence and resilience in livelihoods for a large number of people throughout the world.

The Siran Valley of the frontier area, encompassing 75 percent of the country's dry forests, became the primary destination for the settlement of the majority of the 3 million refugees of the Soviet-Afghan war. About 1.2 million of the original settlers still remained prior to the recent conflict in Afghanistan. Refugees were mostly nomadic and are estimated to have brought in 10 million head of livestock. Over a fourteen year period the dry tropical forest declined by 40 percent from agricultural clearing, fuel wood harvest, and excessive tapping for resin.[97] Eventually, agricultural viability was also lost. Infant and child mortality have remained high, close to 60 percent, due to continuing environmental degradation and waterborne diseases.

It is in the Northwest Frontier Province that the mudrasa education system of fundamental, militaristic Islam has taken hold. The education is free, and sometimes parents are even paid with funds from the state, and increasingly receive private funds, for sending their children.[98] With the collapse of agriculture, opium poppies have flourished as a cash crop. Peshawar, in the heart of the Golden Crescent drug trade, is the most viable economic outlet for many people. Seasonal migration from refugee

camps has swamped the city, exacerbated ethnic rivalries, and led to dramatic increases in drugs, weapons, and violence.[99]

Forests are important for subsistence and resilience in livelihoods for a large number of people throughout the world. Reliable estimates of the worldwide subsistence forest economy, including non-timber products and services, are not available. Nevertheless, large-scale, cumulative loss and degradation of natural forests are contributing to migration and concentration in urban areas, as well as to loss of biodiversity and ecosystem services.

Continuing trends have broad implications for the lives of future generations, their environmental quality, and the realistic possibility of attaining sustainable development. By 2030 about three-fifths of the world's population will be living in megacities where environmental and/or other costs and damages will also be likely to accrue. Health hazards, psychosocial deterioration and conflicts are also expected to rise dramatically. Much of the displacement is attributed to landscape deforestation in areas where the people have been subsistent or highly resource dependent on one or two major resources.[100]

Environment and Human Security

There are growing indications that natural ecosystems such as forests, in combination with other factors, including rank on the UNDP Human Development Index, set up the conditions for destabilization, conflict, and other indications of social disruption as well as further environmental damages. Where there is natural resource wealth there is also a tendency toward inequity between elites, who concentrate resource wealth such as forests, and the poor.[101]

The increasing social and environmental vulnerability that rapid deforestation precipitates in communities has been empirically associated with violent civil conflict. In circumstances where resource inequity is exaggerated, incentives for investment in social capital, such as education, are low. The demand for education drops as well, and a low level of education in turn increases the likelihood that young men will join in rebellions. Economic issues, rather than grievances, appear to be more predictive of conflict.[102]

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Deforestation has been found to be directly related to the rule of law in 120 countries, with general lawlessness and other governance factors key in the path to deforestation. The "disinvestments" in forest ecosystems appears to be directly reflective

of a breakdown in governance.[103] One of the purposes of states is to do what individuals cannot do well nor guarantee-provide public goods, such as clean water, clean air, biodiversity and other ecosystem services, and a healthy environment. Without protection of the most fundamental underpinnings of human life, a state is bound to fail. State services, including security, health care, and education are similarly critical public goods.[104]

An empirical, statistical review of the bottom countries on the Human Development Index, the UNDP report mentioned earlier revealed that forests and subsistence agriculture, closely associated with a country's rank on the HDI, are significant elements associated with destabilization and conflict. It was possible to statistically and accurately predict which countries would be in civil war by using forest and agricultural status.[105] In a similar study, the State Failure Task Force Report, the authors found that there were indications of deforestation as a significant factor that may underlay or may predict looming social disintegration.[106] In focusing on who profits, it appears that primary commodities, such as forests, are good proxies for lootable resources that invite rapid economic exploitation, the essential fuel of civil war. For instance, civil war in Cambodia lasted about 30 years. During that time looting of natural resources to fuel the war was rampant. When the conflict subsided, the United Nations Transitional Authority came in to help the country reorganize and rebuild. The Authority found over time that there was a serious threat to the environment and economic future of Cambodia from the continuing pattern of overexploitation of natural resources, particularly in forests and minerals.[107]

Natural resources availability, especially primary commodities such as forests, has one of the strongest effects on the incidence of conflict as well as the duration of conflict.

In January 2002 a logging moratorium was declared for all of Cambodia as part of a strategy to address the widespread, ongoing illegal activities. Large-scale, continuing impacts have accrued in the watershed of the Mekong River within the country. The river flows through China via the Tibetan Plateau, down through Vietnam, Laos, Thailand and Cambodia. About 50 million people live in the river's lower reaches, encompassing Cambodia. Deforestation is an issue throughout the water body's course, but it has been noticeably high in the river sections above Tonle Sap within Cambodia. The largest freshwater lake in Southeast Asia, the fishery of Tonle Sap is important to millions of people. Nevertheless, upper watershed degradation, particularly deforestation, has caused the lake to fill with sediment, and fishing conflicts are becoming more frequent. It is important to note that the military has been key in participating and promoting the liquidation of the Cambodian forest estate. Similar patterns of military involvement are found elsewhere in the world and includes paramilitary and other private security forces in resource-rich areas.[108]

Natural resources availability, especially primary commodities such as forests, has

one of the strongest effects on the incidence of conflict as well as the duration of conflict.[109] A recent overview of 139 countries confirmed a strong predictive link between deforestation, natural resources, and conflict.[110] Moreover, fighting was found to be prolonged in countries with forests. It may be that forest cover makes it difficult for a government to put down a rebellion and may prolong the duration of conflict. No one has explicitly studied whether or not the fighting may extended due to the lure of forests as the war prize. It has also been found that in countries with a high level of dependence upon primary commodity exports there is a risk of conflict that is four times greater than in countries with more diversified economies and less dependency on primary commodities.[111] Rapidly realized profits to an elite few in these circumstances may become so attractive that there is little motivation for peace.

While the emerging linkages between civil conflict and natural resources are informing the world about the role of primary commodities in many societies, there is also an emerging link with the status of ecosystems themselves. The rampant deforestation associated with those findings can be demonstrated to be causative and regionally and globally cumulative in a downward spiral of ecosystem loss and impacts to biodiversity as well as people.

Conclusions

While the precise roles of the environment in peace, conflict, destabilization and human insecurity are still being debated, there are growing indications that it is an underlying cause of instability, conflict, and unrest. It is thought that there is a "masking effect", in which the political and economic causes of unrest, violence, conflict and destabilization actually obscure the underlying environmental causes.[112] As one author has so clearly stated:

> *It may be the social, economic, and political repercussions of environmental change—rather than the change itself—that are the most important determinants of conflict over the environment…Providing human security is about strengthening the social and environmental fabric of societies and improving their governance…*[113]

We think that recent findings of the role of forests in the world's civil conflicts, considered together with what we know is occurring globally from the broader environmental point of view, provide important evidence of a critical relationship of people with their environment that has long been overlooked by the nation-state system of sovereignty. Historically, the wealth of nations has been expressed as a reflection of produced goods and their flow, usually expressed as GDP or GNP. Many people in the developing world, however, are not part of measurable market forces and instead are highly subsistent or partially subsistent, depending directly upon surrounding ecosystems for livelihood alternatives and resilience.[114] It is unlikely that they will all be totally converted to market economies in the near term, making them continually subject to the vagaries of environmental degradation and loss of resilience in livelihoods. In marginal ecological areas or in areas that are being rapidly degraded,

entire peoples and their ways of life are threatened, with on-going losses in natural resources and ecosystem services, as may be seen in the Mesopotamian wetlands and in the NWFP of Pakistan.

The worldwide loss of biodiversity and accelerated degradation of all environments appear to parallel the conflicts characterizing the twentieth century, especially as it transitioned from interstate to intrastate struggle and violence. This, too, merits some careful exploration to evaluate if there are additional lessons to be learned about people and environmental destabilization over longer time periods. No one knows exactly what is causing the significant shift, but there appear to be strong links between civil strife and forests degradation and loss. Whether or not the environment has fueled conflict or is a victim of conflict remains to be determined. Either way, the result can only be one of diminishing returns and continued accumulation of biological debts that will the burden of future generations across ecosystems of all types.

While society deepens its understanding of the earth's biophysical realities and limitations, environmental governance remains in its infancy. Maturity and change will be facilitated when environmental scientists expand their own world view and transfer ecological knowledge into other parts of society. The environmental and orthodox international affairs communities are struggling to work with each other as well as find ways to match multi-scale, complex resource issues with the historic structure of sovereignty at a global level.

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The discussions held at the 1972 United Nations Founex Conference and the concepts articulated by the Brundtland Commission in *Our Common Future* were visionary and ahead of their time. Environmental security is increasingly understood to be crucial for human security and perpetuation of natural ecosystems. It is equally essential to ensure the perpetuation of resources for their non-material benefits, such as inspiration, cultural values, and spiritual meanings. Extended conflict is an increasing fact, a waste of natural resources materials, people, and potential, curdling development options and the reasonable growth of economies. It is an impoverished expression of economic imperative born of inequity and the breakdown of societal gender-equitable investment in people.

As may be seen in the environmental history of the Northwest Frontier Province of Pakistan, environmental degradation also impacts food security, with a cascading effect on local human conditions. It leads to migration from rural areas of food production and gathering to urban areas of food consumption and related services. It leads as well to increasing poverty and disease. In biological terms, the rural human community is pushed from traditional producer roles into more resource-demanding

consumer roles. Clearly, investment in the environment is an investment for people to have resilience and options to poverty.

Changing the trajectory of the joining of resource degradation and civil conflict will require international convocation of the traditional peace and security community, development communities, and scientific communities. Working together they will have a powerful scope to develop a greater understanding of the intersection of conflict, human development, different ecologies and measures of development.

Environmental security is central to national security, comprising the dynamics and interconnections among the natural resource base, the social fabric of the state, and the economic engine for local and regional stability.

There are already indications that multidisciplinary efforts are being contemplated and accompanied by research agendas. For instance, some have identified the important linkages of economic and financial imperatives of development with social goals, and there is a proposed peace research concept that would include, to some unspecified degree, environment. There is a European analysis utilizing remote sensing and satellite observation techniques to bring together information on security and the environment, and another proposing to research climate change and human security. In 2002 a seminar of the Swedish Johannesburg Secretariat considered how to link security and sustainable development. The nexus of environment and conflict, especially in post-conflict reconstruction, is not yet clearly on the World Bank's agenda, nor that of the other Bretton Woods Institutions.[115] However, on behalf of Bretton Woods, the World Bank could call upon its partnership in the Global Environmental Facility to engage in an initiative that includes a deeper look into the intersection of environment and conflict, especially relative to structural adjustment, other monetary vehicles, and human rights. There is also a need for the regional bank infrastructure to be involved in similar efforts. There may need for greater investment to correct the underlying causes of conflict early after cessation of conflict, which may include addressing natural resource inequities, land tenure, the need for new techniques of environmental restoration and protection, and interventions to avert environmental degradation.[116] Potentials for ecosystem restoration also need to be fully addressed. The UNEP already has a division of Early Warning and Assessment that is capable of bringing focus to this arena.

Environmental security is central to national security, comprising the dynamics and interconnections among the natural resource base, the social fabric of the state, and the economic engine for local and regional stability. Existing institutions, such as the Global Environment Facility, the United Nations Environment Program, UNESCO and others in the NGO and private sector communities, could greatly further the world's understanding of the linkages between environment and human security by integrating existing programs. These include monitoring of geo-referenced

security information that is integrated into environment projects, and development of early warning systems linked to changing environmental quality and ecosystem health. It is currently difficult to interrelate security and conflict information as it is collected and archived with geo-referenced biological information.

In 2001 the United Nations Security Council undertook a study of the situation in the Congo. The expert panel found that the civil conflicts were enabling looting and profiteering on a large scale. Damages to wildlife and other natural resources were rampant.[117] While the materials gained in these exploitations of conflict are feeding into a kind of "economy," only a very few people are benefiting at the waste and expense of many others, squandering current and future potential for civil society. At the first meeting of the United Nations Permanent Forum on Indigenous Issues, a distinguished Batwa leader native to the Congo spoke sadly and poignantly about the plight of his group in the face of the on-going conflicts that are further aggravating their marginalization and destruction as a people. The indigenous Batwa people are suffering not just from the conflict but from health, environmental and spiritual destruction, as well as violation of human rights. Moreover, the slaughter of wildlife and plunder of natural resources by the parties in the African Great Lakes region belies the concept of ecological sanctuary in war zones. The United Nations High Commissioner on Human Rights recently held a meeting in Geneva in 2002 with an initial expert group to discuss the intersection of environment and human rights, an emerging issue that necessarily is directly related to resource overuse and inequity, as well as security of both the environment and people.

Prospects for human prosperity and growth in this new Millennium must take into account the environmental security issues we have raised in this paper:

> *Global partnership in ecology and development has become a crucial factor as regards world peace….securing the natural bases of life over the long term will only be possible if we act in a way that takes account of the mutual dependence of the economic, social, and ecological components of development- in other words, if traditional environmental policy is integrated into all other areas of policy. Worldwide environmental and development policy is the peace policy of the future.*[118]

The environment alone does not determine the course of peace or conflict, but it is nevertheless a critical element woven throughout all human life. One research group tried to estimate the worth of the natural world's ecosystem services and came to the conclusion that the economic value of everything, based upon 17 ecosystem services for 16 biomes, was at least an average $33 trillion per year.[119] The estimate is based on a very limited accounting of ecosystem services based on what we know today.

New forms of governance are evolving that incorporate environment, a trend that may address the institutional disconnect alluded to earlier. The UN Convention to Combat Desertification (CCD), for instance, incorporated the opportunity for local and regional entities within the signatory countries to develop plans and ideas that they wanted to see considered in convention implementation. Non-governmental

organizations have been very active in the convention's unfolding, and official time is granted for NGO presentations within the Conference of Parties. Moreover, the CCD applies to ecosystems that are inherently similar.[120] There are also increasing efforts to create 'synergies' among the environmental conventions in recognition of their inherent scientific commonality. Although the Kyoto Protocol/Climate Change Convention was originally atmospherically focused, it has changed to acknowledge the realities of natural ecosystems in biogeochemical cycling and atmospheric maintenance.

New regional environmental efforts may provide innovative platforms for organization and bioregional management that will have more direct meaning on-the-ground while addressing global issues, such as treaty obligations.[121] In 1989 the Central American presidents signed the Central American Commission on Environment and Development into existence, which recognized the common need to manage the natural resources of Central America. In further recognition of the state commonalities in natural resources, and the biotic diversity and importance of the region, the Mesoamerican Biological Corridor was established by a consortium of non-governmental groups and endorsed by regional heads-of-state at a summit in 1997.[122] International funding from the Global Environment Facility, the World Bank, and the German GTZ have enabled its implementation.

Another important arena that needs to be addressed is trade. As globalization proceeds, it will be increasingly important for trade to be infused with concepts of environmental security and impacts. A recent effort in this direction includes the North America Commission on Environmental Cooperation formed parallel to North American Free Trade Agreement. It is the first broad environmental entity of its kind to be specifically linked with a trade agreement. The Doha Ministerial of the World Trade Organization has opened the door for broader consideration of environment and sustainable development within the trade arena. There is a great need for the development of scientifically viable techniques for determining the impacts of international trade on the natural environment, and it might be important for there to be an impartial group of environmental scientists to help guide the creation of a viable intersection between trade and natural resources as well as to help cross the disciplinary divide between trade and the ecological community.

The cooperative management of transboundary resources is another important area that needs to be addressed relative to conflict and environment. Interesting work is currently being undertaken by the little-known Cooperative Monitoring Center in nonproliferation at the Sandia Laboratories of the US Department of Energy in New Mexico.[123] They have been working in several countries to develop ways to diminish the potential for conflict around transboundary resources such as rivers and wetlands.

Environmental security is essential to human security and potential, and of key importance in sustaining ecosystem services as well as securing peace. Examples given here document the fact that there are many opportunities to avoid environmental damages and promote peace when the environmental, peace, traditional security, and development communities decide to come together and design new approaches to

conflict resolution and development.

When writer Ken Saro-Wiwa was speaking out about disgraceful environmental conditions impacting the homelands of the indigenous Ogoni in Nigeria, he was imprisoned by the ruling elite, with interests that were intertwined with transnational corporations, just for being outspoken. He was executed in 1995, something the world had thought an unimaginable possibility. The importance of non-governmental groups in the environmental security arena is critical, recently highlighted by the work of Global Witness and its African partners in investigating the conflict diamond situation, and nominated for a Nobel Peace Prize in 2002. Healthy ecosystems and equity in access to ecosystem services are now, and will remain, fundamental to peace and human security, and are the metaphor for this new Millennium.

Notes

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