FOREWORD

by P.J . Simmons, Editor

Just over two years ago, then U.S. Permanent Representative to the United Nations Madeleine K. Albright argued that "environmental degradation is not simply an irritation, but a real threat to our national security." As Secretary of State, Ms. Albright has already indicated that she intends to build upon the pathbreaking initiative of her predecessor, Warren Christopher, to make environmental issues "part of the mainstream of American foreign policy." On Earth Day 1997, Albright issued the State Department's first annual report on "Environmental Diplomacy: the Environment and U.S. Foreign Policy." In it, Secretary Albright asserted that global environmental damage "threatens the health of the American people and the future of our economy" and that "environmental problems are often at the heart of the political and economic challenges we face around the world." Noting that "we have moved beyond the Cold War definition of the United States' strategic interests," Vice President Gore argued the Department's report "documents an important turning point in U.S. foreign policy—a change the President and I strongly support." Similar sentiments expressed by officials in the United States and abroad indicate the growing interest in the interactions among environmental degradation, natural resource scarcities, population dynamics, national interests and security.*

The breadth and diversity of views and initiatives represented in this issue of the *Environmental Change and Security Project Report* reflect the advances in research, contentious political debates and expanding parameters of this important field of academic and policy inquiry. As a neutral forum for discussion, the *Report* includes articles asserting strong connections between environment and security as well as more skeptical analyses. In this issue, Kenneth Keller cautions against defining national security (and the term, "environment") too broadly. Recognizing the importance of population variables for the environmental problematique, Robert Engelman and Dennis Pirages explore crucial demographic dynamics and assumptions while laying the groundwork for more detailed population-environment discussions in future issues. Katrina Rogers advocates closer examination of cooperative as well as conflictual responses to environmental degradation and depletion, then turns to the role of an often neglected actor in the environment and security realm: the private sector. And finally, Canadian scholar Franklyn Griffiths offers an outside observer's assessment of the U.S. environment and security discourse while proposing to put the environmental security concept to the test in the "Missing Arctic Waters."

Let me highlight several new features in this third issue of the *Report.* To help bring the latest academic research to the policy community, we include a series of "Special Reports" on research findings as well as detailed rapporteurs' reports from several U.S. and international conferences. The updated bibliography of relevant literature has a new section on population-environment-security dynamics. And as always, the *Report* includes: excerpts from statements by U.S. public officials and institutions; reviews and descriptions of recently published articles and books; summaries of Wilson Center meetings; an expanded list of related internet sites; and details about many U.S. and international scholarly, NGO and government initiatives. We have listed contact information to facilitate links among individuals and groups engaged in complementary endeavors. As the listings and information are not fully comprehensive, we would greatly appreciate your continued submissions of relevant information and additions for future issues. We hope you find the issue helpful and look forward to receiving your comments and contributions.

** See the "Official Statements" section on pages 110-125 for excerpts from remarks by Albright, Christopher, Gore and others. See the Spring 1996 edition for details on the Christopher initiative. The complete text of the State Department's "Environmental Diplomacy" report is available on the Internet at: http://www.state.gov/www/global/oes/envir.html.*

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Unpackaging the Environment

by Kenneth H. Keller

The time has come to unpackage the environment. In the three and a half decades since environmental problems first began to command public attention, they have moved from the periphery to stage center. No longer discussed only at gatherings of the converted, environmental issues are part of centrist political campaigns, the subject of major international conferences, a factor in trade negotiations and an element in the strategic plans of multinational corporations. While this attention has led to some notable successes, actions have fallen well short of needs. The question now is how to transform spotty progress and modest steps into a more consistent pattern of political support for environmental concerns, how to move from the wide recognition that a problem exists to a public consensus that it is important. It is this question that now dominates discussions among environmentalists. The strategies proposed appear increasingly to have two elements: first, to give even more visibility to the environment *per se* by creating national and international institutions devoted exclusively to studying and promoting its health; second, to identify environmental interests with other interests—as an aspect of national security, for example.

I would argue that the term itself has become too broad and overburdened to be useful in setting policy or in guiding specific governmental action. There is even a question about whether "the environment" continues to be an effective umbrella for scientific investigation. The argument here rests on the notion that the strategy for drawing attention to a problem may actually be counterproductive when it comes to finding solutions to it.

Moreover, the unbounded expansion of the concept of national security to include all threats to the well-being of a nation's people renders the term meaningless in an operational sense. There is certainly room for reformulating the concept, but that reformulation should not be cast as a broad expansion of what "security" is taken to mean. Instead, it should focus on identifying those environmental threats that may lead to traditional security problems and those that can be responded to most effectively by military organizations.

By avoiding the temptation to label a confusingly broad category of problems with a ready-made, if slightly ill-fitting, title, we may actually contribute to a larger goal: seeing our vital interests as something broader than national security and the tools available to us to protect those vital interests as necessarily more nuanced than military action.

"Think Globally, Act Locally"

Most people would date the emergence of the environmental movement into relatively broad public consciousness from the 1962 publication of Rachel Carson's classic book, *The Silent Spring*, which decried the excessive use of pesticides.[1] Eight years later, the first Earth Day celebrations took place and, in 1972, the first U.N.-sponsored Conference on the Human Environment was held in Stockholm.

In those early days, environmentalism was synonymous with a rather narrow concept of conservation—the protection of nature—and the major threat was pollution. What is "natural" was distinguished from what is man-made or synthetic. "Chemicals" referred to those substances that people "made" (or industrial societies exploited, such as hydrocarbons), and, chemistry notwithstanding, it was clearly not a term meant to include proteins or lipids or carbohydrates or, for that matter, water, air or natural toxins. Technology was "appropriate" when it was unobtrusive: E. F. Schumacher's *Small Is Beautiful* was required reading. The Stockholm Conference consciously excluded "development" from its title.

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In short, the environmental movement was coherent but driven more by strongly held values than by scientific or economic analysis, an ethos largely aesthetic and moral, perhaps even spiritual. However, although it was relatively coherent in its ideology, it made no pretense to being a central force on the world stage. "Think globally, act locally," René Dubos's famous phrase, was its call to action and the movement was more or less marginal.

New Measurements, New Problems

Much has changed in the intervening years, with science, technology, demographics, economics and politics each playing a role. First, science. Our understanding of the effects of humans on their surroundings has grown with our understanding of the surroundings themselves. Ecology has come into its own as a natural science. Now increasingly quantitative rather than descriptive or value-laden, it is connected to molecular biology and microbiology, to geochemistry and geophysics, with sophisticated models and measurements to support hypotheses. Ecological studies have given us a greater appreciation of the role of biodiversity in the survival of regional biota (plant and animal life) and helped us to understand the distinctions between tropical forests and boreal forests, the role of seasonal wetlands and flood plains, the importance and fragility of coral reefs and Arctic ecosystems—and the concomitant dangers of such phenomena as deforestation, desertification, natural resource exploitation and dam building.

By avoiding the temptation to label a confusingly broad category of problems with a ready-made, if slightly ill-fitting, title, we may actually contribute to a larger goal: seeing our vital interests as something broader than national security and the tools available to us to protect those vital interests as necessarily more nuanced than military action

During these three decades, atmospheric chemists and physicists first predicted and then measured the effect of chlorofluorocarbons (CFCs) on stratospheric ozone depletion. They postulated and largely came to agreement on the reality of global warming, and they detected and came to understand acid rain, smog and other aerosol phenomena. Medical scientists, epidemiologists and demographers offered evidence or hypotheses for connections between emerging and reemerging diseases—from the Ebola virus to malaria and dengue fever—and habitat destruction; between environmental degradation and reductions in life expectancy and between power line electromagnetic fields and morbidity in children.

Much of the broadened attention to the field has come about because our measurements have become more sensitive and sophisticated; satellite-based instruments give us extraordinarily detailed information about land cover and land use, about weather and temperature, about fish populations and the health of coral reefs. High altitude balloons help us determine atmospheric composition. What were once undetectable trace chemicals can now be measured easily, and the power of computers has allowed us to analyze huge volumes of data in short periods of time. Thus, science has vastly increased the range of problems that have come to be included under the rubric of the environment.

Technological advances during these three decades have played a different, but equally important, role in broadening the range of problems labeled environmental—as well as in raising the stakes and forcing on us the inescapable trade-offs between economic development and environmental stress. Polymers, or "plastics"—which can survive centuries without degrading—are now ubiquitous and have made waste disposal a major issue. Our waste products now include more toxic and radioactive materials, and we need to worry not only about where to put them, but also which countries and which groups have the technical capacity to manage them safely over geological time scales—an issue growing ever more serious as rich countries attempt to rid themselves of the problem by exporting it to those hard currency-starved countries in the developing world least able to handle the wastes. The "green revolution"—raising food production without increasing the land under cultivation (since there is no more to cultivate) through the liberal use of fertilizers and pesticides—has exacerbated the problem of pollutants and increased the energy necessary to produce food. The growing global appetite for energy in all forms is the most intractable problem of all. For, at bottom, to increase people's standard of living, we require increases in productivity. Technology is the lever and energy runs the system.

But all of the practical energy sources now available generate environmental stresses. Improving the efficiency of the system, the energy it takes to produce a dollar of product, helps. Using energy sources that generate fewer pollutants also helps. But for the foreseeable future, the need to increase the standard of living of four-fifths of the world's population will lead to significantly increased energy consumption and the production of wastes that will warm and foul the atmosphere and the waters of the earth.

How much energy consumption takes place de-

pends directly on how many people there are to support. The equation is simple: the energy it takes to produce a unit of product, times the amount of product consumed per person per year, times the number of people on the earth, equals the total amount of energy used per year. Thus, the third factor that has expanded the scope and seriousness of environmental problems since the 1960s and 1970s is population growth.

From 1970 to 1990, the population of the world increased by 1.5 billion people, or 43 percent. Without any improvement in standard of living, this would have required a 43 percent increase in energy consumption. In fact, energy consumption doubled during the two decades.

The centrality of population growth has been a key factor in an important shift in the international political debate about the environment over these two decades. In its simplest terms, overconsumption by the North has brought us to the brink of crisis, but population growth in the South, coupled with an improved standard of living (a legitimate aspiration), will take us over the brink.

The issue is joined in the search for solutions to the problem: Who is to blame? Who should pay? Who will benefit? Where should changes take place? I will return to these questions later on.

People and Politics

A second demographic issue altering the environmental agenda is the shift of population from rural to urban settings. The development of urban centers with 10 to 20 million people in Asia and Latin America has led to a new concern about localized atmospheric problems—smog, particulate matter, oxides of nitrogen and sulfur—that affect urban health. Urban sanitation infrastructure has become a major issue, with outbreaks of cholera in cities like Lima, tales of children playing in open sewers in Africa and the threat of drinking water shortages in much of urban China. Furthermore, the separation of people from the sources of food has created a need for highways and railroads, the construction of which removes arable land from cultivation and the operation of which increases energy consumption.

Each of these developments has increased public awareness of environmental issues. This increased awareness has itself been an important goal for environmentalists as they seek to convert an issue that had once been marginal to one that is central.

Less planned have been the changes in the political significance of "the environment"—and the related ownership of the issues. New revelations about aspects of the environmental crisis or new emphases on the relative importance of its many facets have either attracted the political attention of a different cluster of groups or forced a change in the political strategy of those with long-standing interest in these problems.

In the early days of the movement, environmental groups were either the societal dropouts of the 1960s or the Nature Conservancy / Audubon Society crowd—caricatured as a wealthy elite with more concern for the snail darter than for the desperate of the earth. The former group had little political effect; the latter did achieve some political successes through treaties such as the Convention on International Trade in Endangered Species and the international Law of the Sea (not yet ratified by the United States). The thrust of their concerns, however, led most developing countries to dismiss the movement as no more than the rich wishing to preserve the undeveloped regions of the world as large zoological gardens.

As more was learned about environmental effects *within* industrialized societies, the Green movement arose. For the Greens, the environment served as proof of the destructiveness of market-driven industrial societies, which were controlled by multinational corporations for whom the profit motive displaced any social concern. Environmental issues became inseparable from broader social issues and, in a very real political sense, were held hostage to those broader issues. This was not a time in which people sought solutions to environmental problems. Instead, they sought confrontations.

But, over time, the Greens have lost control of the movement. Other political agendas, as well as economics and the sheer magnitude of the issues, have drawn the attention of other constituencies.

"North" versus "South"

As the reality of global warming and the damaging effects of chlorofluorocarbons became clearer, as the costs of uncontrolled population growth became convincingly obvious, it became harder and harder for the developing world to dismiss the environment as a rich man's movement. On the other hand, the environment became an ideal vehicle for resurrecting in the 1980s and 1990s a failed gambit of the 1970s: the notion of a "new economic world order."

In the earlier decade, developing nations had argued that the growth in productivity and the economic success of the North had been paid for by the exploitation of the South. Therefore, the South was entitled to reimbursement. The North, on the other hand, argued that its successes were the result of its own ingenuity and hard work. Not only were its accomplishments not dependent on exploitation of the South, but the South was free to achieve the same thing on its own. Hence, no payment was justified.

The environmental facts appeared to undercut the North's arguments. The accumulation of carbon dioxide in the atmosphere, which put the world under pressure to constrain further expansion in (and even to re-

duce) the use of cheap sources of energy based on carbon-laden fossil fuels, such as coal, had been entirely for the benefit of the North. Now the South was being asked to pay the price, either by constraining future economic growth or by bearing the higher costs for more benign or more efficient energy sources.

Furthermore, the South was being asked not to burn its forests, because the additional release of carbon dioxide would seriously exacerbate global warming and also destroy habitat, thus threatening biodiversity by causing the extinction of untold (because unknown) numbers of flora and fauna. However, the South noted, the North had already cut down a significant fraction of its own forests in order to develop its cities and feed its population, another bit of evidence that the North expected the South to pay the price of the earlier developments.[2]

Finally, the arguments made in the North for the importance of preserving biodiversity were given a different interpretation in the developing world. The industrialized nations argued that the South's flora were a rich source of pharmaceuticals and that biodiversity provided insurance against the inexorable transient victories of one species over another, which rendered a particular food plant vulnerable to attack or a particular microbe invulnerable to an existing drug.

But while the North pointed out the value of the South's biota, the South noted that it had never received any compensation for the germ plasm that had been removed from its lands, converted into useful products and patented and marketed. Thus the discussion of biodiversity became entwined with a discussion of the legitimate profits of biotechnology.

These issues, primarily economic and political, dominated the U.N. Conference on the Environment and *Development* (emphasis added) held in Rio de Janeiro in 1992. The terms of reference, the discussion, and the outcome were all shaded by considerations of who was to blame and who was to pay—which largely determined the position of many of the participants on the proposed conventions, both those agreed upon and those postponed.[3]

The Price of Success

The Greens have also been a victim of some of their own successes. As the first laws regulating the environment began to be adopted, their hold on environmental issues was eroded by the growing interest of governments and large corporations both in leveling the playing field among trading nations with respect to the costs of meeting environmental standards, and in lowering the overall costs of environmental compliance by more creative and less expensive approaches than end-of-pipeline cleanup for reducing pollution. In the business community, large corporations like 3M, Dow and Dupont recognized that their sophisticated research organizations gave them a great advantage over small and medium-sized firms (both in the United States and abroad) in devising new processing approaches that not only reduced environment-related costs, but actually reduced overall production costs. Therefore, it made sense for them to push for rigorous and well-enforced environmental standards, harmonized across all of the countries in which they did business.

The governments of industrialized countries, having entered into a number of international agreements, such as the Montreal Protocols on Substances that Deplete the Ozone Layer, the trade in endangered species convention and certain forestry conventions, have an interest in ensuring that the obligations of those agreements are being met. Hence, environmental monitoring has become an intelligence function.

Furthermore, those countries facing domestic pressures for greater environmental regulation have been motivated to push for international harmonization. The Uruguay Round of the General Agreements on Tariffs and Trade largely avoided environmental questions, but there seems little doubt that the World Trade Organization will have to tackle a number of these issues in the future.

With the circle of parties interested in the environment continuing to grow, the cohesion of the environmental movement itself has been affected, further loosening the connection between environmental issues and the more radical social/political agenda that typified the Greens, particularly in Europe. A clearly centrist group of nongovernmental organizations has emerged, including the Natural Resources Defense Council, the World Resources Institute and others, whose goals and strategies differ from those of the Sierra Club, the Public Interest Research Groups and Earth First! The split was evident in the negotiations associated with the North American Free Trade Agreement. The more radical environmental groups opposed the agreement; the more centrist groups saw an opportunity to use the negotiations to advance the environmental agenda through sidebar agreements.[4]

Something for Everyone

Taken together, the enormous broadening and shifting ownership of the issues that make up "the environmental problematique" have clearly moved it from peripheral to central status. In the growing number of issues, almost everyone has found (or exploited) a connection. But although recognition and concern are wide, commitment is not deep, either within the United States or across the world. In poll after poll, taken at the time of U.S. national elections, almost everyone expresses concern about environmental issues, but almost no one is willing to pay for dealing with them.

Four years after the Rio Conference, only a small fraction of the money promised by the industrialized nations for the Global Environmental Facility has actually been collected or spent. Newspaper articles on recent meetings of the U.N. group established to monitor progress on commitments made in 1992 in Rio tell of failed commitments and lack of follow-through. Several of the developed nations have already announced that they will not meet their year 2000 goal of reducing carbon emissions to 1990 levels, and few nations in the developing world have shown any serious interest in adopting less polluting energy supplies if any increase in price is involved.

The fuel efficiencies of American automobiles, after improving for years in response to supply shortages triggered by the oil crises of the 1970s, have begun to creep up again despite the adverse environmental effects associated with carbon emissions. Indeed, oil companies have found it possible to essentially ignore environmental pressures in creating scenarios of future consumption. Over the last two decades, energy efficiency in the industrialized world has increased by about 30 percent. But this has exactly balanced the increasing need for energy. Actual energy use has not declined.

Indeed, one might reasonably conclude that increases in energy efficiency were driven more by the desire to avoid the capital cost of investing in new energy-generating capacity than to reduce environmental stress. Legislation to slow global warming such as the carbon tax—proposal by the Clinton Administration to tax fuel based on how much carbon dioxide it will add to the atmosphere when burned—failed. A compromise, to encourage general energy conservation by taxing the energy or BTU content of all fuels, also failed. On the other hand, the oil depletion allowance, a credit to "compensate" companies for the oil they no longer have after they take it from their wells and sell it, continues to subsidize and stimulate the use of oil.

It is a small wonder that environmentalists seek ways to convince publics and politicians alike that environmental concerns are more than an aesthetic matter and that environmental degradation is more than an issue of quality of life. And it is easy to see why some adopt a strategy that emphasizes the most dire consequences and equates environmental issues with risks that people understand. However, the usefulness of such an approach is highly questionable.

The problem is that the very process that has brought the environmental problematique to such a level of public recognition—the inclusion of a vast array of issues—has blurred it to a point that it is impractical to put all these issues in the same category or to choose (or justify) a single approach for dealing with them.

The bewildering array of issues also leaves too much room for political mischief at both extremes. At one extreme, *all* environmental problems are dismissed by disparaging references to ones that are viewed to be of minor importance. The remark by Richard Darman, former director of the Office of Management and Budget, in a speech at Harvard—"We have not fought the wars of the twentieth century to make the world safe for green vegetables"—comes to mind. At the other extreme, draconian action to prevent or correct certain problems is justified by suggesting a connection to more serious ones.

Nowhere is the problem of the multiplicity of tenuously related issues more evident than in *Agenda 21*, the 294-page document produced at the Rio Conference as a road map for environmental research and management. Its 14 chapters and hundreds of subsections cover almost the entire range of human activity (although it is an interesting reflection on the politics of the Rio Conference that there is no mention of population management). Some of the issues, such as management of solid wastes or sewage-related problems, are essentially local and domestic. Some, such as ocean waste dumping or transboundary movement of air pollutants, are clearly international, although frequently focused on a particular region. And some, of course, such as greenhouse gas accumulation, are truly global.

Decoupling the Issues

By unpackaging the environment—decoupling the issues—we would make it easier to understand how each fits with the political, economic, and social values and priorities of the country. We would create the flexibility to deal with them in different ways, to associate them with the foreign or domestic policy areas to which they most closely relate and to assign each of them to the agency of government most suited to handling them. The exercise may leave certain environmental issues adrift—at least in terms of government responsibility and action—but it also seems likely to promote practical progress in dealing with many others.

The task of separating environmental problems from each other is not a trivial one. Classifying problems as "global," "regional" or "domestic" is useful, but it is only a beginning. It is certainly true that smog in Bangkok or the contamination of the canals of Venice are domestic problems, that accidents like those at Chernobyl have major international implications in the regions in which they occur, and that ozone depletion in the stratosphere is a global concern.

Being clear about the distinctions can be helpful in transforming the environmental agenda into a foreign policy agenda. But not all problems fit neatly in a single category. For example, when China burns high-sulfur coal, the carbon dioxide released to the stratosphere is of concern to the world; on the other hand, the oxides of sulfur and nitrogen, also released, that drift over

Korea and Japan are regional problems, and the fine particles that pollute the air near the power plants are primarily China's problem. An oil spill that contaminates Russian rivers is a domestic Russian problem—unless or until the oil runs into the Arctic Ocean.

The distinctions are instructive. Consider China's coal burning: from the global perspective of concern about carbon dioxide emissions, it might well be in the interest of the United States to subsidize technological investments that would diminish China's dependence on coal by increasing the efficiency of China's energy production or by enabling China to substitute other primary energy sources. However, there is less reason to underwrite the cost of clean coal technologies that may reduce oxide and particulate emissions but do nothing to cut down on the carbon dioxide released. That point is usually lost in current discussions.

From this same perspective, the Three Gorges Project—the plan for a massive dam on the Yangtze River to produce hydroelectric power for rural China—would actually serve U.S. interests by reducing global carbon dioxide emissions. Nonetheless, the United States has opposed the project because it would have clear negative consequences for the Chinese people, flooding huge areas, disturbing the local ecological balance and displacing hundreds of thousands of people.

Of course, the question of whether a problem is domestic, regional or global—or even primarily of *environmental* concern—should not entirely determine its interest to the United States. Many would argue, I believe correctly, that we need to be concerned about the destruction of the Aral Sea or the reduction of life expectancy in Russia, about the loss of arable land in China and that country's consequent inability to feed its people, about desertification in Africa that may lead to large population migrations. Even though these are domestic or *intra*national problems, they may have a significant effect on political stability and the health of the world's economy. Similarly, an outbreak of cholera in Peru or Ebola virus in a central African country is important, given the movement of people and goods throughout the world.

On the other hand, all global environmental concerns are not necessarily national concerns—or, at least, not high-priority national interests. The concern over the survival of tropical plant species because they may have medicinal or agricultural value is an aspect of biodiversity that might legitimately be characterized as an important national interest, but it would be hard to argue that the survival of elephants, whales, or dolphins, each highly developed animals well up in the food chain, belongs in the same category, even though their survival may be important to many of us.

Origin and Effect

A political taxonomy of environmental issues, then, would need to have a number of dimensions. In geographic terms, it might well begin with dividing the problems into domestic, regional and global categories. It would have to account for the fact that the *origin* and the *effect* of a particular problem might fall in different (or multiple) categories, a circumstance that strongly influences the policy options available and the strategies for international negotiation.

Furthermore, the time scale of the evolution of each problem is a major factor that should be reflected in the taxonomy. Those that develop over a very long period present significant challenges to action. They have little of the current political cachet associated with urgent problems, and the very uncertainty of future events leads the general public to assume that some way will be found to avoid the negative consequences. Ironically, problems that take a long time to develop are frequently those that take longest to correct, if they are correctable at all, as our current experience with ozone depletion demonstrates. Therefore, they are the ones that actually need urgent action.

Finally, we need a way of gauging the relative importance of problems in terms of national interests, which may lead to decoupling issues that would be closely linked in environmental terms or, more to the point, linked in the view of those with deep concerns about the relation of humans to nature. This has certainly been a problem in assessing various aspects of biodiversity, but it also arises in a number of other cases—in distinguishing the problem of deforestation from that of the preservation of virgin forests or the survival of the culture of native peoples, for example, or in separating the issue of overfishing from that of trapping dolphins in tuna nets.

Analyses of this kind are valuable in forcing a certain discipline on environmental discussions, requiring at the very least that a qualitative effort be made to establish connections between the science, aesthetics, ethos, and language of environmental issues and the world of policy and politics. It allows one to argue by analogy, either by establishing environmental categories that parallel such familiar ones as territorial integrity, security, economic well-being, health, opportunity, human rights, or social stability—or by subsuming individual environmental issues within those categories themselves.

In fact, one quickly learns that it is neither necessary nor useful for environmental issues, once disaggregated, to be classified separately from the traditional categories of national interest. They cover the same range and can be described in similar terms. In the language of mathematics, they map easily into the existing categories.

But as others have discovered in attempting this

"back to basics" approach to reformulating the foreign policy agenda in the wake of the Cold War, the exercise has grave limitations. It tends to fail in three ways: First, the notion of what constitutes a national interest is far less objective than proponents suggest and is determined as much by taste and symbolism as by realpolitik. Second, the interests identified are of such variant character that it is all but impossible to put them into some order of priority to distinguish the "vital" from the merely "important." Third, national interests, no matter how well-defined and ordered, offer little practical guidance for action—there may be little we can do about the time bomb that is the population already born, no matter how vital the issue, and a great deal that we might do to deal with the lesser problem of overfishing the world's oceans.

Redefining National Security

To what extent is the rubric of national security a useful way of describing the most serious environmental problems? It is certainly attractive. Is it valid? More questionable. Useful? Most doubtful.

There is an interesting dynamic at work in the proposed marriage of the two. At the same time that some environmentalists are seeking to have environmental issues legitimized by inclusion in the traditional category of security, another group, historically associated with the security enterprise, is hoping to use such nontraditional issues as the environment to define an appropriate and supportable mission in a post-Cold War world. One need not dismiss either effort cynically, but it is important to examine whether joining these issues serves a useful conceptual or operational purpose.

One advantage of traditional categories is that they are not usually subjected to close scrutiny; we expect that time will make them slightly obsolete or inaccurate, but we also assume that flexibility in interpretation will compensate for that. On the other hand, when we redefine or change categories, the changes are examined more closely for their meaning; we want to compare the old and the new and to understand the significance and the justification for the redefinitions.

Thus, the question is what else might reasonably be included in regional (or national) security that is *not* purely defense related. A minimalist's answer might be to consider national security issues to be those that deal with violent physical threats and actions by one group or individual toward another: war between nations, terrorism, ethnic conflict, sabotage and violent crime. Another, obviously broader, interpretation would lead to the inclusion of all sorts of violent threats—those previously mentioned, plus such natural disasters as floods and earthquakes or man-made disasters, such as Chernobyl or Bhopal.

It is only a small further step to add threats of any kind to the physical well-being of a nation's populace—including epidemics, food shortages, mercury in fish or asbestos in schools. And, with a last leap, it could be argued that those things that threaten the economic well-being of a nation indirectly threaten its physical survival and are, therefore, also national security issues.

Environmental issues permeate most human activities, and environmental questions should be raised as often and as ubiquitously as political, economic and public health questions

Each of these arguments has, in fact, been made. Taken on its own terms, each has some logic. But, of course, if everything is included, then the category of national security loses its meaning and provides no useful operational guidance for deciding what institutions or what instruments can or should be used to address such a range of issues.

A possible and attractive middle ground would be to approach the definition of national security operationally—that is, in terms of the kinds of structures needed to deal with the threats the definition covers. Using such an approach, we would include under national security those threats to a nation's people that must be dealt with in a short time frame and that can only be dealt with by large, highly organized operations with sophisticated information and communication networks, well-established chains of command and the capacity to react wherever the need occurs.

Obviously, this would include the traditional threats of war between nations as well as the current, somewhat broader range of threats to peace cited above. Some cogent arguments have been made that a number of regional environmental issues may well lead to such threats. Desertification, resource scarcity—particularly of renewable resources such as water, firewood and food—or local pollution giving rise to serious health problems can destabilize governments, initiate large-scale population migration and lead to interstate and intrastate violence and warfare.

But the definition would also give the military and intelligence communities the responsibility for dealing with a group of natural and man-made disasters (a relatively well-defined set of issues that seems likely to grow in frequency and magnitude as populations increase and as industrialization proceeds), as well as environmental warfare or sabotage.

Such assignments have actually been undertaken on a number of occasions in recent years. Military units have been called upon, to aid in setting up refugee camps, in food distribution, in moving masses of people and in delivering medical supplies. In the past several months, U.S. intelligence satellite observations helped

Russia to assess the extent of damage associated with the Komi oil spill and alerted the British to the impending volcanic eruption on Montserrat, allowing them to evacuate the population of the southern section of the island.

In the past, national security has been synonymous with the nation's most vital interests. Certainly, that has been a major reason why many would like to treat environmental issues as issues of national security. The approach suggested here implies a loosening of that connection.

National security will undoubtedly continue to subsume the most *urgent* issues of national interest—including those related to the environment—but not necessarily the most *vital.* For example, the grave consequences of global warming, should the most pessimistic scenarios turn out to be accurate, might well exceed in importance the devastation caused by a Chernobyl-type accident, or the deliberate fires in the Gulf oil fields, or the violation of the international ban on the use of CFCs. But the action needed to be taken to avoid the threat of global warming is more economic than military and, therefore, global warming would not be treated as an issue of national security, although such issues as the others would be.

Limiting the definition of security in this way would be salutary in several respects. First, it would call attention to the fact that not all of the new threats to the survival and well-being of a nation can fit the old categories of foreign policy. Second, and conversely, it would stimulate discussions aimed at convincing the public that issues not included under the rubric of national security may nonetheless be of vital national interest. Third, it would promote more openness to seeking approaches other than military means to serve the vital interests of the nation.

Dividing the Environmental Problematique

In the end, the key to further progress in dealing with environmental problems lies in dividing the issue into constituent parts and adding it to the agendas of a number of agencies and institutions. Environmental issues permeate most human activities, and environmental questions should be raised as often and as ubiquitously as political, economic and public health questions and, indeed, in the context of those other questions.

In some cases, this will require overcoming the reluctance of policymakers to introduce "extraneous" considerations into their missions. For example, many trade economists object to imposing any environmentally motivated constraints on the world trading system, although some have been grudgingly accepted.[5]

Energy is another area in which there is resistance to making environmental factors an important determinant of policy. Current U.S. policy, both domestic and foreign, is driven almost entirely by the desire to maintain secure access to energy supplies and keep the market price low. There is little stimulus to encourage shifts in sources of energy and patterns of use, even though there are opportunities to simultaneously serve the ends of energy security (by reducing energy consumption) and the reduction of greenhouse gas emission.

But in other cases, calling attention to the environmental dimension can strengthen the case for action in policy areas that have languished in an ideological limbo. Population control programs, for example, have been treated as little more than an international and domestic political football for the past few decades. Yet, there is no area in which action would be more cost-effective in serving environmental ends. Moreover, population control is one of the few issues on which the industrialized North has a strong position in negotiating global climate change agreements.

A similar case can be made for foreign aid, currently a candidate for America's most unpopular international program. As the gradations of national interest in various environmental problems—domestic, regional, and global—are made clearer in the public mind, the practical value of foreign aid may become more readily apparent; that is, small amounts of official development assistance coupled with technology transfer offer the possibility of trading compliance on global environmental issues that are of high priority for the United States for help with local environmental problems of greater interest to the country receiving aid. For example, the United States is most concerned about climate change, ocean pollution, fishing restraints and forest preservation; developing countries need help with maintaining fresh water supplies, developing efficient energy technologies and sanitary systems and ending desertification.

Finally, dividing the environmental problematique into encompassable pieces would create multiple ownership of those pieces by many institutions in the government as well as in the private sector. This would spread responsibility for dealing with environmental problems, allow greater customization in dealing with them and increase the flexibility to move from policies based primarily on regulatory approaches to those that rely more heavily on incentives, education or technological ingenuity.

For example, the new and very promising field of "industrial metabolism" arose with the realization that creative possibilities existed to redesign production processes so that profit margins are increased at the same time that the production of undesirable wastes is reduced. Rigid comprehensive environmental regulation is likely to be less effective in promoting this approach than carefully designed Commerce Department incentives similar to the Baldridge Awards, which recognize excellence in manufacturing quality.

To give another example, tropical habitat destruction is now suspected as a major factor in viral "host-hopping"—the movement of viruses from nonhuman species to humans. That makes it an issue of serious concern to U.S. public health agencies and, as much to the point, an issue likely to command more public attention in that context.

No "One Size Fits All"

Reassessing the international strategic landscape in the wake of the Cold War is no mean task. The rhetoric comes easily; giving it meaning is more difficult. Many commentators have noted—quite correctly—that the old tensions and challenges of international affairs are not likely to disappear and, therefore, the old categories of foreign policy are likely to remain important. But new issues—and problems related to the environment are certainly among them—will take on increasing importance. In understanding them and in dealing with them, we need to avoid the twin pitfalls of depending too mechanically on old categories or moving too quickly to create new ones.

That is the thrust of my argument. There is no "one size fits all" category to which we can assign the environment and no single institution that can help us meet the range of challenges it presents. As we accept that reality, we will be able to analyze the issues more subtly, to fit them into a more textured scheme of political categories and priorities and to craft microstrategies for addressing them. In the long run, this approach may allow us to circumvent the otherwise insurmountable difficulty of moving the public beyond its present level of broad but shallow concern about the environment.

Note to the Reader

Despite the many forms that problems of the environment take, there is a coherent framework within which all of them can be placed.

We live in a thin spherical shell situated between the earth's core and the expanse of space—the biosphere. In thermodynamic terms, it is a closed system; that is, no material enters or leaves the system, although energy can cross its boundaries—from the sun to the earth, from the earth to outer space. Life—both in its biological and nonbiological aspects—is, in large part, a collection of processes through which material in the biosphere is transformed from one form to another, using energy captured from the sun. We transform materials to make the constituents of our bodies and the buildings, tools, and objects we need or want. We also depend on transformations in material to capture the sun's energy in food, trees, fossil fuels and other forms in which we can actually use it.

True sustainability—a "steady state," in technical terms—implies that, over long enough times, material cycles from "resource" to "useful product" to "waste" and ultimately back again to its original form. If the system worked perfectly, these cycles would keep the proportion of material in each form the same even as the processes of transformation continuously changed material from one form to another. In reality, some of the cycles take so long that, in the scale of human lifetimes, the "raw" materials associated with them are "nonrenewable." Those whose cycles can occur in a matter of a few years are called "renewable."

One aspect of sustainability often overlooked, or at least underemphasized, is that energy, too, must not accumulate but must, instead, cycle through the biosphere. It is captured from the sun, used to drive the processes of material transformation and released back to the universe. For both material and energy, each step in the cycle must be in balance or it will accumulate in one particular form—with undesirable consequences.

From a human perspective, how hard this whole system needs to run depends on how many people there are to support and what each person uses (essentially, the gross world product per person). As the system runs harder and harder, bottlenecks develop at different stages in the cycle. Malthus's worry centered on our inability to convert resources to useful form—the provision of food for growing numbers. Technology has been highly successful in coping with that problem, thereby convincing many that the current threats posed by increasing population and production will also be dealt with by technology in time.

However, the bottleneck has now largely shifted to the next step in the cycle—disposing of waste products—which, in a technical sense, is vastly more difficult. It means finding ways of ridding the earth of energy that has been degraded into heat, of dispersing and diluting harmful materials that, in the process of being spread over vast areas, become less controllable or manipulable long before they become harmless or of storing and isolating them over periods of time that exceed the lifetimes of the institutions and systems designed to cope with them. It is this set of problems, and interactions among them, that represents the enormously complex and continuously growing challenge to the environment.

Endnotes

1. There are, of course, many antecedents to the modern movement, both scientific and philosophical. Indeed, Carson's earlier book, *The Sea Around Us*, published in 1951, raised the issue of the fragility of the oceans and drew the reader's attention to the growing danger of marine waste disposal.

2. This particular argument, while superficially attractive and politically useful, is actually flawed. Tropi-

cal forests are quite different from boreal forests. Species are much more confined to localized regions, so that the destruction of a small fraction of a tropical forest is more likely to lead to species extinction than cutting a similar amount of boreal forest. The trees themselves—primarily hardwood—grow much more slowly, so that replacement does not occur as quickly. And the land beneath the trees is much less likely to be useful for agriculture.

3. The environmentalists—as represented at Rio by a host of nongovernmental organizations—had more success in developing *Agenda 21,* a broad, forward-looking document that lays out an extraordinary range of environmental problems that will need to be addressed in the next several decades. Since it committed no one to anything now, there was much greater latitude in developing it.

4. There are serious questions about how effective those agreements have been thus far, but they are perhaps no more serious than the larger questions about how NAFTA is working.

5. For example, trade sanctions associated with the enforcement provisions of the Montreal Protocol on the ozone layer, the convention governing trade in endangered species and the Basel Convention on the international transfer of hazardous wastes.

Environment in the U.S. Security Debate: The Case of the Missing Arctic Waters

by Franklyn Griffiths

As the new century approaches, we find the United States seemingly embarked on a transition to a new security praxis or reciprocal interaction of thought and practice. By no means closed to ideas and information from abroad or to concepts derived by non-state actors within, the U.S. government shows signs of adapting to a post-Cold War environment in ways that accentuate pre-existing American inclinations to articulate and employ extended notions of security. Received thinking which emphasizes the national interest, self-help, the military instrument, and an opposed-forces view of the world now finds itself challenged. New thinking on security, as Emma Rothschild puts it, extends the frame of reference in fourfold fashion: (1) upwards from the state to the global and planetary level; (2) downwards to the individual, (3) sideways to non-military or civil concepts of environmental, economic, and social security; and (4) in all directions where responsibility for ensuring security is concerned.[1] A formidable array of private analysts, NGOs, foundations, think tanks, and officials as well as a few political leaders have started to generate and, to a far lesser extent, to institutionalize new ideas about extended security. The result, even at this early point, is a vigorous intellectual and political process whose complexity cannot but daunt those wanting to estimate where the United States might be headed on matters of security. And yet there is a need to know. Whether or not we happen to approve of state-centered conceptions of politics, the world's security praxis will be heavily influenced by the discourse and the policy priorities of the lead state in the international system.

As also occurs with global warming or Russia's transition to "democracy," the U.S. move towards an increasingly extended security praxis is accompanied by uncertainty as well as complexity. Indeed, the whole project has a futuristic air, insofar as it is a purposive venture. To help situate an inquiry that otherwise risks becoming vaporous, this essay asks whether and if so how the United States might employ new understandings of security in the management of Arctic waters issues, and in responding even more particularly to the prospect of intensified use of Russia's Northern Sea Route for the transport of hydrocarbons and other bulk cargo. Here, too, the subject is futuristic in that there is little or no American interest in the circumpolar North. By no means is this to suggest that the United States is not an Arctic country. Decidedly it is.[2] But Americans are quite unaware of their capacity to act in this part of the world. The Arctic Ocean, for its part, is missing in the American view of the globe, and hardly anyone has even heard of the Northern Sea Route. Appropriately enough for an inquiry into the evolution of an extended U.S. security praxis, in the Arctic we find ourselves at the beginning of a process in which ideas drawn from other places and issue-areas seem likely to predominate in improvised responses to unexpected problems.

Tendencies in U.S. Security Discourse Since 1945

There is little need to document the militarization of U.S. national security thinking and practice during the Cold War. The process may be said to have begun with the reassertion of the phrase "national security" by Secretary of the Navy James Forrestal at a Senate hearing in August 1945.[3] Bolstered by realist conceptions of international affairs, the Cold War orientation of U.S. security policy crystallized in the National Security Act of 1947, and then in the National Security Council paper NSC-68 of 1950 which saw the country effectively committed to two generations of global containment of communism primarily but not exclusively by military means.[4]

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In the Arctic—governed as it was by a succession of interactions among strategic bombers, air defenses, land- and then sea-based intercontinental ballistic missiles, strategic anti-submarine warfare including the forward maritime strategy, and air- and sea-launched strategic cruise missiles—the net effect of Cold War and containment was clear.[5] Both the Soviet Union on the one hand, and the NATO Arctic members on the other, adopted what has been termed a "fully integrated multidimensional security concept."[6] Though it is debatable whether the Arctic states had an explicit concept of regional security, or operated according to a set of extra-regional imperatives open to interpretation that they had one, the practical result was to subordinate any thought of non-military or civil cooperation to the task of gaining and maintaining global strength in relation to the principal adversary. But considerably more interesting than much of this was the latent awareness all along in the United States, and increasingly the practice by the U.S. government, of what amounted to extended security, including on matters of containment.

From the start it was clear that national security took into account "our whole potential for war, our mines, industry, manpower, research, and all the activities that go into national civilian life."[7] Hence, in due course, the National Defense Highways Act, the National Defense Education Act, the growth of government support for research and development, the concern for balance of payments, strategic materials, foreign economic assistance, even for the Soviet grain harvest, and so on—all understood as matters of national security. The point here is fourfold. While requirements of protracted conflict clearly predominated in the orchestration of national security policy, security was never seen purely in military-strategic or even political-military terms. To the contrary, it was extended horizontally to include many and diverse civil matters. Secondly, in what may be termed an introversion of national security policy, all manner of actors right down to the level of the individual bought into civil dimensions of security ranging from scientific research to highway construction. Meanwhile, even within the military-strategic domain, extended notions of security had their say. In the growing practice of summitry, arms control, and détente as of the mid-1950s, Americans were introduced to the seemingly unnatural act of collaboration with the enemy for joint gains. Further, the limited nuclear test ban treaty of 1963 saw the United States engage in its first major act of what could later be termed environmental security by abating nuclear fallout and global public concern over the health effects of nuclear testing. Finally, if regional and global awareness is a hallmark of upwards-extended security, the Cold War national security policies of the United States displayed not a little of it in meeting the worldwide political as well as military requirements of containment. To be sure, the state and a realist policy perspective reigned supreme in all of this. Nevertheless, through the troubled renewal and revocation of détente in the 1970s, the United States exhibited a manifold but as yet inarticulate propensity to act on extended notions of security.

Lester Brown and other precursors aside, Richard Ullman's 1983 piece in *International Security* marks the start of the articulation of a case for an extended security concept.[8] By that time Rachel Carson had long since written and been followed by the Club of Rome, Barry Commoner, Garrett Hardin, and others including the Palme Commission and U.N. studies on security and the relationship between disarmament and development.[9] Also by that time the United States had witnessed Earth Day 1970, the 1972 Stockholm Conference on the environment, the oil price shocks of the mid-1970s, and the appearance of a Japanese challenge to American competitiveness. Though Ullman may have failed to impress the U.S. national security establishment, he was the first to have put the pieces together in arguing for a horizontally extended concept to the community of analysts concerned with international security affairs. By the time Jessica Mathews wrote in 1989, continued evolution of the intellectual and policy climate had made it somewhat easier to impress.[10] What with the advent of "new political thinking" in the Soviet Union after 1985, the assertion of sustainable development in the Brundtland report on environment and development, and then the end of the Cold War, the scene was set for an outpouring of U.S. comment on extended security which before long would have visible effects on the thinking of officials and political leaders.[11] Meanwhile, though new potentialities for an extended security praxis in the Arctic had unexpectedly been created by Gorbachev's Murmansk speech of 2 October 1987, the opportunity went virtually unnoticed in the United States.[12] Throughout the period to 1989, American analysts also preferred on balance to articulate the need for new and better adapted national security *policies*, as distinct from new conceptions of security per se.

As of 1996, thinking about security was very much in flux as Americans grappled with the need for a coherent response to a markedly changed international environment.[13] In fact, the United States no longer had an integrated national security concept. Population specialists and politicians could refer to population as a global security issue, but no one spoke forcefully for demographic security as such. Economists and others identified all manner of economic threats to U.S. national security, but they were not arguing for economic security as a framework for understanding and action in meeting the challenges of the "new battlefield" of economic competition among the industrialized countries. Energy security was also a continuing concern, but it did not claim attention equivalent even to the global warming effects of energy consumption. Ter-

rorism, drug trafficking, and illegal immigration were clearly regarded as security problems along with other non-military or civil threats such as industrial espionage, but they too were not reconceptualized. Meanwhile, in the area of political-military affairs, the Brookings Institution made a powerful case for cooperative security along lines similar to the Palme Commission.[14] Thinking was extended in this instance by virtue of the perceived need for the United States to act in concert with others to achieve national security objectives. And yet the Brookings report was resolute in resisting any significant horizontal extension of security discourse into the civil domain. What with the rapid proliferation of the security-related agenda, and the continuing attachment of many to threat-and-use-of-force notions, any effort to generate consensus on an integrated post-Cold War security concept could only have been judged premature as of mid-decade.

The transitional character of current U.S. security praxis is well captured in the 1995 *National Security Strategy* paper issued by the White House. It is worth excerpting at length:

> Protecting our nation's security—our people, our territory and our way of life—is my Administration's foremost mission and constitutional duty. The end of the Cold War fundamentally changed America's security imperatives. The central security challenge of the past half century—the threat of communist expansion—is gone. The dangers we face today are more diverse. Ethnic conflict is spreading and rogue states pose a serious danger to regional stability in many corners of the globe. The proliferation of weapons of mass destruction represents a major challenge to our security. Large scale environmental degradation, exacerbated by rapid population growth, threatens to undermine political stability in many countries and regions. . . .
>
> Not all security risks are military in nature. Transnational phenomena such as terrorism, narcotics trafficking, environmental degradation, rapid population growth and refugee flows also have security implications for both present and long term American policy. In addition, an emerging class of transnational environmental issues are increasingly affecting international stability and consequently will present new challenges to U.S. strategy. . . .
>
> Our engagement must be selective, focusing on the challenges that are most relevant to our own interests and focusing our resources where we can make the most difference. . . . In all cases, the nature of our response must depend on what best serves our own long-term interests. Those interests are ultimately defined by our security requirements. Such requirements start with our physical defense and economic well-being. They also include environmental security as well as the security of values achieved through the expansion of the community of democratic nations.[15]

Though "environmental security" is cited here, "sustainable development" has pride of place in a document which clearly authorizes action on new dimensions of security while continuing to regard military threats as fundamental. The linear thinking of an earlier era is giving way to the variable geometry of a horizontally and vertically extended security praxis that increasingly admits the necessity for cooperation.

If asked to state which of the varied dimensions of security now being discussed is most likely to perform a pathfinding function in generating concepts that show the way forward for an extended U.S. security praxis, it is the environment and security discourse that gets my bet

The United States has thus been working with extended conceptions of security throughout the period since 1945. The story is not one of military thought and action giving way to extended security. Throughout the period to the 1970s, U.S. national security policy was dominated by militarized and realist conceptions to which diverse civil security matters were effectively subordinated but also acted upon. Thereafter, the correlation began to alter. Horizontal extension brought civil concepts and, as will be seen, practices increasingly into their own. It also began to displace military-strategic and realist considerations. Further, an enlarged interest in vertical extensions of security to the global and individual levels served to dilute the strength of state-centric security thinking and policy. Civil security considerations began to break free of their long subordination to political-military requirements. But while the extended security praxis of the United States showed clear signs of being demilitarized where ideas were concerned, the innate complexity of new thinking about security was such that new practices could be institutionalized only with difficulty and in *ad hoc* fashion. Nor did the vertical extension and the diffusion of awareness of responsibility for security cooperation seem likely soon to supplant the primacy of the national interest, the state, and self-help in the security-related behavior of Americans. Though the old no longer held, a new extended security praxis seemed destined for a difficult birth.

Change in the correlation of civil and military in

U.S. security policy obviously owed much to the waning and then the end of the Cold War. It also owed a lot to what the Soviets used to call objective realities—new civil security threats that demanded attention and new opportunities to address these threats. Nor should we omit domestic politics, notably the election of a Democratic Administration in 1992 and the Republican sweep of Congress in 1994, which served to end the boomlet of expansive thinking that was ushered in by the end of the Cold War. At a deeper level, the altered threat assessment of Americans may be said to reflect change in American preferences of how they are to live as a society. The thought here is that the choice of threats to regard as uppermost is inseparable from the choice of how to live.[16] Whereas the communist menace once provided a good deal of the answer, the growing force of civil considerations in U.S. security discourse suggests that Americans may be embarked upon an endeavor to redefine civility and the civil society. If asked to state which of the varied dimensions of security now being discussed is most likely to perform a pathfinding function in generating concepts that show the way forward for an extended U.S. security praxis, it is the environment and security discourse that gets my bet.

Environment and Security Debate in 1996

To the extent that U.S. government action on Arctic waters issues is shaped by considerations of security, it will be influenced more by the course of tendency conflict between the old and the new on extended security within the United States, than by developments as they occur in the Arctic. This is because Arctic events will be perceived, assimilated, and acted upon not *ab initio*, but in accordance with an evolving security praxis. As of 1996, extended security remains far more a matter of conflicting ideas, than of interaction between resolved thinking and coherent practice. At this point it is by no means a foregone conclusion that Americans will ultimately choose to define their international environmental agenda in security terms. Nor is it at all clear that environment should be treated as a matter of security. The environment and security debate may nevertheless hold the key to the evolution of U.S. security-related activity in Arctic regions which are of particular interest to us here. Before considering main trends in the debate, we should try to be as clear as we can about the magnitude and the meaning of what is being discussed.

In the U.S. debate we observe a rapidly expanding bibliography that now includes hundreds of articles, chapters, and books which are explicitly and, more often, implicitly associated with a security perspective on the environment.[17] Large-scale collaborative research and networking ventures have also been launched. Chief among these are the Project on Environment, Population and Security which is funded by the Global Stewardship Initiative of the Pew Charitable Trusts and operated by the Program on Science and International Security of the American Association for the Advancement of Science in conjunction with the Peace and Conflict Studies Program at the University of Toronto; the Environmental Change and Acute Conflict Project sponsored by the American Academy of Arts and Sciences and University of Toronto's Peace and Conflict Studies Program; and the Environmental Change and Security Project of the Woodrow Wilson Center in Washington, D.C.[18] As well, under a variety of initiatives sponsored by the President and by the Congress, a broadening array of environmental tasks have been taken on by government institutions having national security responsibilities. Specifically we are talking about the U.S. Navy, which has released icepack thickness data and made submarines available for scientific research on climate change; the CIA and other intelligence agencies, which have also cooperated with scientists studying environmental degradation; the National Security Council, at which a global environmental affairs directorate has been created; the Department of Defense, which has established the position of Deputy Under Secretary of Defense for Environmental Security and entered a trilateral venture with Russia and Norway on Russian nuclear waste management in Arctic waters; the Department of Energy, which now has farflung environmental responsibilities including nuclear safety in Russia and other countries of the former Soviet Union; and the State Department, which has gathered international environmental and associated matters under the office of an Under Secretary of State for Global Affairs.[19] Note also the July 1996 Memorandum of Understanding on cooperative action for environmental security agreed to by the Department of Defense, the Department of Energy, and the U.S. Environmental Protection Agency, which received the endorsement but not the participation of the State Department.[20] Put all of this together, and it might seem that the United States is starting to move towards intellectual and policy convergence on "environment and security," if not "environmental security," as a frame of reference and action for the environmental components of an extended security praxis. This, however, would be to overstate the coherence of current U.S. discourse, let alone U.S. practice.

A quick scan of the spring 1995 report of the Wilson Center's Environmental Change and Security *Report* finds private analysts attempting to make sense of a set of variables whose only order at this point can be alphabetical:

> acid rain, biodiversity, civil strife, cleanup and remediation, counter-terrorism, deforestation, ecological security, economic competitiveness, environmental scarcity and stress, environmental se-

> curity, ethnicity, failed states, fossil fuels, free trade, genetic engineering, global security, greenhouse warming, humanitarian relief, infectious diseases, international civil society, intra-state violence, limits to growth, migration, national security, natural disasters, nuclear waste, oil crises, overpopulation, poverty, resource scarcity, sea-level rise, soil degradation, sovereignty, stratospheric ozone depletion, sustainable development, transboundary pollution.[21]

Similarly, the Wilson Center *Report* notes that U.S. government agencies have indicated operational interest in, *inter alia*:

> agricultural yields, biodiversity protection, biological and chemical warfare, the clean car initiative, climate change, democratic institutions, dependence on imported oil, desertification, disaster relief, drought, drug interdiction, empowerment of women, environmental health, environmental security, environmentally-responsible military activity, ethnic conflict, family planning, flooding, hazardous waste, infant and child mortality, long-range transboundary air pollution, natural and technological disasters, nuclear dumping, ozone depletion, pesticides, pollution prevention centers, population growth, public health, refugee flows, renewable energy resources, resource scarcity, state failure, sustainable resource use, technology transfer, terrorism, urbanization, vector-borne diseases.[22]

These two arrays, impressionistic as they are, strongly suggest that the United States is opening up for itself a vast and at present unmanageable agenda that will soon need preliminary sorting if the discussion of environment and security is not to be sidetracked as a focus for policy development.

At its most elementary, a policy may be taken to consist of (1) a set of goals; (2) an understanding of the situation in which goals are to be pursued; and (3) a set of routines for goal-attainment in the situation as understood. Though some form of policy on many of the specifics cited is certainly within reach if not already to some degree in hand, an integrated set of routines based on a systematic causal understanding of the totality of variables in play is far off. In fact, such an approach is not the way things are normally done in a pragmatic political culture accustomed to acting before all the physical and social science results are in. It would seem, therefore, that today's environment and security debate is primarily about goal-changing as Americans grope towards an understanding of what is of uppermost importance to them in an altered world. Goal-changing occurs as the rhetoric of security is used to attract attention to new concerns, as government and non-governmental institutions respond to situational change in *ad hoc* but incremental fashion, and as new values are internalized in security policy-making.[23] In due course, Americans may be expected to cut through the vast knot of environment and security variables with rough and ready understandings of what is going on and how best to act. Rather than negotiate a conception of what needs to be done or left undone each time a call for environmental action is made upon their government, they may evolve a concept that systematizes action and favors pro-action. How and indeed whether this is done will depend substantially on interaction between different schools of thought on environment and security as they succeed or fail in generating guidance for policy inside and outside of government.

Following Geoffrey Dabelko in a rough and ready classification, we may identify three broad viewpoints—ecological, health, and military—in the current U.S. discussion of environment and security.[24] We may also note that aside from debates over environment and security, there are significant differences among Americans over the redefinition of security as such. Broadly, the course of environment and security debate would now seem to be favoring what Dabelko terms "military" thinking and practice at the expense of the ecological and health perspectives.[25] As to a redefinition of security, it is unlikely to be with us any time soon. Throughout, there is no agreed U.S. understanding of what "environmental security" might signify, considerable reluctance to employ the term,[26] and, again, little likelihood of early consensus.

The ecological perspective is key to understanding and addressing global environmental problems at the level of causes rather than symptoms.[27] Concentrating on planetary issues such as climate change, deforestation, ozone depletion, overpopulation, and other consequences and causes of environmental degradation which exceed the bounds of national sovereignty, the varied exponents of this standpoint are inclined to mute the prevailing emphasis on the national interest and to emphasize the individual, non-governmental, transnational, inter-governmental, regional, and the global as points of reference. By the same token, they may be strongly averse to opposed-forces, military, and statist notions of security. Preferring to treat the environment and security agendas holistically, some see the underlying problem not so much in terms of sustainable development as of a fundamental transformation in the relationship of humankind to Nature.

Health conceptions of security and environment may share some of the ecological inclination to redefine security, but the aim is more to react to the human consequences of environmental degradation than to anticipate and address its causes at the source. The main focus is on the health effects in the United States of past military and defense-industrial activity, as in

(1) the Strategic Environmental Research and Development Program which entails defense-related environmental compliance, remediation, and information-gathering and analysis; (2) the Defense Department's Defense Environmental Restoration Account of some $5 billion which is applied to toxic cleanup at military sites; and (3) the Department of Energy's commitment of roughly one-third of its annual appropriation to cleanup of the environmental aftereffects of nuclear-weapons production.[28] Being problem-driven as they are, these programs represent a significant dimension of current U.S. practice on environment and security, but are not accompanied by much in the way of conceptual argument.[29]

Third, in military conceptions of environment and security we encounter a viewpoint that is most in keeping with received state-centric and conflictual views of national security. It is not surprising that this standpoint should be found congenial by policy-makers. The analytical emphasis here is on the environment as a source of violent conflict in Third World societies. In practice, however, the analysis tends to be used to draw attention to the symptoms of environmental degradation which are seen to constitute a new category of threat to U.S. national security. Though many have contributed to this discourse, the work of Thomas Homer-Dixon of the University of Toronto stands out in Dabelko's and most anyone's assessment.[30] Prior to Robert Kaplan's publication of an article on "The Coming Anarchy" in *The Atlantic Monthly* in February 1994 which drew attention to the studies of Homer-Dixon, the latter was invited to brief the associate directors of the National Security Council. In due course, Homer-Dixon established a relationship with Vice President Gore, was cited favorably by President Bill Clinton, and found his ideas being taken up by U.S. national security agencies.[31] Within the U.S. government, however, the political effect has been to add environmentally-related Third World conflict to the list of concerns of interest to U.S. military planners and intelligence analysts. In Dabelko's view there is an irony here in that Homer-Dixon's policy agenda centers on international assistance to Third World peoples subject to environmental deprivation, not on national security and military planning. Still, if any one individual stands out in the U.S. discussion of environment and security, it is Homer-Dixon, a Canadian. As might be expected, he has another take on what's been happening.

Homer-Dixon broadly agrees that his work is being used by the U.S. national security establishment for purposes other than he intends.[32] He is also surprised at the interest shown by U.S. policy-makers in his ideas, by their readiness to listen and adapt their thinking. But he adds that from the start he intended to make a somewhat subversive contribution and told the Vice President so when they met. In linking "environmental scarcity" and violent conflict he sought to force a broadening of American horizons and eventually a pro-active U.S. commitment to humane development. This he sees as inescapable: given that the United States cannot wall itself off from the rest of the world, the logic of the situation is such that U.S. policy-makers will sooner or later be driven to recognize that action is excessively costly and problematic if left to the point where violent conflict has already broken out and military intervention is required to serve the American interest.

Homer-Dixon's aim has thus been to deploy a discourse of environmental scarcity and security against the conventional U.S. security praxis, and on behalf of greater U.S. pro-action—a consideration that will figure prominently when we turn to the Arctic. Such success as he has had to date also indicates that contributions from outside the United States can make a difference to the course of policy debate in a country that is omnivorous where new and workable ideas are concerned.

In addition to interaction among ecological, health, and military perspectives, there is considerable disagreement on whether or not to link environment and security in the first place. Some argue that collective action on environmental issues will only suffer if it is militarized.[33] Others insist that the national security establishment and the military in particular have little or no business in dealing with international environmental affairs and should stick to what is most important.[34] Either way, there is a reluctance to link environment and security into "environmental security." Homer-Dixon, for example, refuses to speak of environmental security on grounds that it invites sophistic discussion of terms and meanings. Still others see little utility in the term when it embraces everything from sustainable development to the environmentally detrimental effects of military operations.[35]

If budgetary allocations are the measure of success in discourse on environment and security, health concepts are clearly the winner in the United States and should not be downplayed in their future implications. Ecological thinking, though not without support, seems most at variance with received precepts, most open-ended in its budgetary implications, and therefore most likely to encounter difficulty. Military concepts keyed to violent conflict and environmentally responsible defense activity, on the other hand, are most in keeping with received thinking and entail the least outlay of funds barring a readiness to address the issues at source. Remember, too, that there is still a heavily institutionalized Cold War and realist tendency to subordinate the civil dimensions of extended security to conventional geopolitical requirements, and to regard the extension of security as so much "globaloney."

How then might all of this be brought to bear in considering U.S. government behavior in matters of

environment and security where Arctic waters are concerned? Several implications come to mind. In the absence of new Arctic marine disasters or a surge of interest in the shipping of Alaskan hydrocarbons, U.S. Arctic policies are likely to be conservative. The current correlation of tendencies favors a traditionally restrictive view of the civil dimensions of security, a new awareness of the need for environmentally responsible national military activity, and an interest in the violent conflict potential of environmental degradation. Uncertainty over Russian political and military development may be expected to brake the decline of traditional security praxis in this region of the world as compared to others. The lack of significant potential for environmentally-conditioned intra-state violence in the Arctic outside of Russia will also serve to limit the extension of U.S. national security interests to include the region. At the same time, in pursuit of environmental responsibility, military engagement in monitoring and cleanup of nuclear pollution in the Russian Arctic will continue to be of interest.[36] Overall, U.S. efforts on behalf of environment and security in the Arctic will be heavily conditioned by the evolution of the bilateral relationship with Russia.

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Second, the force of health conceptions of security in the United States is suggestive insofar as more active U.S. intervention in Arctic affairs is to be encouraged. Though health has long been the subject of non-governmental collaboration in the circumpolar North, the potentialities of this theme in animating the U.S. government are far from being fully explored, much less tested in practice. The difficult requirement, as for example with the dumping of radionuclides in Russian waters, would be to substantiate the links between the health and humanitarian interests of Americans on the one hand, and the presence of environmentally-based Arctic health threats on the other.

Third, of the three orientations to environment and security that have emerged to date, the needs of the Arctic are best met by an emphasis on ecological concepts of security which currently stand at the bottom of the U.S. preference order. The Arctic is, after all, a region whose physical and social processes, especially for native peoples, are heavily influenced by transboundary fluxes and require cooperation on civil agendas among non-governmental and territorial actors as well as states at all levels from the local to the global.[37] Paradoxically, the relative lack of U.S. national security interests in the Arctic could prove to be an advantage in widening the U.S. commitment to an ecological practice in this part of the world: Arctic actors and active minorities in Washington and the metropoles of other regional countries may be in a position quietly to extend the range of regional civil collaboration as long as core strategic military interests are not brought into play. Indeed, rather than risk engaging the U.S. national security establishment needlessly by seeking greater Arctic policy intervention in the name of environmental "security," it could be tactically advisable to decouple environment from security and drop all reference to security if a reactive and symptoms-driven "military" understanding of the environment were clearly to become paramount in Washington.[38]

Finally, if debate over environment and security is indeed to perform a pathfinding function in the further extension of U.S. security praxis, a more enabling internal political setting will be indispensable. Notwithstanding Republican strength in Congress, the renewed Clinton Administration could move beyond a "military" stance on the environment and open the way for an ecological conception of security. If so, it would make sense for Americans and others to persist in treating the environment as a security issue. Late 1996, however, is surely not the moment to decide whether to treat ecological and environmentally related health concerns on their own merits, or to persist in including them within an extended security framework.

Arctic Waters in U.S. Security Policy

To test the potential of an environment and security discourse in truly difficult circumstances, I now ask whether and if so how an improved performance might be evoked from the United States on a particular set of issues with the use of an environmental conception of security. International cooperation in the management of Arctic waters is the set of issues in question. The question in turn implies a deficiency in U.S. performance to date. The deficiency is twofold. On the one hand, from an external perspective and from that of some of the few Americans who are paying attention, the United States is not playing the leadership role it could and should in the affairs of the circumpolar North. Secondly, from a purely internal U.S. perspective, the fact is that the United States is at present not interested in playing any such role. So the question is whether an environmental and particularly an ecological conception of security, articulated in preliminary fashion within the United States and by other regional states and non-governmental actors might do two things: (1) assist the United States in redefining its Arctic interests; and (2) add to the force of civil considerations in the extension of U.S. security policy writ large. If the answer is on balance positive, we should think about what to do. If clearly negative, there would be reason for Americans and others to consider aban-

doning a security perspective on the environment.

During the Cold War the United States did not hesitate to play a leadership role on Arctic issues in relations with fellow NATO members—Canada, Denmark, Iceland, and Norway—in opposing the Soviet Union and dealing with the two Arctic neutral states—Finland and Sweden. U.S. leadership was however mainly derivative of the global struggle with communism. It had little to do with the Arctic as such. Governed by the perceived need to subordinate civil collaboration to the wider requirements of political-military security, it allowed for little or no multilateral interaction on issues specific to the region. But with the waning and then the end of the Cold War, a leadership role could be maintained only by taking the initiative on Arctic-specific matters. This the United States declined to do. No longer seized by the Soviet threat, it was left with no substantial perceived interests specific to the region. Washington's problem in the Arctic became *cooperation*, specifically requests from other Arctic states for multilateral civil collaboration for which the United States had and continues to have little appetite.

Only with difficulty was the United States drawn into the multilateral process which created and now constitutes the Arctic Environmental Protection Strategy (AEPS)—an evolving multilateral regime that joins the eight Arctic states and other participants in a variety of efforts to monitor and protect the region's environment.[39] Similarly, the longstanding Canadian initiative to establish an Arctic Council or central intergovernmental forum for multi-purpose regional cooperation on civil issues ran into considerable U.S. resistance that ended only with the Council's establishment in 1996.[40] In September 1994 the United States announced a new post-Cold War Arctic policy which emphasizes environmental protection, environmentally sustainable development, and the role of indigenous peoples while also separately recognizing U.S. national security interests.[41] It is as well concerned with the need for scientific research and affirms the importance of international cooperation in achieving Arctic objectives. The new policy signified that between 1989 and 1994, multilateral cooperation had to some extent come to be accepted as routine. And yet Washington continued to be exceedingly restrictive in making new Arctic international commitments. The sources of U.S. reluctance to lead are evident in the way policy is made on Arctic affairs.

The key individual in the policy process for international relations in the circumpolar North is the Polar Affairs Chief in the State Department's Office of Oceans and International Environmental and Scientific Affairs. This is the person who does the hard work of coordinating departmental positions and also such non-governmental views as may be brought to the table in the Inter-Agency Arctic Policy Group. The Polar Affairs Chief also carries the U.S. position out into major international Arctic venues and brings issues back into the policy process. Circumstances are such that in my view he has something of a free hand and yet not much of a hand at all in the making of U.S. policy on Arctic multilateral civil matters. Interviews with the previous (1986-1994) and current (1994-) Polar Affairs Chiefs confirm the impression that U.S. policy on Arctic international issues is ordinarily made at lower levels of the bureaucratic hierarchy without benefit of active political guidance or substantial input from non-governmental actors.[42] President Clinton (and with him the Secretary of State) was drawn into the Arctic Council negotiation momentarily in February 1995 at a meeting with the Canadian Prime Minister in Ottawa. Vice-President Gore has been engaged in a variety of Arctic-related issues on an intermittent basis, though these again are extensions of broader U.S. interests such as global science or bilateral relations with Russia as in the Gore-Chernomyrdin talks.[43] As a rule, however, the White House and also the National Security Council are "not interested" in Arctic multilateral affairs.[44] Within the State Department, Arctic issues do not generally get up to the Assistant Secretary level. On the contrary, active engagement by senior management has been "real low."[45] The Polar Affairs Chief therefore runs with the issues himself in the midst of a fair amount of benign neglect at higher levels of government.

As to other agencies, the Department of Defense is "the biggest player" of all.[46] Indeed, it has been described as an 800 lb. gorilla which no one wants to see entering their office. Where Arctic waters are concerned, DoD means the U.S. Navy and its overriding strategic military interest both in global freedom of navigation and in regional submarine and anti-submarine warfare operations.[47] Not to be limited, DoD representatives at inter-agency Arctic sessions to 1993 made a point of emphasizing the paramount importance of military-strategic considerations as meetings drew to a close.[48] Legal officers of the Department may be particularly interested in Arctic marine matters.[49] Their job is presumably to guard against commitments that might serve to impede the free movement of submarines and surface vessels not only in the Arctic but, by precedent, in any of the world's oceans and straits. Whatever the reason, DoD "doesn't see" the significance of Arctic environmental issues.[50] As to the U.S. Coast Guard, while it can be "very active," as on emergency response in U.S. Arctic waters, Arctic issues are handled at a low level in the service.[51] Illegal immigration by boat, drug interdiction, marine safety and so forth in U.S. coastal waters are the priority concerns, with the result that the Coast Guard is "not focused" on the Arctic.[52] The situation could change if and when marine transportation of Alaskan oil and natural gas became a serious proposition. But until then it is the pressing issues of the day that get the attention of flag

officers who have no time for "etherials."[53]

Where *"environmental* security" is concerned, I would add that there is no way the Department of Defense could assent to it as a prime governing concept for ocean operations without opening the door to significant departures from the Navy's traditional mission. By the same token, the Coast Guard is reluctant to endorse discussion of "environmental *security*," since it could authorize the intervention of the Navy into what the Coast Guard regards as its own preserve of marine environmental "safety."[54]

To continue this *tour d'horizon*, back in the early 1990s the Environmental Protection Agency had to be "dragged" into the preparation for the AEPS.[55] For its part, the Department of Energy is occupied with Arctic-related issues but in the Alaskan context and internationally as a function primarily of relations with Russia and offshore oil and gas development. Insofar as DoE is also occupied with international concepts, it would seem to favor stability, rather than security, for sustainable economic and technological development.[56] The Alaskan Senators, though very powerful, have broadly been content to receive consultation from State and do not as a rule pressure the Polar Affairs Chief, who may feel he's doing well if there are no complaints from this quarter.[57] The Alaskan delegation on the Hill has, however, been showing increased interest in the AEPS and in the Arctic Council as a means of securing greater recognition for Alaska's objectives within the Congress.[58] As to the Alaskan Governor's office, roughly a dozen Alaskan native organizations, the shipping sector, and some two dozen southern-based environmental groups, they have until recently not so much sought access but on the contrary have been invited into the policy process by State.[59] Their participation is beginning to take hold. As of 1996, Athabascan and Aleyut native organizations are actively engaged on the Arctic Council issue; the Governor is prepared to commit resources for the Council's secretariat when it comes time for the United States to host the operation; and environmental NGOs are showing more interest in Arctic affairs as the Antarctic agenda shrinks following the institution of the environmental protection regime there.[60] Meanwhile, the Northern Forum—a transnational association of territorial governments from around the region whose creation was spearheaded by the Alaskan Governor in 1990—was also invited by the Polar Affairs Chief to take part in the work of the Inter-Agency Group and is now increasingly interested in Arctic cooperation at the inter-governmental level.[61]

It is fair to say that while things are changing, nobody has really been beating on the Polar Affairs Chief's door. He does as he thinks best under broad guidelines from on high and with a determination to consult as widely as possible within and outside government. On the inside, he is faced with a powerful aversion to any U.S. international commitments that entail new spending. At the same time, he is likely to be told there is no time for "great ideas," and to come back to the IAPG or individual departments "when real money is being talked about."[62] If there is any explicit conceptual guidance, the relevant notion is sustainable development and not environmental security, much less ecological security. The U.S. position on the mandate of an Arctic Council, for instance, is solid in support of sustainable development—indeed, an Arctic Sustainable Development Initiative—and environmentally-conscious resource exploitation.[63] As to environmental security, the term is not frequently encountered and, when it is, causes "a bit of heartburn" owing to its lack of clear meaning.[64]

To associate considerations of environment and security with possible development of the Northern Sea Route at this time is to be way ahead of the game where the United States is concerned

U.S. Arctic policies are caught between a block of drifting ice and a hard place. On the one hand, we have the expressed intent of other Arctic countries to pursue a civil collaboration that cannot go far without the United States. On the other, we observe a state that is reluctant to support active engagement in multilateral civil cooperation, has little awareness of the Arctic as a region, and is without an overarching sense of purpose or unifying concept to mobilize and lend direction to collective action. One major result is significant rigidity in U.S. multilateral negotiating behavior which is formulated and altered at lower levels of the bureaucracy only with considerable difficulty. Another result is institutionalized aversion to international arrangements that would treat the Arctic as a region and thereby offer others added opportunities to seek collaborative action on issues in which the United States has little perceived interest beyond that which can be satisfied through select bilateral or trilateral interaction. The United States has indeed yielded to the entreaties of others, but grudgingly and in a manner that falls far short of its potential to offer leadership in circumpolar affairs. As compared to sustainable development, any concept of environmental security is sufficiently far away from acceptance as to be of little use in moving the United States to greater pro-action and leadership in Arctic cooperation. The problem seems to be one of interests and lack thereof, not one of concepts. To justify this point we could consider the workings of PAME (Protection of the Arctic Marine Environment), which

is a subgroup of the AEPS; or the talks stemming from a Canadian initiative to harmonize the rules for Arctic shipping under the auspices of the International Maritime Organization.[65] But let us cut to the Northern Sea Route (NSR) which itself can be dealt with summarily.

Increased shipping along Russia's Arctic coastline is sufficiently far from being a concern in Washington that it is difficult at present to see what or who could benefit from the use of an ecological or environmental security perspective if one were to be clarified. This too could change, for example with a major Russian effort to increase the volume of shipping, which could create a perceived need to act. Nevertheless, the NSR has been discussed in the Inter-Agency Arctic Policy Group and at Alaska Senators' meetings without anyone being persuaded that the prospects are real enough to be worth spending much time on.[66] Though the Northern Forum once had an active interest, it appears to have subsided. Nor has the shipping sector or for that matter the Department of Defense paid much attention.[67] The State Department's perspective on Russian oil and gas transportation by marine mode currently favors a sustainable development approach in which resource exploitation proceeds with full attention to the protection of Arctic ecosystems and populations.[68] As to the potential lead agency, the U.S. Coast Guard is "not interested," and has "nobody" working on NSR matters.[69] To associate considerations of environment and security with possible development of the Northern Sea Route at this time is to be way ahead of the game where the United States is concerned.

Leadership on the part of the United States in the international management of the Arctic marine environment can only be achieved by raising the issue-area to the political level in the U.S. policy process. Barring the appearance of Arctic marine threats that bear directly on the U.S. interest, it is the Senators from Alaska who are in the best position to move the Administration. They, however, are embroiled in a perennial dispute with the White House over the development of North Slope oil reserves and are not much taken with environmentalism. A coalition of environmental and native NGOs, scientists, and other interested parties, even if one could be formed,[70] seems very unlikely to capture the Administration's attention, much less that of officials. Otherwise, greater awareness of the need to act could in principle be injected by foreign governments approaching the United States up to and at the highest level. What with the inclination of other Arctic states to handle the AEPS at the bureaucratic and technical level, they, too, seem to be far removed from attaching any great significance to Arctic marine environmental issues. In these circumstances, the outlook for greater pro-action in U.S. Arctic waters policy seems bleak.

As to the potential of an ecological or environmental security discourse in assisting the United States to redefine its Arctic interests, and in adding to the force of civil considerations in the extension of security policy writ large, it is decidedly unpromising under current conditions. There is no felt need for a discourse of environment and security in dealing with Arctic issues. In any case, there is no consensus on how to integrate considerations of environment and security in a way that yields more than rhetorical policy effect. It seems to be a Catch-22 situation. As long as agreement lacks on what is being talked about, there is no way for a security-related approach to Arctic waters problems to speed early agreement in the wider U.S. discussion of environment and security. But the thought of working now for returns down the road is something different.

Conclusions

The subtext of this essay is one of timing. To discuss the potentialities of a security-related concept of the environment is not unlike talking about the character of a child before it has been conceived. In fact, it is like part of the decision on whether or not to conceive. To press the imagery, there is much intercourse among Americans on environment and security these days, but the moment of conception, if there is to be one, is still some time off. Whether or not the act of conception is a decision or an unintended outcome, it will be undertaken by Americans, in the light of perceived U.S. interests, and without decisive input from abroad. Nevertheless, at the margins and over time, outsiders may expect to make focused contributions to the extension of a U.S. security praxis that will inevitably affect them. They should explore the potential. The United States, after all, will not stop being guided by security considerations. Nor will the new break free from the old in U.S. policy on security and environment alike. These things are certain. So is the openness of the United States to ideas that work. At issue is whether and how a security perspective might benefit the environment more than another, such as sustainable development or environmental protection. This will not be known until the elements of a new security perspective have been clarified, tested, and begin to yield a basis on which to judge their effectiveness.

The fundamental problem in the U.S. discussion of environment and security is the lack of agreement on a concept that has demonstrated guidance value. Such a concept, if one can be achieved, will not be a literary construct divorced from practice. Rather, it is likely to emerge from intense interaction between practitioners and analysts. Even modest progress in this area could make a significant contribution in focusing the wider U.S. debate and providing direction for practice. Demonstration projects are in order to lend precision to the meaning of ecological or environmental se-

curity, and to show what may be accomplished internationally with such a concept that cannot already be done. Ventures of this kind could of course be confined to U.S. citizens. But they could also be international in character. The advantage of an international demonstration project lies in the pooling of insight and the discovery of potential subjects to be discussed in inter-governmental negotiation.

The point being made here is significant and suggests a change of perspective on the praxis of environment and security. It is that the development of an environmentally-related security concept that is not only of use to the United States, but also effective in providing for joint management of environmental issues, may more readily be achieved internationally in a process actively shaped by U.S. interests and thinking, than in a process confined to the United States alone. If security is to be cooperative, the elaboration of an environmental security concept should itself be a cooperative venture.

I therefore conclude that a track two international demonstration project should be set up to assess the merits of a security perspective on the Arctic marine environment. By track two I mean well-placed and knowledgeable practitioners and analysts working together in their capacity as private individuals. A project of this kind should evaluate not only the cost-effectiveness of an inter-governmental effort to engage in a follow-on venture, but also the utility of a security discourse for Arctic international environmental cooperation in the years ahead. If the answer is affirmative, the missing Arctic waters may finally be found. Ways will have been invented to raise Arctic marine issues to the political level in the circumpolar countries and, the United States and other regional governments will be prompted to redefine their interest in multilateral environmental cooperation. With compelling environmental threats to the U.S. national interest in short supply in this part of the world, the value of an ecological or environmental security concept will lie mainly in its capacity to fit the pieces of the policy puzzle together in ways that produce results cheaper and faster than current practice allows. And if the answer is negative, there will be cause to set aside a security discourse on the environment, to cast the issues in ecological terms, and to continue doing what can be done at the technical level.

Endnotes

[1] Emma Rothschild, "What Is Security?" *Daedalus* 124, No. 3 (Summer 1995): 55. I would add to this list the need for cooperation as well as responsibility.

[2] U.S. capabilities for Arctic scientific research and understanding of the physical environment, for example, exceed those of any regional country and indeed most of them combined. See *Arctic Research of the United States*, a series sponsored by the Inter-Agency Arctic Policy Group and issued by the Office of Polar Affairs, National Science Foundation.

[3] Quoted in Joseph J. Romm, *Defining National Security: The Nonmilitary Aspects* (New York: Council on Foreign Relations, 1993), 2.

[4] On NSC-68, see Samuel F. Wells, Jr., "Sounding the Tocsin: NSC-68 and the Soviet Threat," *International Security* 4, No. 2 (Fall 1979): 116-158.

[5] On the militarization of Arctic waters in particular, see Steven E. Miller, "The Arctic as a Maritime Theatre," in Franklyn Griffiths, ed., *Arctic Alternatives: Civility or Militarism in the Circumpolar North* (Toronto: Science for Peace/Samuel Stevens, 1992), 211-236.

[6] Willy Østreng, "Political-Military Relations Among the Ice States: The Conceptual Basis of State Behaviour," in Griffiths, *Arctic Alternatives*, 33.

[7] Quoted in Romm, *Defining National Security*, 3.

[8] Richard H. Ullman, "Redefining Security," *International Security* 8, No. 1 (Summer 1983): 129-153. Stephen J. Del Rosso, Jr., reports that Ullman's statement caused "hardly a ripple" in official thinking at the time. See his "The Insecure State: Reflections on 'the State' and 'Security' in a Changing World," *Daedalus* 124, No. 2 (Summer 1995): 186. Prominent among Ullman's precursors were Robert McNamara, *The Essence of Security: Reflections in Office* (New York: Harper and Row, 1968); Lester Brown, "Redefining Security," *WorldWatch* Paper 14 (Washington, D.C.: WorldWatch Institute, 1977); and Maxwell D. Taylor, "The Legitimate Claims of National Security," *Foreign Affairs* 52, No. 3 (April 1974): 592-594.

[9] Rachel Carson, *Silent Spring* (Boston: Houghton Mifflin, 1962); Garrett Hardin, "The Tragedy of the Commons," *Science* 162 (1968): 1243-1248; Barry Commoner, *The Closing Circle: Nature, Man and Technology* (New York: Bantam, 1971); Donnella H. Meadows et al., *The Limits to Growth: A Report for the Club of Rome's Project on the Predicament of Mankind* (New York: New American Library, 1972); Independent Commission on Defence and Security (Palme Commission), *Common Security* (London: Pan, 1982); and United Nations, Department of Disarmament Affairs, Report of the Secretary-General, *Concepts of Security* (New York: United Nations, 1986).

[10] Jessica Tuchman Mathews, "Redefining Security," *Foreign Affairs* 68, No. 2 (Spring 1989): 162-177.

[11] World Commission on Environment and Development (Brundtland Commission), *Our Common Future* (London: Oxford University Press, 1987). On Soviet new thinking, see Franklyn Griffiths, "Current Soviet Military Doctrine," in Murray Feshbach, ed., *National Security Issues of the USSR: Workshop 6-7 March 1896, NATO HQ, Brussels, Belgium* (Dordrecht: Martinus Hijhoff, 1987) 241-258, and Eduard Shevardnadze "Ekologiya i diplomatiya" [Ecology and Diplomacy], *Literaturnaya gazeta*, November 22, 1989. The subse-

quent U.S. cascade is evident in the some 500 items listed in the first report of the Environmental Change and Security Project, *Environmental Change and Security Project Report* (Washington, D.C.: The Woodrow Wilson Center, Spring 1995).

[12] Mikhail Gorbachev, *The Speech in Murmansk* (Moscow: Novosti Press, 1987). The original is in *Izvestiya*, October 2, 1987.

[13] Romm, *Defining National Security*, provides an overview of several of the issue-areas (the economy, the environment, energy, drug trafficking) in the U.S. discussion. On population, see for example Alex de Sherbinin, "World Population and U.S. National Security," Environmental Change and Security Project *Report,* Issue 1: 24-39.

[14] Janne E. Nolan, ed., *Global Engagement: Cooperation and Security in the 21st Century* (Washington, D.C.: Brookings Institute, 1994).

[15] *National Security Strategy of Engagement and Enlargement* (Washington, D.C.: The White House, February 1995): 1 and 7. The 1996 *Strategy* is not substantially different.

[16] Mary Douglas and Aaron Wildavsky, *Risk and Culture: An Essay on the Selection of Technological and Environmental Dangers* (Berkeley: University of California Press, 1993). A brilliant reading of the Soviet threat in American Life is to be had in William Pfaff, "Reflections: The Soviet Myth," *The New Yorker*, (November 6, 1978): 172-178. Following the collapse of socialism, Martin Malia sees in the ecological cause a new candidate for millennial utopianism complete with central ecoplanning for the collective planetary interest of humankind. Martin Malia, *The Soviet Tragedy: A History of Socialism in Russia, 1917-1991* (New York: The Free Press, 1994), 519-520.

[17] See Environmental Change and Security Project *Report* Issue 1: 92-105. Reviews of the U.S. discussion are to be had in Geoffrey D. Dabelko and David D. Dabelko, "Environmental Security: Issues of Conflict and Redefinition," *ibid*., 3-13, and Geoffrey D. Dabelko, "Ideas and the Evolution of Environmental Security Conceptions," paper presented at the annual convention of the International Studies Association, San Diego, CA, 16-20 April 1996. Also, Geoffrey D. Dabelko and P.J. Simmons, "Environment and Security: Core Ideas and U.S. Government Initiatives." *The SAIS Review* 17:1 (Winter/Spring, 1997). Also consider Marc A. Levy, "Is the Environment a National Security Issue?" *International Security* 20, No. 2 (Fall 1995); and the rejoinder to Levy from Thomas F. Homer-Dixon, " *ibid*., No. 3 (Winter 1996): 189-194.

[18] Discussed in Dabelko, "Ideas and the Evolution of Environmental Security Conceptions."

[19] *Ibid*. See also the statements from various agencies including the National Oceanic and Atmospheric Administration (NOAA) and the Environmental Protection Agency, as cited in *Environment and Security Debates*, 83-86; and, on Russian nuclear cleanup in Arctic seas, Kent Butts, "National Security, the Environment, and DOD," in *Environmental Change and Security Project Report*, Issue 2 (Washington, D.C.: The Woodrow Wilson Center, Spring 1996), 26.

[20] Office of the Assistant Secretary of Defense (Public Affairs), "Agreement Reached on Environmental Security Plan," *News Release* 430-96, July 18, 1996. See also the letter from the three agencies, July 18, 1996, conveying the MOU to Secretary Warren Christopher, and his reply of August 8, 1996 to Carol Browner of the EPA.

[21] *Environmental Change and Security Project Report,* Issue 1: 3-39, and 63-78.

[22] *Ibid*., 47-58 and 83-86.

[23] Ken Conca, "In the Name of Sustainability: Peace Studies and Environmental Discourse," in Jyrki Käkönen, ed., *Green Security or Militarized Environment* (Brookfield: Dartmouth Publishing, 1994), 7-24.

[24] Dabelko, "Ideas and the Evolution of Environmental Security Conceptions."

[25] *Ibid*.

[26] For example, the Secretary of State avoided the term altogether in a major statement of U.S. policy at Stanford University, April 19, 1996. "American Diplomacy and the Global Environmental Challenges of the 21st Century," in *Environmental Change and Security Project Report*, Issue 2: 81-85.

[27] Al Gore, *Earth in the Balance: Ecology and the Human Spirit* (New York: Houghton Mifflin, 1992); Dennis Pirages, *Global Technopolitics* (Pacific Grove: Brooks-Cole, 1989) and Pirages "Social Evolution and Ecological Security," *Bulletin of Peace Proposals* 22, No. 3 (Summer 1991), 329-334. Tim Wirth, Under Secretary of State for Global Affairs, also shares an ecological perspective: *Congressional Record — Senate*, June 28, 1990, S-8936-8938, and "Sustainable Development: A Progress Report," July 12, 1994, excerpted in Environmental Change and Security Project *Report*, Issue 1: 54-55.

[28] Dabelko, "Ideas and the Evolution of Environmental Security Conceptions."

[29] See however Murray Feshbach and Alfred Friendly, Jr., *Ecocide in the USSR* (New York: Basic Books, 1992), Laurie Garrett, *The Coming Plague: Emerging Diseases in a World of Balance* (New York: Farrar, Straus, 1994), and Garrett, "The Return of Infectious Disease," *Foreign Affairs* 75, No. 1 (January/February 1996) which cites change in the ecological relationship between microbes and humans, 72-73.

[30] Thomas F. Homer-Dixon, "On the Threshold: Environmental Changes as Causes of Acute Conflict, *International Security* 16, No. 2 (Fall 1991): 76-116, and "Environmental Scarcities and Violent Conflict," *ibid*., 19, No. 1 (Summer 1994): 5-40.

[31] For excerpts from President Clinton's Remarks to the National Academy of Sciences, June 29, 1994, see, *Environmental Change and Security Project Report*, Issue

1: 51-52.

[32] Interview, Toronto, April 2, 1996. In his view, the project on Environment, Population and Security has been driving the U.S. debate. Papers produced by the project and sent out to a list of 1,500 officials and others were all written by Canadians. For a critique of thinking that would replace communism with "chaos" as the prime concern of U.S. foreign policy, see Jeremy D. Rosner, "The Sources of Chaos: The Latest Bad Foreign Policy Idea," *The New Democrat*, (November 1994): 20-22.

[33] Conca, "In the Name of Sustainability," which offers a critique of "ecological security," and Daniel Deudney, "The Case Against Linking Environmental Degradation and National Security," *Millennium* 19, No. 2 (Winter 1990): 461-476.

[34] C. Boyden Gray and David B. Rivkin, Jr., "A 'No Regrets' Environmental Policy," *Foreign Policy* 83 (1991): 47-65; and Stephen Walt, "The Renaissance of Security Studies," *International Studies Quarterly* 35, No. 2 (Winter 1991): 211-239 who, aside from a brief reference to economics, made the point simply by defining security in military-political terms. This however is a waning position. Gary D. Vest, Principal Assistant Deputy Under Secretary in the Department of Defense, reports that, "DoD's view of environmental security is comprised of the following: (1) ensuring environmentally responsible action by military units wherever they may be; (2) ensuring adequate access to land, air and water to conduct a defense mission; (3) protecting DoD's warfighting assets (people, equipment, facilities); (4) understanding where environmental conditions contribute to instability, and where the environment fits into the war and peace equation; (5) bringing defense-related environmental concerns to the development of national security; (6) studying how defense components can be used as instruments of U.S. global environmental policy." *Environmental Change and Security* Project *Report*, Issue 2: 83. See also Kent Hughes Butts, "Why the Military Is Good for the Environment," in Käkönen, *Green Security*, 83-109.

[35] See Hans Bruyninckx, "Environmental Security: An Analysis of the Conceptual Problems in Defining the Relationship Between Environment and Security, paper presented at the annual meeting of the International Studies Association, Acapulco, Mexico, March 1993.

[36] U.S. Department of Defense, "Report on a Joint U.S.-Russia Ecological/Environment Seminar," Washington, D.C., May 15-19, 1995. See also Peter Gizewski and Alan Chong, "Military Activity: The Case of Radioactivity in the Arctic," in Daniel Deudney and Richard Matthew, eds., *Contested Ground: Security and Conflict in the New Environmental Politics* (Albany: SUNY Press, forthcoming).

[37] *Arctic Systems: Natural Environments, Human Actions, Nonlinear Processes* (Oslo: IASC Secretariat, 1996).

[38] On decoupling, see Franklyn Griffiths, "Epilogue: Civility in the Arctic," in Griffiths, *Arctic Alternatives*, 279-309.

[39] The negotiation that produced the AEPS began in 1989, on a Finnish initiative, and ended with a multilateral declaration in June 1991. For the founding document, see "Arctic Environmental Protection Strategy," *Arctic Research of the United States* 5 (Fall 1991): 29-35. Whereas other states sent delegations ready to do business at the first negotiating session, the United States was represented by junior staff from the embassy in Helsinki. Subsequently the U.S. commitment to the talks lagged well behind that of other participants. On the negotiations, see Oran R. Young, *Creating International Regimes: Arctic Cases, Generic Processes* (forthcoming), esp. ch 4. Whereas the AEPS took the form of a standing conference or process, two Arctic multilateral organizations were also created in the early 1990s: the International Arctic Science Committee (1990), a non-governmental body representing national science establishments; and the Northern Forum (also 1990), which unites territorial governments from around the circumpolar North and as far south as Sakhalin.

[40] "Canada Hosts Inauguration of Arctic Council," Government of Canada *News Release*, No. 166, September 19, 1996. The Arctic Council proposal was floated as a what-if proposition by the Canadian Prime Minister in Leningrad in November 1989, and announced as a commitment by the Minister of External Affairs in a speech made in Ottawa in November 1990. For comment, see Oran R. Young, *The Arctic Council: Making a New Era in International Relations* (New York: The Twentieth Century Fund, 1996); and David Scrivener, *Environmental Cooperation in the Arctic: From Strategy to Council* (Oslo: The Norwegian Atlantic Committee, 1996).

[41] U.S. Department of State, Office of the Spokesman, "Statement by Christine D. Shelly, Acting Spokesman: United States Announces New Policy for the Arctic Region," September 29, 1994. See also Robert Senseney, "U.S. Arctic Policy Aims for Circumpolar Cooperation," *Witness the Arctic* 3, No. 2, 1995, 1-2. *Witness* is published by the Arctic Research Consortium of the United States, at Fairbanks, Alaska.

[42] Interviews with Raymond V. Arnaudo, former Polar Affairs Chief, in London, May 11, 1995, and with Robert S. Senseney, current Chief, in Washington, D.C., November 1, 1995.

[43] The release of ice-thickness data was very largely the doing of then Senator Gore in 1991. Dabelko, "Ideas and the Evolution of Environmental Security Conceptions."

[44] Arnaudo interview.

[45] *Ibid*.

[46] Interview in Cambridge, U.K., February 17, 1996 with Lawson W. Brigham, former Commander and head of policy planning, USCG. Brigham retired in 1995, having skippered the *Polar Sea* to the North Pole the year before.

[47] *Ibid*.
[48] *Ibid*.
[49] Arnaldo interview.
[50] Brigham interview. Nevertheless, the Navy does assist global scientific research in the Arctic, as has been indicated. As well, the Office of Naval Research manages the Arctic Nuclear Waste Assessment Program in cooperation with Russia and several other countries. "ANWAP Prepares Risk Assessment," *Witness the Arctic* 3, No. 2 (Autumn 1995): 10.
[51] Brigham interview.
[52] *Ibid*.
[53] *Ibid*.
[54] *Ibid*. Also interview in Washington, D.C., at U.S. Coast Guard HQ, November 2, 1995, with Lt. Commander Stephen M. Wheeler, Ice Operations Division. Whether or not to refer to "environmental security" is seen by Brigham as a problem in the "tactics of terms."
[55] Arnaudo interview. Arnaudo is also of the opinion that the Arctic has stood "at the bottom" of the U.S. pollution prevention agenda.
[56] Interview with Gene Delatorre, International Affairs Director, Environmental Restoration and Waste Management, U.S. Department of Energy, in Washington, D.C., November 1, 1995.
[57] Arnaudo interview.
[58] Senseney interview.
[59] Arnaudo interview.
[60] Senseney interview.
[61] Arnaudo and Senseney interviews.
[62] Arnaudo interview. Arnaudo also reports that in preparing the 1994 Arctic policy statement the money people caused him "much grief."
[63] Senseney interview. See also "U.S. Discussion Paper: Sustainable Development," paper dated November 1, 1995, Office of the Polar Affairs Chief.
[64] Senseney interview. Michael Schneider, Senior Advisor to the Under Secretary for Global Affairs, suggests that environmental security need not compete with or take away from sustainable development: whereas the latter is a core belief with sweeping implications, the former connotes regulatory action by diverse government agencies to defend and protect the environment. Interview, Washington, D.C., November 1, 1995.
[65] Terms of reference for PAME are to be found in "Arctic Environmental Protection Strategy." See also "Report to the Arctic Ministers: PAME Working Group Publishes Findings," *Arctic Bulletin*, No. 1, 1996, 5-6. The *Arctic Bulletin*, published quarterly by the World Wide Fund for Nature, is a useful source of comment on the AEPS, which was folded into the Arctic Council's work at the Council's creation in September 1996. On the Harmonization Talks, see International Maritime Organization, "Harmonization of Polar Ship Rules (Code of Polar Navigation)," Document DE 39inf.4, December 1, 1995, and "Summary of Minutes" from the St. Petersburg, Russia meeting, 15-18 October 1996, both available from Ship Safety Northern, Transport Canada.
[66] Arnaudo interview.
[67] *Ibid*.
[68] Senseney interview.
[69] Wheeler and Brigham interviews.
[70] Environmental NGOs such as the Audubon Society, the Environmental Defense Fund, and the World Wildlife Fund have joined with U.S. native and health groups in an Arctic Network to shape government policy on some of the AEPS working groups. The Network issues a newsletter from Anchorage entitled *Leads: Arctic Network News Summary*. Young, *Creating International Regimes*.

Ecological Security and Multinational Corporations

by Katrina S. Rogers

As the first two issues of the Woodrow Wilson Center's *Environmental Change and Security Project Report* (1995, 1996) have demonstrated, there is a great deal of discussion and disagreement about environmental or ecological security: what it means (Conca 1995) how it can be achieved (Dabelko and Dabelko 1995), and what are the methodological implications of current research (Homer-Dixon 1995; Levy 1995). This essay flows in part from this theoretical debate by arguing first that ecological security needs a clear and workable definition for practical methodological reasons. Second, studying environmental cooperation is the next important task for scholars. Why there is evidence of cooperation, even in the face of environmental degradation, is a useful question to explore.

Defining ecological security more clearly assists in building a usable methodological framework for understanding how and why some actors cooperate rather than engage in violent conflict over environmental issues. Ecological security is defined here as the goal of stakeholders to create a condition where the physical surroundings of a community provide for the needs of its inhabitants without diminishing its natural stock. This definition assumes that continued economic growth is derived from the earth. Human survival depends both on our recognition of this dependence, and our success at working out the ways in which we use the environment and protect it. Following a brief discussion of environmental and ecological security, this essay addresses the current and future potential of a particular set of international actors, multinational corporations (MNCs), as agents which advance or impede ecological security.

Environmental Versus Ecological Security

The terms ecological and environmental security are often used interchangeably by both scholars and political actors. I suggest that for the purposes of clarity and research, environmental security refers more precisely to resource protection. Actors refer to environmental security when discussing the protection and defense of their natural resources. For example, in the 1996 U.S. National Security Strategy, the preface states, "Protecting our nation's security—our people, our territory, and our way of life—is [this] Administration's foremost mission and constitutional duty. . . .Large scale environmental degradation threatens to undermine political stability in many regions and countries" (*ECSP Report* 1996: 72). The statement is a reflection of an implicit link between national security interests and environmental degradation as a threat to political stability.

In recent years, scholars have advocated extending the meaning of the term security from primarily political and military matters to include environmental issues (Mathews 1989; Hampson 1990). Lothar Brock defines environmental security as a normative connection designed to cope with the negative linkages between the environment and human activities. This includes the avoidance of environmental warfare, war over natural resources, and also environmental degradation, which he defined as a form of war (Brock 1991).

Some scholars raise questions regarding the term environmental security itself. They question the utility of the term as an analytical tool for scholarship (Conca 1994). Others argue that viewing environmental problems as national security threats might undermine the sense of world community that may be necessary to solve the problem (Deudney 1991). When environmental degradation is viewed as a *threat* to societies, national security scenarios of protecting one's territory against invaders leap to mind. In a sense, ecological degradation becomes the invader, the invader that we ourselves have created. This idea presumes that governments only need to be convinced of "the threat" for them to take defensive action.

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There is an added level of uncertainty with the term environmental security. It is composed of two words that have independently accumulated a variety of meanings and are each value laden. To place them together is problematic in that the effect may be to militarize solutions to environmental problems, rather than make security issues green (Deudney 1991; Wæver 1995). National militaries, either as instruments of war or as consumers of resources, have played a significant role in environmental degradation. As such, many ecological security scholars distrust the military mentality. They suspect that responses conceived in military terms would more likely result in accelerating (or even creating) conflict, rather than solving environmental problems and promoting ecological cooperation. This concern will likely remain until policy developments clearly demonstrate alternative outcomes.

Ecological security refers to the creation of a condition where the physical surroundings of a community provide for the needs of its inhabitants without diminishing its natural stock

Other definitions of environmental security have broadened the concept further. In these definitions, the beginnings of a framework for ecological security becomes evident. Whereas environmental security refers fundamentally to the threat of environmental degradation to political stability, ecological security refers to the creation of a condition where the physical surroundings of a community provide for the needs of its inhabitants without diminishing its natural stock.

Arthur Westing defines environmental security in the context of a broader human security which he argued has two intertwined components: political security and environmental security (Westing 1989). This approach coincides with my description of ecological security. Political security, he elaborates, includes military, economic, and social/humanitarian subcomponents while environmental [ecological] security has a protection-oriented and utilization-oriented subcomponent. The protection requirement refers to safeguarding the quality of the human environment. The utilization requirement means providing a sustaining basis for any exploitation (harvesting or use) of a renewable natural resource. He also emphasizes the necessity for a commitment to the sustainable development of resources and the sustainable disposal of wastes in order for environmental [ecological] security to be achieved.

Clovis Brigagão evaluates linkages between ecology and security by arguing that social inequalities and local sustainable development are key to promoting the condition of ecological security. His list of desirable actions for parties in conflict includes equality of rights over natural resources, prohibition of ecological aggression, monitoring of ecological conditions, exchange of information on national or regional situations, cooperation in circumstances of ecological emergency, international responsibility for the environment, and self-sustained development (Brigagão 1991). In this comprehensive definition, ecological security is broadened to encompass social, political, and economic problems.

An umbrella concept such as ecological security allows scholars to think about security issues outside the state-centric rubric which has dominated international relations for decades. Achieving ecological security encourages, and in fact requires, that multiple actors become involved in establishing goals for ecological security as well as offering a number of instruments for working towards these objectives.

When an actor is seeking to deal with the systemic causes of insecurity and environmental degradation, then that actor is engaged in trying to achieve ecological security. For instance, efforts to restore habitats or prevent their loss (e.g., protection of rain forest or old growth forest), are indirectly aimed at bolstering ecological security. Other activities could ameliorate long-term negative consequences of a degraded environment through reforestation, reclamation of wetlands, or reduction in CFC emissions to slow the depletion of the ozone layer. These actions can all be seen as efforts designed to promote ecological security.

The following two examples further illustrate the distinctions between environmental and ecological security. If a state invades another state either for the purpose of acquiring additional natural resources, or on the basis of protecting, defending, or ensuring continued resource access, that state is pursuing environmental security as defined here. These justifications have often been used throughout history, and indeed, are considered to be common causes of war. In the most literal understanding of this term, the search for *lebensraum* on the part of states can be considered, at least partially, as resource motivated.

Addressing the more systemic causes of environmental degradation, such as taking long-term conservation measures, is an example of trying to achieve ecological security. After the oil embargo in 1973, many industrialized nations undertook energy conservation measures. The United States instituted a national speed limit in an attempt to conserve fuel. It also passed legislation and provided tax incentives for individuals who used alternative energy sources, such as solar power, wind, and water power. Temporary as they were, these actions can be seen as attempts to address the systemic problems with long-term approaches.

Within the literature of environmental and ecologi-

cal security, considerable attention has been devoted to the linkages between environmental degradation and conflict, particularly, violent conflict. It is at these crucial junctures of conflict that we discover where environmental problems become part of the micro politics of a violent episode. Both the Environment and Conflicts Project, under the co-direction of Günther Bächler (1995) and Kurt Spillmann, and the Project on Environment, Population, and Security, under the direction of Thomas Homer-Dixon (1994), have sought to find and describe the linkages between environmental scarcity and violent conflict. The results of this research has been reported and debated in earlier issues of this *Report* and will therefore not be thoroughly detailed here.[1]

The evidence of the case studies written under the auspices of these two projects clearly demonstrates that environmental degradation is linked to violent conflict, but often in an indirect way. The conclusions state that resource scarcity, in and of itself, does not lead inevitably to violent conflict. Resource scarcity has a social impact which may or may not lead to conflict, and this causation is particular in each case. A second conclusion is that environmental degradation can lead to mass migration. These migrants, sometimes called "environmental refugees," seek sustenance elsewhere, putting pressure on different resource pools. These pressures can in turn contribute to ethnic conflict. Finally, environmental degradation and depletion more generally can lead to social and economic inequality which can contribute to civil strife. In these three important ways, environmental degradation is linked to violent conflict.

In a world of growing population and dwindling resources, environmentally-induced conflicts are almost certain to increase in the future. As more and more intrastate conflict occurs, it is likely that outside actors will be invited, or will feel compelled to intervene to prevent or to stop violent conflict. Actors must be prepared to cope in new ways with problems as varied and different from one another as the cultures and ecosystems that spawn them. As one U.S. policy document stated, "we need to seek and identify the root causes of conflict and disasters before they erupt" (*ECSP Report* 1995: 50).

Having made this important link between environment and conflict, we are now faced with the challenge of integrating these results into discussions of ecological security. The results confirm the complexity of the task before us: to develop environmental cooperation for ecological security. We now know that environmental degradation and violent conflict are linked, but we also know that these linkages are often indirect, subtle, and not always predictable. Other variables also interact in any given situation of violent conflict, including perceived social inequality, ideological positions, and ethnic tension. Therefore, environmental cooperation cannot just be about building institutions for communication to address environmental matters. It must also be about initiating and maintaining sustained communicative mechanisms for cooperation in a number of political, social, and economic areas that include environmental issues.

Integrating these results into discussions of ecological security allows us to establish clearly defined steps for identifying environmental cooperation and promoting ecological security on several levels. For instance, the environment and conflict research lends empirical power to the idea that states should support multilateral cooperation in development programs, such as family planning, encourage local communities to initiate or continue the slow, laborious process of building multi-partnership arrangements and improving communication. Lastly, these results, and some of their criticisms, point researchers to the next step for research—investigating cooperation as well as conflict.

Focusing on Cooperation

Research efforts are beginning to shift focus from where environmental conflict occurs to studying where it does not occur in the face of environmental scarcity (Rogers 1995). Why do some actors cooperate and others do not when faced with similar environmental challenges? This question, among others, brings us to the issue of environmental cooperation. Are the answers to this question intuitive? For example, can we make the assumption that democratic governments with institutional frameworks become more prone to cooperate? In the absence of such frameworks, will conflict be more predictable? Cooperation in this context does not mean that there is an absence of conflict. But it does imply that there is a mutual will among actors to resolve the conflict through communicative and non-violent means. These questions should be at the center of the "next wave" of environment and conflict research (Levy 1995; Conca 1995).

As we begin to address strategies and techniques systematically, normative concerns will become more obvious and more critical. What kinds of cooperation on environmental issues are most useful for ameliorating conflict potential? What are the moral imperatives and limits for actors? What are the parameters of acceptable behavior? Whose definition of ecological security should be implemented? In the absence of consensus, the strategies are developing without systematic attention to these questions. If ecological security is ever to be achieved, strategies must be developed which will allow necessary processes to begin and endure. Actors must be prepared to make a commitment to pro-active, long-term strategies.

In developing strategies for environmental cooperation and, thereby, the promotion of ecological security, it is useful to first identify the actors and describe

the instruments used to facilitate environmental cooperation. Such micro issues as local resource use and allocation are as much a part of the process of achieving ecological security as a state promoting technologies to prevent the depletion of the ozone layer. Actors, however, can be sorted into groups: states, international governmental organizations, non-governmental organizations (NGOs), multinational corporations and local communities.

When dealing with any of these different actors, strategies for environmental cooperation are needed (1) to address the systemic problems that undermine ecological security, (2) to anticipate environmental conflict before it erupts into violence, and (3) to cope with environmentally-induced violent conflict. Each of these groups of actors has different stakes in each environmental issue. Therefore strategies for cooperation must be considered first within each group and then linkages across groups can be sought. We turn now to a discussion of one of those sets of actors commonly neglected in discussions of ecological security.

Multinational Corporations: A Role in Ecological Security

Multinational corporations are among the most powerful economic and political organizations in the world. Since World War II, the rapid spread of multinational corporate activity has led to their increasing influence as not only economic actors but also as concerned participants in the development of governmental and supragovernmental policy. Global exports by MNCs now account for 20 percent of total world trade in manufactured goods (Cohen 1994). This economic power translates into political muscle as MNCs work to influence national governments and international governmental organizations in a number of policy areas, not the least of which is the environment. Harnessing the power of MNCs and encouraging their cooperation should be one of the key areas for building ecological security.

To an extent much greater than is commonly recognized, multinational corporations are extensively involved in the environmental debate. Both individually and increasingly as cartels and coalitions, they have the size, influence, and financial resources to wield considerable power in the international sector. They are now wielding that power more frequently and more openly than ever before. MNCs have the potential to become major agents for change by shaping technological advances and commercialization worldwide (Choucri 1992). MNCs define markets with their products and strategies, and their influence has been central in determining much of the environmental agenda of the international community.

These corporations help shape present and future conceptualizations of environmental problems, their solutions, and the economic structures that currently guide the world. In the future, MNCs will invest heavily in promoting ecological security. They will do so for the following reasons: the moral imperative, the economic benefits, and their public image.

Because they are primary users of natural resources on the earth, the moral imperative is increasingly an issue among MNC managers. The sense that MNCs have an obligation to the environment is beginning to be felt in the boardroom. To those alarmed about environmental problems, this awareness may seem glacial in its movement, but a cogent indicator of the seriousness of these concerns is seen in the proliferation of trade journals devoted to environmental issues and the number of re-training programs for managers in environmental management and strategic planning. Growth areas in business include environmental auditing, waste audits, life cycle analysis, eco-planning, and environmental technology.

The economic imperative for companies has grown with the realization that at the base of a company's profit are the increasingly scarce raw materials which supply that industry. This can be in the form of the raw material itself (as in the case of agri-business), or the fuel used to manufacture any given product, or the fuel itself as the product, or extractive industries (such as timber, oil production, and mining). As scarcity occurs, companies are more likely to view protecting raw materials as an economic necessity. The old way was to find new resources, but as it becomes less possible to secure or find new sources of raw materials, entire industries will be faced with protection of these resources or extinction. Whether and when MNCs acknowledge this reality will vary depending on the type of industry, the perceived depletion of essential resources and particular corporate culture. Furthermore, as environmental regulations have proliferated, so too has demand for green technologies that pollute less and that clean up the existing environmental problems. The growth of green technology has not only enabled companies to use resources more efficiently but also exerted pressure on industry to plan for a future of diminishing resources.

The third motivation for MNCs to make decisions that support ecological security is the necessity to safeguard the public image of the company. The public and regulators are increasingly demanding information about the environmental records of MNCs. Some companies have become pro-active in leading industry toward a more environmentally sensitive and sensible agenda. A number of industrial leaders have stressed a corporate environmental ethic, in the hopes of salvaging or improving their industry's reputation as unfriendly to the environment.[2]

Concerned observers often point an accusatory finger at the international business community as rapacious despoilers of the environment. Critics contend

that the business community must be held responsible since it profits most from a global economic system which perpetuates continuing environmental degradation. Apologists usually argue that the business community merely responds to demands made by consumers. Therefore, both consumers and producers are culpable. Although the point is debated, most business leaders agree that industry shares the responsibility for environmental stewardship. But cleavages also exist among MNCs about how accountable the business community should be for global environmental problems. There is a tendency to see environmental protection and economic growth as two sides of a balance sheet, where companies need to reconcile the positive benefits of environmental protection against the costs of that protection.

MNCs are influential in advancing ecological security in four specific ways: (1) participating in treaty negotiations on a number of global environmental issues, (2) sponsoring public programs and research, (3) promoting public education on environmental issues, and (4) creating international institutions to advance ecological security and sustainable development principles.

MNCs have the resources to assist companies, public officials and the public in developing countries in gaining and spreading environmental awareness

At the end of the 1980s, a new surge in environmental concerns among the citizenry in the United States as well as throughout Europe led to a new wave of regulation on business. Many companies responded by changing certain aspects of their production or packaging processes. These changes even applied to companies producing goods considered unhealthy for the environment as well as humans. In 1993 for example, *Philip Morris*[3] designed and introduced a recycled and recyclable cigarette carton for their best selling brand, Marlboro. Averaging 24 billion cigarettes per year around the globe, the company acknowledges that the impetus behind this change was regulations which had been introduced in Germany in 1992. "The regulatory indicators were clear," said a company spokesman. "We had to adapt to tightening regulations and, coincidentally, it turned out to be cheaper and an effective marketing tool for our European markets. We are now making the changes voluntarily in all of our European manufacturing plants."[4]

Governments were pressured by domestic political interests to implement environmental policies that directly impacted business activities. As a result, the business community began to take greater interest in environmental debates at the international level. They wanted to make sure that they had input whenever possible into regulation that could effect them on a global as well as a state by state basis. One of the first examples of this international lobbying and active participation in negotiations was in Montreal in 1987 when the Montreal Protocol on Substances that Deplete the Ozone Layer was signed .[5]

During the pre-treaty negotiations, representatives of industry met with government officials, environmental groups, and scientists in informal workshops. A negotiator at Montreal commented that these informal workshops achieved a high level of consensus before formal sessions began and were unprecedented for the number of participants in the proceedings. The cooperative process by which the Montreal Protocol was developed may have significant implications for future international environmental cooperation (Benedick 1988; 1991).

The cooperative atmosphere, which encouraged the participation of business, marked a change from the more traditional framework of confrontational corporate lobbying against government regulation. In the 1970s for example, *Du Pont* and several other chemical manufacturers waged a virtual war against the regulation of CFCs. By the late 1980s, however, the corporate stance against government involvement had shifted considerably toward the recognition that some type of international agreement was inevitable and necessary. An industry lobby group, the Alliance for Responsible CFC Policy, announced that it would support a reasonable global limit on the growth of CFC production capacity. *Du Pont* was already developing non-CFC technology and looking for substitutes that would not harm the atmosphere. This repositioning of industry toward favoring an international treaty is considered to have been one of the critical factors in successfully negotiating the Montreal Protocol (Morrisette 1989).

The second way that MNCs have become involved in ecological security issues is through the sponsorship of research and public programs. For example, a number of companies conduct research on the environmental impacts of pesticide use or sponsor programs for recycling and green packaging. There are also companies that engage in in-house research on greening the financial sections of the company and that have integrated environmental management throughout the company's operations.

As Anita Roddick, founder of *Body Shop*, explains, "we challenge the notion that any business can ever be 'environmentally friendly.' This is just not possible. All business involves some environmental damage. The best we can do is clean up our own mess while searching hard for ways to reduce our impact on the environment" (Body Shop 1991). This covenant to "clean up our own mess" involves more than waste

and energy management. It also involves establishing environmental goals for the finance department, the information technology section, the design and merchandising department, and the purchasing section.

As part of their commitment to the community and their public image, many MNCs have also added an environmental component to their public programs. This includes underwriting the costs for recycling campaigns, public lectures on environmental issues, clean-up programs, and urban gardens. For example, the *Nestlé* corporation, the third largest agri-business MNC in the world, believes that industry plays an important role in research and public programs. From *Nestlé's* perspective, many business sectors depend on nature's diversity for their sustainable success. As the world's largest single buyer of coffee and cocoa, *Nestlé* is at work developing advanced preservation techniques for the many different plant species threatened with extinction. *Nestlé* also collaborates with public research institutes to make its results freely available to others (*Nestlé* 1995). "Above all, we are working to integrate good environmental management practices in every aspect of the company," said a company spokesman. "We do this because as a food industry, we need to sustain our economic base—that is, the raw material we depend on for our products."[6]

A third way that MNCs have become involved in environmental issues generally is through the promotion of education about the environment. These activities are commonly the production and distribution of materials on environmental issues to schools and libraries. This involvement is often controversial. Some companies, such as major oil companies, have been criticized by environmental activists for using this technique to get their trademark in front of younger consumers. Other companies, however, have been less self-serving in their participation.

Steps to Fulfill MNC Potential

The three ways briefly described above demonstrate that MNCs often play a role in supporting ecological security. MNC responses to environmental issues, naturally enough, are based on their experiences as giants from the industrialized world. In terms of institutional arrangements, MNCs have only recently become involved in building institutions for ecological security. At the UNCED Rio Summit, for instance, a number of positive initiatives emerged from the business participants. The International Chamber of Commerce (ICC), representing several hundred major companies, produced a Business Charter for Sustainable Development, a set of voluntary guidelines for good business conduct (ICC 1991).

Transfer of technology is another potential positive industry response. Making advanced technology available to developing countries is important, but no more important than the transfer of understanding. In the industrialized world, building environmental awareness among the citizenry is an ongoing, and often an uphill, struggle. In the developing areas of the world, also, people must learn to cope with daily life in the context of their environment. For the most part, industrialized societies already have effective mechanisms in place; such as educational systems, access to media and other sources of information, and a supportive political culture. Acquiring and utilizing the essential information for survival and quality of life is much more difficult in societies where the environment is a low priority, where access to information is limited, and where educational systems are inadequate.

MNCs have the resources to assist companies, public officials and the public in developing countries in gaining and spreading environmental awareness. The resources available for this kind of technology transfer remain vast even in this time of shrinking budgets and constrained programs when resources seem limited by industrialized world standards. In industrialized countries, public and private sector resources are available to foster cooperative projects with less industrialized countries that provide them with access to information. The challenge for concerned MNCs is to make those resources available. The challenge must be to continue building and strengthening global networks for understanding environmental degradation and resultant societal breakdown. Furthermore, it is critical to foster mechanisms at the local level that are contextual, organic, and adapted to the local culture.

Whether it is due to lack of imagination or shareholder reluctance, the gap between what MNCs contribute to building ecological security and their potential to heal wounds they helped to create, is enormous. The next step for MNCs is to establish a number of blind trusts for advancing ecological security. In this fashion, ethical questions surrounding industry's alternative motives would not be at issue as is so often the case with corporate sponsorship of public programs and education. Such an organization could support a range of ecological security subjects.

In 1992, an organization with the support of visionary MNCs was formed along similar lines. It was called the Business Council for Sustainable Development (BCSD). Originally, this small and focused group, set up by senior managers of major companies, produced the work *Changing Course*. The first two sentences of the Declaration of the Business Council for Sustainable Development asserted that, "business will play a vital role in the future health of the planet. As business leaders, we are committed to sustainable development, to meeting the needs of the present without compromising the welfare of future generations" (Schmidheiny 1992). To achieve this goal, the Declaration argued, new forms of cooperation among government, business, and society would require the industrial lobby organiza-

tion, WICE, to become the World Business Council on Sustainable Development (WBSCD). The new organization now appears to be an industry lobby group with little of BCSD's earlier vision left intact.

If ecological security is ever to be achieved, mechanisms and institutions must be built that will allow necessary processes to begin and endure. Institutions, however, have a way of becoming ends in themselves. Institutions and the mechanisms they help put in place must not be placed higher than the goals that benefit the environment initially and human life ultimately. The scope of institution building required is massive. The depth and breadth of mechanisms needed to achieve ecological security is daunting. The great diversity of problems from sub-soil to stratospheric, means scientific input must be multidisciplinary in the broadest application of the word. Effective mechanisms, however, can only be put into place when there is agreement about what constitutes ecological security. In the absence of consensus, informal networks and processes will continue to be built but only in a haphazard fashion. Some multinational corporations have shown a willingness to accept responsibility and shoulder some of the burden for global environmental problems. They have done this through participating in international negotiations, sponsoring research and education, and building institutions. But to date their contributions fall far short of their resources and capabilities.

Endnotes

[1] See Homer-Dixon 1996; Levy 1995; 1996; Dabelko and Dabelko 1995 in prior Woodrow Wilson Center *ECSP Reports*.
[2] Three examples are *Du Pont*, *3M*, and *Hewlett Packard*.
[3] *Philip Morris* is best known in America as a tobacco products industry but is also a multinational agribusiness corporation.
[4] Interview, 7 February 1995, *Philip Morris* Representative, Cigarette Manufacturing Plant, Neuchâtel, Switzerland.
[5] Representatives from 24 nations, met in Montreal in September 1987, and signed the "Montreal Protocol on Substances that Deplete the Ozone Layer," an international agreement designed to reduce the production and use of chlorofluorocarbons (CFCs).
[6] Interview, 8 November 1995, Environmental Affairs Director, *Nestlê* International Corporate Headquarters, Vevey, Switzerland.

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Demographic Change and Ecological Security

by Dennis Pirages

Environmental concerns are now becoming an integral part of U.S. foreign policy, but within academic and policy circles there is an ongoing debate over the role that environmental stress plays in creating security threats. An argument is made here for moving beyond environmentalism and using an ecological security perspective to inform foreign policy planning and future defense allocations. Ecological security rests on maintaining four kinds of equilibrium between human beings and the physical environment. Large-scale shifts in human demographic patterns are threatening these equilibriums and thereby increasing insecurity for individuals, groups, countries and the planet. Substantial changes in security thinking are required in order to address these imbalances.

Developing an ecological conception of security provides one starting point for debating new security thinking. Discussion then turns to the four most significant demographic issues in the context of the ecological security framework: population growth, movements, graying, and differential growth. Finally, a brief commentary on the state of U.S. population policy provides an overview of missed opportunities and needed actions.

The Context: An Ecological Approach to Security

Discussions of environmental security are now percolating through the Washington policy community. During his recent tenure, former Secretary of State Warren Christopher spoke specifically about the environment and issued directives to integrate environmental issues into the State Department's core foreign policy goals. The Department of Defense (DoD) has spent billions integrating environmental clean-up into its day-to-day operations. The Department of Energy (DoE) is spending similar sums for environmental remediation at its nuclear weapons production facilities. And as the "red" threat diminishes, even intelligence agencies are "greening" in anticipation of future missions.[1]

As a first step, injecting green concepts into daily operations is laudable. But as yet there has been little effort to move beyond cosmetics and use ecological perspectives to re-orient long-term foreign policy planning and security thinking. Thus, there is now little disagreement that environmental remediation is a positive development. Likewise, having learned valuable lessons from Operation Desert Storm, there is not much controversy at DoD over preparing troops to operate in more biologically hazardous environments in the future. And the State Department now recognizes that resource shortages and environmental degradation should be factored into assessments of potential regional conflicts (water in the Middle East) and political havoc (Haiti). But this new focus on the environment in foreign affairs has so far been timid and mostly limited to greening ongoing operations. It has not revamped foreign policy and security thinking to accommodate broader ecological perspectives.

An ecological approach to security is anchored in a broader conception of threats to human well-being. Ecological security moves beyond preparations to repel military assaults from enemy states to ensuring safety from other kinds of ecological and economic challenges. These threats can include attacks by other species (ranging from locusts to microorganisms), retribution from nature (including floods, droughts, and famines), and economic failures associated with ecosystem mismanagement.

Ecological security raises a broader set of concerns not yet commonly addressed in policy forums. Given traditionally accepted purposes of national security policy, the protection of the state and prevention of large-

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scale premature loss of human lives and potential, this approach suggests looking beyond cross-border military incursions when assessing future threats. Historically, security policy has countered threats that were readily understood. It was hoped that credible defense measures would thwart future attacks. But such predation has not been the only, or even the major, threat to state security and human well-being. For example, while defense efforts against viruses have not traditionally been part of security thinking, the deadliest battle ever fought was the struggle between Homo sapiens and the influenza virus that began in Kansas in 1918 and spread around the world during World War I—it is estimated that nearly twenty million people lost their lives during this struggle.[2]

Human populations have co-evolved with various other species and microorganisms over time within an ever-changing physical environment. Ecological security for human beings has been maximized when the following four kinds of equilibriums have been maintained:

- Between the demands of human populations and the sustaining capabilities of environmental systems;
- Between the size and growth rates of various human populations;
- Between the demands of human populations and those of other species;
- Between human populations and pathogenic microorganisms.

Significant breakdowns in any of these four equilibriums can have serious consequences. Most past security efforts have focused on only one of these dimensions, disruption of equilibriums among human populations. This has been largely due to the fact that security threats from other sources were poorly understood and not easily remedied.

The size, growth patterns, and habits of interacting human populations are very critical to all aspects of ecological security. The following overview of significant demographic changes permits the exploration of one aspect of ecological security; other dimensions will be explored in future articles.

Demographic Change and Disequilibrium

There are at least four types of large-scale demographic shifts that can create disequilibriums. Rapid population growth, large-scale population movements, differential population growth patterns, and even population stabilization and graying can present challenges to human well-being and ecological security. Rapidly growing human populations, for example, require resources in order to maintain or increase living standards. But growing human populations often run up against the carrying capacity of territories they occupy, leading to environmental degradation, increased vulnerability to disease, and occasionally to violent conflict.[3] If needed resources cannot be obtained domestically, and if capabilities exist to get them elsewhere, lateral pressure to move across borders is likely to develop.[4]

For long stretches of history Homo sapiens lived in relative harmony with nature. Numbers grew very slowly and, while the local environmental impact of individual populations might have been considerable, the global impact of human beings was relatively small.[5] During the early stages of the Industrial Revolution, however, the world's population began to expand rapidly. In 1650, there were only 500 million human beings on the Earth. This number doubled to one billion in only 200 years. Only 80 years later, by 1930, the world's population had doubled once again. The next doubling, to four billion, took only forty years. Today, there are more than 5.8 billion people occupying an ever more densely populated world.

As yet, there has been little effort to move beyond cosmetics and use ecological perspectives to reorient long-term foreign policy planning and security thinking

While rapid population growth is frequently identified as a primary cause of insecurity, three other kinds of demographic change also create problems. People in motion—whether moving from rural to urban areas within a country or from one country to another—often trigger tensions and hostilities at their destinations. Thus, migrants have recently poured into Germany from Central and Eastern Europe, into France from North Africa, into Zaire from Rwanda, and into the United States from the Caribbean and Latin America. They have frequently been met with various challenges ranging from discrimination to massacres. And differential population growth rates, such as those between certain Islamic states and their neighbors, often lead to conflict and provide pressure leading to large-scale population movements.

Paradoxically, even slow population growth or decline can have political, economic, military, and disease ramifications. The United States, Japan, and most European countries recently have experienced steadily declining birthrates that, abetted by life-prolonging technologies, are shaping "graying" societies and a set of potentially divisive inter-generational conflicts. The so-called "birth dearth" in these countries threatens to pit economically productive young people against those who are benefitting from social security and medicare payments. A future dwindling work force will be faced with picking up the costs of swelling entitlement programs that were established when economies were expanding and labor forces were growing.[6]

The contemporary world is thus best characterized as demographically divided. On the less affluent side of the demographic divide, rapid population growth and related urbanization are creating ecological insecurities by overwhelming the sustaining capability of the physical environment. But on the more affluent side of the divide, graying populations increasingly confront problems of chronic diseases and sociopolitical arteriosclerosis. And large-scale traffic across the divide often provokes the wrath of those who see migrants as potential threats to their interests. It is this divide, largely between North and South, that provides the context for the discussion of the four demographic changes challenging ecological security.

Growth Pressures and Insecurity

As human numbers have rapidly grown, ecological insecurity has increased apace and there are now abundant signs of stress. For example, the contemporary densely-populated world is experiencing increasing numbers of so-called natural disasters as burgeoning human populations press into areas—river basins, coastal lowlands, earthquake areas—that can be occupied only at great risk.[7] And the number of people continues to grow. The world is projected to have 8.2 billion occupants by the year 2025, with eighty-five percent of them living in the presently less industrialized countries.[8] It is estimated that 60 percent of the less industrialized world's poorest people live in ecologically vulnerable areas.[9] Trees that can be used for firewood are rapidly disappearing before the demands of growing populations, and the related deforestation is increasing soil erosion and flooding.

Water is another source of insecurity in many areas of the world. Rapidly growing populations in the Middle East are competing for very limited supplies. Israel and the Palestinians are perpetually at odds over control of water, and Jordan and Syria have repeatedly accused each other of stealing water from the small river running between the two countries. Similarly, Syria, Turkey and Iraq are constantly feuding over the use of water from the Tigris and Euphrates rivers.[10]

Population pressures on land and water are also responsible for considerable malnutrition and even starvation. While growth in worldwide food production has slightly exceeded world population growth over the last decade, this has not been the case in many countries. When data for the period 1982-84 are compared with 1992-94, food production per capita actually declined in 72 countries.[11]

A widening gap in economic opportunity also parallels the demographic divide. The richest fifth of the world's population now produces 83 percent of the gross world product while the poorest fifth produces only about one percent.[12] And the income gap seems to be widening: between 1960 and 1989 the per capita income difference between the average person in the top twenty percent of the world's population and the bottom 20 percent grew from $1,864 to $15,149.[13] And between 1980 and 1993 there was a decline in real per capita GDP in 53 countries on the southern side of the demographic divide.[14]

Economic stagnation and decline is related, in turn, to political turmoil and insecurity. There is a strong relationship among rapid population growth, poverty, environmental deterioration, social violence, political instability and authoritarian forms of government.[15] When politics revolves around an authoritative allocation of deprivations it is difficult for democratic regimes to survive. In Haiti, for example, the combined birth and death rates are unmatched in the Western Hemisphere and the pattern of authoritarian regimes and political violence there led to the U.S. intervention to establish some semblance of order. Similarly, authoritarian governments and violence have been commonplace in African countries such as Angola, Ethiopia, Liberia, Somalia, Sudan, and Uganda.

People in Motion

The rapid rate of population growth on one side of the demographic divide and the potential for a birth dearth on the other are related to two kinds of large-scale population movements. The pressures of rural population growth in less industrialized countries combined with perceived, and often illusory, economic opportunities in urban areas are driving large numbers into cities. And others, driven by the pressures of population growth, declining economic opportunity, and political instability, are also moving, legally and illegally, across flimsy bridges spanning parts of the international demographic divide.

Migrants are moving into the United States from Asia, the Caribbean, and Latin America at a rate in excess of 600,000 annually. Western Europe is being pressured from several directions; estimates indicate that between 1991 and 2000 as many as 4.0 million Eastern Europeans, 3.5 million citizens of the former USSR, 2.5 million North Africans, 2.0 million Sub-Saharan Africans, and 1.0 million Asians will have arrived in Western Europe.[16]

People migrate for a variety of reasons. The largest share has moved historically in search of better economic conditions. But contemporary migration is also being fueled by refugees from military conflict, ethnic violence, and the collapse of states. It is very difficult to estimate the numbers and types of migrants and refugees in the world today. The largest share of migrants remains in the countries of origin. The next largest portion crosses boundaries only within the less-industrialized world and an even smaller share crosses the demographic divide into the industrialized nations. But millions of migrants cross borders quite legally each

year, and there are several million contract laborers living abroad at any given point in time.

It is illegal migrants, asylum-seekers, and refugees that attract most attention. By definition, illegal migrants are very difficult to count. It is roughly estimated that between 100,000 and 300,000 people slip into the United States illegally each year.[17] Most industrialized countries, with the clear exception of Japan, have recently seen a large increase in people seeking political asylum. In most of these countries the wheels of justice turn very slowly, permitting those seeking asylum to stay for long periods or to slip quietly out of sight.[18]

The most troublesome political and moral dilemmas are associated with refugees. While precise data on migrants and refugees are difficult to obtain because of the ever-changing nature of population movements, the United Nations estimates that there are now about 23 million official refugees that have crossed national borders. There also are nearly 27 million internally displaced persons.[19] Thus, protracted conflicts, civil wars, ethnic cleansings, and a variety of similar human tragedies have created a large population of semi-permanent refugees, most of whom live dreary and hopeless lives under primitive conditions in refugee camps. Afghanistan tops the list of countries creating refugees with three million Afghans registered as refugees abroad. Rwanda follows closely behind with 2.1 million refugees.[20] The pieces of the former Yugoslavia have collectively created similar numbers of refugees.

Intense urbanization within less industrialized countries can also increase ecological insecurity. Worldwide in 1965, 36 percent of the world's population lived in cities. By 1990 the portion living in cities had increased to 50 percent. In the "low income" countries, however, the percentage living in cities more than doubled, growing from 18 to 38 percent. In China the percentage increased from 18 to 56 percent and in Tanzania it jumped from five to 33 percent.[21]

Rapid urbanization is creating a parallel problem of growing "megacities." Projecting urbanization trends forward to the year 2034, for example, Mexico City and Shanghai could have populations of 39 million, Beijing 35 million, Sao Paulo 32 million and Bombay 31 million.[22] Providing adequate housing, sanitation, transportation, jobs, security and other amenities for such rapidly growing numbers of urbanites will be a staggering undertaking. So will the task of maintaining order and preventing epidemics among the restless army of unemployed in these crowded and polluted megacities.

The number of people living in urban areas is expected to double to more than five billion people between 1990 and 2025. About ninety percent of this growth will take place in the less industrialized countries.[23] Many migrants to urban areas become squatters, having little chance to own land or a home of their own. More than two million people in Calcutta live in slums and squatter settlements, as do more than one million people in Rio de Janeiro, Jakarta, Manila, Bogota, Lima, Casablanca, and Istanbul.[24] It is estimated that by the year 2000, half of the developing world's poor will live in urban areas; 90 percent of the absolute poor in Latin America and the Caribbean, 40 percent of the poorest in Africa, and 45 percent of the poorest in Asia will live in cities.[25]

In many large and growing cities, urban crowding combined with the lack of economic opportunities is threatening the social order. Cities in the less industrialized countries are giant resource sinks, creating a large "ecological footprint" on the surrounding countryside.[26] Large quantities of food are imported to sustain ever-increasing numbers of urbanites. But growing cities also need tremendous amounts of water for drinking and sewage treatment; water which is often not available. In Dhaka, Bangladesh, for example, only one-fifth of the population is served by a sewage system. And in Bangkok, Thailand, demand is depleting the groundwater in much of the city and parts of it are sinking at a rate between five and ten centimeters per year. It is estimated that in Mexico City the center of the city has dropped about eight meters over the last fifty years due to groundwater extraction.[27] In addition, urban sprawl often destroys much of the fertile agricultural land surrounding cities. It is estimated that 476,000 hectares (1 hectare = 2.47 acres) of arable land is being transformed to urban uses annually in the less industrialized countries.[28]

These trends in population growth and population movements (in particular urbanization) combined with poverty carry dramatic implications for disease. The 20th century has been characterized by remarkable progress in the struggle against the many diseases that afflict human beings. But there are now indications that the rapid growth in human numbers, the increasing density of human populations, poverty, and ecological changes are making human populations much more vulnerable to disease-bearing microorganisms.[29] The World Health Organization estimates that one-quarter of the world's population is subject to chronic intestinal parasitic infections. Of the nearly twenty million annual deaths due to communicable diseases, tuberculosis now kills three million people, malaria two million and hepatitis one million. In addition, millions of others die prematurely from a myriad of other diseases.[30]

In the United States, a drug-resistant strain of tuberculosis, linked to HIV infections, seems to be spreading. And the AIDS virus, which is estimated to have infected more than 1.2 million people in North America, has infected approximately 17 million people worldwide. More than 9.7 million people are infected in sub-Saharan Africa and 3.5 million are stricken in Asia. By the year 2005, it is projected that 2.4 million people will

die from AIDS annually, which will represent nearly five percent of deaths from all causes.[31]

Many of the bacteria and viruses that pose future threats are not new. They have coexisted with Homo sapiens in various parts of the world for long periods of time. It is changes in human behavior, population growth, patterns of residence, poverty and rapidity of transport that have altered the people-microbe balance.[32] In the words of Nobel Laureate Joshua Lederberg, "Some people think that I am being hysterical, but there are catastrophes ahead. We live in evolutionary competition with microbes—bacteria and viruses. There is no guarantee that we will be the survivors."[33] Thus, the greatest future threat to ecological security may not come from thermonuclear explosions, but from disrupting the equilibrium with microorganisms too small to be seen by the human eye.

Graying and Social Insecurity

Most industrial countries are now well into the third stage of a demographic transition where the number of births and deaths are roughly equal and thus have reached or are approaching zero population growth (ZPG). The portion of the population under fifteen years of age is shrinking and that portion beyond retirement age—benefiting from longer life expectancy—continues to grow. In the industrial countries as a whole, fourteen percent of the population is now over 65 and only twenty percent is under fifteen. In Germany, Italy, Spain, Denmark and Sweden, the portion under fifteen and over sixty-five is nearly equal.[34]

The economic, political, social, and health implications of graying have not yet been adequately explored both because the greatest impact of this demographic shift still lies ahead and because of the politically explosive nature of the associated distributional issues. As Michael Boskin, the former Chairman of the U.S. Council of Economic Advisers, forewarned more than a decade ago, "A confrontation between workers and retirees will arise that will create the greatest polarization along economic lines in our society since the Civil War."[35] Aging in each of the graying countries will lead to various kinds of inter-generational skirmishes as unfunded liabilities growing out of entitlement programs created during a period of rapid population and economic growth must be paid for during a period of relative austerity. A growing elderly population expects to receive continued extensive pension and medical benefits, presently unfunded or underfunded, at a time when a shrinking working-age population will be hard pressed to pay the bills.

The Organization for Economic Co-operation and Development (OECD) has examined some of the long-term social policy implications of graying within its member countries. It estimates that by the year 2030, 27 percent of the population of Switzerland and 26 percent of the population of Germany will be over 65. In the United States and Japan, 20 percent will be over 65.[36]

This graying will alter dramatically future aged dependency ratios in the industrial countries. An aged dependency ratio refers to the ratio of those over 65 compared to those of working age (15-65). In the United States the ratio now stands at about .20 meaning that one elderly person is theoretically supported by about five people in the labor force. But not nearly all people age 15-65 are employed. By the year 2030 this ratio rapidly increases to .32, meaning that each person over 65 could theoretically be supported by only three active workers. In Switzerland the ratio rises from .21 to .47 and in Germany from .22 to .44.[37] In both of these countries in the year 2030, there will be only about two potentially active workers for each retiree. These figures conjure up visions of a new proletariat toiling long hours in order to pay taxes necessary to keep politically organized retirees in the style to which they have become accustomed. Since most of these future obligations are woefully underfunded, the two or three workers supporting each retiree will have to provide the bulk of entitlement funding, clearly a politically explosive situation.

The population of Japan is aging faster than that of the United States, and the Japanese Economic Planning Agency is concerned about the future impact of graying on the savings rate and related economic growth. The portion of Japan's gross domestic product devoted to social expenditures is projected to mushroom from 14 to 27 percent between 1983 and 2025.[38] This is a consequence of the extraordinary portion of the population that will be over 75 in 2025. In that year over half of Japan's elderly will be 75 or over, and among them there will be 100 women for every 75 men.[39] The Japanese are particularly concerned about the impact of these changes on the nature of the future labor force, particularly given the existing stringent regulations governing immigration. Thus, robots are being developed to supply a significant portion of future labor.[40]

The insecurities associated with aging are not limited to the industrially advanced nations. In China a vigorous family planning policy stressing one-child families has led to more rapid graying than is taking place in many other countries. Estimates indicate that by the year 2040, fully 35 percent of the population could be over the age of sixty. This is five times the present ratio.[41] The dilemma facing Chinese leaders is that the one child per family policy, made necessary in order to preserve some semblance of equilibrium with nature, has resulted in an aging population long before enough economic growth has taken place to support extensive social programs. Similar long-term problems likely will be faced by the former socialist coun-

tries of Central Europe where a demographic transition has been completed without an accompanying period of rapid economic growth.

Adding future retirement and medical burdens associated with graying together, it is very likely that the generous systems of social protection that evolved in an era of expansion and exuberance are going to increasingly be the cause of social insecurity and the subject of political controversy. Unfunded and underfunded pension systems and growing medical care costs will place heavy demands on smaller workforces in more slowly growing economies. Since future generations do not vote, one of the first casualties may well be education and other programs for the dwindling number of politically unprotected young people. It is somewhat ironic that on the southern side of the demographic divide it is the large and growing number of young people that poses a threat to stability while on the northern side it is the growing number of retired persons that presents a similar challenge.

To summarize, aging patterns are likely to affect future ecological security in a number of ways. Already, it could be argued, graying countries are less enthused about getting into military adventures requiring significant manpower. In the future there is the prospect of social conflict over generous entitlement programs. And graying countries are likely to be at a competitive disadvantage in international economic competition.

The Hazards of Differential Growth

While rapid population growth frequently contributes to ecological insecurity by disrupting the human equilibrium with nature, patterns of differential population growth among societies can be a precipitant of violent conflict. Population pressures often force people from high pressure areas of rapid growth to neighboring low pressure areas of lesser growth. Such differentials can precipitate conflict within states shared by two or more ethnic populations, or can create similar conflict pressures among states.

Leaders of states with low population growth rates often perceive themselves to be potential targets of rapidly growing neighbors. Israel, with an annual rate of natural population increase of 1.5 percent, is threatened by Arab neighbors with populations growing at between three and four percent. Israel has compensated for this perceived imbalance by encouraging large-scale immigration, particularly from the former Soviet Union. This, in turn, has increased insecurity among Palestinians in the West Bank and Gaza areas who fear that the migrant influx will continue to increase pressure on their lands. As former Israeli Prime Minister Shamir once put it succinctly, "A big immigration needs a big Israel."[42] Similar fear dynamics operate within countries. In countries as diverse as Rwanda, India, Somalia, and Canada, friction between differentially growing ethnic and religious groups can contribute to political instability, conflict, or even massacres.

The rapid growth of Islamic populations compared to their non-Islamic neighbors is a growing source of future instability. There are now 40 countries in which more than half of the population is Islamic, and another seven in which Moslems are a very significant minority (25-49 percent). In recent years these 47 countries had a population growth rate of 2.8 percent annually, while their non-Islamic neighbors in the less-industrialized world were growing at only 2.3 percent.[43] Given a seeming increase in Islamic fundamentalism in certain countries, neighbors of Islamic nations are somewhat insecure in the face of these burgeoning populations.

The unstable situation in the territory of the former Soviet Union offers a vivid example of the pressures of differential population growth. During the 1980s, the population of the Russian Republic was growing at only 0.7 percent annually while the populations of the Turkmen, Uzbek, Kyrghish, and Tajik Republics were growing at between two and three percent. Furthermore, 17 percent of the population of the former Soviet Union was Islamic and this portion was growing at four times the rate of the Russian population.[44] The sporadic violence that continues to occur in this part of the world is at least partially a reflection of the persisting differential growth rates among the ethnic populations of the region.

Even within the United States, although violent conflict based on differential population growth is unlikely, it will be an important force in re-shaping the political map over the next few decades. The white portion of the population, traditionally controlling the two major political parties, is nearing zero population growth while minority populations, reinforced by immigration, are growing much more rapidly. This demographic shift is of great interest to both major political parties as they reassess traditional bases of support.

Differential population growth will also be responsible for significant shifts on a global scale. By the year 2025, there will be six people living South of the demographic divide for every person in the industrialized North.[45] The less industrial countries will have young, growing, and potentially restive populations while industrial ones will be stable, older, and more likely to be conservative. Various new challenges to global stability are likely to come from growing populations, radical doctrines, and revolutionary movements arising within large poverty pockets in the South, and it will be increasingly difficult for politicians in the North to understand or respond to these needs and challenges.

Policies for Ecological Security

Building ecological security requires developing

and promoting global policies designed to restore equilibriums among human populations, between human populations, with nature, and with other organisms. It implies re-directing defense spending from treating the visible symptoms of ecological insecurity to attacking the causes, many of which are closely related to patterns of demographic change. It is much more cost-effective to spend a billion dollars promoting family planning or AIDS education in potentially unstable countries than it is to engage in expensive police actions to restore order later.

Promoting ecological security requires a "paradigm shift" in foreign and defense policies that can only be very briefly explored here. Dealing with rapid population growth is an obvious place to begin. But attempts to confront this issue are politically difficult because many politicians worldwide are unwilling to take on the pro-natalist values that were originally shaped during a period of human history when the future well-being of Homo sapiens was ensured through vigorous reproduction. As John Weeks has suggested, "It must be remembered that all nations that have survived to the present day did so by overcoming high levels of mortality."[46] Thus, U.S. population policy has vacillated from one administration to the next, as have those of many of the less industrialized countries.

One of the biggest barriers to dealing with population growth as a cause of ecological imbalances is an emphasis on rights at the expense of responsibilities. Instead of tackling tough responsibility issues of value and behavior change required to restore global population equilibrium, rights issues now dominate the agenda. Thus, at the 1994 U.N. International Conference on Population and Development, the program was dominated by interest groups pressing their causes at the expense of resolute action on family planning. As Lindsey Grant has put it, nowhere does the U.N. "Programme state that population growth should stop. Nowhere are growing countries urged to give high priority to stopping (or even slowing) population growth."[47]

One of the biggest barriers to dealing with population growth as a cause of ecological imbalances is an emphasis on rights at the expense of responsibilities

Another roadblock to resolute action is persistent quibbling among population scholars over the depth and causes of these problems. While there is a preponderance of scholarly opinion that the world's population is much too large, many academic hairs have been split over its optimum level.[48] Pro-natalists, such as economist Julian Simon, only muddy the waters when they declare that the human population is the ultimate resource and "that population growth, along with the lengthening of human life is a moral and material triumph."[49] These population "optimists", for the most part living in comfort in the industrial countries, can ignore the suffering of the growing numbers of starving and malnourished in the less affluent neighborhoods on the disadvantaged side of the demographic divide.

Finally, the timid and contentious domestic and international politics of family planning also hinder efforts to shape coherent policies to deal with population growth. A political split between North and South first became apparent in 1974 at the World Population Conference in Bucharest, Romania. The industrial countries, led by the United States, sought the adoption of a World Population Plan of Action which would have made family planning a central part of economic development efforts. But many leaders from less industrialized countries portrayed this as an intrusion into internal affairs and argued that economic development must take priority since it is the "best contraceptive." This split persisted over the next decade and surfaced again at the 1984 International Population Conference in Mexico City. And, at the Rio de Janeiro "Earth Summit" of 1992 and the 1994 Cairo conference, the core population issue was very much ignored because of pressure from religious institutions, various women's groups, and politicians from poor countries who blamed the bulk of the world's environmental ills on the industrial world.

Discontinuities in U.S. policy are also part of the problem. The United States has historically been at the forefront in global family planning activity. Throughout the 1940s, noted demographers such as Dudley Kirk, Frank Notestein and Kingsley Davis called attention to the impact of colonialism on population growth. These insights influenced U.S. policy and every Secretary of State from Dean Rusk to George Schultz. The United States began to encourage population limitation as part of development policy during the Kennedy Administration and this emphasis persisted through the Carter Administration.[50] Since the mid-1980s, however, this support has been wavering, held hostage to increasingly bizarre domestic politics. In 1984, the United States astonished family planning advocates when former Secretary of State James Baker, addressing the International Population Conference in Mexico City, declared population growth to be a natural phenomenon that neither advanced nor hindered economic growth.[51]

The United Nations Population Fund is the largest multilateral agency providing family planning services, with programs in 130 countries. The United States used to fund about 20 percent of the UNFPA budget. Although the UNFPA has policies that preclude the funding of programs associated with abortion, in 1985 the agency gave a $10 million grant to China—a country

that includes abortion as a method of family planning—to support maternal and health care as well as contraceptive research. The Reagan Administration, seeking to placate domestic anti-abortion forces, seized upon this as an issue and began withholding the U.S. contribution to UNFPA.

When George Bush came into office in 1989, there was hope that the U.S. contribution to UNFPA would be restored. Bush had been an outspoken advocate of family planning in the 1960s and 1970s, and even advocated making contraceptives available worldwide on a "massive scale."[52] When he was appointed Ambassador to the United Nations in 1971, Bush called existing population trends a prescription for tragedy and chaos, and expressed the hope that greater U.N. efforts would have a major impact.[53] But family planning assistance under Bush continued to be hostage to political infighting, and the cuts were not restored. The Clinton Administration has taken a more vigorous position on population growth issues, but a Republican Congress has continued to limit administration flexibility.

In 1989, 79 countries, including the United States, met in Amsterdam and drew up a plan to stabilize population growth and to extend the availability of contraceptives to 75 percent of the world's women. The Amsterdam Declaration called for worldwide family planning assistance to increase to $10.5 billion by 1991, a target that was never reached. This amounted to four percent of the total foreign assistance given by industrial countries. Moving rapidly to reach the goals set forth in the Amsterdam Declaration would certainly be a major step forward in slowing global population growth. The United States could carry most of the financial burden of such a program by shifting funds from exotic weaponry to foreign assistance.

The Clinton Administration has made U.S. population policy more proactive and given it a higher profile. Clinton restored the U.S. contribution to UNFPA funding early in his first administration. Responsibility for population policy has been centralized in the newly created position of Under Secretary of State for Global Affairs.[54] Yet, as part of the 25 percent cut Congress made to the foreign assistance budget in 1996, the resources for international population assistance were cut by 35 percent. Further disbursement policies restricted new 1996 funding resources to 13 percent of 1995 levels.[55] Hence, despite executive branch willingness to pursue international efforts at slowing population growth, the impact of U.S. leadership is limited by diminishing resources.

Slowing down the global movement of people is also difficult, but stemming population growth could prevent many of the "low-intensity" conflicts that produce bumper crops of migrants and refugees. Stemming the influx of people into the cities of less industrialized countries requires local action and, for the most part, has not been a high priority for international donors. The situation could also be ameliorated to some degree by successful family planning efforts. Future sustainable development requires creative alternatives and educational efforts to keep people from migrating to already dangerous, overcrowded, and polluted cities. Such alternatives might include redirecting economic growth to smaller cities, as well as increasing economic incentives to farmers in order to keep more people in agricultural occupations.

The impact of graying in the United States is just now surfacing, and resolute action will be required to deal with it. Notions that more incentives should be made available for having children or alternatively that the immigration floodgates should be opened, can be quickly dismissed as ecologically counterproductive. New definitions of and requirements for retirement are needed as well as greater understanding of the burdens to be shouldered by coming generations. But at present, even small changes in the construction of the consumer price index are contentious because of their social security implications.

Unfortunately, as the countries on the northern side of the demographic divide grapple with significant budget deficits, they are also much less likely to provide the types of family planning and economic assistance necessary to help the less industrial countries spring out of their demographic traps. Coping with these emerging and linked demographic uncertainties will require anticipatory thinking on an unprecedented scale. These challenges call for a new approach to future policy-making stressing ecological security, the human interest, and the welfare of future generations.

Endnotes

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Human Population Prospects: Implications for Environmental Security

by Robert Engelman

The emergence since World War II of authoritative demographic projections has brought to discussions of human population prospects an unwarranted sense of complacency. Because the projections are generally accepted as expert and reliable, non-demographic analysts tend to see projected population growth as an inevitable and unstoppable force in human affairs. A common but erroneous statement is that population is expected to double or even will double in size in the next century or so.

It is my intention to discuss population prospects while challenging public perceptions of population projections. These projections are valuable tools for considering the human prospect. They are, however, misunderstood as reliable guides to the future of human numbers, and this misunderstanding has potentially hazardous consequences. In particular, the apparent mathematical precision of projections encourages the misconception that there is nothing anyone can *do* about population growth, when there is very much we can and should do. The usefulness of projections could be enhanced by much more open discussion of the assumptions that underlie them, and an occasional challenge of some of those assumptions.

The challenge presented here is based on several principles. One, prediction of human behavior is necessarily subjective. The projection process is only objective insofar as it is made manageable by a handful of consistent assumptions, all of which depend on subjective judgment about future trends in fertility, mortality and migration, the three key variables of demographic analysis.

Two, consideration of population prospects ideally should be an interdisciplinary endeavor that takes into account the many factors—economic, social and environmental—that influence demographic variables. Debate on the earth's human carrying capacity has a history going back to the time of Thomas Malthus (Malthus 1798), and the exercise continues to this day (Food and Agriculture Organization 1984; Heilig 1993; Smil 1994). There have been few efforts, however, to make assumptions about demographic feedback loops, through which population growth itself could contribute to declines in fertility or increases in mortality (Lutz 1993).

Finally, in dealing with the future it is more useful to consider that which *could* be, rather than that which *will* be. The first category is so much larger in scope, so much closer to the grasp of current insight, and instills so much more hope for the future our children will inherit that it is puzzling why the second category occupies the stature it does. We have it in our power to significantly influence our demographic future. What follows will concern above all the population prospects we could claim for our species if we chose to do so.

Past and Present Realities

We know with reasonable certainty that the human species has expanded in numbers from at most a few tens of millions of individuals in prehistory to more than 5.8 billion at the close of the 20th century (for this and the following demographic data, see United Nations Population Division, forthcoming in 1997). Most of this growth has occurred since World War II, in large part because of global triumphs over infant and child mortality. Today, three out of every five people live in Asia, and more than one in three of these is Chinese. Each of the other major world regions is home to several hundred million people, but the populations of each continent are growing at different paces: Europe, with 729 million people, is growing very slowly at just under one-tenth of 1 percent annually; North America (mostly the United States and Canada), with 300 million people, is growing

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more rapidly at just under 1.1 percent annually; Asia, with 3.5 billion people, is growing at an annual rate of just under 1.5 percent; and the Latin American and Caribbean region, with about 485 million, is growing more rapidly still, at about 1.6 percent annually. Standing apart from the rest of the world demographically is Africa, with 738 million, where population growth has continued for decades at more than 2.7 percent a year, with only recent signs of falling. The average of all these uneven rates of growth worldwide is equivalent to that of Asia, or under 1.5 percent.

The apparent mathematical precision of projections encourages the misconception that there is nothing anyone can do *about population growth, when there is very much we can and should do*

Despite the ever higher population numbers, demographic growth is slowing. The annual growth rate peaked at 2.1 percent in the late 1960s and has drifted down since. When a growth *rate* slows, however, *growth* itself continues until the rate reaches zero. As the size of world population increases, more modest rates of growth can add larger annual increments to the population base. While the highest rates of population growth saw only about 72 million people added to world population each year, the current lower rates of growth are adding about 80 million people. This increment appears now to be declining. In a world without surprises, the projections inform us, the added numbers will gradually become smaller each year, until eventually (around 2200 by the UN's most recent medium variant) global births will equal deaths and world population will stop growing.

Most of the easing of world population growth rates occurred in the 1970s, a response in part to the spread of organized family planning efforts in developing countries during that time period. Fertility was also declining rapidly in industrialized countries. Often it fell for the first time in human history below the approximately two-child-per-couple average that is necessary (absent immigration) to replace each generation with the one that follows. The significance of this for the future of population is potentially enormous. Currently, throughout the developing world, women are seeking to have smaller families than their mothers and even their older sisters had, and they increasingly have the means to achieve the family size they seek. In industrialized countries, where effective contraception and safe abortion are generally accessible, women can have the childbirths they want, and total fertility remains below replacement level of slightly more than two children per women.

The other variable that shapes world population is mortality. (International migration affects the growth rates and size of national populations, but it has only an indirect and dimly understood impact on world population. Within nations, the dominant migration trend is urbanization, which for a number of reasons tends to reduce fertility rates.) Death rates, expressed as the number of deaths per thousand people in any given year, continue to fall in most places around the world. The dominant influences here are at both ends of the age spectrum: relatively fewer children are dying in the first few years of life, and higher proportions of adults are surviving to old age. Demographers assume that mortality decline will continue, placing some further upward pressure on the pace of population growth. The pace of mortality decrease, however, could moderate worldwide as further improvements in health care and nutrition become more difficult to achieve. In eastern Europe mortality rates have actually risen in recent years, and in sub-Saharan Africa, the AIDS pandemic is reversing past progress on mortality rates. Both trends, along with the growing specter of emerging infectious diseases, raise questions about the inevitability of mortality decline. A serious weakness of population projections is the assumption of continued mortality decline well into the 21st century despite this uncertainty.

Projections and Their Perils

The challenge for demographers is to understand the complex and uneven trends in fertility and mortality (and, to a lesser degree, migration) and to consider to what extent they are likely to continue into the near future. The major population projections are published by the United Nations Population Division and, until recently, by the World Bank. (The U.S. Census Bureau, the International Institute of Applied Systems Analysis and the Population Reference Bureau also offer world population projections, but these have less currency internationally.) The United Nations offers a medium population trajectory that, according to just-released 1996 numbers, would produce a global population of about 9.4 billion people around the middle of the 21st century, compared to 2.5 billion in 1950 and 5.7 billion in 1995. World population would then grow fairly slowly, leveling off at around 10.7 billion just after the 22nd century. The single projection offered by the World Bank resembled the UN's medium projection (United Nations Population Division 1992; World Bank 1993). The UN demographers, though not those at the World Bank, issue two alternative projections, low and high, at least suggesting that different population trajectories are possible. Long-range global projections released in 1992 and extending to 2150 included a total of seven projections. These projections suggest a world population reaching anywhere from 4.5 billion to 28 billion in 2150 (UN 1992). The newly-released

country-by-country projections suggest a 2050 world population between 7.7 billion and 11.2 billion.

In practice, however, most journalists and analysts take the UN's medium variant, or middle trajectory to be the most probable one, and it is often expressed as the expected or most likely population future. These terms are inaccurate, as projections are at best highly conditional predictions. The assumptions that prop up the medium projection in reality simply split the difference between more extreme assumptions. These assumptions themselves are at best educated guesses about how demographic determinants will play out, especially when looking beyond the immediate future. True, recent demographic history has unfolded as predicted by the UN and World Bank's medium projections. Nonetheless, there have been surprises. Prior to the 1950s, demographers missed the acceleration of rising life expectancy and falling death rates, so they underestimated population growth. Recently, demographers underestimated the acceleration of falling fertility, and the newest UN estimates and projections reveal a world population that is growing more slowly than they had thought.

Strictly speaking, no population growth, not even tomorrow's, is really *certain.* Until very recently, nuclear holocaust lurked as an ominous possibility. Today, astronomers blithely inform us that comets and asteroids could collide with Earth in our lifetimes. Obviously, in such catastrophic events, all demographic bets are off. In a world where not only comet collisions but emerging microbial epidemics—not to mention revolutions in childbearing practices—cannot be ruled out, words like *inevitable* and *certain* overstate the case. More importantly, such language lends itself to the false impression that no actions in the present can influence the near demographic future.

Dubious Assumptions

The debate on environmental constraints to population growth has been long, prolific and occasionally even bitter and *ad hominem.* Only a few points merit mention here.

When potential or supposed environmental threats are disaggregated and examined in isolation they can often be made to appear individually manageable. This is especially the case when humanity's historic capacity to innovate and adapt is taken into account. This approach is often taken by economists skeptical about the hazards of global environmental change, such as William D. Nordhaus of Yale University and Julian Simon of the University of Maryland.

Each assumption about a specific adaptation, however, presupposes that a specific environmental development occurs in isolation. Environmental trends, however, tend to occur simultaneously and synergistically. They may reinforce each other all the more if critical natural thresholds of sustainability are crossed. If, as ecological economists such as Herman Daly argue, economies are subsets of and dependent on ecosystems (Daly & Cobb 1994), and if individual happiness and morale are influenced by the conditions of daily life (the weather, access to clean water and sanitation, the price and quality of food, for example), then the state of the environment can affect social and political stability as well. And the impact of the whole of environmental trends on human life and death can be far greater than the sum of individual parts.

Environmental trends could influence birth rates as well as death rates, through increases in involuntary infertility and intentional decreases in childbearing. Logic and anecdotal evidence suggest that such fertility feedbacks could reduce birthrates. Infertility appears to be a rising problem from sub-Saharan Africa to the United States, although its epidemiology remains uncertain. Male animals exposed to certain chemicals resembling the hormone estrogen appear to develop female attributes. Rising exposure of women farmers to agricultural chemicals could be influencing reproduction, lactation and maternal and child health.

Equally plausible, declining environmental quality and rising scarcity of critical natural resources could be influencing the childbearing decisions of couples and women. The apparent positive correlation between economic development and declining fertility may be more complex and varied than once thought. Recent evidence indicates that increases in the status of women and wider access to family planning services are far more important to fertility decline than national economic growth (Robey, Rutstein & Morris 1993). Indeed, scarce housing and stagnant incomes may contribute to recent fertility declines in countries as varied as those of Italy and Kenya. Environmental factors could play a similar role in the fertility calculus. Carl Haub, a demographer for the Population Reference Bureau in the United States, recently found in a survey of women in Belarus that lingering effects of the nearby 1986 nuclear accident at Chernobyl were discouraging many women from having additional children. And a recent World Bank study of the population-environment nexus in sub-Saharan Africa found that desired family size in the region tended to fall as arable land became less available (Cleaver & Schreiber 1994.). In a world of resource scarcity, declines or stagnation in economic well-being may actually encourage declines in fertility where couples and women have some control over childbearing.

More positively, it is the combination of access to quality family planning services, a chance to complete at least most of secondary school, and enhanced opportunities for women in the formal economic sector, to own farms or launch businesses for example, that powerfully delays childbearing and reduces fertility among women in developing countries. Add the steady

march of urbanization, and fertility decline could occur more rapidly than demographers have assumed. Lacking any way to assess the probability of such synergistic impacts on fertility trends, demographers tend not to factor them into projections—a fact that can be misread as a prediction that such changes will not occur.

One mathematical quirk about projected fertility decline further weakens projections but receives little attention. This involves total fertility rate, or TFR, the number of lifetime childbirths a woman would have if she experienced rates typical of each age group in her country at that time. World population projections assume that each country will eventually reach a TFR slightly above, slightly below or precisely at two children per woman and will then settle precisely at the selected figure indefinitely.

This assumption has its roots in history and mathematical logic. For most of human history, the effective number of children who survive to become parents themselves cannot have been many more than two per women, or else population would not have grown so slowly for most of human history. Incredible as it seems today, families in which only two children survived to maturity must have been the average even in Africa and India, which had relatively stable populations for hundreds of generations before colonization by Europeans.

It is possible that traditional modes of contraception, especially prolonged breastfeeding and postpartum abstinence, resulted in significantly lower birthrates. The dominant influence on what is called the net reproduction rate, however, was the much higher death rates of the past. An African woman of the eighth century, for example, may on average have given birth to six live babies. But the chances of any one of them surviving to become a parent were only about one in three, and life expectancy probably hovered in the late teens and early twenties. Seen this way, population programs in developing countries do not so much impose upon their citizens the alien modern influence of artificial contraception; rather, they weaken the alien modern influence of persistent above-replacement fertility, brought about as an unintended byproduct of lower death rates (Cleland 1993).

Even more important for demographic projection is the mathematical logic that dictates that something very close to replacement fertility must be achieved again in the near future. Exponential growth cannot continue indefinitely on a finite planet. In 1974 Ansley Coale calculated that at then-current rates of growth human population would occupy every square foot of land on earth within seven centuries, and within 6,000 years the mass of humanity would form a sphere expanding at the speed of light (Coale 1974). Faced with the impossibility of extended exponential growth, demographers assume that current population growth levels are a historical aberration, and that humanity will return to historical near-replacement fertility levels within a few generations. The dramatic fertility declines of recent decades further justify this assumption.

There is no guarantee, however, that replacement fertility itself will always be two children per couple. If infant and child mortality rates began to rise from their current historic lows, replacement fertility itself would rise. Already today, the replacement fertility rate in high-mortality countries such as Ethiopia is as high as three children per couple. In the deep past, when the life expectancy of women was as low as 20 years, replacement fertility could have been as high as 6.5 children per woman. Obviously, no one would want to envision a future as grimly fatal as this past, however, so the conventional assumption is that replacement TFR is always just a bit higher than two children per woman.

Practically speaking, the developers of projections make their best guess as to when total fertility rates will reach something close to the replacement level of just over two and then, lacking any more probable scenario, the demographers assume fertility will lock in at this level. The United Nations most recent long-range low, medium and high variant projections are based on the assumption that total fertility rates stabilize, sometime before 2100, at about 2.05 (medium projection), 2.5 (high projection) or 1.7 (low projection).

Intriguingly, the oft-cited medium projection assumes that couples and women in industrialized countries will also settle at a TFR of slightly more than two children each, even if women in these countries today have *fewer* than two children each on average. In many European countries and even such developing states as Hong Kong, Singapore and South Korea, fertility rates sit at levels that will lead (or have already led) to population decline. The medium projection assumes that women in these countries will eventually, in effect, come to their senses and begin having the number of children needed to prevent depopulation of their national territories.

How realistic, however, is the assumption that any society will reach replacement fertility, either from above it or below it, and then remain there? Is there something magical about this figure of 2.05 children per woman? The reality is that replacement fertility is more a demographic concept than a force of reproductive gravity for women and men. Many industrialized countries that have experienced replacement fertility have then moved on, without noticeable disruption, to reduce their fertility even further or to return to higher levels of fertility. In Argentina and Costa Rica, to pick two examples, overall access to family planning services and schooling for girls have improved greatly, yet fertility has remained above replacement levels. In few if any countries has the total fertility rate stabilized at any low level, let alone two children per woman, for

a long period. Yet this is what the projections assume fertility will do.

The demographic experience of the world to date suggests that total fertility rates are dynamic and highly responsive to the circumstances of women and couples. Although there are good reasons to expect fertility decline to continue where families are typically large, there is no particular reason to assume fertility rates will settle at 2.05 or 2.5 or 1.7 children per woman. Nor does it make sense to assume that below-replacement fertility will inevitably lead to population decline (since the rates may well rise if housing or other economic conditions improve), or that below-replacement fertility return to and stabilize at replacement fertility. The implications of dynamic and condition-specific fertility rates for the future of population growth could be substantial.

What other factors might cast doubt on the population projections? One of the most important is the timing of childbirth. The projections assume no changes in the ages at which women and girls first give birth to a child. Nor do the projections assume that mothers will wait longer between pregnancies before giving birth to subsequent children. It is the nature of calculating TFR, which is based on the number of children born to each five-year cohort of women of similar ages, that age at first childbirth and birth spacing are only indirect issues. (The approach section of the United Nations Population Division's 1992 long-term projections, for example, states that the only difference among the various projections in fertility is the average lifetime births per woman, with no consideration of the timing of those births [UN 1992].)

Yet the timing of childbirths influences birth and population growth rates with impressive force. If women wait longer before their first childbirth, and longer between each subsequent one, they contribute to an attenuation of generations that reduces birthrates and slows population growth. They do this even if they have just as many children as they would have had with no birth delay or spacing. (In practice, women who begin childbearing late and practice child spacing tend to have fewer children.) Moreover, the demographic impact of these practices is immediate. Delayed births weaken population momentum, the force that propels near-term population growth even in the face of replacement fertility because tomorrow's parents are already here today.

Yes, tomorrow's parents are here today. But if they not only have few children but have them late and through widely spaced births, the effects on near-term population growth are surprisingly large. John Bongaarts, a demographer with the Population Council, has calculated that if the mean age of childbearing in developing countries were to rise gradually by five years between today and 2020, and if global fertility rates immediately reached replacement, the population of these countries would stabilize by 2100 at a level 1.2 billion people fewer than would be the case if replacement fertility began immediately in the absence of any change in childbearing age (Bongaarts 1994). Such numerical differences could make a major difference in population projections if low and high assumptions about the average age of childbearing were taken into account.

Effecting delays in childbirths and longer intervals between pregnancies would be most likely to result not from intrusive population-control measures but from better educational opportunities and more access to paid employment. Also important would be help in improving sexual negotiating skills among adolescent girls and crucial access to a wide range of birth-spacing contraceptives. Perhaps most important of all, the evidence is overwhelming that more women and children survive pregnancy and the first few years of life when the mother is no longer a teenager and when births are spaced at least two years apart. Policymakers could actually slow population growth by focusing their attention on maternal and child survival simply because the level of contraceptive prevalence needed to assure high survival rates would lead, as a side benefit, to substantial declines in births.

Prospects and Possibilities

Demographers point to three near-certainties in the future of human population growth: Considerable growth will occur before population stabilizes or reaches a peak; the vast majority of this growth will continue to occur in developing countries; and as population growth continues to slow down, national populations even in developing countries will age dramatically.

Beyond this, we are left with the precisely quantified projections of the United Nations and a few organizations. It is much less clear that these are reliable guides to the prospects for world population. The projections point out where human population is *headed*, but not necessarily where it will *go*. If current trends continue, and fertility falls toward replacement levels while life expectancy rises to the optimum, then the range of expectations for the future of human population is probably about what the projections describe. Certainly it will be very difficult to stabilize population at a level below 7.7 billion people without either rising mortality rates, which no moral society could willingly accept, or delays and reductions in childbearing beyond what seems likely today.

In peering into the future, it is useful to consider population projections—all the variants and scenarios, not just the medium ones—as a statistically sound basis for what would be most likely to happen in a future without significant surprises. Then we should constantly remind ourselves that demographers have con-

structed a series of artificial alternatives in which all change is gradual and limited. These alternatives can teach us about our options in the present, but the future is unlikely to unfold exactly as they describe. It is difficult to keep in equipoise this seeming contradiction exploiting plausible scenarios for research and education purposes while reminding ourselves and the public that no single scenario can be considered likely in all its details. This, however, is precisely what is needed.

What, then, are the prospects for world population? It is here that experience, values and subjective judgment combine for what must be a personal and individual view. Clearly, we must loosen the grip the medium projections have on the limited attention of policymakers and the public. We need at least to bring to greater attention the range of growth suggested by the low and high projections for the next century and beyond. And, despite its necessarily artificial quality, we should hold forward the low projection as a vision worth working toward. It is not a target but a hoped-for byproduct of aggressively pursued development initiatives that slow population growth while serving more immediate human needs.

In peering into the future, it is useful to consider population projections—all the variants and scenarios, not just the medium ones—as a statistically sound basis for what would be most likely to happen in a future without significant surprises

Demographers are not convincing in arguing that the low projection lies on the very borders of the impossible. In most instances in which the projections rest on unrealistic assumptions—especially optimal life expectancy for all, and continued young average ages of childbearing—logic and some evidence argue for adjustments that would result in lower rather than higher population growth. Birth rates could fall more quickly than the projections suggest. As we have seen, unexpected declines are emerging in sub-Saharan Africa and other regions. Death rates, unfortunately, may end up being higher than the projections suggest. Both of these factors could combine to produce an earlier-than-expected peak in population size.

It is possible, in fact, that population growth could decelerate for both commendable and deplorable reasons: a simultaneous mix of improved access to family planning and more decisionmaking power in the hands of women, combined with some increases in infertility and in death rates that no one could applaud. Indeed, approximately such a mix (with access to abortion substituting for the availability of good contraception) appears to be responsible for a reversal of population growth in the former Soviet states. The responsible position for advocates of population stabilization is to work to bring down child and maternal mortality while continuing to support universal availability of reproductive health and family planning services and the greater capacity of women to use them effectively.

Humanity today is now crossing a series of significant environmental thresholds at a time when even democratic societies seem disinclined to take such threats seriously and to help those whose well-being is most threatened. These threats include: early signs of human-induced climate change, a peaking of the global fish catch, the growing scarcity of renewable fresh water, massive degradation of agricultural soils, the global reemergence of infectious disease, and increasing resistance among microbes and pests of all kinds to drug and chemical attack. Human beings are an innovative species. But in today's free-market economies, innovation follows not so much human need as profitable opportunities. Will it be profitable to extend and improve the lives of the poor? And, if not, will governments or other benefactors pay for the innovations that will be needed to accomplish that goal?

Because the planet and its resources are finite, world population must eventually reach a peak. Therefore global total fertility rates must eventually reach replacement levels. These logical statements do not make it certain that women on average will have just two children at any particular point in the future. Falling life expectancy could perversely raise replacement levels above two children per woman. Even on the optimistic assumption that replacement fertility levels will not increase, however, a two-child average family hardly seems implausible. This is especially the case when one recalls that a total fertility rate of two is compatible with the presence of three, four or more children in many families. Adoption, of course, is an obvious but under-emphasized option for those wanting large families. But all that is required demographically is that a significant proportion of people of reproductive age choose to have only one child or to remain childless. A replacement-fertility society would not have to impose a two-child norm.

Already more than two out of every five human beings lives in a country in which total fertility rates are at or below replacement levels. In rural areas, land, fresh water and fuelwood are increasingly scarce, encouraging new thinking about the benefits of small families. The rising necessity and growing costs to parents of education and the onward march of urbanization contribute to the same reexamination of the costs and benefits of large and unplanned families. This is

especially the case as more people are exposed to the global information network with its enticing visions of options and possibilities beyond raising a large family. Added to these social factors is the growing commitment of countries, with some notable exceptions, to develop and implement population policies and to base them on improved access to voluntary family planning and reproductive health services and better overall opportunities for women. The consensus reached at the 1994 International Conference on Population and Development (ICPD) in Cairo has not yet produced the needed shift of financial resources to population and human development efforts. But the conference succeeded in establishing an international standard for the work ahead. As governments search for guidance in dealing with demographic pressures, the ICPD's Programme of Action offers a set of strategies that could dramatically slow population growth while producing immediate improvements in the lives of women and men.

While the number of women of reproductive age grows by about 24 million each year (Population Action International 1996), an estimated 228 million women, one out of every six of reproductive age in the world, lack effective contraceptive protection (Alan Guttmacher Institute 1995). Nonetheless, there is reason for optimism. Historical experience suggests that, once launched, major movements for human rights rarely retreat. It seems likely that women will expand their influence in economic, political and social spheres. Their rights will be more widely respected in the next century than in this one.

The idea of planned pregnancy, too, moves inexorably forward. The past three decades have seen contraceptive prevalence grow from 10 percent to 55 percent of developing world couples. This suggests a world of satisfied clients, and a powerful and pervasive force that is likely to become more so in the complex and hazardous times that lie ahead.

The future of world population depends in large part on the willingness of nations to invest the financial resources needed—about $17 billion a year by the end of this decade, a relative pittance compared to military spending—to insure universally available reproductive health care. This would include access to family planning for those who seek it, combined with maternal and child health care and the preventive services aimed at sexually transmitted disease. If the resources were invested wisely, something roughly resembling the low projection of population growth could be achieved even with continuing declines in death rates. Two complicating factors deserve brief mention here: abortion, and China's population program. Changes in either could significantly effect world population growth. Although the demographic implications of abortion are rarely discussed, they are significant. While 190 million pregnancies occur each year, 51 million of these end in abortion—21 million in countries where the procedure is illegal. Since the world's population is growing by 80 million people each year, elimination of abortion without decline in unintended pregnancy would spur population growth by dramatically raising birth rates. On the other side, the proportion of births desired at the time they occur varies from an estimated 76 percent in sub-Saharan Africa to a mere 38 percent in Latin America (Alan Guttmacher Institute 1995). Wider access to safe and legal abortion around the world would undoubtedly reduce the many births that result from unintended pregnancy. Overshadowing the demographic implications, however, is the fact that access to safe abortion is critical to the health and survival of women, especially poor women. An estimated 500,000 women die each year from causes related to pregnancy and childbirth, and more than 100,000 of these deaths are the result of unsafe abortions. The safest bet is that the status of abortion will continue as today, with varied legality and accessibility, and thus will not trigger any demographic surprises.

The high visibility of China's population policy excesses raises difficult questions in the population field. Ultimately, population stabilization is more likely to occur—and endure—on the basis of voluntary childbearing decisions rather than from the kind of government mandates and pressures that characterize China's policies and programs. Population stabilization cannot be built upon the kind of short-term changes in fertility that coercive population-control programs may produce temporarily but cannot sustain. To help rapidly growing countries stabilize their populations, programs and policies will have to succeed not on time scales of political terms of office, but over generations. And to succeed at this they will have to be based upon popular consent and participation.

Population policies and programs can help serve the demographic goals of a society, but only by serving primarily the private and felt needs of couples and individuals. Realistically, the future is likely to see less rather than more population control—meaning direct government attempts to bring population size to a target range—just as it is seeing less rather than more economic and political control.

Should governments nonetheless aim for an optimum world or national population size? Some analysts have suggested that such a number could be identified and perhaps even arrived at, but there is good reason for skepticism. The world is too complex. The figure would vary substantially—even if we had the needed data and understanding, which we do not—depending on the environmental issue or natural resource chosen for examination. More importantly, there is no population policy imaginable that would respect human rights, and thus be worth supporting, and that would also take us precisely to this hypothetical demographic state of heavenly stasis. While popu-

lation dynamics do respond powerfully to governmental and private initiatives, the very idea of population *control* is fundamentally unworkable. As long as human freedom is paramount among our values, reproductive freedom should and will be highly valued. We can no more control population than we can control people themselves.

It makes more sense to work for better understanding among all people of the linkages between population and environmentally sustainable development. Policies can then tolerate and even encourage the lowest fertility levels consistent with the free and responsible decisions of women and men to have the number of children they desire. If such a goal is ever achieved, solutions to still-threatening environmental and other social problems will need to be sought exclusively among non-demographic contributing factors. We are, however, a long way from this point. For the foreseeable future, policies that improve the lives of women, especially those that allow them to make their own decisions about the timing of pregnancy, will contribute powerfully to a better world for all human beings.

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Special Reports

This section highlights the work of various organizations on issues of environmental change and security. This issue includes reports from Ecologic - Centre for International and European Environmental Research, the Master of Science in Foreign Service Program at Georgetown University, and the Natural Heritage Institute.

NATO/CCMS[1] Pilot Study:

Environment and Security in an International Context

State of the Art and Perspectives
Interim Report
October 1996

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1. Introduction and Overview

. . .The Round Table on Environmental Security, which took place during the NATO/CCMS Plenary Meeting in Washington D.C. on November 14, 1995, highlighted the importance of the relationship between environment and security and marked the start of the Pilot Study on "Environment and Security in an International Context." The establishment of the Pilot Study pays tribute to the fact that, while research has advanced steadily during the last ten years, large gaps still exist in the knowledge about the correlation and interaction of environment and security issues. Much remains to be done to raise public awareness and to inform policymakers. The Pilot Study group met for the first time from April 17 to 18, 1996 in Waldbröl, Germany and adopted the Methodology and Structure for the Pilot Study. All documents are available on the NATO CCMS Environmental Clearinghouse System (ECHS) World Wide Web site.[2]

. . .The present report first takes stock of the current state of knowledge about the relationship between the environment and security. Section 2 of the report briefly reviews the conceptual issues surrounding the discussion on the environment and security. Section 3 deals with the development of data collection and indicators that are needed for threat assessment and priority-setting. Section 4 summarizes existing knowledge about the major problems and problem regions with regard to environmental risks to security. Section 5 describes the political and institutional options at the international level that are currently pursued or under discussion and might deserve further investigation. Finally, in section 6, some recommendations regarding the substance and structure of the future activities of the Pilot Study are outlined.

2. Environment and Security: Conceptual Issues

. . .There are many meanings of security in everyday language, but in international politics and in security policy in particular, the term "security" generally refers to the absence of violent conflict, the continued exist-

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ence, integrity and sovereignty of states ("national security") and the peaceful coexistence of states in the international system ("international" or "global security"). The perception of what are the causes of threats to security and what are thus security issues has broadened over the years. In the wake of the oil price shocks in the 1970s and the heightened awareness for growing international economic interdependence, economic considerations were taken into account in defining security. Likewise, after the rise of global environmental issues onto the agenda of international politics, the relationship between environment and security has become a major subject of scientific as well as political discussion. In this context, the term "environment" is related to environmental problems like air or water pollution, natural disasters such as major storms, as well as to natural resources.[3] The next section discusses the role of environmental degradation and resource scarcities as causes of violent conflict.[4]

2.1 Relationship between Environment and Security

The relationship between environment and security can be subsumed under two fundamental environment-security linkages. These refer to problems of environmental degradation (including natural catastrophes) and resource depletion or scarcity as a consequence of military activity in times of peace and war[5] on the one hand and a direct or indirect source of conflict on the other.

It is the role of environmental degradation and resource scarcities as causes of violent conflicts that needs further study and that is of special concern to NATO.

2.2 The Environment as a Cause of Violent Conflict

. . .The potential causal pathways leading from environmental degradation and scarcities of natural resources to violent conflict are presented and systematized in Figure 1**.**

Figure 1 shows three levels to be distinguished regarding the relationship between environment and security. At the most basic level, there are certain framework conditions or societal capacities, most importantly: (1) the characteristics of the political system; (2) the existing knowledge about an issue; (3) the economic and technological options available; and, (4) the cultural and ethnic characteristics of the society or societies involved. Under the heading of framework conditions situational factors (e.g. a change of government, current diplomatic tensions, sudden increases/decreases of commodity prices, etc.) should also be considered. These framework conditions influence all other elements and relationships depicted in Figure 1. They build the foundation on which environmental degradation and resource scarcities are generated and perceived. Resource scarcities might lead either directly to potentially violent conflict or to secondary social problems with the potential for causing violent conflict. Environmental degradation, including natural disasters, might result in secondary problems by means of which they become indirect causal factors of violent conflicts. Whether or not resource scarcities and/or environmental degradation will lead to the outbreak of violent conflict in a particular instance, however, is dependent on the framework conditions.

The influence pathways shown in Figure 1 are not always one-way relationships. At the most basic level, the underlying framework conditions might themselves be influenced by environmental problems, secondary social problems, or any resulting violent conflict. Furthermore, secondary social problems might feed back to the environmental problems that caused or contributed to them in the first place. For example, a country experiencing food scarcities as a result of soil erosion caused by overly intensive use of agricultural land may increase the intensity of agricultural land use even further. This results in further soil erosion, exacerbating the pre-existing food problems. This is also true with regard to the relationship between environmental degradation and the scarcity of natural resources. For example, global climate change might lead to reduced water availability in certain regions. Finally, violent conflict can also result in reinforcing social problems as well as environmental problems and resource scarcities by the destruction of societal structures and the environment.

These feedback relationships are not included in Figure 1 because its purpose is to depict possible pathways of environmental problems leading to violent conflict. Whether environmental change actually leads to social problems and, consequently, contributes to the emergence of violent conflict in a particular instance depends on the underlying framework conditions and on the political strategies and measures chosen to deal with the different issues. If preventive measures are taken and prudent policies are employed in time, the conflict potential emanating from environmental stress can be minimized.

At the same time, in cases where environmental problems are a major cause of the outbreak of violent conflict, such problems will hardly be the only factors that need to be considered. Usually, environmental problems will be only one of many factors and will be relevant to security issues only under certain circumstances. For example, sea level rise resulting from anthropogenic climate change may contribute to conflict in less developed countries where its destabilizing effect is reinforced by an unstable political system which is also experiencing distributional or ethnic problems.

. . .One question that has not yet been answered to any satisfaction is how can the relevance of environ-

Figure 1-The Role of the Environment in Contributing to Violent Conflict

mental problems in contributing to the generation of violent conflict be determined and measured, given that in any specific case environmental factors are only one part of a whole set of relevant factors. From a preventive perspective, it would be desirable to identify environmental problems or sets of environmental problems that—under certain framework conditions—are or might become particularly serious threats to security. Apart from the problems of measurement and quantification, there is currently no consensus concerning the threshold of severity above which environmental problems may be related to security. It is evident, however, that if too low a threshold is chosen, the analysis of the relationship between the environment and security would only duplicate the work which is carried out in the context of the discussions on sustainable development.

Although the sustainable development agenda should not be duplicated by the investigation of environment-security linkages, both issues are certainly closely related. In considering the role of environmental problems as threats to security, those items on the sustainable development agenda requiring specific attention because of their security relevance need to be highlighted. A list of the environmental issues which are most prone to becoming security threats remains to be determined. Tackling those environmental threats to security as a matter of priority might serve environmental as well as security purposes. Furthermore, achieving security in the military sense is a major precondition for the success of any strategy aimed at reaching sustainability. This is because violent conflict and the destruction resulting from it necessarily counteract efforts to realize sustainable development. Thus, mitigating environmental problems that might cause or contribute to violent conflicts is itself a contribution to sustainable development. By the same token, sustainable development can be seen as a major precondition of security, and its realization will alleviate any environmental threats to security.

3. Data in the Field of Environment and Security

Explorative research on environment and security has primarily relied on case studies. However, in order to generalize across larger sets of cases, it is indispensable to build a stronger database. While there appears to be a lack of specific databases on environment and security, a variety of data sources has incorporated some relevant clusters of variables.

Variables of interest to the environment and security field range widely in the literature. Therefore, some delimitation is necessary. We focus on four major clusters of variables:

- human driving forces (pressures on the environment);
- state of the environment (environmental performance);
- policy response (e.g. instruments); and
- indicators of violence.

A brief review of prominent reports by international governmental and non-governmental organizations as well as relevant research projects shows that

existing data sets cover at least a minimum range of economic and demographic variables under the category of human driving forces. However, the data set most frequently used for research on international and civil war (Correlates of War data sets) omits environmental variables.

The geographical and temporal scope of the databases vary. In some cases, yearly variable scores are available since the early 19th century until 1995; other data sets include only the past decade or only a few time points from the post-World War II period. In terms of geographic coverage, data collection ranges from nine countries (for a structured comparative case study) to worldwide coverage.

Many of the data collection efforts have been inspired by the notion of sustainability. To this end, a variety of institutions—such as the World Bank and the World Resources Institute—have contributed frameworks of analysis which build on the first three clusters of variables mentioned above (human driving forces, state of the environment, and responses). However, no universally accepted indicators for sustainable development exist. Most prominent may be the attempts by UNEP to construct a "human development index" (HDI) which serves as an "early warning indicator"—especially in the context of "secondary social problems" (see Sections 2 and 4). Environmental sustainability indicators are neither integrated with indicators of violence nor with the HDI. Overall, research on sustainable development indicators is still at the stage of conceptualization rather than at the stage of mature data integration and evaluation. The review shows very few data sets *specializing* on environment and security.

In general, there is little integration of all four clusters of variables mentioned above. In particular, most datasets include either environmental policy response variables *or* variables of violence—but rarely both groups. This is regrettable since for the purposes of the Pilot Study, both groups of variables must be considered simultaneously to find the necessary and sufficient conditions for the onset of environmentally induced violence—and the ways to prevent its occurrence. Thus, the best approach to data integration appears to be consolidating databases which use the driving forces—state of the environment—response framework and integrating it with databases specializing on civil and international war. These attempts will be hampered by a lack of congruity of the temporal and geographical scope of present databases.

Data sets specifically covering environment and security are at an early stage of development. Furthermore, there appears to be a lack of universally agreed upon indicators and indexes on environment and security In conclusion, the current data sources on environment and security are likely to be insufficient for *systematically* assessing the crucial link between environmental pressures, state of ecosystems, related social problems, and governmental response, as well as the occurrence of violence. Therefore, more structured efforts have to be undertaken to substantiate findings in support of better informed public policy on environment and security.

4. Major Problems and Problem Regions

The following discussion tries to reflect the emphasis of recent research activities, but does not pretend to present a comparative assessment of which issues might be the major environmental threats to security and which regions might be most seriously affected.

4.1 Major Problems

A distinction has to be made between natural resource scarcities and environmental degradation as causes of violent conflict. As explained in Section 2, scarce natural resources and their distribution can be a direct and indirect cause of violent confrontation, whereas, in general, the causal pathway from environmental degradation to violent conflict leads through secondary social problems. Neither of these problems by itself necessarily leads to violent conflict. In fact most of them are dealt with successfully in a non-violent way. The significance of an environmental problem is dependent on the context it encounters—e.g. social, economic, political, cultural, religious, and ethnic factors. A water problem between Israel and Jordan has different implications than a similar dispute between Canada and the United States. In this Section, (1) selected social problems relevant to environment and security are discussed. (2) The main problems of environmental degradation and (3) resource scarcities are also reviewed.

(1) Secondary social problems

The most examined social problem that can be environmentally induced is *migration*. For example, environmental problems contribute to rural-urban migration in developing countries. This results in overflowing slums in large cities which in turn contribute to political instability. In rural areas, the loss of grazing land as a consequence of soil erosion may lead nomads to migrate into regions where farmers settle, thus creating conflicts over the distribution of the land which may become violent. In general, many environmental problems, including changes in the availability of water, land degradation, and natural disasters, etc., may cause or contribute to migration. Migration may become an even more serious issue if it moves beyond national boundaries. It may not only be the *result* of environmental problems, but may also be the *cause* of new environmental problems at the place of arrival.

Another secondary social problem that may feed back to political instability as well as environmental problems is *poverty.* As the economy and the environment are inter-related, it is often difficult to differentiate between their role in conflict. However, less developed countries earning a large portion of their national income by agricultural production may lose part of their income as a result of natural disasters or land degradation. In some African countries it has been estimated that dryland degradation has significantly reduced the gross domestic product.

Environmental degradation or soil salination may lead to *limited food availability and famines*, which in turn contribute to political instability. A well known example is Africa's Sahel Desert where overgrazing, droughts, and soil erosion have caused famines, and where examples of violent conflict are numerous. While such social problems are seemingly local or regional events resulting from overuse of certain natural resources, global environmental change might also contribute to social problems by shifting the balance between humans and their environment.

Changes in the environment and in human behavior can contribute to increased *health problems* that, especially if they are epidemic, may become security concerns. In particular, global climate change and changes in the water cycle may induce the migration of microorganisms into densely populated areas. Health problems, by enhancing the above mentioned social problems, can lead to violent conflict. Epidemic diseases might, for example cause people to migrate and may result in poverty and famines. Also, migration, poverty, and famines can easily feed back to health problems by contributing to the creation of squalid living conditions which promote the spread of infectious diseases.

(2) Environmental degradation

Regarding issues of anthropogenic *global environmental change*—ozone depletion, loss of biodiversity, climate change, desertification, deforestation—global climate change may be considered the greatest threat to security. Its consequences could easily alter the availability and distribution of resources. This could lead to the above mentioned social problems which may result in violent conflict. Changes in precipitation levels and desertification due to global climate change may, for example, affect the availability of freshwater and the capacity for vegetation growth. Change of ocean currents may result in changing or loss of fishing grounds. Sea level rise will lead to land loss, inducing a migration problem. The same might become true for regions affected by increased frequency and severity of extreme weather conditions, such as floods, hurricanes, droughts, and fires, due to global climate change.

Today, however, *local and regional environmental degradation*, especially the erosion of arable and grazing land, have shown a particularly high potential to contribute to violent conflict. Large areas of degraded soil can be found around the world (e.g. Horn of Africa, Iran, Iraq, India, Mongolia, China, Central America, and the Amazon basin) and is one of the major environmental causes of migration. Land degradation may thus easily aggravate existing scarcities of fertile soil which is an ecological resource that has frequently been involved in war.

Pollution is another environmental problem that generally contains a potential for conflict because its costs may be distributed unevenly. The recent violent incidents in the Niger delta, for example, are partly due to pollution. Another example of pollution-induced conflict is the case of the Trail smelter in Canada which affected the United States. The dispute was settled by the International Court of Justice. Pollution might also contribute to the above mentioned social problems by triggering migration, damaging food production and human health etc.

Natural disasters, such as the eruption of a volcano, major storms, floods, droughts, fires, earthquakes, or massive pest attacks are also environmental factors that can contribute to political instability. The differentiation between natural and anthropogenic environmental catastrophes, however, becomes increasingly difficult because of increased human interference with ecosystems on a global scale. Thus, the numerical increase in natural catastrophes with disastrous consequences for people during recent years may be a first sign of this human influence.

(3) Resource scarcities

Natural resources—both renewable and non-renewable—may become issues of conflict when they are scarce. These resource scarcities can be caused by a decrease in the supply of the resource, an increase in the demand or by unequal resource distribution. Resource scarcities can contribute directly or indirectly to violent conflict. If violent conflicts are fought over natural resources (simple-scarcity conflict), the contribution of the environment to the conflict seems obvious. This might explain why resource scarcities have been of primary interest to research on environment-security linkages.

Fresh water, fish, and forests are *renewable natural resources* of special concern. Water shortage is generally seen as the environmental problem most likely to lead to violent conflict. According to the Secretary General of the UN Conference on Human Settlements Habitat II, Mr. Wally N'Dow, water is the critical factor threatening world peace.[6] For example, the Middle East is known for its violent conflicts involving water issues. Another example of conflict over renewable natural resources is the recent dispute between Canada and Spain over fish. Scarcities of renewable natural

resources are in many cases closely related to environmental degradation because the latter can cause such scarcity by damaging or altering the regenerative processes involved.

Non-renewable natural resources such as oil, coal, iron ore and other minerals have been known through history for causing simple-scarcity wars between states. During World War II, for example, Japan sought to secure oil, minerals and other resources in China and Southeast Asia, and the 1991 Gulf War was partly motivated by the desire to secure oil supplies.

4.2 Major Problem Regions

The threat that an environmental problem poses to security depends on the degree of the threat to welfare and survival, (i.e. on the framework conditions.) Thus, the capacity to act on the environmental problem and its consequences, the promises of the application of force, the general conflict situation in the region concerned, and the institutions binding the possible adversaries together, all influence the eventual probability of violent conflict. In general, these conditions appear to be more prone to triggering violent conflict in developing countries than in industrialized states. Therefore, violent conflicts over environmental issues have been more notorious in the South than in the North. Most wars and violent conflicts identified as environmentally induced have been internal in nature and have taken place in ecologically sensitive regions of the developing world.

Regions of special interest to recent research on environment-security linkages have, not suprisingly, been regions with acute conflict where the environmental factor seems rather obvious, such as the Middle East and the Horn of Africa. Additionally, some regions are popular illustrations of the consequences of particular environmental problems. Bangladesh, for instance, is often mentioned in conjunction with sea level rise; Haiti and the Philippines for their problems of deforestation; the Sahel for its desertification; and again the Middle East in connection with water scarcity.

However, it has been left largely to the discretion and preferences of the researchers involved, which environmental problems and problem regions are pronounced in research. There exists neither a comparative assessment of the security threats posed by different kinds of environmental problems, nor research results available that would allow assessment of the severity of environmental threats to security on a regional basis.

5. Policy Responses to Environmental Threats to Security

There are certainly countless policy options for responding to environmental challenges at every level, be it local, national, regional or international. In the following discussion, the focus will be on action at the international level and on bilateral as well as multilateral policies. Several reasons can be given for this emphasis. First, insofar as environmental problems are relevant to security policy, they either have or acquire an international dimension, since it is, in the end, mainly peace among different states and societies that is of concern. Even violent conflicts that appear to be purely domestic are mostly of international concern. Second, the greatest risk associated with environmental problems has been identified in developing countries and in Eastern Europe. Thus, from the perspective of NATO and NATO member states, it should be the international level that is the focus of responses to environmental risks to security. Finally, most modern environmental challenges are international themselves and thus require an international or regional approach (i.e., climate change, stratospheric ozone depletion, but also shared water resources).

Furthermore, regarding more general policy strategies for coping with environmental change, a distinction has to be made between adaptation and mitigation and prevention. Policies can aim at adapting society to changing environmental conditions and resource scarcities without tackling the causes of the environmental change in question, or they can be directed at mitigating such causes or preventing the emergence of environmental problems and resource scarcities. The two approaches are not mutually exclusive.

. . .The following discussion will, first, deal with the international institutions concerned. This will include international *environmental* institutions in a narrow sense as well as other international institutions that are important for effectively dealing with environmental problems. Second, as to the substance of international environmental policies, the importance of capacity building as a fundamental approach to environmental policy will be highlighted. In general, the Pilot Study will put special emphasis on building and strengthening international institutions of regional or global scope.

(1) International institutions in the field of the environment.

International institutions in the field of the environment comprise international organizations and other international cooperative arrangements commonly referred to as "international regimes". International regimes are usually based on international conventions and other instruments of international law. The instruments of international law provide for general and specific proscriptions and prescriptions as well as decisionmaking procedures like voting rules of the members in specific issue areas of international relations.

More than 100 of these arrangements have been created based on international agreements which exist in the field of the environment at the regional or international levels. Most of the known important interna-

tional environmental issue areas are thus governed by international environmental regimes, including a number of arrangements for the common management of natural resources, most notably water. The issue area of climate change, for example, is governed by the United Nations Framework Convention on Climate Change opened for signature at UNCED in 1992; the depletion of the ozone layer is dealt with in the framework of the Vienna Convention for the Protection of the Ozone Layer (1985) and the Montreal Protocol (1987). Other global environmental agreements include the Convention on Biological Diversity (1992) and the Convention to Combat Desertification (1994). Protection of the oceans and their resources is regulated by a whole range of regional and global agreements. Several regional problems like long-range transboundary air pollution in Europe and North America, the protection of the Rhine and Danube rivers and the management of other freshwater resources are also regulated by regional or global agreements.

While the examples mentioned are only representative of the complete list of international environmental regimes, the United Nations Environment Programme (UNEP) is the only global international organization exclusively in charge of environmental issues. UNEP's role, however, is mainly confined to facilitating and supporting environmental protection by the catalyzing and coordinating functions assigned to it by the community of states.

Environmental matters have, however, become increasingly prominent in the activities of other international organizations. Environmental matters are now regularly considered in programs of the United Nations Development Programme (UNDP), the Food and Agriculture Organization (FAO), most other organizations and bodies of the United Nations, as well as of the World Bank and many other financing institutions including the regional development banks. The establishment of the Global Environment Facility (GEF) by the World Bank, UNDP and UNEP in November 1990 as well as its restructuring in 1994 provided an additional instrument for channeling resources from developed to developing countries in order to address global environmental issues. None of these organizations and bodies, however, is actively pursuing environmental regulation and its implementation.

Furthermore, the rules and activities of many international organizations and regimes that appear to be outside the realm of environmental policy do influence the environment directly or indirectly. The best-known examples are the General Agreement on Tariffs and Trade (GATT) and the World Trade Organization (WTO).

Since the Earth Summit in Rio de Janeiro in 1992, there has been some institutional reform to enhance the role and increase the weight of environmental considerations in international policy-making. The UN Secretariat in New York was restructured to give the environment and sustainable development a more prominent role. In addition, the Commission on Sustainable Development (CSD) was established. It was hoped that the CSD would help solve the *problem of coordinating* different international policies and institutions relevant to the environment. Coordinating international policies has become more important with the increase in the number of international environmental regimes and the realization that many seemingly unrelated activities of other international institutions are indeed of great relevance to environmental matters. As a consequence, this problem is characterized by duplicated work, overlapping responsibilities, and incompatibilities and tensions among different environmental institutions. This is demonstrated by the great need for cooperation between environmental regimes and between environmental institutions and institutions mainly responsible for other policy fields. Despite the value of the CSD as a global forum for discussion, the many challenging issues on its agenda have not allowed it to make decisive progress in solving the problem of coordinating different environmentally relevant activities to the degree hoped for initially.

Much remains to be done regarding the two main problems of international environmental regulation and implementation. These problems are closely related to the lack of any central authority in the international system and which the CSD was meant to address. One constraint on the effectiveness of international environmental policy is related to the nature of regimes. Given the sovereignty of participating countries, they have to consent to an international agreement in order for the obligations included to become binding. Taking into consideration countries' differing degrees of knowledge and their varying interests and concern, reaching agreement in the negotiations frequently takes a long time and the resulting obligations are often "too little, too late". Second, implementation problems plague international efforts to protect the environment. As in the field of security policy, monitoring compliance with international agreements is a crucial issue in environmental politics. In the absence of adequate monitoring, states fear that some of the parties to the agreement may not comply and thus may save the costs associated with compliance. Effectively responding to known cases of non-compliance serves to promote that trust. However, the international system now offers little room for enforcing obligations.

In conclusion, the effectiveness of international environmental institutions is still very limited. The institutional reforms following the Earth Summit have not changed this situation fundamentally. More work needs to be done to evaluate alternative policy options in order to assist decisionmakers in setting priorities.

(2) Capacity building.

It is the capacities available that are of fundamental importance to the ability of societies and policies to respond to environmental challenges. Indeed, whether environmental policies are formulated and implemented effectively depends not only on the political will of decisionmakers but also on the availability of sufficient capacities. Therefore, capacity building can be seen as a major part of a strategy to combat environmental threats to security. This applies especially to developing countries. Emphasis needs to be placed on capacity building to enable the societies of concern to follow sustainable development paths in order to prevent environmental problems from becoming relevant to security policy at all.

Capacity building measures supporting sustainable development are addressed in Agenda 21. They can comprise a variety of different activities covering a whole set of areas, e.g. economic and technological development, institution building and institutional reform, diffusion of knowledge and know-how, health care, and the transfer of financial and technological resources. More specifically, training activities, financial assistance, transfer of suitable and adaptable technology, education programs, the strengthening of the role of important societal groups (e.g. children, women, indigenous people, NGOs), and similar measures are associated with the more general aim of capacity building. Thus, capacity building is a major aim of current efforts to confront global environmental change, especially at the national and local levels. Research must still provide some direction as to the building of which kind of capacities should be supported under specific circumstances to give optimal support to sustainable development.

6. Recommendations for Structuring the Future Discussion

To assist NATO in defining its own policy priorities with respect to the environment and security, it is essential to identify those environmental problems that merit special attention and are in need of urgent action because of their particularly high potential for triggering violent conflict. Furthermore, the different policy options, especially those concerning possible reform and restructuring of international institutions, should be evaluated as to whether and to what extent they are appropriate for addressing the most pressing environmental challenges in the context of environment and security.

This report identifies several gaps in existing knowledge that should be addressed in the Pilot Study on Environment and Security in an International Context. The questions to be addressed can be put into two distinct clusters. Cluster 1 would be science-oriented and would address methodological and conceptual problems as well as issues of data collection and availability, and the construction of appropriate indicators. Cluster 2 would build on the results of Cluster 1 by addressing policy-oriented questions of comparative threat assessments of different environmental issues as well as evaluating possible policy responses, particularly regarding international institutions. . . .

Cluster 1: Indicators and Data Collection

Cluster 1 on Indicators and Data Collection will deal in particular with the following topics:

Update existing lists of violent conflicts in which conflicts over natural resources and the environment played a major role.

Several lists of violent conflicts that were at least partly environmentally induced have been produced. None of them, however, appears to have been encompassing nor up to date. Thus, this step in the work program consists of compiling existing lists of environmentally induced conflicts and completing them with the latest research results on such conflicts.

Development of criteria for assessing the degree to which a conflict has been caused by environmental degradation and natural resource scarcities.

This task requires the identification of the major factors contributing to the emergence of violent conflict. Furthermore, a methodology for weighing the importance of the different causes of violent conflict needs to be developed.

Elaboration of criteria for assessing the security risks associated with environmental problems.

This analysis might include identifying the relevant variables and indicators that describe and explain the linkage between the environment and security. The possible causal chains leading from environmental problems to violent conflict need to be documented systematically and investigated in detail. Also, the structure of relevant framework conditions (e.g. economic, political, cultural) that either reinforce or mitigate the outbreak of violence should be identified.

Development of different categories of environmental problems according to the extent to which they are relevant to security.

Building on the previous step, this task may best be dealt with by developing taxonomies of (a) environmental stress, environmental risks to security and environmental threats to security; (b) attributes of environmental conflicts themselves; and (c) contextual factors more or less likely to help transform environmental problems into security threats.

Collection of data on a representative sample of environmental threats to security at different levels of conflict escalation.

This effort should start by exploring relevant existing data sources and determining gaps in data and should include cases that have not led to violent conflict. This will include collecting data systematically on the environmental problem in question, contextual factors, and attributes of the political conflict involved. The specific regions to be investigated will be defined in the course of the work. This data collection might best be done in case studies that are closely coordinated and use a common framework for analysis in order to facilitate comparison across cases. This common framework for analysis is yet to be elaborated.

Definition of indicators and reasonable thresholds of severity of environmental problems that indicate heightened danger of their causing or contributing to violent conflict.

The analysis should try to assess whether thresholds can be found that exist irrespective of framework conditions. In addition, constellations of contextual factors that reinforce or mitigate environmental threats to security should be identified and classified. This step will require integrating environmental and contextual factors. This might make it possible to determine certain context-specific thresholds of severity that indicate heightened danger of the outbreak of violence.

Definition of early warning indicators and ways of integrating relevant environmental factors into existing early warning systems.

Systems of indicators that are used to produce a timely warning in cases of a growing conflict threatening security exist, but need to include sophisticated environmental indicators. Thus, this task starts from developing such environmental indicators and integrating them into existing early warning systems.

Cluster 2: Evaluation of Environmental Threats to Security and Policy Responses

Cluster 2 on Evaluation of Environmental Threats to Security and Policy Responses will focus in particular on the following items:

Comparative threat assessment of major global and regional environmental problems in order to set priorities with regard to their security relevance.

The analysis has to draw on the work done in Cluster 1 and expand it. Relevant environmental problems might include climate change, depletion of the ozone layer, loss of biodiversity, desertification, deforestation, lack of water availability, and "classical" air pollution (SO_2, NO_x). It will have to take into account the current knowledge about the effects of the environmental problems under investigation as well as the structure and development of framework conditions in relevant regions.

Integrated threat assessment for the NATO region as well as for other regions particularly relevant to NATO.

Also drawing on the work done in Cluster 1, it is necessary to identify those regions particularly liable to become the location of violent conflict triggered by environmental problems. This step will be based on the comparative assessment of environmental issues which will allow one to identify those regions that will be most affected by the most severe environmental threats to security. In contrast to the previous step, this analysis will not focus on single environmental problems but will try to take into account the total amount of environmental stress to specific regions.

Developing a decision support system.

Based on the results of the work done in the context of Cluster 1, this task will include, *inter alia*, integrating early warning systems. Also, existing decision support systems that can provide meaningful support to policy-makers in the face of environmental threats to security may be evaluated and ways of integrating environmental considerations into these systems defined.

Evaluation of selected policy responses to environmental threats to security.

This assessment will focus on international organizations and international conventions ("regimes"). It might distinguish between different kinds of environmental degradation and resource scarcities. The evaluation should take into account the criteria for sustainable development as included, *inter alia*, in Agenda 21, and should encompass at least four steps: (1) taking stock of the existing system of institutions, (2) discussion and assessment of their effectiveness, (3) discussion and assessment of possible alternatives, and (4) judging all options discussed from the perspective of environment and security.

Elaboration of recommendations for improving and redesigning international institutions so as to effectively address environmental threats to security by supporting and strengthening sustainable development.

Recommendations for improving and redesigning international institutions for the environment will be based on the above evaluation and will generally flow from the work done in previous parts of the work programme.

Endnotes

[1] The Committee on the Challenges of Modern Society (CCMS). Acknowledgements: Laurie MacNamara and Brian Smith, Evidence Based Research, Inc., Vienna, Virginia Bertram Spector, Centre for Negotiation Analysis, Potomac, Maryland.

[2] http://echs.ida.org/s05/biblio.html

[3] For the purposes of this report, we will thus distinguish "environmental degradation" (including "natural disasters") from issues related to the scarcity and distribution of "natural resources." Such scarcities may,

however, themselves be caused at least partially by environmental degradation. To refer to the aspects mentioned *in toto* we will use the term "environmental problem".

[4] In the following discussion, we will avoid using the term "environmental security" of which, by now, no common definition has emerged. On the contrary, a variety of quite diverse understandings have been put forward. The alternatives range from defining "environmental security" as "the protection of armed forces from environmental threats" to a broader definition: basically the absence of severe environmental problems or, as the realization of sustainable development. Under these circumstances, instead of seeking to find a definition of environmental security that would suit everyone, it appears more fruitful to approach the issue of environment and security by differentiating analytically certain relationships between the two realms of environment and security in order to avoid confusion and to reach clarity on the subject to be investigated.

[5] The environmental effects of the regular training activities of military forces in general and the pollution of military bases in particular have received increasing attention during recent years. This aspect of the relationship between the environment and security, however, is dealt with in the context of various defense-related CCMS Pilot Studies, e.g. the NATO/CCMS Pilot Studies on Environmental Management Systems, on Cross-border Environmental Problems Emanating from Defence-Related Installations and Activities, on Environmental Aspects of Reusing Former Military Lands, on Protection of Civil Populations from Toxic Materials Spills during Movements of Military Goods.

[6] Declaration by the Secretary General of the UN Conference on Human Settlements Habitat II, Mr. Wally N'Dow, in New York on March 17, 1996.

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Task Force Reports on Environmental Change and Security

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During the past three years the Environmental Change and Security Project has brought together representatives of the academic, policy, NGO and international communities to learn about and discuss a range of pressing issues of national and global importance.

In line with the general objectives of this Project, the following Task Force Reports provide overviews of three important issue areas: infectious disease, water scarity in shared river basins, and military and intelligence activities. Due to space considerations, what follows are brief summaries of the original reports; the case studies in particular have been edited aggressively. In doing this, I have tried to provide an accurate sense of the general arguments advanced; I take responsibility for any omissions or distortions of these.

These Reports reflect an important commitment at Georgetown University's School of Foreign Service and, in fact, throughout the academic world to encourage research and education in the broad, interdiciplinary area of environmental policy. They have been prepared by individuals who, for the most part, have several years of relevant work experience and have returned to the academic world to spend two years in Georgetown's Master of Science in Foreign Service Program acquiring specific skills and knowledge that they will take back to the policy, NGO and private sectors in the United States and abroad. Research for these reports has involved extensive interviews and fieldwork, as well as published materials and internet sources.

Readers may recognize in these reports the influence of the pioneering work directed by Thomas Homer-Dixon at the University of Toronto over the past several years. Although these groups of researchers are not associated with any of Homer-Dixon's projects, they owe a large debt to the research he has directed. In particular, the analytical models developed in these reports reflect both relationships identified in the research conducted by each Task Force and those identified by Homer-Dixon and his co-authors.

Infectious Disease as a Global Security Threat

Task Force: Rohit Burman (Team Leader), Kelly Kirschner and Elissa McCarter

Abstract

This report examines the resurgence of infectious diseases as a major threat to national and international security. Infectious diseases are the world's leading cause of death, killing at least 17 million people each year, most of whom are children, and the numbers only continue to increase. While developing countries are hit hardest, migration, the mass movement of millions of refugees, and increasing international air travel, trade, and tourism ensure that no country is safe from the spread of disease. More people in more countries are at risk of infectious diseases today than at any other time in human history. Diseases are threatening the young, working populations of many developing countries—which jeopardizes their social and economic stability and could have serious reverberations around the world. The United States is no exception, for it is seeing startling increases in tuberculosis nationwide and a continuing AIDS epidemic. Infectious disease is a global problem. It requires global action.

Despite the worldwide resurgence of infectious disease, there is still a lack of political will and resources to prevent disease outbreaks from occurring. This report attempts to underline how epidemics occur, what can be done to best prevent them, and who should take action. For illustrative purposes, the report uses three original case studies of the current AIDS epidemic in India, the tuberculosis crisis in South Africa, and the 1991 cholera epidemic in Peru. It is divided into several parts: 1) the variables which lead to a disease epidemic; 2) the variables which lead to a security threat; 3) the links between disease and security; 4) three specific situations where disease has threatened or is threatening a large population; and 5) policy recommendations to reduce the threat of infectious disease to national and international security.

Past experience shows that treatment-driven policies to combat disease are ineffective and more costly in the long run. Infectious disease must be stopped before it develops, meaning that prevention-driven policies

instead of "magic bullets" are the key to solving the disease problem. A prevention-driven policy includes action at international, national, and community levels to establish a foundation of community-based public health. Our findings show that the major contributors to disease epidemics are malnutrition, poor sanitation, poor hygiene, and lack of education; therefore any attempt to reduce the threat of infectious diseases must focus on improving living conditions and basic public health. We propose a disease prevention policy in which the central tenets are: education and awareness campaigns from the primary level onwards; empowering women and using indigenous skills to improve living conditions—this includes providing microcredit and initiating pilot projects in rural and urban communities alike; and utilizing private corporations, NGOs, national governments, and the international community for collaborative support and funding. Because neglect has jeopardized much of the progress achieved in the past decades towards improving human health, we must invest now in disease prevention to avoid even more serious consequences in the future.

Introduction

At the close of the 20th century, the world and the health of its citizens are under attack by the scourge of infectious disease. Despite the promises of modern medicine, disease and poor governmental policy are pushing many areas of the world to the brink of crisis. Infectious diseases kill over 17 million people a year, 9 million of whom are young children. Almost 50,000 men, women and children die every day from these diseases.[1] The microbes which cause the plagues transcend people, cultures, and borders within hours and the phenomenon is not isolated in the developing world; rather, it is a global menace that is a threat to all civilizations.

It is the obligation of all governments to meet and anticipate this threat by providing and protecting the safety and well-being of their citizens. To the extent that this obligation is not fulfilled, it is logical that dissatisfaction among people will grow towards their respective governments, leading to conflict and demands for change. This paper addresses three cases and demonstrates how they are all, indeed, menacing situations for national and global security. These cases are: AIDS in India, tuberculosis in South Africa, and Peru's cholera epidemic.

With the discovery of penicillin and other major pharmaceutical and medical innovations, public health officials long believed that the obliteration of viral, bacterial, and parasitic foes and the infectious diseases they cause was a goal within their reach. For a period, there was a general consensus that by the turn of the century we would achieve such a mastery over the majority of infectious diseases that we could then devote our entire energies to research the intricacies of human genetics, cancer, and heart disease. Unfortunately, this overly optimistic sentiment rested on two false assumptions: that disease could be geographically isolated and that microbes were biologically unchanging organisms, which could be eliminated with the development of one drug.[2]

Today there is a much different, pessimistic outlook on the future of infectious disease. With the widespread introduction of AIDS in the late '70s and early-'80s, the public health community awoke to an incurable disease that, in a short period of time, was endemic to every country in the world. We have recently discovered how correct Charles Darwin was, as we are finding increasingly stronger, more resistant forms of bacteria and microbes that have arisen due to the uncontrolled and inappropriate use of antibiotics. Different strains of the hepatitis virus, herpes virus, tuberculosis, and cholera represent a few of these new and evolving diseases.

Used too often to treat the wrong kind of infections, with the wrong dosage and for incorrect periods of time, the antibiotics were sent to battle without the proper tools, giving the enemy time to evaluate its foe and regroup based upon that evaluation. Millions of dollars and years of work that were spent on the research and development of past antibiotics are ignored by mutating microbes, as they successfully find ways to continue their propagation. Pathogens' resistance to antibiotics improves and hence drugs grow obsolete. In addition, previously unknown infections are appearing in humans (29 new diseases since 1973) who are living or working amidst new or changing ecological conditions.[3] These environments are exposing the individual to novel pathogens, as well as new and numerous animal and insect carriers. Poor hospitals and health facilities in the less developed world are also being used by these microbes as launching grounds into prospective hosts. These under-funded, unsanitary facilities often do more to disseminate diseases than control them.

Global warming brings with it a more conducive environment for the outbreak of mosquitoes, rodents, other insects, and ocean algae blooms, which bring with them different bacteria, protozoa, and viruses. At the same time, the increased warming can lead to changes in weather patterns, bringing periods of floods and drought which destroy crop yields, causing dramatic increases in starvation and malnutrition in the less developed world, thus weakening human resistance to disease.

Urbanization also enhances the presence of disease as a security threat today. In the next 20 years, nine of the top ten megacities will be in developing nations.[4] This type of growth leads to the spread of urban slums and shantytowns. These areas usually do not have any

running water, electricity or any semblance of a sewage system. With immune systems that are already weakened by malnutrition and the overall poor sanitary conditions in which they live, people living in these areas are highly susceptible to being the hosts upon which new diseases prey. Overcrowding within the cities permits disease to spread rapidly. Rapid commerce, international air travel, and mass refugee movements all ensure that no country is safe from the spread of disease. With disease, risk is internationalized. Countries in the developing world are, at present, being hit the hardest. The economic losses from declining tourism and declining demand for possibly infected products disrupt fragile economies. This, along with the degradation of these countries' young, working populations, leads to economic and institutional breakdown. The risk is intensifying and in a global marketplace, its disturbing effects will be felt throughout the world.

Robert Kaplan's Hobbesian view of the world in the coming years is ominously taking shape in the global health arena. Items in the media, such as Kaplan's piece, "*The Coming Anarchy*," as well as calls from popculture, such as the recent movie, "*Outbreak*," and the best-selling novel by Richard Preston, *The Hot Zone*, all have attempted to frighten us into action by detailing specific infectious disease horrors of the day or through exploring "what-if" scenarios. This paper is not a continuation on that theme, but rather it is a sober reflection on three cases which unfortunately reflect this theme in today's world.

This paper begins with a discussion of a general model, detailing the variables which lead to the emergence of infectious diseases and how these diseases pose a threat to national and international security. This is followed by summaries of three case studies which depict three areas in the world where the interplay between disease and security is obvious and frightening. The current AIDS epidemic in India, the tuberculosis crisis in South Africa and the 1991 cholera epidemic in Peru, as an example of success, are presented as today's warning signals. We conclude by presenting a set of broad policy recommendations which address the common roots from which diseases spring. While these recommendations hold particular relevance to our three case studies, they are proposals which are applicable to all of the industrializing and industrialized world.

Variables that Bring About Diseases

There are numerous factors that bring about diseases. Many diseases share common factors whereas others are more unique with regard to their causes. However, there are certain variables that do contribute to the emergence of most infectious diseases. According to the Centers for Disease Control and the World Health Organization these variables can be divided into three broad categories: social variables (such as education, lack of adequate health care facilities, cultural barriers); demographic variables (such as urbanization, population growth, migration, human travel); and environmental variables (such as sanitation, disruption of the ecosystem, access to clean water and safe food, drug resistance, new viruses).

Social Variables

The lack of education about infectious diseases has been a primary factor that has led to the reemergence and explosion of infectious diseases around the world, especially in developing nations. A large percentage of the population in the world remains unaware and uneducated about the threat of infectious disease and methods of prevention. Low-income families do not have the resources to educate and protect their children. Moreover, schools often do not have any education seminars or programs on infectious diseases. The result is that people remain unaware of infectious diseases or in cases where they do hear about them, the information available is not accurate and no prevention methods are highlighted. Secondly, the lack of education coupled with cultural barriers often leads to the emergence of a disease. For example, in India, cultural barriers with regard to talking openly about sex have contributed to the AIDS epidemic. This is highlighted in the case study on AIDS in India.

Additionally, the lack of adequate health care facilities has proved to be a major obstacle in containing the explosion of infectious diseases in much of the world. Hospitals and health care centers in many developing countries do not have the facilities necessary to perform tests and treat infected patients. In many areas the number of clinics and hospitals is not enough to support the needs of the infected population. Furthermore, doctors and nurses are not trained or equipped to deal with many of the diseases. Until the necessary training and infrastructure are developed, infectious diseases are likely to perpetuate high mortality rates around the world. Currently, infectious diseases remain the leading cause of death worldwide. Of about 52 million deaths from all causes in 1995, more than 17 million were due to infectious diseases.[5]

Demographic Variables

Population growth has played a major role in the spread of infectious diseases. Population expansion raises the statistical probability that a pathogen will be transmitted, whether from person to person or from vector (insect or rodent) to person.[6] Population density is rising worldwide. The population density exceeds 2,000 people per square mile in seven countries, and 43 countries have density greater than 500 people per square mile.[7] If housing, public health provisions,

and sewage and water systems are adequate then a high population density may not doom a nation to epidemics. However, most of the areas where density is increasing today are not capable of providing such infrastructural support, and therefore have provided the perfect ground for the spread of infectious diseases.

Rural to urban migrations have also contributed to the rapid spread of infectious diseases. A large number of people from villages migrate to urban centers in search of better jobs. These centers of urbanization have become jammed together and typically lack sewage systems, housing, safe drinking water, medical facilities, and schools to support the burgeoning population. Close physical proximity leads to an astronomical increase in the transmission of infectious diseases that are airborne, waterborne, sexually transmitted, and transmitted by contact. Moreover, urbanization and globalization propel radical changes in human behavior as well as in the ecological relationship between microbes and humans. Often in large cities, sex industries rise and multiple-partner sex becomes common. Access to antimicrobials via the black market is common in urban areas, which leads to overuse of precious drugs and the emergence of resistant bacteria and parasites. Furthermore, intravenous drug users' sharing of syringes also provides a mechanism for the transmission of microbes.[8] Thus, urban centers have become centers for dissemination of disease rather than control.

Human travel has also contributed to the spread of infectious diseases to the remotest parts of the world. With travel in the jet age, a virus that originates in Burkina Faso can reach Australia within a day. Passengers flying from Japan to Uganda leave the country with the world's highest life expectancy—almost 79 years—and land in one with the world's lowest—barely 42 years. A flight between France and Ivory Coast takes only a few hours, but it spans almost 26 years of life expectancy.[9]

Environmental Variables

Environmental variables such as poor sanitation, disruption of the ecosystem and limited access to clean water and safe food have played a major role in the emergence of infectious diseases. Many infectious diseases such as malaria, cholera, and tuberculosis emerge or are exacerbated due to poor sanitation facilities. The lack of sanitation provides a breeding ground for germs. In many developing regions people do not have access to safe food and clean water, and this has led to a significant increase in infectious diseases.

Drug-resistant strains of microbes are having a deadly impact on the fight against infectious diseases, especially tuberculosis, malaria, cholera, diarrhea and pneumonia—major diseases that killed more than 10 million people in 1995.[10] Some bacteria are resistant to as many as 10 different drugs. Thus, diseases previously under control are re-emerging at an alarming rate. Moreover, new viruses have also contributed to the

Table 1 Major Diseases that have Emerged in the last two Decades

(Source: World Health Organization, "Infectious Diseases Kill Over 17 Million People a Year," http://www.who.ch/whr/1996/press1.htm)

New Diseases

Some of the causative agents, and diseases associated with them, include in chronological order of their identification:

1973	Rotavirus, a major cause of infantile diarrhoea worldwide
1976	*Cryptosporidium parvum*, a parasite which causes acute and chronic diarrhoea
1977	*Legionella pneumophila*, the bacterium which causes potentially fatal Legionnaires' disease
1977	Ebola virus, which causes haemorrhagic fever—fatal in up to 80% of cases
1977	Hantaan virus, which causes potentially fatal haemorrhagic fever with renal syndrome
1977	*Campylobacter jejuni*, a bacterium which causes diarrhoea
1980	Human T-lymphotropic virus I (HTLV-1), which causes lymphona-leukaemia
1982	*Escherichia coli* 0157:H7 strain of bacteria, which causes bloody diarrhoea
1982	HTLV-2 virus, which causes hairy cell leukaemia
1983	*Helicobacter pylori*, the bacterium associated with peptic ulcer disease and stomach cancer
1983	Human immunodeficiency virus (HIV), which causes AIDS
1988	Human herpesvirus 6, which causes fever and rash
1989	Hepatitis C virus, which causes liver cancer as well as liver disease
1991	Guanarito virus, which causes Venezuelan haemorrhagic fever
1992	*Vibrio cholerae* 0139, which causes epidemic cholera
1994	Sabia virus, which causes Brazilian haemorrhagic fever
1995	Human herpesvirus 8, associated with Kaposi's sarcoma in AIDS patients

spread of infectious diseases. Table 1 lists some of the new diseases that have emerged in the past two decades.[11]

Finally, resource depletion and degradation have led to the spread of infectious disease. Our societal needs are constantly increasing, especially with the growth in population, but we are faced with limited resources. This, has resulted in scarcity of food, limited access to clean water, and a surge in pollution levels. Malnutrition in particular greatly weakens the immune system, which leaves people vulnerable to disease and infection. All of these factors have interacted to facilitate the emergence of disease.

Variables that Affect the Stability of the Institutional Structure

The United States Central Intelligence Agency and academics such as Thomas F. Homer-Dixon, Ted Gurr, and Nadir A.L. Mohammed have identified several key factors that affect the stability of the social and economic system in a country. These are: population pressures; poverty; ethnic tensions and social strife; and economic and political crises. In the case of infectious diseases, resource depletion and degradation, mortality, and health care costs also affect the stability of social and institutional structures.

Population Pressures

According to Homer-Dixon, population pressures are a key factor which affect the stability of social and economic systems. The population in developing regions of the world has been increasing at an alarming rate. Currently, approximately 75% of the world's population lives in these regions.[12] This has resulted in a fierce competition for resources. Population pressures on a nation's resource base results in people migrating to areas where resources are still not fully exploited. In many cases, this leads to rivalries between groups and regions as people indigenous to a region find migrants encroaching on their land and exploiting their resource base. The cumulative effect of these pressures and rivalries is that the stability of social and economic systems is challenged.

Ethnic Tensions and Social Strife

A second factor that affects the stability of the social and institutional structure is ethnic tensions and social strife, according to Ted Gurr.[13] We live in a world that is culturally and ethnically diverse. Each state, and often regions within a state, has its own distinctive culture and language. However, not all groups are tolerant of diversity and this has often led to ethnic tensions and social strife within a state or between states. With the current increase in population and migration there is likely to be an increase in ethnic tensions as the interests of different groups come into conflict due to greater interaction and competition for limited resources. Therefore, increased ethnic tensions could lead to a breakdown of social and institutional structures.

Poverty

Poverty is another important factor that can lead to social and institutional collapse in a country.[14] The majority of the population of the developing world lives in poverty. These people do not have access to proper shelter, safe food and water, and health care facilities. Resentment and frustration permeate societies in which the majority of individuals are deprived of basic human needs. This resentment and frustration is often expressed through violent acts, especially if the individuals have access to arms. Many countries in South Asia, parts of Africa, and Latin America have seen a surge in violence in recent years, an increase in the number of strikes, and a growing resentment against institutions which are apathetic to the condition of the majority of the population.

Morbidity and Mortality

John Cuddington, an economist at Georgetown University, has shown that morbidity and mortality affect the social and economic growth of a country. The rise in morbidity has two immediate effects: it reduces labor productivity and increases spending on health care.[15] The worst case scenario for the social and economic structure of a country would be a dramatic drop in the life expectancy of its people. Not only does this reduce the working age population dramatically, it also puts a strain on the economy. As more money is spent on health care due to illnesses, the resources of individuals and society at large are drained. This affects the economic growth of a country and threatens the stability of its economic institutions, as it may need to borrow from other countries and international institutions to provide for the health care needs of citizens.

Economic and Political Crises

Nadir A.L. Mohammed and others have argued that economic and political crises are major factors that affect the stability of social and economic structures.[16] When a country is faced with an economic crisis such as hyper-inflation, currency devaluation, and deficit or debt, the economic security of its citizens is challenged. Moreover, in situations of political crisis such as revolts against the government, government shutdown or corruption in the government, the safety net that a government provides for its citizens may no longer hold. Under these circumstances a country could be faced with collapse of its social and economic system.

INSERT FIGURE 1.1

Resource Depletion and Degradation

Finally, resource depletion and degradation not only lead to the spread of infectious diseases, but also pose a security threat to the stability of the social and economic systems. This is supported by Robert Kaplan and Homer-Dixon. Kaplan asserts that environmental degradation will be *the* national security issue of the 21st century.[17] With the expanding needs of our society, the resources that we have are being drained. Resource depletion and degradation are severe problems in many countries of the developing as well as developed world, largely because of the surge in population growth. If sustainable practices are not undertaken and population growth remains unchecked, it may not be long before our resource base is exhausted. Already, urban centers across the developing world are faced with scarcity of food, lack of clean water, and record pollution levels. These problems are gradually moving into the rural areas. Thus, the intense competition for limited resources and degradation and depletion of environmental resources in order to maximize individual benefits present a serious challenge to the stability of our social and economic systems.

The Link Between Disease and Security

Infectious diseases may be an increasingly significant variable that puts pressure on the security variables and thus threatens the stability of social and economic structures. Figure 1.1 provides a model of these relationships. First, an increase in population coupled with an increase in infectious diseases will result in the spread of these diseases to all corners of the world. Population expansion raises the statistical probability that pathogens will be transmitted.[18] Hence, as population increases more people are likely to be exposed to microbes. Moreover, with population expansion comes migration, and as people who are infected travel to different regions, they are likely to transmit diseases to others. Every day one million people cross an international border. In 1994 at least 110 million people immigrated, another 30 million moved from rural to urban areas within their own country, and 23 million were displaced by war or social unrest.[19] Most people move to urban metropolises. The United Nations estimates that urban populations will continue to soar and that five billion people, or 61 percent of humanity, will be living in cities by 2025.[20] These new centers of urbanization typically lack sewage systems, housing, safe drinking water, medical facilities, and schools to support the ever increasing population. Such conditions will only increase the transmission of infectious diseases.

Infectious diseases often strike the poor hardest, since they have limited access to health care, safe water, and food. As infectious diseases spread more among the poorer people in the world, the productivity of a large segment of the population is likely to drop. These individuals may already feel deprived and harbor resentment for the status quo. Poverty coupled with disease increases the marginalization of these individuals, which in turn could increase their feeling of resentment against society. Moreover, a growing number of

people means a growing need for treatment and health care. Thus, the social and economic structures in regions where a large percentage of the population is poor, uneducated, and suffering with disease are likely to be under severe strain.

The explosion of infectious diseases diverts national resources from education and infrastructure investment to health care for individuals who are infected. Analysts at McGraw Hill estimate that over the next six years Asian countries will spend between $38 and $52 billion on health care for AIDS patients.[21] The Centers for Disease Control (CDC) states that infectious diseases in the United States increasingly threaten public health and contribute significantly to the escalating costs of health care.[22] Many regions of the world are in dire need of investment in education and infrastructure; therefore increased expenditure on health care is likely to exert pressure on the social and economic system.

Infectious diseases can also exacerbate social tensions in society. In the case of AIDS, individuals infected with HIV are often stigmatized and looked upon as evil. Many individuals believe that AIDS is a way for god to punish the evil. Thus, the lack of awareness about AIDS and other infectious diseases generates numerous myths and misconceptions which results in people afflicted with the disease being considered as social outcasts. A clear line is drawn between those suffering with disease and those who remain uninfected. Therefore, infectious diseases could potentially exacerbate social tensions and hence affect the stability of the social structure.

Finally, infectious diseases increase the mortality rate, which in turn affects the social and economic system. Life expectancy is already expected to drop dramatically in Africa and India over the next decade if AIDS and TB continue to spread unchecked. By reducing life expectancy and increasing mortality, diseases present a threat to the economic growth of countries, as a large percentage of the working-age population will no longer be able to work or will have succumbed to the disease.

The above account illustrates the potential threat that infectious diseases present to the social and economic system of countries and to the international system. It is evident that special attention at both the national and international level is required to combat the spread of infectious diseases and the security threat it poses to our society. Within this context, the following summaries of three case studies illustrate how infectious diseases can pose a threat to national and international security.[23]

CASE STUDY SUMMARY: AIDS IN INDIA

Introduction

AIDS represents a serious but underestimated and neglected health problem in India. Around 1.6 million people in India are now estimated to be infected with HIV. Current research indicates that India will have the unfortunate distinction of being the HIV capital of Asia, with 4 million cumulative infections by the year 2000. AIDS poses a major security threat to the stability of the social and economic system in India.[24]

The purpose of this case study is to examine what has led to the rapid growth of AIDS in India and the security threat it presents to the stability of the country's social and economic system. The effect of HIV/AIDS in the social, political, and ecological realms is elucidated via a formal model. Moreover, recommendations for policy makers and health officials are made, based on the research done, to counteract the increasing threat that HIV/AIDS presents to the region and the world.

HIV/AIDS in India

India is now at the epicenter of AIDS in Asia, with the maximum number of cases having been reported in Bombay. The number of HIV positive and AIDS cases recorded in Bombay in 1995 were 7,000 and 1,200 respectively. The estimated number of HIV positive cases in Bombay increased from 150,000 in 1994 to 200,000 in 1995, and the estimated number of AIDS cases in Bombay increased from 15,000 to 20,000 during the same time period.[25] According to estimates from the Indian Health Organization (IHO) around 65 percent of the 70,000 prostitutes in Bombay have tested positive for the HIV virus. The IHO estimates that there are currently 4 million cases of HIV in India and that figure could reach 15 to 20 million by the end of the century.[26] It is clear that India is faced with an AIDS crisis. There are a number of factors that have led to the rapid emergence of AIDS in India.

Variables that have Led to the Emergence of HIV/AIDS

The main factors that have caused an explosion in the number of HIV/AIDS cases in India fall within the broad categories of demographic, social and environmental variables. These factors are: (1) Education; (2) Cultural barriers; (3) Sexual Contact; (4) Blood transfusions; (5) Intravenous drugs; (6) Childbirth and breast-feeding; (7) Rural to urban migration; and (8) Lack of adequate health care facilities.

Variables Affecting the Social and Economic Structure

The variables that affect the stability of the social and economic structure in India are the same as those outlined in the general model. These are: (1) Population pressures; (2) Ethnic tensions and social strife; (3) Poverty; (4) High mortality, which effects the labor force

and increases expenditure on health care; (5) Economic and political crises; and (6) Resource depletion and degradation.

The Relationship Between HIV/AIDS and Social and Economic Stability

This section examines how HIV/AIDS threatens the security of the social and economic structure in India by either affecting the variables that impact the stability of the social and economic system or by acting directly on the system. Thus, the relationships between the variables that have brought about the AIDS epidemic in India, their impact on the disease, and in turn the effect of the disease on the stability of the nation are elucidated.

AIDS is not only a threat to India but also to the region and the international system at large. With ever increasing globalization, diseases that originate in one country or region can reach the farthest corners within a matter of hours. With global travel and migrations, a disease like AIDS can be easily transmitted to individuals in other countries. Thus, if the AIDS explosion continues in India, the security of the international system and developed countries is likely to be threatened. AIDS requires special attention at both the national and international level.

Policy Recommendations

No single HIV/AIDS prevention strategy is likely to be effective on its own. Instead what is needed is a combination of strategies, backed by resources to stem the spread of AIDS. Among the key strategies to control AIDS in India is education. Without substantial political commitment, leadership, and resources HIV/AIDS will not only be a health disaster, but also a development disaster in India.

If governments, corporations, NGOs, and international organizations can come together and work effectively there is hope that the threat that AIDS poses to India, and world society, can be substantially reduced. While researchers look for medical solutions and health care professionals cope with the treatment for those already infected, the general public and policy makers can facilitate HIV prevention through education and information. We cannot and do not need to wait for scientific breakthroughs. We must act now.

Conclusions

The key points that emerged from this study are: AIDS is problem that has reached critical dimensions in India; if the spread of AIDS continues unchecked there is likely to be a breakdown of the social and economic system in India; enhanced cooperation is essential among policy makers at all levels and among governments, NGOs, corporations, and international institutions to counteract the spread of AIDS; and that resources need to be directed towards prevention and control of the spread of AIDS.

CASE STUDY SUMMARY: TUBERCULOSIS IN SOUTH AFRICA

In 1993 the World Health Organization declared a "global tuberculosis emergency," hoping to draw attention to the increasing severity of the TB epidemic. This warning went unheeded; three years later, WHO's 1996 report concludes that TB now affects more populations in more countries than at any other time in history. TB kills three million people each year, and as many as 1.9 billion people—one third of the world's population—may be infected with TB. TB is now the leading killer of women and of HIV-positive individuals. It is the biggest single infectious cause of adult deaths worldwide.[27]

Tuberculosis is an air-borne disease caused by the bacillus *Mycobacterium tuberculosis,* which attacks the lungs 85 percent of the time. TB bacteria destroy living lung tissue, causing blood vessels to rupture and blood to collect in the lung cavities. If left untreated, TB sufferers will die by asphyxiation—literally drowning in their own blood.[28] Once TB bacteria infect a person, most healthy immune systems can keep them in a state of dormancy. In fact, only five to ten percent of people infected actually become sick with active TB.[29] This emphasizes the importance of nutrition, lifestyle, and other factors that contribute to a strong immune system, since a person cannot pass the disease to someone else if he/she does not develop active TB.

Until recently, there has been a steady decrease in TB mortality rates in industrialized nations. Reliable evidence shows that this decrease had begun before the discovery and implementation of anti-TB chemotherapy in 1945, suggesting that the decline of TB was due to improved nutrition, behavioral changes, and overall better living conditions rather than to the impact of medical treatment.[30] But recent statistics show that tuberculosis is on the rise again in industrialized countries. For example, from 1985 to 1993, the number of cases in the United States increased 14 percent. Increases have been reported in Denmark, Holland, Norway, Switzerland, Italy, Spain, and Portugal; and TB is rising rapidly in Eastern Europe and the former Soviet Union. In developing nations, TB rates are highest in parts of southeast Asia and Africa. Of the estimated 1.9 billion people infected with TB today, 95 percent are in the developing world.[31]

In June 1996, WHO announced that South Africa had the worst known TB problem in the world, with the highest documented infection rate of 350 cases per 100,000 population. The variables which have contributed to the TB crisis in South Africa are primarily popu-

lation growth, migration, urbanization, malnutrition, poor education and hygiene, poor health care, drug resistance, and the HIV/AIDS epidemic. The two latter variables deserve special attention: Multidrug-resistant tuberculosis (MDR-TB) arises when doctors or health workers prescribe the wrong drugs, wrong combination of drugs, or if anti-TB drugs are not taken for the complete duration of treatment. Recent outbreaks of multi-drug resistant TB have occurred in New York City, London, Milan, India, Thailand, South Africa, Estonia, and Pakistan. Although exact numbers of MDR strains of TB are unknown, WHO estimates that 50 million people are already infected with MDR-TB.[32] The other variable which exacerbates the TB crisis is AIDS. WHO estimates that approximately 5.6 million people are co-infected with HIV and TB.[33] An HIV-positive individual is 30 times more likely to develop active TB. With both population explosion and the HIV epidemic in sub-Saharan Africa, the annual number of TB incident cases is expected to more than double from 1990 to 2000.[34]

Tuberculosis puts great strains on the social and economic structures in South Africa. The most serious consequence of a TB epidemic is its financial burden on the country. TB hits the most productive sector of South Africa's population—people between the ages of 18-45. UN Food and Agriculture Organization has estimated that by the year 2010, Africa's labor force could be reduced by 25 percent.[35] A shrinking labor force will severely limit South Africa's ability to service its huge national debt, to maintain a stable currency, and to support the rising cost of labor. In a country which has a tendency toward violent outbreaks and civil unrest for political reasons, economic hardship only fuels popular discontent.

Clearly, tuberculosis poses a threat to the security of South Africa. It is also a threat to other countries—even in the industrialized world. The unprecedented resurgence of TB in the United States during the 1980s and early 1990s illustrates the threat of TB to industrialized nations: From 1985 to 1992, TB cases increased as much as 30 percent in some parts of the U.S.—namely New York, New Jersey, and Florida. An alarming outbreak of TB occurred in New York City during the late 1980s which caught health workers unprepared to deal with the crisis. As a result of neglect to public health systems in New York, the prevalence of HIV, and the inability of health workers to enforce completement of treatment programs, up to one million New Yorkers may now be infected with the TB bacillus.[36] Other outbreaks of drug-resistant TB have occurred in Florida and New Jersey, and increasing evidence indicates that drug resistance is on the rise nationwide.[37]

The experience with TB outbreaks in New York City along with the lessons of rising TB in South Africa show that treatment-driven control programs as opposed to prevention-driven programs are more costly and ineffective in the long run. Especially in light of TB-HIV/AIDS coinfection, real prevention means building up immune systems and awareness of both TB and AIDS to prevent active TB—rather than curing TB after it has developed. An effective policy starts at the community level and targets the conditions which allow TB to develop and spread. A community-based public health campaign requires a collaborative effort between the international community and national governments, under the direction of indigenous experts and involving members of the local population, particularly women, who are key to ensuring proper pubic health. Addressing the global problem of TB means looking at individual needs. Nutrition, sanitation, and proper hygiene are therefore key to building healthy immune systems and reducing the risk of TB.

In conclusion, TB is a danger to all nations, not simply in the developing world where it is currently most prevalent. With open trading policies and the intertwining of global markets, economic instability caused by a TB epidemic in one country could have repercussions on the world at large. The presence of HIV in all regions of the world make nations doubly susceptible to a tuberculosis epidemic, and the emergence of MDR-TB jeopardizes even the most advanced nations' ability to cure TB. The battle against TB will tilt in our favor only when we alleviate the conditions in our environment which invite disease and allow it to spread.

CASE STUDY SUMMARY: CHOLERA IN PERU

In late January of 1991, cholera was re-introduced to Peru and Latin America for the first time in 90 years. Within months, Peru faced a spreading "medieval plague" that had accounted for more than 160,000 cases and over 1,500 deaths. Health-watch groups converged on Peru, as the world's health community feared that the disease would become endemic and spread throughout the entire hemisphere within one year. Many experts believed that by 1992 the number of cases in the hemisphere would reach 6 million, with a possible 40,000 deaths.[38]

Peruvian exports of fish, fruit, and other horticultural products were virtually shut down. Tourism to Peru, as well as its neighboring countries in South America, was relegated to a slow crawl. In 1991 alone, economic losses were estimated at $1 billion, equivalent to almost half of Peru's 1989 export earnings. Peru's economy had been in a severe crisis from the beginning of 1982 and this plague could not have hit the nation at a worse time. Social expenditures on health, education, housing, and employment had been reduced tremendously—in 1990, social spending was equivalent to only 28% of 1980 levels, as the nation tried to come to terms with the strict macro-stabilization policies of the World Bank and International Monetary Fund (IMF). A 1991 Standard of Living Survey found

that 21.7% of the total population was living in *extreme* poverty (total per capita expenditure below the per capita cost of the basic food basket), while a frightening 53.7% of the population was in a state of *critical* poverty (total per capita expenditure below the basic shopping basket, including food and nonfood items).[39]

We are standing on the brink of a global crisis in infectious diseases. No country is safe from them. No country can any longer afford to ignore their threat

Dr. Hiroshi Makajima, World Health Organization, World Health Report 1996

During the same period, Peru was facing a political upheaval with the entrance of newly elected president Alberto Fujimori, as well as sustained fighting and terrorist attacks from the Maoist guerrilla group, Sendero Luminoso (Shining Path). There is a sharp divide between Peru's rich and poor, not to mention the systematic racism experienced by the nation's indigenous peoples. The introduction of cholera at this period was a very heavy straw to be placing on an already burdened camel's back.

This case study examines how Peru persevered in the face of this terrible epidemic which raged through most of the country in 1991 and 1992. The menace of cholera, seen at this time in Peru's history, was a definite security threat. The national economy, in terms of internal and external consumption of Peruvian agri/aquacultural goods; Peru's national workforce; the health care system; urban/rural sanitation and drinking water; and continued depression of Peru's poor were all variables upon which this epidemic put an added strain. Nonetheless, the disease was contained and violence and chaos did not encroach further into Peru. The case study provides the Task Force Report with analysis of a disease and region where all indicators seemingly pointed to a security crisis, but through rapid and efficient recognition and response to the disease, the problem was solved. It also analyzes the roots of this disease. It is these roots, that are much like those of the other two case studies in this report, that, in many ways, continue to lie dormant in Peru's social soil. As the other cases demonstrate, it is these roots which are present throughout much of the developing world. Cholera, tuberculosis, AIDS, and other infectious diseases are leading the global community into a more difficult age. These diseases are the manifestations of the ill-health of society and its environment, and the cholera epidemic in Peru is only one example of this.

The economic, social and political setting in Peru in late January of 1991 was highly conducive to the rapid expansion of a cholera epidemic. Kaplan's Dark Ages' scenario was unfolding in Peru in 1991, with all of the warning signs for an imminent security crisis: extreme poverty, large proportion of youth relative to total population, and rapid urbanization, coupled with a disease epidemic. The next phase of collapse and violent conflict seemed imminent.

Demographic, social and environmental variables led to the outbreak of cholera in Peru. In turn, cholera exacerbated the variables which led to its emergence and placed a tremendous pressure on the economic, political and ethnic variables affecting national and international security. Specifically, cholera intensified Peru's economic and political crisis; forced health care costs to skyrocket; led to greater unemployment and, therefore, greater levels of poverty; exacerbated ethnic tensions and heightened the possibility of armed resistance with the support of legions of sick, impoverished, indigenous people; hit Peru's urban slums and spread rapidly, creating greater population displacement pressures, while widening the gulf between rich and poor; and finally, offered the illegal drug industry further prospective employees—disgruntled citizens who were desperately seeking a reliable source of income.

Through competent domestic leadership in the Peruvian Ministry of Health (MOH), the assistance of domestic NGOs and community-based organizations, and the effective use of international health diplomacy in garnering support from international organizations (IOs), neighboring and developed countries, Peru was able to quickly address the disease and bring it under control. Beyond this, it was able to bring direly needed international attention to Peru, which helped push the nation back into a positive direction.

The individual response at a grass-roots level in Peru was also very impressive. In urban shanty-towns and rural villages alike, health, women's, and neighborhood committees were formed in response to the epidemic, and also in response to the nation's dire economic state and wide-spread infiltration of drugs. These committees independently assisted Peru in educating the public and aiding the MOH in areas where insufficient funds did not allow them to go. In areas which could have been hot-beds for rebel insurrection and recruitment, the people chose rather to opt for their health and stability.

By April of 1991, the UN Disaster Relief Organization reported total assistance at $5.5 million, with 21 governments and the EU donating more than $4.5 million; the Pan American Health Organization (PAHO), UNICEF, and the Inter-American Development Bank provided more than $1.5 million; while 15 NGOs had given nearly $1 million.[40] The United States view that the cholera epidemic was indeed a security threat is evidenced by the convening of a Congressional hearing on the epidemic on May 1, 1991. Following that

hearing, continued aid flows rushed into Peru through the auspices of USAID, the CDC, and federally supported NGOs such as Catholic Relief Services and CARE. Bilateral treaties with Brazil also provided Peru with more funds, as well as more surveillance powers for the isolated Amazonian region. By August of 1991, a senior UN administrator officially declared that the spread of cholera had been controlled within Peru.

Peace was maintained and Peru has emerged from the crisis in a state that is, in many ways, better than when the disease had struck. In an interview with Dr. Julio Sotelo, national president of the Peruvian-American Medical Society, he mused in retrospect, "I don't know the reasons, but a country devastated by terrorism, hyperinflation and lacking the appropriate infrastructure, could not have done better [in addressing the crisis]."[41] As an example to other developing nations and the developed world at large, the Peruvian cholera epidemic serves as an instance of success which should be re-examined for future global crises and which, as a still-fragile, developing nation, should not be forgotten as quickly as it was recognized. At the same time, it is important to note that many of the underlying conditions that enabled the epidemic remain. Until these are addressed, Peru remains especially vulnerable to the threat of infectious disease.

GENERAL POLICY RECOMMENDATIONS: LINKING THE CASE STUDIES

No one policy can pertain to every type of infectious disease, each disease having its own particular characteristics and requiring a particular set of solutions. However, the three case studies we have summarized above share a similar focus for policy recommendations. That focus is on prevention instead of treatment, and lies in the socioeconomic roots of the emergence of all three diseases. There are, however, three general approaches one could take to reduce the security threat which disease epidemics pose to a particular nation or region. These are: (1) a demographic approach, (2) a clinical approach, and (3) a socioeconomic approach.

A Demographic Approach

A demographic approach includes border controls, immigration limits, and population controls. Border controls, for example, aim to keep disease out by preventing infected people from coming into a particular area. This is currently the strategy used by Russia to limit the spread of HIV—strict border controls to keep out HIV-infected people. But this method can prove difficult to implement, is politically controversial, and is ineffective in diminishing the prevalence of disease elsewhere. All three diseases in this study have certain incubation periods, and it is often impossible to detect if a person is infected, especially if he or she shows no symptoms whatsoever. Border controls require extensive, high-tech screenings and tests to effectively detect disease-infected individuals.

Limiting immigration does not fully address the problem either. While it could help reduce the incidence rate in one country as opposed to another, tightening immigration laws does nothing to prevent the disease from escalating elsewhere and causing indirect economic consequences. Controlling population growth through family planning programs could significantly alleviate the population pressures which put stress on already overcrowded cities which breed diseases. But experience shows that contraceptive programs face huge barriers due to social and cultural traditions of large families and the importance of having many children. While family planning is desirable in the long run, it is an indirect action to combat disease and does not guarantee results. Thus, a demographic approach would be not only expensive, but also difficult to implement and most likely ineffective.

A Clinical Approach

A clinical approach to reducing the threat of infectious disease relies on the use of science and technology—it is a treatment-based approach. For diseases that have a cure, like tuberculosis, effective treatment is possible when all the necessary resources and infrastructure are present to ensure that a disease-infected person is completely cured. For most developing countries, a well-managed health system does not exist, and resources are severely limited when large debts already burden their struggling economies. The cases of both TB and cholera prove the danger of ineffective treatment resulting from poorly-managed health care systems. The appearance of drug resistant strains of TB, cholera, and several other diseases today threaten to undermine even good health programs. A clinical approach ignores the lessons of history—the fact that the decline of infectious diseases at the turn of the century began before drugs were discovered. While medicine and technology helped speed up and reinforce the decline, they were not the reasons for the decline as many had assumed. The fact is, we cannot be overly optimistic about the capabilities of science and technology, because in many cases the microbes outsmart us.

The United States has recently proposed an "Interagency Task Force" which would mobilize several U.S. agencies—the Centers for Disease Control, the Department of Energy, the Federal Drug Administration, the Department of Defense, and others—to "help build an international network for infectious disease surveillance and response."[42] The Task Force would provide a mandate for U.S. agencies to coordinate communication networks to detect disease and to mobilize a concerted response when outbreaks occur. While it re-

mains to be seen if the proposal for a disease Task Force will actually be put into practice—since it is still in its infancy stage—it could serve as an effective tool to help prevent the spread of infectious diseases to the U.S. and to other countries as well. But even this does not address the heart of the problem. Surveillance and response teams are not unimportant; the problem is that they are still reactive methods of dealing with disease. The root of the disease crisis stems from the conditions, or the disease variables in our model, which allow it to develop and which perpetuate its spread.

The lessons of AIDS, tuberculosis, and cholera stress the importance of prevention-driven health policies in light of the relationship between environmental conditions and epidemics. The term "environmental conditions" refers to the general surroundings in which a person lives, involving such things as access to food, water, housing, sanitation facilities, education, and general public health. A third approach then, and we believe the most effective one, is a socioeconomic approach which deals with the conditions that allow disease to spread and develop.

A Socioeconomic Approach

An effective socioeconomic policy to combat disease must look at individual needs and should target the community level. Because infectious disease is a global problem, this requires the involvement of a variety of actors at all levels—international, national, and community levels. In this way a concerted effort and combination of strategies together can fight to prevent disease before it has a chance to become a security threat. These strategies include education, improved living conditions, and community-based public health.

Education

First, a key element in the prevention of all infectious diseases, especially in the case of HIV/AIDS, is improved education and awareness of disease. This includes disease awareness programs from primary school onwards and practical health training for mothers and youth alike. Here, non-governmental organizations (NGOs) can play a key role. NGOs can provide training in areas that governments find difficult to deal with—such as promoting the use of condoms or discussing issues related to sexual behavior. Because they often involve volunteer action, NGOs can be more dedicated, flexible, and cost-effective as executing agencies. They also provide a voice for those who otherwise might not be heard, and can bring local concerns to the attention of national and international audiences. Indigenous organizations and local volunteers who identify with a particular cultural community can provide an important liaison between education efforts and the local population.

Empowering Women

Attention should be directed most to women, since throughout the developing world women are the ones who nourish their families, collect water and firewood, and clean and maintain their homes. Ingar Brueggemann, Secretary General of International Planned Parenthood Federation, states that women provide "more health care than all organized health services put together."[43]

Improved Living Conditions

Alleviating the poor living conditions from which most developing populations suffer is crucial to disease prevention. Overcrowding, poor sanitation, malnutrition—all of these create the perfect environment for endemic disease. Here, a government policy committed to increasing employment, securing access to education and training, and giving the poorest members of society access to land and credit will integrate the poor into both the economy and the community. Community-based training programs, sponsored by the national government, have the potential to eliminate "pockets" of peasants, refugees, and ethnic groups in order to prevent the trap of poverty and isolation which characterizes many inhabitants in urban centers. Private corporations and international organizations can assist with housing projects to alleviate overcrowding in the cities. Projects like these are already happening. For example, residents in a slum community in Poona, India "designed their own small but airy brick houses, bought cheap materials, and then constructed them with residents and neighbors pitching in."[44] Similarly, slum dwellers in Orangi, a squatter community in Karachi, Pakistan, laid their own sewage pipes and installed toilets. Using cheap materials and simplified technology, the residents themselves built 5,400 sewers and 94,000 latrines with $1.8 million of their own money. The project was directed by a research organization called the Orangi Pilot Project, "backed by $105,000 in private funds, which operates with little government help and often refuses foreign aid."[45] In addition, providing the poor members of society with credit, as is the practice of the Grameen Bank in Bombay through its micro-lending policies, can help empower the local people and relieve governments of the some of the burden and responsibility. Providing job opportunities and training at the community level in regions outside of large urban centers can also diminish the adverse effects of urbanization and reduce migration. The net effect of these improvements in social and economic conditions will alleviate tensions in society and prevent violent outbreaks which could result from continuing poverty and social discontent.

Public Health

Finally, disease prevention requires good community-based health care that has frequent and direct contact with the local population and is in touch with individual needs. Often foreign consultants and foreign experts in various fields, including the field of disease control, are sent to work in a country they know very little about. Foreign donors often prefer entrusting their funds to a consultant with whom they are familiar; and as a result, they send foreigners to implement elaborate control programs which simply do not work in certain communities.[46] For this reason, indigenous consultants should assist in the direction of foreign or government-funded projects and should oversee the implementation of those projects. For improving community-based public health, all members of the local population, in addition to indigenous consultants or experts, should be mobilized to join the effort. Local members of society who are engaged in health education campaigns, food preparation, water filtering, and other activities can influence greatly the behavior patterns of neighbors and friends. Establishing an environment for the development and use of indigenous skills is crucial for the success of public health.

Funding

Underfunding is a major obstacle to the progress of public health in both developing and developed countries. Typically, very little money is given to health care and disease prevention; even less money is provided for developing countries as more and more industrialized nations make cuts in foreign aid. The UN Special Initiative on Africa is a positive sign, but it is an exception to the rule. Because corporations have a large stake in the success of disease control, as their labor force depends on a healthy population, they also should play a part in education and awareness. Private businesses often have more liberty to allocate resources for educational facilities and other programs. Because funding is crucial to the progress of disease control, contributions of both the private sector and governments are necessary for effective prevention.

While infectious disease is most serious in developing countries and most efforts must be focused on this part of the world, industrialized countries have a clear interest in helping to fund and to implement disease prevention. Recent outbreaks of tuberculosis in New York and the growing AIDS epidemic nationwide testifies to the danger of spending cuts to health facilities and insufficient commitment to disease prevention. Even a nation as technologically equipped and economically strong as the United States is not excluded from the threat of diseases at home. The fight against infectious disease needs a leader, and the U.S. is in the best position to lead. Collaboration among governments via the United Nations and the cooperative effort of health institutions like the World Health Organization, the Centers for Disease Control and Prevention, the London Institute for Hygiene and Tropical Medicine, and Institut Pasteur could provide the direction needed to instigate disease prevention programs and improve the living conditions of many of the world's population. Because disease does not discriminate among its victims, all nations should commit to maintaining public health in their own communities and to cooperating with international efforts as well. Preventing outbreaks before they occur will be more cost-effective in the end. We either pay now or we will pay much more later—in both money and human lives.

Conclusion

In this report, we have attempted to demonstrate that infectious disease is a global threat, and that as a global threat, it requires global action. But global action does not mean guarding ports of entry to keep out infectious germs nor sending a few teams of experts to treat a disease when an outbreak occurs. It does not mean financing expensive after-the-fact control programs nor searching for "magic bullets" to cure every illness. The lessons of history teach that this approach is both costly and ineffective in the long run. For HIV/AIDS, there is no cure as of today. But if there is a cure eventually, would it mean that AIDS would no longer pose a threat? If it follows the patterns of other "curable" diseases in the past, like tuberculosis and cholera, the answer is "no." Human neglect caused these and other "conquered" diseases to return, often in much deadlier, incurable forms; and there could be many more AIDS lurking in the future. As Thomas McKeown stated, "the health of man is determined essentially by his behavior, his food and the nature of the world around him."[47] If humankind is to keep its health, these are the things it must consider. Fortunately, these are also within human reach. If we had the power to create the conditions in which we live today, then surely we must also have the power to correct these conditions. Our very survival may, in fact, depend on it.

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Report On Applying Military and Security Assets to Environmental Problems

Task Force: Nathan Ruff (Leader), Robert Chamberlain and Alexandra Cousteau

Introduction

With the end of the Cold War, the United States military and intelligence communities have been searching for new enemies and new roles. The demise of the Soviet Union presented an opportunity to revisit traditional conceptions of security and consider new missions such as heightened counter-terrorist activities and protection of U.S. firms against economic espionage. In this project, special attention has been given to the importance of environmental change. The exploration of linkages between environmental change and security has developed into a complex debate focused on two fundamental and interrelated questions:

- Is environmental change a "traditional" security threat?
- In any case, what role is best played by the military and intelligence communities?

Consideration of the natural environment and security together is certainly not a new phenomenon. Natural resources and strategic minerals have long been considered vital to a nation's security, and well within the realm of military attention. In addition, states' actions in pursuit of security or the prosecution of war have been harmful to the natural environment.[1] Dabelko summarizes the idea of environmental security as follows:

> Environmental security has emerged as a transnational idea, the core of which holds that environmental degradation and depletion, largely human-induced, pose fundamental threats to the physical security of individuals, groups, societies, states, natural ecosystems, and the international system. Security institutions in particular are currently failing to redress these threats. All institutions, according to the central tenets of the idea, must better address these threats. The alternative if these threats are not addressed will likely be economic, social and/or political conflict that will continue and increase as human, societal, and ecosystem health and welfare decreases (Dabelko, 1996, p. 2).

The aim of this report is to examine what the military and intelligence communities can do to alleviate or solve the problems identified under the rubric of environmental security issues. It presents three approaches to understanding environmental security, offers a synthesized model that underscores environmental factors as threats to security, and applies this model to two cases. The case studies examine varying environmental problems, and yield a number of general prescriptions for policy makers.

THREE PERSPECTIVES ON LINKING ENVIRONMENT AND SECURITY

Ecological Security

Ecological conceptions of environmental security focus on a competitive environment in which humankind and nature are at odds. Some proponents of this perspective take an uncompromisingly ecocentric view, maintaining that the environment must be protected from human intervention at all costs.[2] Less exclusive viewpoints include "microsecurity," the competition between man and microorganisms as identified by Dennis Pirages; concern over man's continued extermination of thousands of plant and animal species (biodiversity loss); and concern with the irrevocable tampering with the assembly rules of ecosystems planetwide.

To mitigate and end mankind's assault on nature, ecological interpretations of environmental security place value on cooperation as the most appropriate means for achieving their goals, largely through multilateral mechanisms focused on the root causes of environmental change.

Human Security

The human-based concept of environmental security concentrates on the minimization of human suffering and addresses issues related to environmental cleanup, economic sustainability, and the emergence of exotic diseases.[3]

Norman Myers is perhaps the best known advocate of this approach to environmental security. Myers, in his efforts to emphasize individual well-being as the guiding principal for national security, seeks to radically redefine the very notion of "security," shifting its focus from territorial sovereignty to individual welfare. Dabelko believes that whereas ecological approaches treat the underlying causes of the environmental crisis, human security approaches are generally reactive, responding to degradation that is already apparent.

Military Security

A third approach adopts a conventional military security focus. At the center of U.S. military conceptions of environmental security is research on environmental change as a cause of conflict. Although current research does not support the idea that environmental stress can trigger interstate conflict, it has indicated that, in league with other contributing factors, environmental conflict can lead to subnational, or intrastate violence (Homer-Dixon, 1994).

In view of this research, environmental variables are being identified by some within traditional security institutions as a threat that must be added to the list of traditionally established threats that analysts and military planners consider when attempting to anticipate coups, political instability, mass migrations, and violent conflicts (Butts, 1994a).

Another aspect of military security deals with "greening" the military. For example, the Clinton Administration's Office of the Deputy Under Secretary of Defense for Environmental Security is charged with, among other responsibilities, compliance with national environmental regulations, taking a more ecological approach to doing business, and cleaning bases where military excesses threaten civilian populations.[4]

In summarizing current thinking on the role of the traditional security community, Gary Vest, the Principal Assistant to the Deputy Under Secretary, has outlined a six-point Department of Defense (DoD) conception of environmental security:

> DoD's view of Environmental Security is comprised of the following: (1) ensuring environmentally responsible action by military units wherever they may be; (2) ensuring adequate access to land, air and water to conduct a defense mission; (3) protecting the DoD's war-fighting assets (people, equipment and facilities); (4) understanding where environmental conditions contribute to instability, and where the environment fits into the war and peace equation; (5) bringing defense-related environmental concerns to the development of national security; (6) studying how defense components can be used as instruments of U.S. global environmental policy (ECSP *Report* 2, 133).

At least in theory, it would appear that Vest's six-point program could be compatible with any understanding of the linkage between environment and security. Many are skeptical, however, that the military and intelligence communities can or should play a constructive role in addressing environmental problems. We have identified five specific ways in which those assets could be—and to some extent are being—used effectively (see Matthew, 1996). These are:

- support R & D—the Administration can use military research to broaden technological solutions to problems of environmental scarcity and degradation;
- transfer skills—the U.S. military can work closely with other militaries to "green" their institutions by fostering environmental sensitivity and training others in environmental impact assessments and environmentally sensitive techniques;
- make better use of National Technical Means (NTM) data—the United States can monitor and report on many aspects of the environment, from soil degradation to population migration;
- threaten force to compel compliance from other nations on environmental agreements;
- conflict resolution—in cases where environmental scarcity does lead to conflict, the United States can apply security assets to monitor cease-fires, troop movements, and provide logistical support to humanitarian efforts.

The following case studies of Russia and Rwanda underscore the value of using military and intelligence assets, describe current activities along these lines, and suggest directions for the future.

CASE STUDY ONE: RUSSIA

Introduction

Russia is an unstable country that continues to "control" the largest stockpile of nuclear weapons in the world. It is undergoing a transformation that threatens to tear apart the very fabric it is attempting to restitch. Its governing body is factionalized, rogue leaders operate with impunity, the economy is in ruin, and its military assets are guarded with less vigilance than would be recommended by the world community.[5] Add to this scenario environmental conditions that border on unlivable, and a picture of impending disaster begins to crystallize.

Russia represents a unique situation in which the epitome of traditional security concerns, the nuclear threat, blends with newly developed ideas of environ-

mental security. The fusion of these two terms yield an enhanced threat to the United States. Not only does the fear exist that the Former Soviet Union (FSU) could slip back into a state of Cold War antagonism against the United States or that nuclear weapons might fall into the wrong hands, but these possibilities are exacerbated by the strains of economic and environmental stress Russia is undergoing. The United States has an obvious interest in disarming these problems before they reach a critical threshold. Russia's instability cuts across all fronts, political, economic, military and environmental; a satisfactory response must address all four sources of instability. This case study examines the specific role that military and intelligence assets do and can play in achieving this goal.

The Model—"Four Frontiers of Instability"

The model that is presented in Figure 1 shows how environmental instability (comprised of pollution, radiation, and resource scarcity) can work to directly destabilize Russia as well as enhance political, economic, and military destabilization vectors. This same environmental instability can affect the United States directly by disrupting international environmental integrity through ozone depletion, global warming, and deforestation. An unstable Russia promotes fears of "loose nukes," and ultimate failure of the state would result in a destabilized world community. This would create intense, detrimental effects to the United States. Finally, this world destabilization would cycle back in a negative feedback loop and exert renewed stress on the four frontiers of initial instability.

Russia, 1996

The conditions in the FSU have eroded to a level at which human existence is being threatened. This may seem an extreme statement, but there are a number of Western experts, as well as the Deputy Minister of Public Health in Russia, Nikolay Vaganov, who believe that the Russian gene pool is on the verge of irreparable damage. The cause of these conditions has not come from the West, as so many Soviets foresaw; rather, in an ironic twist of fate, the destruction of Russia's motherland has developed as a byproduct of Soviet attempts to achieve national security and economic growth. At present, Russia's continuation as a sovereign and stable country is being severely threatened by its lack of environmental management. The stress on its internal

FIGURE 1

security is developing into a pressure felt throughout the entire world system.

Unfortunately, problems have been amplified, rather than alleviated, by the collapse of the Soviet Union due to the difficulties Russia has had in restructuring its command economy into a free market economy. Quite simply, there is not enough money available in the government to move Russia through its transition. Taxes are not being collected effectively, huge expenses are still being devoted to an oversized military machine, and corruption has reached unprecedented levels and organization. Steve Blank of the U.S. Army War College in Pennsylvania has described Russia as a "failing state." These dire economic conditions have further degraded an environment in which Russian health and the longevity of its people are being threatened.

As Murray Feshbach states, "reproductive health is one of the most accurate indicators of public health overall, as well as of local ecological conditions. Probably no other statistic epitomizes the current societal crisis facing Russia than that there are two abortions for every three pregnancies (1995, p. 10)." Infant mortality is at an all time high, the morbidity and mortality of the general public are rising, and birth defects from radiation poisoning are creating a situation in which "there is a danger of the nation's physical degeneration, of irreparable damage to its genetic fund (p. 12)."

The lakes, seas, rivers, wetlands, and public water supply are nearly all contaminated with chemical, radioactive, and human waste. The great forests in Siberia, second only to the Brazilian rain forests as a source of planetary oxygen production, are under attack from acid rain, pollution, and industrial clearing. Air quality has deteriorated to such an extent that a popular belief in Russia is that "living longer means breathing less." The dumping of nuclear byproducts is unsupervised, nuclear power plants are run "blindly," and the fear of fissile material smuggling has put the entire world community on alert. In essence, the evident deterioration of the last five years which has brought the continued existence of Russia as we know it into question is, in part, the culmination of 50 years of environmental mismanagement and abuse.

The Threat to United States Security

The situation in Russia is unstable. General environmental degradation in Russia is a cause of internal distress as well as external pressure. Not only are national concerns an issue, the overall welfare of the global system as linked by oceans, jet streams, and ecobalance is in jeopardy. For these reasons, the security of the United States is being compromised by four major threats. The first two fall under the aegis of traditional security issues, while the second two reflect environmental security concerns.

First, the nuclear threat from the FSU has been transformed from fear of a nuclear strike to fear of nuclear ineptitude. Chernobyl-like accidents in the future are seen as an eventuality if old and unsafe RMBK reactors are not shut down in Russia. In addition, the economic stress that Russia is experiencing opens the door to organized crime, the smuggling of fissile materials to terrorists, and the enticement of unpaid nuclear specialists to aggressive Third World countries as consultants to their growing nuclear programs. Many divisions of the Russian army have not been paid in three months.

Second, the fear that Russia could revert back to Cold War status is a priority concern. The sociopolitical threat of internal revolt lends itself to the possibility that a successful coup could take place in a country that has the military might to throw the world into a nuclear winter. If a small number of hard-line, old-school military leaders, or an unstable militant faction, takes control of Russia's stockpile of weapons of mass destruction, they would be in a position to blackmail the world community and especially the United States. The advantages that the U.S. military and intelligence community provide in addressing these first two concerns are evident and fall into the category of traditional national security issues.

Third, United States national security is threatened directly by environmental degradation as shown in the model. Global warming, ozone depletion, global resource pollution, and ecobalance destruction all affect the collective future of the planet directly. The consequences may vary from increased incidence of skin cancer to lower crop yields and worse. Regardless, the results are negative.

Fourth, environmental stress can adversely affect U.S. security indirectly by causing regional instability at an international level. Certain areas of the world will succumb more rapidly then others to the tensions created by environmental stress. This can trigger secondary effects which ultimately result in international conflict. The Arab-Israeli War in 1967, often dubbed a water war, represents a perfect example of this scenario. If one is to believe the dire predictions of Robert Kaplan (1994), this type of war is a prototype for armed conflict in the 21st century.[6] The reasoning follows a linear progression of cumulatively critical conflicts: for example, global warming exacerbates the necessity for water in various regions of the world, resulting in mass migrations; these migrations put undo stress on neighboring countries which are forced to aggressively stem the human tide; this conflict escalates into local wars, and it ultimately destabilizes the region. As recent history has shown, this would pull the UN and the United States into the fray and could lead to an international systemic crash. Thus, it is in the United States' national security interest, in both traditional and revised forms, to follow a policy of pressure point intervention in or-

der to defuse such situations before they reach critical threshold. Before precautions can be taken, pressure points must be identified where resources can be applied most effectively. It is at this point that the military and intelligence community can provide invaluable assistance.

The Role of the Military and Intelligence Communities

A major role of support can be undertaken by the intelligence community and the military establishment though the identification of present and future areas of concern (an early warning system), the monitoring of Russian deterioration as well as environmental treaty compliance (space based observation), and the provision of archived environmental information (bilateral information transfers—BITs).

The feasibility of having the military and intelligence community address these environmental security concerns, as opposed to traditional national security threats, was the topic of a study conducted in 1992. Under the urging of Vice President Gore and the blessing of then Director Robert Gates, the CIA chose 70 civilian environmental scientists with whom they paired CIA officials to create an unprecedented task force—now known as the Medea Group. The goal was to answer the question of whether the U.S. Cold War spy equipment could be used effectively to combat environmental degradation. The scientists were given security clearances and allowed to examine the CIA's archives of photographic and radar images, atmospheric data, and undersea records. In addition, they were allowed to access the spy satellites directly through their control at the National Reconnaissance Office (NRO). As Robert Dreyfuss makes clear in his article, "Spying on the Environment," the scientists' initial report leaves no doubt that the intelligence community's archives and collection devices could provide invaluable clues to understanding global environmental change. Unfortunately, the task force's findings may never be productively used by the environmental community at large because of the CIA's fear of revealing too much information regarding their collection processes. Their chief worry concerns compromising the United State's ability to successfully collect information pertinent to immediate national security issues. They fear that if reconnaissance pictures fall into the wrong hands, certain of their gathering capacities will be compromised. Just as one can tell where a photographer is standing by looking at a normal picture, so too can experts triangulate the locational path of remote sensing satellites from the images they record. Thus, if satellite imaging was made public, this information could be used to inhibit the United States in obtaining information later. This fear is not unfounded.

During the 1992 Gulf War, Saddam Hussein is said to have been able to protect a trove of scud missiles from allied attack based on information he received from unclassified satellite reconnaissance. "The Iraqis demonstrated on numerous occasions their accurate understanding of the limitations of U.S. technical collections systems and of how data gathered by such systems were interpreted. The catalogue of techniques used by the Iraqis to thwart these systems includes construction of buildings within buildings; deliberately making buildings designed to the same plans and for the same purposes look different; and dispersing and placing facilities underground" (Godson, p. 109).

Certainly security concerns of this nature must be contrasted against the potential benefits of making satellite imagery public. Ideally, sensitive information could be kept "in-house" and only cleared members of the scientific community and policy makers could access it. In this way, environmental degradation could be effectively attacked using our extensive intelligence resources without compromising their integrity.

Applicability of Remote Sensing and Intelligence Assets

The benefits of remote sensing are quite impressive. Robert Dreyfuss was able to obtain an eight-page draft summary of the Medea Group's findings which laid out the possible applications that the United States remote sensing capabilities have to fight environmental degradation. The report says that "[c]hanges in vegetative and desert boundaries, which may be sensitive indicators of global climate change, can be tracked over time by satellite systems. The monitoring of changes in ocean temperature could provide a direct measurement of global warming. Undersea listening systems also may be able to detect this effect by measuring changes in ocean sound speed over long distances." Where civilian satellites such as LANDSAT can produce color images of land areas and oceans, "the NRO's satellites can actually zoom in and count the number of trees in a certain area and even determine what species they are." In addition, if the satellites are programmed to "take a reflection of, let us say, sunlight off the top of a forest canopy, you can do a spectral analysis of the composition of the forest," says Bruce Berkowitz, the former CIA analyst (as quoted by Robert Dreyfuss). "That will tell you if [the forest] is deficient in certain chemicals that are associated with healthy vegetation." These are all pertinent and highly valuable tools that could be used to analyze Siberian deforestation and sea pollution in Russia (Dreyfuss, 1995, pp. 28-35).

Other dynamic applications were discovered by the CIA. Again from Robert Dreyfuss' access to the report, "satellite radar devices and submarines could combine to measure the thickness of the polar ice pack, whose variation provides a good indicator of climate change"

(p. 31). Ice floes, undersea volcanoes, whale migrations, earthquakes, and scientific buoys that monitor ocean temperatures, salinity and currents are all trackable with our intelligence/military assets. More specifically, remote sensing activities could be used in Russia to accomplish the following specific goals:

- Tracking of impending ecological disasters;
- Determination of ecological disaster areas and land degradation;
- Reaction to emergency situations;
- Tracking of global geological processes such as earthquakes, volcanoes, etc.;
- Monitor forest diseases, pest infestation, pollution impact on tree cover;
- Monitor pollution of surface and underground water;
- Assist in cartography, locate mineral deposits, track ice floe movements.

If this information was continuously declassified to the extent that it could be shared by scientists across national boundaries, not only would Russia benefit, so too would the United States and the world community as a whole.

Further destruction of common resources could be addressed rapidly, accurately, and more effectively by employing this specialized space-based monitoring technology. In particular, the assistance that this information could provide to Russia's State Committee on Protection of the Environment (*Goskompriroda*), the agency in charge of environmental clean-up and protection, might enable it to target areas of immediate concern, convince Politburo diplomats of the urgency of environmental concerns, and lend credibility to the institution's overall mission.

U.S.-Russia Cooperation

Positive steps in this direction are already being undertaken by Vice-President Al Gore and Russian Prime Minister Viktor Chernomyrdin. The Gore–Chernomyrdin Commission was developed by Vice-President Gore, who recognized that underlying environmental problems are linked directly to the future stability and security of Russia, and in part to address the United States' and Russia's shared concern of global degradation. In January 1992, in a meeting of this commission, the value of bilateral intelligence assets was demonstrated. Maps prepared from classified assets that depicted environmental contamination at Eglin Air Force Base in Florida and Yeysk airbase in Russia were exchanged. Speaking at the National Defense University on August 8, 1996, Sherri Wasserman-Goodman, Deputy Under Secretary of Defense (Environmental Security), said that the administration "hope[s] to continue this cooperation and develop our respective capabilities previously used exclusively for intelligence purposes to support creation of warning mechanisms for potential crises. . . .Last year DoD co-sponsored a conference with the Intelligence Community on environmental security and national security. The conference participants concluded that the Intelligence Community has the information-gathering infrastructure and the ability to perform integrated analysis on linkages between environmental problems and other instability factors necessary to contribute to an indications and warning system."

This type of arrangement seems to represent a prototype for future BITs and multilateral information swaps. Former Secretary of Defense William Perry advocated a policy of "preventive defense" in which promoting military environmental cooperation would contribute significantly to the overall security of the United States. "All over the world, American forces are sharing the wealth of their environmental experience with foreign militaries, showing them by example and instruction how to protect and preserve the air, lands, and waters in their own countries."

The Department of Defense has established a number of environmental defense relationships that seek to achieve Secretary Perry's "preventive defense" policy. One of the most important of these relationships involves the U.S. and Russia bilaterally, and the addition of Norway to form a trilateral arrangement, focused on the environmentally fragile and militarily active Arctic region. Arctic Military Environmental Cooperation (AMEC) was begun in 1994 and has already evaluated specific projects to reduce environmental degradation caused in the Arctic by defense activities. Secretary Perry signed a memorandum on Cooperation in Environmental Protection Issues with the Russian Minister of Defense in 1995. Goodman states that the "U.S. and Russia are utilizing the MOU's information exchange mechanisms as the beginning of a new bilateral environmental relationship." In late October, 1996, she led a delegation to Russia in order to exchange experiences in environmental education and training.

The Counter Argument

Ronald Deibert represents those opposed to obtaining environmental assistance from the military and the intelligence communities. He proposes that "the use of U.S. satellite reconnaissance offers a clear illustration of the perils of redirecting military expertise towards the environment. This argument rests on the belief that military and civilian approaches are incompatible in fundamental ways" (unpublished manuscript, "Out of Focus: U.S. Military Satellites and Environmental Rescue").

In part, this group believes that the existing technology and skills in use by the CIA and NRO were not designed for scientific applications, and thus the data recovered may be of limited value. This fear would seem to be dispelled by the optimistic reports from the 70 scientists who worked on the CIA project. More problematic is the resistance of the military and intelli-

gence agencies to releasing data. Even when the data is released, important information on how the data was gathered is often omitted for security reasons. The scientific community is then left with no way to evaluate the accuracy of the information or to determine its origin. John Pike of the Federation of American Scientists (as quoted by Dreyfuss) adds, "[t]he cultural antagonism here is that the fundamental tenet in science is that you tell everyone everything, and the fundamental tenet in intelligence is that you don't tell anyone anything" (1995, p. 34).

Finally, there is the fear that the military/intelligence community will mislead the scientific community by altering or selectively passing on certain information to advance other goals. This concern could be alleviated if the NRO, CIA, or whichever agency was charged with dissemination of important environmental security information cleared a number of scientists who would be integrally involved in the collection and assessment of the significant information. Deibert would probably argue that the fundamental dilemma remains; if the CIA has been able to evade Presidential scrutiny in the past, what chance do a handful of scientists have at playing the role of task-master. A more effective solution might be to apply the expertise that the United States has developed in building international regimes to this problem. Through incremental and cumulative steps, confidence could be built between the scientific and intelligence communities. Creation of an institution that would act as a central clearing house for declassifying and disseminating intelligence on a continual basis would create an environment where distrust and uncertainty would be greatly reduced through a gradual, collaborative, confidence-inspiring process of incremental gains. Both sides would realize that they had to cooperate over time, and the traditional "we versus they" mindset of the military and intelligence sectors would prove itself inefficient in this institutionalized setting.

Reliance on Military/Intelligence Space Based Technology?

An important question remains to be addressed: Does the scientific community *really* need the satellite information gathered by military means when there is a large, public sector, space-based collection network. Meteorological satellites, such as the GOES (Geostationary Operational Environmental Satellite) and POES (Polar-orbiting Operational Environmental Satellite) series of weather satellites, the non-meteorological U.S. LANDSAT and the French SPOT satellite series, as well as the European ERS–1, the Japanese JERS–1, and the Canadian RADARSAT SAR satellites perform a vast array of environmental missions for scientific users.

In addition, NASA is in the process of expanding the amount of earth science data available to scientists through the development of its Earth Observing System (EOS) and the EOSDIS (Data and Information System) which will serve as the key link between the data collected by the satellite systems and the scientists working on global change research. The $8 billion EOS project is the centerpiece of NASA's Mission to Planet Earth (MTPE). "In conjunction with its international partners, the U.S. plans a program of civilian Earth observation to provide, by the early years of the next century, the comprehensive collection of data on resources, weather, and natural and human-induced physical and chemical changes on land, in the atmosphere, and in the oceans. These programs are unprecedented in both their scope and cost," as described by the Office of Technology Assessment to the U.S. Congress (Congressional Report, Failure of Remote Sensing from Space: Civilian Satellite Systems and Applications Office of Technology Assessment 1988). Unfortunately, the limitations of satellite based platforms and budgetary cutbacks "will prevent process-oriented studies from being performed at the level of detail that is required to address the most pressing scientific questions." Although MTPE total budget has increased as a percent of its total project balance, its funding was cut from $11 billion to $8 billion. Intelligence community funding is estimated at $23 billion, of which a large portion goes to space-based technology. For financial reasons alone, continued reliance on the military and intelligence community's technology is likely to be necessary for supplemental information.

Although great advances are being made in the non-classified public and private sector, the technology costs a great deal of money and a long lead time is necessary to bring it to operational status. The scientific community will need to continue to strengthen its ties with the military and intelligence community in order to access important environmental information for at least the next five years. In addition, certain technologies will always remain under the aegis of the military/intelligence realm due to their extraordinary cost and levels of advancement. Even when EOS is up and operating, scientists will need to supplement the system's vast reconnaissance with specialized information from the NRO, NIMA, and others. Because global degradation is a problem now, immediate cooperation between the public and military sectors needs to be continued and improved.

Conclusion

The case of Russia demonstrates the need and early success of U.S. military and intelligence activities in support of environmental security policy. New satellite information and the archived trends with which it is contrasted present an important way in which the military and intelligence community can assist present day concerns and help to defuse potential future problems that will affect U.S. national security. To further

their contribution, the military and the intelligence sectors need to coordinate their efforts through a centralized institution that can work directly with the scientific community. Through the application of their analytical skills and expertise in crisis management, monitoring technology, and extensive databases of archived information, they can play a major role in addressing national security concerns of an environmental nature. By developing an early warning system that could project potential hot-spots internationally, Perry's idea of "preventive defense" can be achieved. Military-to-Military Contact and Security Assistance Programs will enable our non-sensitive expertise and environmental assessment technologies to be utilized to restore acute areas of foreign degradation. By targeting pivotal states such as Russia and China, the interests of U.S. security will be directly served. Finally, by incorporating environmental expertise into all aspects of U.S. foreign policy and international negotiation, a strong, healthy, safe United States will be maintained for future generations. The application of these ideas requires long-term thinking, vision, and leadership; attributes that are becoming more and more dominant in the policy leaders we elect to steer our country into the next millennium.

CASE STUDY TWO: RWANDA

Introduction

The tragedy that unfolded in Rwanda in 1994 is widely accepted as an example of environmental scarcity combining with population pressures to precipitate intrastate conflict. Along with many others, the Clinton Administration has expressed its belief that environmental factors were significant contributors to the genocide.

This case study suggests two things. First, policy makers need to be careful about assuming that conflict in the Third World is the result of environmental problems. The case of Rwanda suggests that environmental factors played a small role in contributing to the violence. Second, there remains a significant gap between the position of the Administration and the behavior of the security community. In this case the military reponded in a conventional manner. Perhaps it recognized the problem for what it really was; more likely it has not yet adequately accepted and internalized the concept of environmental security.

Rwanda As a National Security Threat?

States once regarded as inconsequential to American national interest are being given a closer look as environmental factors have been identified as a key to understanding the causes of conflict. One reason for this is the belief that environmentally related conflict may increase in the near future. If this is true, it is important to study cases as they arise. Moreover, such cases are of general interest because they involve an issue—environmental change—that is increasingly central to U.S. foreign policy. Consequently, although far removed from direct contact with the United States, Rwanda, under this new understanding, did indeed merit American interest.

At first blush, the case of Rwanda appears to fit the model of environmental change and conflict developed and popularized by Thomas Homer-Dixon. Homer-Dixon's research has indicated that environmental scarcity, defined as degradation or depletion of a resource (scarcity of supply), increased consumption of a resource (scarcity due to demand—brought about by population growth or high per capita resource consumption), and uneven distribution that gives relatively few people disproportionate access to the resource and subjects the rest to scarcity (structural scarcity), affects the intermediate social variables often believed to be the underlying causes of subnational conflict (Homer-Dixon, 1996). These intermediate social variables include endemic poverty, weakened institutions, and increased inter-group competition that can ultimately lead to instability and civil conflict (Homer-Dixon, 1996). It is important to note that rather than a linear progression of primary environmental stressors leading to secondary social effects that result in tertiary results, these factors all interact, and can amplify and reinforce one another in a cascade series that ultimately will result in the negative outcomes described.

The Clinton Administration believes that what this research portends for the rest of the world is clear: increasing competition for resources will mean that civil conflict and failed states will increase, placing a heavy burden on those countries in the North which, less vulnerable to this sort of problem, may nonetheless suffer indirectly and be called upon to help resolve it. What this means for the United States is also clear: increasing global misery will eventually affect not only the American economic way of life, but also prospects for global democratic governance, as developing states lose the capacity to govern effectively. In the long term, global instability will come to greatly affect U.S. national security. In the short term, responding to complex disasters precipitated by environmental factors will require expensive humanitarian relief operations that, more often than not, do not work out as planned.

Administration Understanding of Rwandan Events

Robert Kaplan's 1994 *The Atlantic Monthly* article, "The Coming Anarchy," caught the imagination of the Clinton White House, and resulted in a greater Administration focus on the environment as a cause of conflict. In addition to Clinton's speech before the National Academy of Sciences, Timothy Wirth, the Under Secretary of State for Global Affairs stated:

> Resource scarcities are a root cause of the violent conflicts that have convulsed civil society in Rwanda, Haiti, and Chiapas. These conflicts could intensify and widen as ever-growing populations compete for an ever-dwindling supply of land, fuel, and water….In Rwanda, the unspeakably brutal massacres of recent months have occurred against a backdrop of soaring population growth, environmental degradation, and unequal distribution of resources. Rwanda's fertility rate is among the highest in the world—over eight children per woman. The nation's once rich agricultural land is so severely depleted and degraded that between 1980 and 1990, during a time of unprecedented population growth, food production fell by 20 percent (*ECSP Report*, 1995, 54).

Further, and more importantly:

> In the newly configured world, national security is closely linked to human security. Human security is built on a foundation of peace and political stability, physical health, and economic well-being….[W]e are coming to understand the close connections between poverty, the environment, the economy and security. This historic transformation demands that we now liberate ourselves—from outworn policies, from old assumptions, from fixed views that only yesterday seemed to be the dividing and defining lines of our politics (*ECSP Report*, 1995, 54).

Even as recently as April of 1996, Secretary of State Warren Christopher noted that "We must not forget the hard lessons of Rwanda, where depleted resources and swollen populations exacerbated the political and economic pressures that exploded into one of this decade's greatest tragedies" (Christopher, 1996). The solutions to these problems were to include multilateral diplomatic initiatives, environmental conditionality applied to aid packages, and comprehensive approaches to sustainable development (ECSP *Report*, 1995; 1996).

As outlined above, the Clinton Administration believed environmental factors to be key to the conflict in Rwanda. Despite the new solution-sets outlined by administration officials to counter the underlying causes of conflict, the Clinton Administration waited and pursued the option of assisting a humanitarian program only once the conflict had sufficiently abated. Given the Clinton Administration's understanding of the underlying causes of the conflict, was this support for the humanitarian program the most efficient use of resources? Could resources have been brought to bear sooner?

The Case of Rwanda

Details of the tragedy in Rwanda are relatively well-known and have been adequately documented elsewhere. This case study will highlight events from the crisis and focus on the Clinton Administration's understanding of the Rwandan crisis and its response to it. (See Figure 2)

Environmental variables *(Ai)* through *(Aiii)* are interrelated, with population growth and land degradation contributing to declining agricultural production *(Aii)*, and lead to the first of three intermediate social effects, population migration *(Bi)*. Professor Homer-Dixon also notes that other effects included the weakening of the legitimacy of President Juvenal Habyarimana's regime (Percival and Homer-Dixon, 1996).

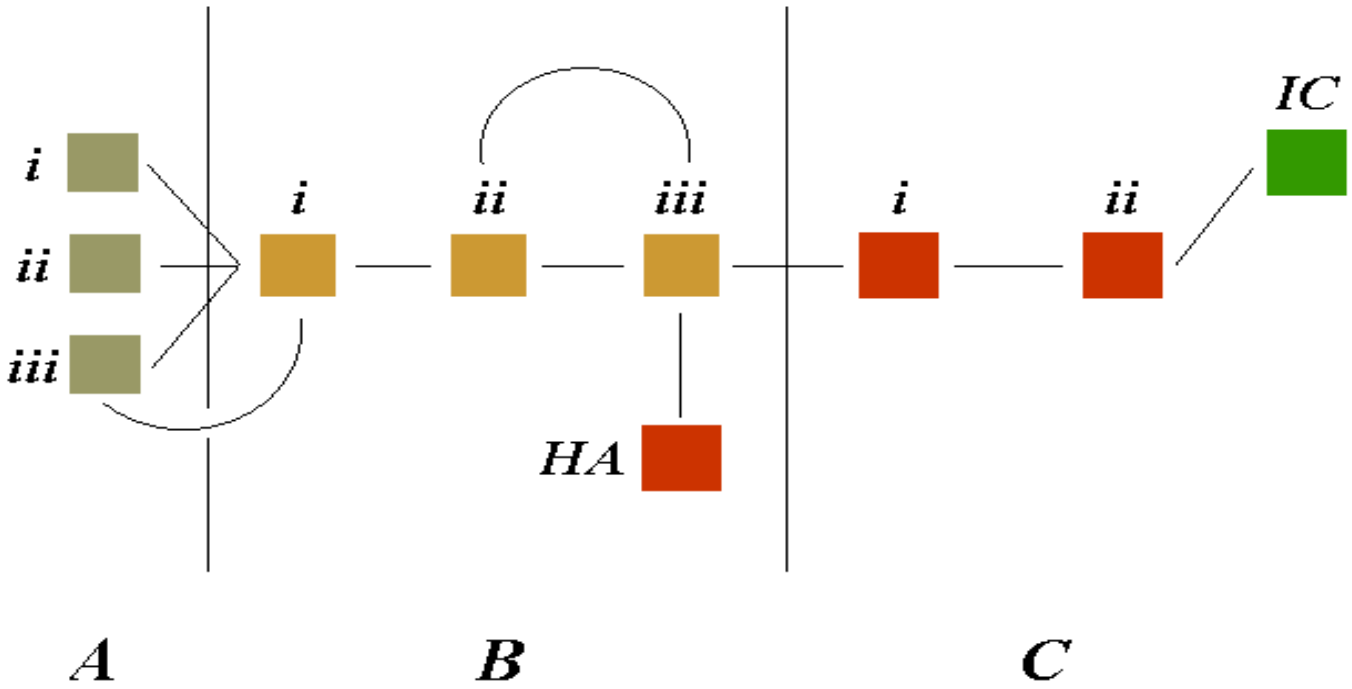
Note also that (*Aiii*) and (*Bi*) closely affected one another, as land degradation led to population migration, which induced further land stress, contributing to another cycle of migration. Population migration, in turn, contributed to existing inter-group competition (*Bii*) among the northern and southern Hutu and Tutsi. The latest wave of this competition dated back to the 1990 invasion from Uganda of the mainly Tutsi Rwandan Patriotic Front (RPF). Fighting also contributed to further population migration. This civil war placed a great deal of institutional stress (*Biii*) on the Hutu Habyarimana regime, which responded by forming the *interahamwe* ("those who attack together") militias to counter antigovernment sentiment among the population.

After much of the fighting, and once a tentative cease-fire and peace negotiations were under way, elements of the regime felt that President Habyarimana had given too much away at the Arusha peace conference signing in Tanzania. The accords would have acceded too much northern Hutu power and control to the rebel Tutsi and southern Hutu, and so to derail the Arusha Accords, President Habyarimana was assassinated (*HA*). The hard-line elements within the northern Hutu regime then attempted a wholesale eradication of the Tutsi minority (*Ci*), their "final solution" to the Tutsi problem, resulting in the humanitarian crisis (*Cii*) to which the international community (*IC*), including the United States, finally responded.

Inaction Then Action

Based on the eventual U.S. response to the humanitarian crisis after the genocide in Rwanda, this case is best categorized as falling under a *military* conception of environmental security. Geoffrey Dabelko described military conceptions of environmental security as requiring the least amount of discomfort to traditional security specialists. Further,

> The referent object of security remains the state as it has been in the dominant, military-centered definition (Buzan, 1991). As the object of what is to be made secure, the state, and its military forces, remain the primary actors when pursuing these con-



Model Components

- *Ai*—Population Growth
- *Aii*—Declining food production
- *Aiii*—Land degradation
- *Bi*—Population migration
- *Bii*—Inter-group Competition
- *Biii*—Institutional stress, in this case, that of the ruling regime
- *HA*—Habyarimana's assassination
- *Ci*—Organized civil conflict
- *Cii*—Humanitarian emergency (Internally displaced persons and refugees)
- *IC*—International Community Response

Figure 2

ceptions of environmental security. Competition and conflict are the *modus operandi* for this class of environmental security conceptions as the actors and institutions attempt to address the *symptoms* of "environmental scarcity"….By focusing on mitigating the symptoms of environmental scarcity, this class of conceptions is primarily reactive to already existing problems (Dabelko, 1996).

During this crisis, however, *two* views of environmental security were at play. High-level Clinton Administration officials held to a human security viewpoint, focusing on underlying causes, while it is likely that U.S. military institutions found no compelling reasons to intervene from their military security viewpoint.

From a *human* security perspective, then, appropriate intervention points could be identified among four temporal periods; *pre-civil war*, *civil war*, *genocide*, and *refugee crisis*. These intervention points are significantly modeled after some of the recommendations made in the Synthesis Report of the Joint Evaluation of Emergency Assistance to Rwanda. These intervention points could have included the following:

Before the civil war

- more agricultural aid tied to sustainable development conditionality;
- health and education funding to alleviate stresses from migration and population displacement;
- general infrastructural aid to the government tied to human rights conditionality;
- urging the World Bank and IMF to take into account potentially harmful social effects in their structural adjustment program for Rwanda;

During the civil war

- taking leadership in stopping arms shipments to the combatants in the civil war;
- tying all aid to the Hutu Rwandan government to human rights conditionality;
- committing to a strong multilateral and comprehensive approach, incorporating the United Nations (UN), the Organization for African Unity (OAU), and local African states, to settling Hutu and Tutsi differences;
- coordinating and contributing to the financing, equipping and tasking of UNAMIR I to implement the Arusha Accords;
- more rapid and concerted initiatives following the assassination of President Habyarimana;

During the genocide

- organizing a multilateral coalition, incorporating the United Nations, the Organization for African Unity, and local African states, that would in no uncertain terms have told the Rwandan regime to cease their massacre;
- expanding the support to, scope, and mandate of UNAMIR II;

During the refugee crisis

- coordinating and contributing to the financing, equipping and tasking of a police force to separate militants from noncombatants in the camps;
- providing more support to the new Tutsi Rwandan government to recover, rebuild, and prosecute criminals, and also to repatriate refugees in Zaire.

When the United States *did* finally act, it was after the genocide was over, and as part of the humanitarian effort to assist the refugees, including retreating Hutu government forces and perpetrators of the genocide, that streamed into Zaire around July of 1994. From a *military* security standpoint, the crisis was not an appropriate subject until the solution-set fit a more traditional mission profile of support to a humanitarian operation. The United States provided logistical support to what was, on the whole, an impressive and effective relief operation.

Rwanda Revisited

It is ironic that the very researcher whose ideas are quoted for Administration understanding of the crisis in Rwanda actually found that environmental factors did *not* play a significant role in the genocide. In a 1995 Occasional Paper from the University of Toronto titled "Environmental Scarcity and Violent Conflict: The Case of Rwanda," researchers Valerie Percival and Thomas Homer-Dixon came to conclusions very much apart from the Clinton Administration's understanding of the series of events. Of four hypotheses with various environmental factors accorded varying degrees of import, the most likely series of events entailed elite insecurity in the context of the Arusha Accords, where environmental factors played a minor role. Homer-Dixon and Percival concluded that:

> The Rwanda case tells us important things about the complexity of causal links between environmental scarcity and conflict. Scarcity did play a role in the recent violence in Rwanda, but given its severity and impact on the population, the role was surprisingly limited. The role was also not what one would expect from a superficial analysis of the case. Although the levels of environmental scarcity were high and conflict occurred, the connection between these variables was mediated by many other factors. This complexity makes the precise role of environmental scarcity difficult to determine….Although the recent violence occurred in conditions of severe environmental scarcity, because the Arusha Accords and regime insecurity were the key factors motivating the Hutu elite, environmental scarcity played a

much more peripheral role (Percival and Homer-Dixon, 1995).

The fact that the Clinton Administration and the Homer-Dixon research team could come to opposite conclusions regarding events in Rwanda is indicative of what Richard Matthew has criticized as lack of adequate scientific understanding on the part of policy makers (Matthew, 1996, p. 41). Matthew suggests that enthusiasm for "environmental security" be tempered by more clearly delineating and distinguishing between "environment *and* security," that is, emphasizing that the environment contributes to security issues, not that it should somehow supplant or redefine security (Matthew, forthcoming).

Conclusions

Was the application of United States military logistical support for the international humanitarian effort the best, most efficient use of security resources in Rwanda?

From the human security standpoint of Clinton Administration officials, no. Clearly more could have been done sooner. That more was not done implies a variety of factors at work—perhaps in keeping with a bureaucratic politics understanding of the situation, U.S. military institutions successfully resisted attempts to engage them in non-traditional military or support enterprises. More likely, there was insufficient political will among members of the Administration to impose a solution-set evocative of similar circumstances in Somalia. That more was not done even before the civil war began is indicative of the cost-cutting trend in Congress for foreign aid appropriations.

From a military security standpoint, yes. Attempting to apply force sooner would have entailed far higher risks for the assets applied, coupled with a vague exit horizon. As it was, U.S. support to the international relief effort in Rwanda reflected U.S. logistical expertise and military engineering skills.

Most important, as Homer-Dixon has underscored in much of his writing, it is misleading to suggest a simple, direct relationship between environmental security and conflict. However, environmental problems are prominent features of the general context in which conflict often occurs. Analysis and response need to be fully cognizant of the difference between background conditions and immediate causes.

The Clinton Administration must articulate more clearly a national environmental security policy, one to which it can steadfastly and sincerely commit, and communicate its resolution to the public and Congress. The Administration must reassess its aid program cutbacks and priorities, and realign them more in keeping with this national environmental security policy. It must communicate and educate effectively members of the Executive and the security community, so that there is a clear and concerted effort in pursuit of this policy.

Policy Recommendations

Clearly the Administration has indicated its interest in addressing the root causes of environmental change as much as possible. Sustainable development, and all that the term entails, is—rightly—the linchpin of the Clinton Administration's multilateral approach. During this period of transition to an "earth in balance," the traditional security community can play an important role. Specifically:

- The Clinton Administration must clearly articulate its vision of the interplay between the environment and security, and throw the full weight of the Office of the President behind it. Kent Butts has a few excellent suggestions for raising the national profile of the environment and security, even suggesting a Presidential Decision Directive (PDD) as the most effective vehicle (Butts, 1996);

- In line with the first recommendation, the Clinton Administration must educate policy makers, the Congress and the public about the key interrelationships between the environment and security, and justify the expense of scarce resources more clearly. Educating policy makers would enable them to more effectively task military and intelligence assets;

- Although employing National Technical Means (NTM)—basically, U.S. satellites and other remote sensing assets—can be somewhat problematic, the United States should nonetheless explore the feasibility of establishing an interagency imagery and environmental data clearinghouse tasked with the timely dissemination of environmental information to relevant and interested scientific and social institutions. In addition, the United States should fill any environmental data gaps with partially publicly funded commercial data gathering ventures, along the line of Mission to Planet Earth;

- In emphasizing that the environment relates to security, the Clinton Administration should ensure a thorough "greening" of the security community. Many recommendations have already been put forward, but one that is missing involves greening the service academies. Each new crop of officers should be exposed to issues of the environment and security right from the beginning;

- Finally, the United States must ensure that environmental experts are included in any international negotiations, whether trade related (as in NAFTA), or in the event of interstate or regional conflict resolution.

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Endnotes

1 U.S. military bases face monumental cleanup costs, a legacy of the belief that environmental issues needed to take a back seat to earnest prosecution of the Cold War. Also, most recently, Saddam Hussein set the oil fields of Kuwait afire in an attempt to divert U.S.-led coalition resources away from continuing battle against the Iraqi leader's forces.
2 The group Earth First characterizes this viewpoint, as evidenced in their (revised) motto, "no compromise in defense of Mother Earth."
3 As mankind pushes into previously remote or inaccessible terrain, "new" deadly diseases are discovered, with a serious potential for introduction into the wider population via the planet's well-established air transportation network.
4 It is interesting to note that the United States military has not taken this same mandate to heart overseas. Many international bases remain terribly polluted, and do not adhere to domestic U.S. environmental guidelines.
5 The number of near "compromises" to nuclear materials security demonstrate this fact. Please refer to the USAWC briefing in the bibliography.
6 See Robert Kaplan, "The Coming Anarchy," *The Atlantic Monthly* (February 1994): 45-76.

Water Scarcity in River Basins as a Security Problem

Task Force: Sophie Chou (Team Leader), Ross Bezark, and Anne Wilson

By 2025, chronic water scarcity will affect as many as three billion people in 52 countries. It is a pressing issue that demands the committed attention of governments of water-scarce nations and of regional and international institutions. In spite of numerous calls for decisive and collective action, however, water scarcity is worsening on a global scale. Demand for water is growing along with populations and economies, while sources of water are being rapidly degraded and depleted. Inequalities in the distribution of water supplies also are increasing, exacerbated by poor water management. In consequence, human welfare, ecological health and economic potential suffer. Under certain conditions, water scarcity threatens national security. This report examines the role of water scarcity in shared river basins in triggering, intensifying and generating regional instability and other security problems.

Three case studies have been selected to illustrate how various factors interact with water scarcity to threaten national and regional security. In the Jordan River Basin conflict has resulted from water scarcity combined with certain catalytic conditions. A lack of cooperation sustained by historical tensions could prove to be detrimental to regional and even global welfare. In the Nile River Basin, water scarcity exists, but conditions have not yet brought it to the level of conflict present in the Jordan River Basin. The nine countries in this basin, however, have been stalemated by political inertia, although there have been some recent indications of a growing interest in pursuing cooperative solutions to water problems. The Mekong River best exemplifies the potential for both conflict and cooperation in a shared river basin. Water-sharing mechanisms exist; the question is whether they can defuse the tensions posed by water scarcity.

The importance of this issue is hard to understate. Water is a vital resource upon which all organisms directly depend. River basins have been referred to as "cradles of human civilization," sustaining productive, prosperous societies throughout human history. As these vital areas have been stressed by pollution and growing human demands, the world has witnessed growing competition and conflict over their water. So serious is the problem that the United Nations Commission on Sustainable Development has initiated a global freshwater assessment; it is currently underway and a report will be submitted to the U.N. General Assembly later in 1997.

Introduction

Water is essential for human and ecological health. It is vital for nutrition, food production, sanitation, and economic production. It is used for recreation, power generation and transportation, and embodies symbolic and cultural value. Water is a vital component of ecosystems, contributing to climate control and the hydrologic cycle. These processes profoundly affect the characteristics of the natural world of which human beings are a part.

As a natural resource, water has unique characteristics. From a global perspective, it is renewable and abundant; in regional settings, however, it is often finite, poorly distributed, and subject to the control of one nation or group. It is difficult to redistribute economically and has no substitutes. River flows in particular are uneven over time and poorly matched to human needs.

Reliable access to water supplies has long been a human concern because deprivation can cause illness, death and economic hardship. Yet given that water covers over 70 percent of the Earth's surface, scarcity might appear to be a low priority issue. The ostensible abundance of water is misleading. Fresh water comprises only 2.5 percent of the Earth's total water supply. Of this, 79 percent is locked in ice caps and glaciers. Groundwater comprises 20 percent; this leaves only one percent as easily accessible. Thus, only 0.000008 percent of the Earth's water is readily accessible for basic human use.

Historically, human welfare and progress have been closely associated with access to this small fraction of the world's total supply of water. Today, changes in the factors that determine water scarcity and in the manner

in which scarcity is being handled ensure that the familiar problem of reliable access persists. Addressing this problem requires new approaches to managing water-scarce situations so that threats to international security are minimized. As world population skyrockets and increasing numbers pursue material wealth, high quality accessible water is likely to be the subject of competition and conflict. Unfortunately, simple solutions may not be adequate to address contemporary water scarcity conditions. Water scarcity problems are complex, subject to competing interests, and often entrenched along sensitive ethnic, religious, or social class divisions. They exacerbate interclass or interstate tensions where they exist, and create new tensions where previously there were none.

Water disputes are currently proliferating in several arenas, from oceans to lakes to rivers basins. Degradation of oceans and lakes has severely damaged marine ecosystems, eliminating or diminishing numerous fish species and igniting hostilities between countries vying for the declining fish stocks. The shrinking of the Aral Sea in central Asia has attracted worldwide attention for having depleted, diverted, and poisoned the maritime ecosystem, but it is only one example of water depletion due to human diversion and contamination. The relationship between water scarcity and regional security, however, is most transparent in the cases of rivers shared by multiple countries. Nearly 40 percent of the world's population rely on shared river basins; this percentage jumps to 50 in northeast Africa and the Middle East. Rivers flow across political boundaries, usually giving upstream countries a distinct advantage over downstream neighbors. As rising demands strain river water supplies, international friction intensifies.

Analytical Model

In discussing the causes of water scarcity and how it may become a security issue, it is necessary to elaborate upon what is meant by "scarcity" and "security." Quantitative definitions of scarcity range from less than five to seven liters per person per day (the amount required to sustain a human being) to less than 2,740 liters per person per day (based on the average amount required to sustain a Western standard of living). A number of specialists describe a state as "water-*stressed*" if renewable runoff per person is less than 1,700 cubic meters annually, and "water-*scarce*" if renewable runoff is below 1,000 cubic meters per person annually. But given the diversity of agricultural and industrial practices and expectations throughout the world, it is not especially useful to assign a specific value to water scarcity. We argue that water scarcity exists when demand (which varies considerably) exceeds supply. It is resolved by establishing a balance between supply and demand.

We define a security threat as a threat to the values in the defense of which a country will use violence. These values include sovereignty, territory, public health, economic prosperity, and cultural identity. Situations that potentially or actually threaten such values are considered threats to security. It is important to note, however, that while security problems have the potential to lead to violence, they may also act as a stimulus for cooperation.

Variables that Cause Water Scarcity

There are three categories of variables that cause water scarcity: increased demand, decreased supply, and impeded access to available supplies. (Homer-Dixon, 1994)

Increased demand generally results from population growth, economic growth, and/or poor water resource management. There are 95 million people added to the planet each year, increasing the demand for water; throughout the world economic growth is a top priority; and all too often poor water management adds inefficiency to the other pressures for more water. Per capita use today is almost 50 percent higher than it was in 1950, and in most of the world it continues to rise (*Dimension of Need: An Atlas of Food and Agriculture*, p. 43).

Decreased supply is caused by the pollution, diversion, and depletion of water. Pollution degrades water quality, often so much that it is unsafe to drink, use for hygiene and sanitation, or use for fishing, agricultural and even at times industrial purposes. Water pollution can decrease the amount of employable water by means of domestic waste, industry, and agricultural runoff. This is particularly true in developed countries; in Poland, for example, the share of river water of drinking quality has dropped from 32 percent to five percent during the last two decades, and around three quarters of Poland's river water is now too contaminated for even industrial use (Postel, p. 21, 1992). Diversion occurs in river systems when an upstream water user alters the flow such that downstream users receive a diminished volume of water. Depletion occurs when ground water is pumped to the surface at a rate that is too quick to be replenished. Ground water and aquifers are recharged and purified through percolation of precipitation through layers of soil and rock; because the hydrological cycle takes a long time to complete, based on a human time frame, severe depletion of groundwater means not only a diminished supply, but also an unclean supply. Severe depletion can also permanently abate natural water storage capacity, further jeopardizing the amount of water available for human use.

Unequal access to available supplies causes the unfortunate conditions of water scarcity only for certain portions of the population, regardless of the aggregate availability of water. This is the case in many

places, and the inequality can be due to natural irregularities in precipitation, seasonal river flows, or human activities.

If the access problem is due to natural causes, catching and storing water when it is available is a critical factor in determining how much human suffering and damage will result from scarcity. If the problem is human-induced, access to water supplies is usually tied to political and economic power. In this situation the poor and marginalized subsidize the water use of those who have access to power. Thus, unequal access frequently creates water scarcity even in places where overall water scarcity may not exist.

Variables that Affect the Stability of Institutional Structures

The consequences of water scarcity can be severe. Populations can be displaced, as people migrate in search of water and new livelihood, or even as a result of attempts to remedy the scarcity situation, such as the construction of dams, the flooding of reservoirs, and the diversion of rivers from their natural river beds. As water scarcity causes water to be more highly valued, water prices increase and controlling water supplies becomes increasingly lucrative and may exacerbate existing forms of competition based on ethnic or other social divisions. As a fundamental component of the natural resource base which supports agricultural and industrial activities, production and growth are likely to be threatened. Finally, institutions are weakened as the various burdens placed on them increase; in the mose severe caes they may fail or resort to violence.

The Link to Security

Water scarcity poses a clear threat to internal or domestic security by contributing to health problems, civil strife, economic crises and institutional failures. Water scarcity may expand into the international realm, however, if certain conditions exist. The extent to which a river is shared by more than one country, disparate relative strengths of the countries sharing the water source, and the lack of equitable water-sharing agreements among all water users can catalyze a situation of water scarcity into one of regional insecurity. Moreover, water scarcity may amplify conventional international security problems related to militarization, weak institutions and ethnic and other sources of hostility and tension. Conceivably, the forces that prevent countries from resorting to violence to protect their interests and core values may be overwhelmed.

Model 1

CASE STUDY SUMMARY: THE JORDAN RIVER BASIN

Water in the Jordan River Basin is a limited resource whose scarcity has been a contributing factor to conflict between states in the past. The Jordan River Basin states are Israel, Jordan, Lebanon, Syria and the Occupied Territories. The upper Jordan is fed by three major springs: the Hasbani in Lebanon, the Banias in Syria, and the Dan in Israel. The major tributary of the Jordan, the Yarmuk River, originates in Syria and Jordan and constitutes part of the border between these countries and the Golan Heights before flowing into the Jordan River. The quality of Jordan River water is good up to the point where it enters the Sea of Galilee but by the time it arrives into the Dead Sea, the water has become too salty to use (Gleick, 1995, p. 9).

The surface and hydrological formations in the Middle East are nonhomogeneous discontinuous, meaning some sections of the region are dependent upon others for water supply (Ghezawi, 1994, p. 3). Those nations geographically situated upriver are gradually diverting more water from shared water resources in the Jordan River Basin for themselves, decreasing the available water for downstream users, while region-wide demands are swelling. Therefore, the control and allocation of water has evolved into an issue of high politics with global consequences and it has been explicitly made a part of the ongoing bilateral and multilateral peace negotiations (Gleick, 1995, p. 99).

Complicating the problem of water scarcity, the Jordan River is historically and culturally important to the region and the world, as some of the most ancient civilizations of the earth formed and grew around the river basin. Judaism, Christianity, and Islam consider the Jordan holy and it plays a role in national ideological objectives, such as settling border areas and population distribution, fanning ancient rivalries and disputes.

Since the establishment of Israel in 1948, interstate disputes over the Jordan River and its related ground water basins have played a role in ensuing violence in the area. In the 1960s, for example, the Arab League attempted to divert the waters of the Jordan River into Jordan, preventing the waters from entering Israel. Water-related tensions between Israel, Jordan and Syria contributed to the atmosphere which led to the 1967 war.

Problems continue over the control of water resources in the region and have begun to deteriorate at an even more rapid pace, due to the almost complete exploitation of local resources. Palestinians on the West Bank and Gaza Strip compete with Israelis for dwindling groundwater supplies. Much of the water supplying northern and central Israel comes from aquifers that originate on the West Bank and drain westward towards the Mediterranean Sea (Brown, 1993, p. 130). Overpumping of the aquifer underlying the Gaza Strip has caused sea water to intrude and partially contaminate this source. As extraction from ground and surface water continues to increase, so do problems associated with low water levels, decreased quality, overflowing waste, and contamination from pesticides and fertilizers. Negotiations over water rights between Palestinians and Israelis were postponed in 1995, along with the issues of Jerusalem and Jewish settlements, indicating how important the subject of water is to the region and the diametrically opposed positions held by each side (Gleick, 1995, p. 8).

Though it may seem as such, this is not only an Arab-Israeli phenomenon. Tensions also exist between Syria and Jordan over the construction and operation of a number of Syrian dams on the Yarmuk River, which would allow Syria to regulate the Yarmuk's flow, which feeds the Jordan (Gleick, 1995, p. 11). If Syria acts aggressively to combat its own water shortages, violent conflict between the two states is possible.

Estimates suggest that fresh water deficits are increasing rapidly in the region and that if current water policies continue unchanged, the nations of the Jordan River Basin may begin to "experience acute and progressively worsening perennial water shortages and quality degradation analogous to the areas running out of renewable sources of fresh water within the next decade" (Naff, 1993, p. 116). Rapid population growth in the region, caused by elevated birth rates, reduced infant mortality rates, improved access to health care, and increased rates of immigration will place even greater burdens on all of the nations that utilize the water supply of the Jordan River Basin. Along with this population explosion, increased rates of urbanization and the growing demands of the agriculture and industrial sectors of these economies are placing further pressure on existing water reserves.

The United States, as the main mediator in Arab-Israeli negotiations, has an interest in assisting the parties to manage regional water scarcity obstacles because any factor which could derail the progress of the peace process would hinder the prospects of a lasting peace accord and perhaps damage U.S. prestige worldwide. Miriam Lowi, a professor at the College of New Jersey, argues that solving problems of water scarcity in the Jordan Basin are "specific to the task and cannot be viewed as an avenue towards political settlement" (Lowi, 1993, p. 204). But unless the issues involving water scarcity, especially those between Israelis and Palestinians, are rectified in some manner, which will only occur in the foreseeable future with the assistance of the United States, the chances of resolving political problems in the region will be restricted. This is in part because of the high priority given to Palestinian problems in the negotiations and in part because the dilemma of water in the West Bank is integral to the dif-

ficulties of the Jordan River Basin as a whole (Gleick, 1995, p. 101).

While unilateral steps will assist in improving water management, cooperative efforts will be the ones which bring lasting success to the Jordan River Valley Basin. As the former Agriculture Minister of Israel, Meir Ben-Meir, said, "If the people of the region are not clever enough to discuss a mutual solution to the problem of water scarcity, war is unavoidable" (Brown, 1993, p. 128).

CASE STUDY SUMMARY: THE NILE RIVER BASIN

It is not unreasonable to assume that the world's longest river would offer the inhabitants of its banks an abundant and unlimited water resource. For millennia this has been the case in the Nile River basin. In the past several decades, however, this basin has suffered from enormous pressure from increased demand and reduction in supply. Not only does this pose a direct threat to the health of the humans and wildlife who depend on it for water, but it also poses the indirect threat of strained relations among the nine nations of varied levels of development that lie on the river's banks. This is no esoteric, whimsical notion; in 1989 Boutros Boutros-Ghali (then Egypt's Minister of State for Foreign Affairs) addressed the U.S. Congress and maintained that "The next war in our region will be over the waters of the Nile, not politics" (Gleick, 1994, p. 14).

Although the Nile passes through a multiplicity of nations (Rwanda, Burundi, Tanzania, Zaire, Kenya, Uganda, Ethiopia, Sudan, and Egypt), only two of these cooperate in its management: Egypt and Sudan, a result of the 1959 Nile Waters Agreement which allotted each a certain amount of water per year. The Nile has two sources. The Blue Nile originates in the Ethiopian highlands and meets the White Nile (the headwaters of which is Lake Victoria in Tanzania) at Khartoum, Sudan. The White Nile has actually demonstrated an increase in flows over the past 60 years, and thus the immediate problem is limited to Egypt, Sudan, and Ethiopia. The difficulty lies in the fact that, the 1959 Agreement notwithstanding, these nations, which demonstrate a wide range of development levels, have historically relied on a local approach to water allocation as opposed to a concerted, basin-wide approach. The local approach, however, does not take into consideration the other users of the waters, as witnessed in the case of Egypt's construction of the Aswan High Dam in the late 1950s. This type of approach caused no serious difficulties until this century, but recent developments that increase demand and reduce supply have deemed this an unsustainable method of allocating resources.

One of these recent developments is population growth; Egypt's population is growing by another million *every nine months*. Despite famine and civil wars in Sudan and Ethiopia, their populations have grown steadily since 1960. This growth has increased and will continue to increase water demand for human and livestock consumption and for industrial and agricultural activities. Since there is a finite amount of water, this poses a serious problem.

In addition to the demand pressure caused from population growth, economic growth (or in the case of Sudan and Ethiopia, the *desire* for economic growth) presents another strain, as industry usually requires extensive amounts of water. Thus, the problem is twofold; for Egypt, which is relatively industrialized, a decrease in flow due to elevated upstream consumption establishes constraints on economic options. Countries such as Sudan that strive for economic strength will vastly increase their consumption of water as electric power generation and manufacturing materialize. Another ominous strain is Egypt's intent to reclaim desert land for agriculture in order to reduce its dependence on imports for food; this would substantially increase its demand for water supplies. Taking into consideration the projected growth in population and its current per capita water use, Egypt's total water demand in 20 years will exceed its allotted share by almost 60 percent (Postel, 1992, p. 188).

To make matters worse, the actual supply is being reduced. Water is of no use to a thirsty person if it is polluted; degradation, as much as if the water simply disappeared, therefore decreases the available supply. In Egypt, for example, 117 factories dump their wastewater directly into the Nile (Postel, 1996, p. 143). Egypt is the last in line for the Nile and thus currently suffers from only self-inflicted injury. However, as the upstream countries nurture their interest in economic growth, they may be tempted to subsidize industrial water use, which would render degradation of the upstream waters (and thus further degradation of Egyptian water) inevitable.

In addition, a *potential* usurper of supply is global warming. It is almost impossible to predict exactly *where* changes resulting from this development will take place, but it is certain that where less rainfall is the outcome, periods of shortages may result if they are at or near water supply limits. With the inevitable increase in potential and actual evaporation that would result from higher surface air temperatures, the best guess for greenhouse-induced change in Nile flows would be a reduction in Blue Nile flows and constant or slightly increased White Nile flows (Howell and Allan, 1994, p. 159). Thus the current situation would only be aggravated.

As our general model suggests, each of these factors that are bringing about scarcity are affecting and will continue to affect security in the Nile basin. The decreasing supply of Nile waters in conjunction with

an unlimited demand poses several types of security issues: those on the human, individual scale; the security of the ecosystem itself; and the security of nations. Clearly, the first two security issues are the most immediate and tangible. Along with the obvious consequences (dehydration, disease, and hunger) that result from water scarcity, unemployment and other factors that negatively affect the economy could threaten the security of the lives of Nile basin inhabitants. Also, although ostensibly not of much immediate interest to the countries involved, water scarcity in the Nile basin and unnatural attempts to alleviate it could have serious detrimental ramifications on the ecosystems and consequentially on the inhabitants of the region, as intact ecosystems play a vital role as water purification systems.

The indirect threat of international insecurity is, however, the most sweeping. If current circumstances persist, Egypt and Sudan will experience a severe deficit in water resources by the year 2010. The seven "lesser" countries have expressed a desire to increase their use of the river water source. Such an occurrence, especially by Ethiopia, could reduce water available to the downstream nations and significantly increase tensions. Mutual fear proliferates; although the Ethiopians understandably fear that Egypt could resort to violence, Egypt has little control over the water-related actions of the eight upstream governments. It may not have been an exaggeration when Boutros-Ghali declared that "The national security of Egypt is in the hands of the eight other African countries in the Nile basin" (Postel, 1996, p. 73). Despite the existence of several cooperative opportunities, policy-makers can expect the risk of conflict among the countries to grow. Egypt, though more developed in almost every aspect, is extremely vulnerable to water withdrawal by upstream countries and will be vigilant and apprehensive as she warily watches the growth spurts of her neighbors.

Several possibilities exist to mitigate scarcity and therefore the threats posed to the security of the Nile countries and their inhabitants. They fall under three principal approaches: increasing the supply of water (through purification and other projects and by controlling pollution); decreasing the pressures of demand for water by reducing population and eradicating wasteful use domestically and agriculturally; and formulating cooperative water management agreements. There is widespread support for emphasizing cooperation and reducing demand and contamination rather than searching for new supplies in this basin. Since most of the solutions dealing with demand and cooperation are similar for all river basins, they will be discussed in the "Policy Recommendations" section of this report. States depending on the Nile River basin, plagued with political inertia, need to be particularly concerned with sitting at the table and conducting cooperative, basin-wide negotiation; only after doing this can discussion of an overhaul of policy and of new projects begin. There currently exists a stalemate as Egypt refuses to renegotiate its 1959 Agreement allocation and as Ethiopia refuses to sit at the table as long as it is excluded from new allocation agreements. A useful actor could be the international community in the form of aid and technological assistance to Ethiopia to give it an edge. All things considered, it is essential that these countries realize that one's gain does not necessitate another's loss; otherwise, this malignant suspicion will protract the lack of coordination that in the long run just may well prove to be disastrous as water scarcity and its consequent security troubles continue to be exacerbated.

CASE STUDY SUMMARY: THE MEKONG RIVER BASIN

The Mekong River basin is a water scarce region where increasing competition for water threatens South East Asian security. The Greater Mekong Sub-region covers 2.3 million square kilometers, is home to 325 million people, and is Asia's southwest growth region. 52 million people, mostly small-scale farmers and fishermen, are directly sustained by the river. At 4,800 kilometers in length, the Mekong is the world's 12th longest river, flowing through the Yunnan Province of China, Myanmar, Laos, northeastern Thailand, Cambodia, and southern Vietnam. The Mekong provides the natural resource base for agriculture, fishing, transportation, economic development, and ecological systems maintenance. As a freshwater ecosystem, virtually every human action is eventually reflected in the functions of the Mekong River (Abramovitz, 1996, p. 10).

Potential for development along the Mekong is great but the river's turbulent annual flood-drought cycle renders harnessing its waters for human purposes expensive and problematic. The diverse interests and needs of the countries in the Mekong Basin have the potential to create and exacerbate existing intraregional tensions. Conflicts of interest are developing over use of the river. Mekong development is thus an opportunity for conflict as well as for cooperation. The diverse needs and interests in river development represented by riparian nations, the political relationships among the Mekong countries, and the ability of the Mekong to meet the current and projected demands for its services are all uncertain.

What is certain is that the Mekong is being used unsustainably. It cannot supply the water demanded by human users and the ecological functions it provides. Declining productivity in fisheries, the intrusion of salt water into previously fresh surface water and groundwater, the recession of fertile coastal deltas due to the reduced ability of lower water volumes to

flush sediment into the sea, and the declining diversity of wildlife species all indicate that water resources are overexploited and stressed in the Mekong River basin. The region displays many of the characteristics that indicate or lead to water scarcity.

Population growth rates in the Mekong basin are high. In the lower Mekong countries, the annual growth rate averages 2.29 percent (Environmental Almanac, 1994). This means that the regional population increases by 2,550,870 people per year in the lower Mekong basin alone.

The rate of economic growth in the lower Mekong countries is also high. In 1995, GDP grew at an average rate of 8.18 percent. Average growth in the industrial sector in the lower Mekong countries averaged 11.75 percent Asian Development Outlook 1996 and 1997). With the economic expansion of the economies of the lower Mekong countries, water pollution increases and higher per capita consumption rates contribute to water scarcity through increased demand. In addition, rates of access to safe water supplies in the lower Mekong region, excluding Cambodia, range from 47 to 67 percent in urban areas and 25 to 85 percent in rural areas. Including China and Myanmar, these figures range from 47 to 87 percent in urban areas and remain unchanged in rural areas (Environmental Almanac, 1994). Segments of populations in both urban and rural areas of the Mekong basin are water scarce due to lack of access to existing supplies.

Water scarcity and its adverse impact on the people, economies and ecology of the Mekong River basin have the potential to generate or exacerbate an international security issue. This possibility amplifies existing political and ethnic tensions and weakens institutions that mitigate the negative impacts of water scarcity on social, political, and economic systems. Of vital concern today are proposed dam, reservoir, and irrigation development projects which threaten the per capita share of safe drinking water. Lack of access to safe water is destabilizing through its weakening of the productivity of the labor force through mortality and morbidity. Centuries old political and ethnic tensions in the Mekong basin may be exacerbated by increased competition for scarce water and by increasing inequality in distribution and access of water. The inevitable population displacements that will result from the projected infrastructure projects will further exacerbate these tensions as thousands of people are simultaneously evicted from their homes. Institutional weakening may plague governments, NGOs, regional and international development organizations, disaster relief agencies, and even the Mekong Committee.

From the perspective of water scarcity, the Mekong River basin is a danger zone. Mekong River development is imminent. Countries in the region are approaching an important decision point. In order to prevent an international security issue over water scarcity in the Mekong River basin, policies to govern Mekong development must be formulated that promote efficient technology, especially for agricultural and industrial uses, to enable efficient use of water; protect ecological and human health; and strengthen existing water regimes.

Decisive, proactive action is necessary in order to prevent water scarcity from developing into an international security issue. Policies focused on the causes of water scarcity and causes of insecurity will prevent instability and violence in the region and enable the region to reap tangible and long-term benefits. Prevention is effective and cost-effective relative to retroactive, crisis-driven reactions. Preventive policies grounded in human and ecological needs reflect the vision and leadership demanded for future regional and international peace and prosperity.

Policy Recommendations

Given the importance of the particular context in which water scarcity becomes a threat to international security, this report recommends that policies consider the particular physical, geopolitical, and cultural conditions of each case. Thus, this report emphasizes a case-by-case approach in policy-formation. Policy recommendations fall under five umbrella categories: promoting education, improving living conditions, protecting human and ecological health, allocating sufficient resources to address water scarcity, and building international water regimes.

Education

First and foremost, education should encourage the use of more efficient technology and improved resource management suited to the particular conditions of each case. Determining and implementing efficiency standards can be achieved through information-sharing and technology transfers. Policy-makers should support technology transfers as well as the research and development of new technologies. Focus should be on agricultural improvements, as the sheer volume of agriculture's share of water render this area one in which the most benefits can be reaped per technological innovation.

Improvement in Living Conditions

Improving living conditions in the affected areas must be a policy goal. It can be achieved in part by preventing the human suffering that results from population displacement and the marginalization of poor people. Because living standards rise with increasing incomes in the long run, sustainable economic development must be encouraged. Wasteful, short-term economic gains should be regarded as future threats to human well-being and thus discontinued.

Human and Environmental Health

Policy must protect human and ecological health. Inadequate drinking water supplies and poor sanitation facilities can have devastating impacts on mortality, morbidity, and the economy. A healthy population contributes to the productivity of a country, which strengthens societal institutions and promotes stability. Robust institutions are more effective in withstanding stresses when they occur. Ecological health, aside from its inherent importance, must be maintained since it forms the natural resource base upon which human and economic well-being depend.

Allocation of Sufficient Resources

Policy-makers, both local and international, must commit the resources necessary to collectively correct this urgent state of affairs. Informal promises will only exacerbate the problem as the causes of water scarcity worsen.

Creation of Effective International Water Regimes

Basin-wide water regimes must be designed so that all stakeholders have the opportunity and are given an incentive to contribute to effective water allocation agreements. All stakeholders should be obliged to participate and comply with agreements.

The problem of water scarcity *will* be resolved; the question is how? By acting collectively and decisively, humans relying on shared water basins can ensure their continued well-being and development. By acting unilaterally and indecisively, the probability of a military solution increases.

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The Natural Heritage Institute

U.S.-Mexico Case Study on Desertification and Migration

by Michelle Leighton Schwartz and Heather Hanson

The Natural Heritage Institute (NHI), a non-profit public interest environmental organization in San Francisco, California, has spent several years investigating the links between agricultural dryland degradation and rural migration within Mexico and across the border into the United States. Results of NHI's research, including analysis of national survey data on land use and migration in Mexico, will be released by the Institute in May 1997 and suggested policy reforms will be presented to the Congressional Commission on Immigration Reform, Clinton Administration officials, and Mexican officials and organizations. The following is a brief overview of NHI's work and findings to date. Portions of NHI's final report will be published in the forthcoming issue of the *Environmental Change and Security Project Report*.

A growing number of experts believes that the national security interests of many countries will be affected in the coming century by environmental scarcities and associated conflicts, by local and regional level population pressures, and by economic policies exacerbating patterns of inequitable resource distribution. International organizations estimate that 25 million people have been displaced by environmental problems.[1] Some researchers estimate that those displaced by land degradation in dryland areas could top *100 million* in the coming two decades.[2] This phenomenon has been termed "desertification," and is the subject of a global treaty which entered into force in December, 1996.[3] The international Food and Agriculture Organization (FAO) estimates that 70% of the world's dryland agricultural areas are degraded, placing roughly 1 billion people at risk. This is compounded by chronic water shortages currently facing roughly 550 million people; these threaten both human health and farming possibilities.[4]

Desertification has profound social and economic implications. Because rural communities depend on local land and water resources to ensure their continued subsistence, soil erosion contributes significantly to declines in rural incomes. This decline in incomes, combined with factors such as population growth (which can increase land use and subdivision) and access to labor markets, can exacerbate conflicts over land resources and stimulate migration. Conflicts may also arise as new migrants attempt to integrate into established communities. Moreover, developed countries have responded adversely to increased migration: almost 1 in every 3 developed countries is restricting immigration from developing countries.[5] These policies can serve to increase conflict between developed and developing countries, particularly those with shared borders.

Desertification is a growing problem in the Americas, affecting much of the Peruvian coastal areas, 20% of Argentina's territory, and all of Northeast Brazil. Haiti has experienced a 2/5 decline in productive lands over the last several decades, and only 2% of its territory is currently forested. Mexico, which shares a 2,000-mile border with the United States, is one of the most affected countries in the region: 60 percent of lands are severely degraded and drought is a persistent phenomenon. These concerns, as well as the tensions created by population movements along the border, led NHI to investigate the dryland degradation in agricultural regions as a "push" factor for urban and cross-border migration, and to investigate links with associated factors, such as population trends and economic reforms.[6] Work has been undertaken to improve understanding of environmentally induced migration and to identify policy alternatives for the United States and Mexico that could also be relevant for other countries suffering similar problems.

The U.S.-Mexico Profile

Mexico's natural resources are coming under increasing threat of destruction, not unlike those of the United

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States.[7] Over 1,000 square miles of lands are desertified annually, forcing more than 260,000 hectares of grazing and crop lands out of production. In addition, only 50,000 square miles of forest are still standing and much of these forest lands are likely to be gone by the year 2000 if cutting continues at current rates. This degradation is largely caused by unsustainable land use practices, but climate also plays an important role. Experts attribute more than 10% of the changes in vegetative cover to climatic conditions. Climate models project that Mexico may become dryer and 2-5 degrees warmer by 2025, with precipitation becoming more erratic. A drought is experienced every five years in one or more regions of Mexico.[8] Because the majority of Mexican croplands are rain-fed, climatic changes could reduce crop yields by up to 40%, compounding the income risks of 30 million rural residents who are dependent on agriculture. Moreover, this has led to increasing dependence on groundwater, which is now being pumped at rates exceeding recharge. In some principal aquifers, water tables are dropping 1-3 meters annually. The problem is exacerbated by high rates of population growth in poor rural areas—nearly twice the national average. Population trends remain highly correlated with poverty, lack of education and diminishing resources: while the national birth rate stands at 2.5 children per women, in the poorest regions of the country it remains above 4.5.

To keep pace with population growth, the Mexican government will have to create 1 million new jobs each year. Given that at least half of the labor force is already unemployed or underemployed, this level of job creation will be enormously challenging for Mexico. In these circumstances, migration may be inevitable. Moreover, these problems are exacerbated by increasingly uneven resource distribution: between 1990 and 1993, 27 new billionaires were created in Mexico, while millions of Mexican incomes fell to below the official poverty line. Conflicts over land in Mexico are becoming more acute. Many analysts link conflicts in Southern Mexico, particularly Chiapas, to natural resource scarcity arising from land degradation, population growth and economic inequality.

As immigration has increased to the United States, so have tensions over border issues. This is evident in the new U.S. legislation passed by Congress last session. Under the new reforms, only the U.S. Supreme Court will be allowed to issue injunctions against INS policies, severely limiting immigrant access to the U.S. court system. In 1997, the INS budget will rise to $ 3.1 billion. The INS will expand the number of Border Patrol agents upwards from the 5,100 in 1995 to 10,000 by 2001. The INS will also increase their workplace enforcement activities. In addition, the INS has unveiled an electronic device called the "car stopper," which will help to eliminate high speed chases by allowing Border Patrol agents to electronically disable a suspect's automobile.

Addressing the Problem: Developing Institutional and Policy Responses

To the extent that they contribute to migration, current environmental, demographic and economic difficulties in rural Mexico pose serious challenges to reducing migration flows and resolving the long-standing migration conflict. Cooperating with Mexico to meet these challenges should become a high priority among U.S. officials, not only in seeking to address the migration dilemma, but also because Mexico remains important to U.S. geopolitical and economic interests. Our shared border will continue to present opportunities for economic cooperation through many vehicles, including the North American Free Trade Agreement (NAFTA) and the newly created North American Development Bank, a binationally financed effort to promote more equitable development throughout the border region. Moreover, Mexico has ratified the new global Convention to Combat Desertification and Drought. If the United States ratifies the Convention, this treaty could serve as an immediate vehicle for joint programs.

Laws, policies and institutions play an important role in advancing or mitigating environmental degradation, population growth, and outmigration. For this reason, NHI's research program focuses on explicitly determining the existing incentives and disincentives to sustainable management. Regardless of the differences of opinion regarding population, environment and migration, there is a remarkable degree of agreement among scholars that policy changes play an essential role in creating "vicious and virtuous circles" of response.[9] This means that positive changes tend to be self-reinforcing, as do negative ones. The example of land degradation in Mexico illustrates this well; desertification contributes to climate changes, leading to decreases in rainfall and higher temperatures which then exacerbate existing erosion. Likewise, once migration becomes a well established community strategy, human capital resources and migrant networks make it increasingly difficult to slow or stop migratory flows. This snowball effect also works in the other direction: with positive steps towards soil conservation and greater rural productivity also producing feedback loops for greater positive change, such as reducing migration.

In sum, policies and activities in both the United States and Mexico can create conditions for construction of either vicious or virtuous circles. There is substantial momentum for continued migration: the large wage differential between the two countries, extensive migrant networks, and historic policies to provide cheap labor for agriculture in the United States act as an enormous "pull" in motivating many in Mexico to migrate, while poverty, economic disparity and increas-

ing loss of agricultural lands in Mexico, fueled by population trends, are strong factors which "push" migrants from rural to urban areas and toward the United States.

In stopping this "vicious circle" and in assuring that people are not forced from their homelands in order to make a living, policy makers on both sides of the border will need to address the connections between population trends, environment, trade and migration directly by investigating how to promote the sustainability of livelihoods in rural Mexico. Clearer understanding of the links between these factors is essential to developing policy responses in Mexico and bi-nationally.

NHI's effort to document this problem, both causes and consequences, also recognizes that analysis of the U.S.-Mexico case study may inform similar work in other regions by improving understanding of conflicts related to environmentally induced population movements. Mexico suffers from many of the same problems endemic in other regions, such as widespread desertification, high rural population growth, and an increasing rural migration.

To accomplish its goals, the Institute has organized a team of researchers to undertake a larger and more in-depth investigation of the physical and human dimensions of desertification in Mexico. The team includes economists, environmental scientists, demographers, and lawyers. NHI has also secured commitments for the participation of officials on both sides of the border, including the U.S. Commission on Immigration Reform (CIR) and U.S. Department of State, Mexican National Population Council, Mexican Secretariat of Government, Mexican Secretariat of Environment, Natural Resources and Fisheries (SEMARNAP). In addition, the team will receive input from the International Organization for Migration (IOM), and the United Nations Environment Programme (UNEP). The investigation will also expand our binational network of NGOs.

Currently, NHI is working with Professor Alain de Janvry of U.C. Berkeley to undertake environmental, economic and demographic analysis of variables from a recent national survey of farm households in Mexico related to land use and cross-border migration. This analysis and data will be the first of its kind and the results will be combined with other research to develop potential policy reforms for both Mexico and the United States. NHI's findings will be published in a report and presented to officials in both countries, including the U.S. Congressional Commission on Immigration Reform, which has provided support for this study.

About the Natural Heritage Institute

Founded in 1989, NHI is a non-profit public interest law and consulting organization dedicated to conserving the world's natural resources. The Institute specializes in managing multidisciplinary teams of researchers, legal specialists and officials in the study of global environmental issues. Its technical teams are comprised of hydrologists, biologists, water project engineers, modelers, lawyers, sociologists, political scientists and economists. NHI currently collaborates with and counsels over 20 resource management and regulatory agencies at the local, state, and national levels throughout the United States and multinationally in Asia, Latin America and Eastern Europe. NHI is also currently undertaking similar efforts in its binational program with the U.N. Development Program in Africa. NHI collaborates closely with local communities and NGOs to exchange experiences, information and technologies for sustainable natural resource management.

Copies of the Natural Heritage Institute's report, *The Desertification and Population Root Causes of Migration: A Report on Indicators in Mexico and the United States,* can be ordered from the Natural Heritage Institute, 114 Sansome Street, Suite 1200, San Francisco, CA 94104; phone (415)288-0550; fax (415)288-0555; email <nhi@igc.apc.org>.

Endnotes

[1] See, "Statement of Principles," at 7, Report of the International Symposium on Environmentally-Induced Population Displacements and Environmental Impacts Resulting from Mass Migrations, Geneva, 21-24 April 1996 (convened by the International Organization for Migration, United Nations High Commissioner for Refugees, and the Refugee Policy Group).

[2] Gregoire von Kalbermatten, "Desertification, Environmental Migrations and Conflicts," *Environmentally-Induced Population Displacements and Environmental Impacts Resulting from Mass Migrations, Id.*

[3] 50 nations had ratified the treaty by the end of September 1996, the required number to ensure that the treaty would enter into force three months later.

[4] N. Myers, *Environmental Exodus: An Emergent Crisis in the Global Arena* (Climate Institute, Washington, D.C. 1995).

[5] Ibid. 9.

[6] While our investigation does not undertake comprehensive analysis of "pull factors," such as the wage differential, U.S. labor needs, and other U.S. policies, these are also recognized as significant contributors to the problem.

[7] Much of the western United States continues to be plagued by soil erosion in agricultural areas, deforestation, and excessive siltation of rivers and streams.

[8] See, Michelle Leighton Schwartz and Heather Hanson, "The Desertification and Population Root Causes of Migration: A Report on Indicators in Mexico and the United States (NHI, October 1996).

[9] See Robert Repetto, *The Second India Revisited: Popu-*

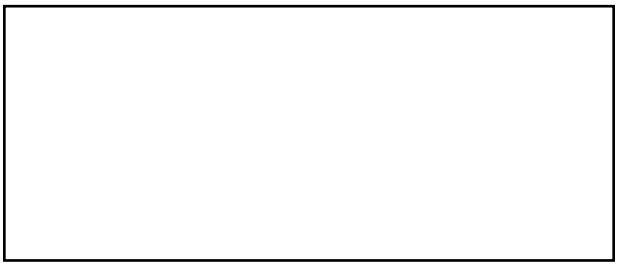
lation, Poverty and Environmental Stress Over Two Decades. World Resources Institute, Washington, DC, August 1994.

Erratum

In "The Project on Population, Environment and Security: Key Findings of Research" by Thomas Homer-Dixon in the Spring 1996 issue of the *Report* the diagrams of Figures 2 and 3 were reversed. The corrected version follows:

Figure 2: The Process of Resource Capture

Figure 3: Ecological Marginalization



Official Statements and Documents

Below are excerpts from recent official statements and public documents in which environmental issues are cited in the context of security institutions and national interests. The Wilson Center encourages readers to inform the Report of other related public statements; please send a note to the address listed on the inside cover, or E-mail us at ecsp@erols.com.

Statements By William J. Clinton
President of the United States

Excerpts from President Clinton's Remarks at the International Coral Reef Initiative Event, Port Douglas Park, Port Douglas, Australia
22 November 1996

We are citizens not only of individual nations, but of this small and fragile planet. We know that pollution has contempt for borders—that what comes out of a smokestack in one nation can wind up on the shores of another an ocean away. We know, too, that recovery and preservation also benefits people beyond the borders of the nation in which it occurs. We know that protecting the environment can affect not only our health and our quality of life, it can even affect the peace. In too many places, including those about which we read too often now on the troubled continent of Africa, abuses like deforestation breed scarcity, and scarcity aggravates the turmoil which exists all over the world.

. . .Finally, we must work to reduce harmful greenhouse gas emissions. . . .If they continue unabated, the consequences will be nothing short of devastating for the children here in this audience and their children.

New weather patterns, lost species, the spread of infectious diseases, damaged economies, rising sea levels—if the present trends continue, there is a real risk that sometime in the next century, parts of this very park we are here in today could disappear, submerged by a rising ocean. That is why today, from this remarkable place, I call upon the community of nations to agree to legally binding commitments to fight climate change. . . .

Statements by Albert Gore, Jr.
Vice President of the United States

Excerpts from Vice President Gore's Letter in the U.S. Department of State's first annual report on the environment and foreign policy, *Environmental Diplomacy: The Environment and U.S. Foreign Policy*, April 1997

The U.S. State Department's first annual report on the environment and foreign policy represents a new way of looking at the world. We have moved beyond Cold War definitions of the United States' strategic interests. Our foreign policy must now address a broad range of threats—including damage to the world's environment—that transcend countries and continents and require international cooperation to solve.

Environmental problems such as global climate change, ozone depletion, ocean and air pollution, and resource degradation—compounded by an expanding world population—respect no border and threaten the health, prosperity, and jobs of all Americans. All the missiles and artillery in our arsenal will not be able to protect our people from rising sea levels, poisoned air, or foods laced with pesticides. Our efforts to promote democracy, free trade, and stability in the world will fall short unless people have a livable environment.

We have an enormous stake in the management of the world's resources. Demand for timber in Japan mean trees fall in the United States. Greenhouse gas emissions anywhere in the world threaten coastal communities in Florida. A nuclear accident in Ukraine kills for generations. Our children's future is inextricably linked to our ability to manage the earth's air, water, and wildlife today.

The first State Department report details the Clinton Administration's priorities for working globally, regionally, and bilaterally to combat serious and growing international environmental threats. It documents an important turning point in U.S. foreign policy—a change the President and I strongly support.

Statements by Madeleine K. Albright
Secretary of States

Excerpts from Secretary of State Albright's Letter in the U.S. Department of State's first annual report on the environment and foreign policy, *Environmental Diplomacy: The Environment and U.S. Foreign Policy*, April 1997

Just over one year ago, then-Secretary of State Christopher announced that the State Department would spearhead a government-wide effort to meet the world's environmental challenges. He said, "The United States is providing the leadership to promote global peace and prosperity. We must also lead in safeguarding the global environment upon which that prosperity and peace ultimately depend."

This report is an outgrowth of that initiative. It will be released every year on Earth Day. Its purpose is to update global environmental challenges and policy developments and to set our priorities for the coming year.

Not so long ago, many believed that the pursuit of clean air, clean water, and healthy forests was a worthy goal, but not part of our national security. Today environmental issues are part of the mainstream of American foreign policy.

We are building on three basic premises.

First, we know that damage to the global environment, whether it is overfishing of the oceans, the build-up of greenhouse gases in the atmosphere, the release of chemical pollutants, or the destruction of tropical forests, threatens the health of the American people and the future of our economy. We know that rapid population growth exacerbates these problems and has consequences that transcend national borders. And we know that the global environment can be protected most effectively if nations act together. For these reasons, this effort must be a central concern of American foreign policy.

Second, environmental problems are often at the heart of the political and economic challenges we face around the world. In Russia and central Europe, environmental disasters left over from the Soviet era shorten lives and impede reform. In central Africa, rapid population growth combined with the competition for scarce resources fuels conflict and misery. We would not be doing our jobs as peacemakers and as democracy-builders, if we were not also good stewards of the global environment.

Third, we believe, as did President Kennedy, that "problems created by man can be solved by man." The environmental problems we face are not the result of natural forces or the hidden hand of chaos; they are caused by human beings. These problems can be solved if America works in partnership with governments, NGOs, and businesses that share our commitment to a cleaner and healthier world.

To meet this challenge, the State Department is changing the way we do business. Four years ago, we appointed an Under Secretary for Global Affairs. Our embassies and bureaus are developing regional environmental policies that advance our larger national interests. To help coordinate these policies, we are opening regional environmental hubs at our embassies in Costa Rica, Uzbekistan, Ethiopia, Nepal, Jordan, and Thailand. We have made environmental cooperation an important part of our relationships with countries like Japan, India, Brazil, and China.

Globally, we are pursuing five environmental priorities: the problems of climate change, toxic chemicals, species extinction, deforestation, and marine degradation. We have made many important advances, including agreements to phase out the remaining substances that damage the stratospheric ozone layer and to ban ocean dumping of low-level radioactive waste.

We have many opportunities this year to make further progress. At the conference on the UN Framework Convention on Climate Change, which will be held in Kyoto, Japan this December, we will be pressing for a substantive agreement to reduce greenhouse gas emissions. The United Nations will hold a special session this year to commemorate the fifth anniversary of the Rio Earth Summit. There will also be an important meeting of the Convention on the International Trade in Endangered Species.

Environmental diplomacy is a work in progress. The depletion of our fisheries, the increase in the level of greenhouse gases, and the destruction of habitats and species did not occur overnight and cannot be reversed overnight. We must work with the Congress and the American people to obtain the resources we need to support our diplomacy in this area, as in all others.

We have made a good beginning. Our nation and our friends and partners around the world have the tools, the commitment, and the know-how to get the job done. As Secretary of State, I am committed to this effort and optimistic that we will succeed.

Statements by Warren Christopher
Secretary of State

Secretary Christopher's Remarks to the Woodrow Wilson International Center for Scholars,
14 January 1997
"The Environment in U.S. Foreign Policy"
see page 186 of this *Report*

Secretary Christopher's Remarks to Council of the Americas, Washington, D.C.
Excerpts from "Council of the Americas: Supporting Economic Growth and Democracy"
6 May 1996

. . .We will advance our hemispheric efforts to help preserve the environment when the Summit's Conference on Sustainable Development meets in Bolivia later this year. At Stanford University three weeks ago, I stressed the importance of integrating environmental issues into the mainstream of foreign policy. Whether in confronting the costs of climate change or the impact of deforestation on the consolidation of democracy in Haiti, addressing these issues is squarely in America's interest. That includes helping American companies expand their commanding share of a $400-billion market for environmental technologies. We all need to recognize that pitting economic growth against environmental protection is what President Clinton calls "a false choice."

Statements By William J. Perry
Secretary of Defense

Excerpts from Secretary Perry's Remarks to
The Society of American Engineers ,Washington, D.C.
20 November 1996

Last month, I visited the Little Star Shipyard in Archangel, Russia. . . .I went there to observe the dismantlement of a nuclear submarine. A few years ago, that submarine was out on patrol, carrying enough nuclear missiles to destroy dozens of American cities. Now it is being dismantled by some of the same Russian workers who built it, using equipment provided by the United States Department of Defense.

The waters around the Little Star Shipyard are packed with old Russian nuclear submarines. These submarines no longer threaten the world with a nuclear holocaust; however, they are still a major environmental hazard to the Arctic region. By helping Russia dismantle these subs, we are creating a win-win-win situation.

It's a win for America—the submarine we saw being dismantled will never again threaten American cities. It's a win for the Russians—the workers doing the dismantlement were previously unemployed because of the decrease in orders for nuclear submarines. And it's a win for the environment—the submarine's nuclear fuel will be disposed of safely; and the sub's components are being recycled into materials that can be used to produce commercial products. To use defense resources to destroy weapons that once threatened us makes good sense on its face. Indeed, that's why we call it "defense by other means." But to use defense resources to protect and preserve the environment may seem counter-intuitive.

Each year, Congress gives the DoD environmental budget a special working-over. The critics wonder why we are spending scarce defense resources on what seems to be a non-defense activity. They say, "Focus on a strong defense and leave the environment to others." They are wrong. I say that a strong environmental program is an integral component of a strong defense—and a strong Department of Defense. The Defense Department must have an environmental program that protects our troops and families; that manages our training and living areas carefully; that fulfills our obligation to be good citizens to the community in which we live; and that sets a good example to other militaries around the world. Let me take these one at a time.

First, let's be clear that defense environmental protection is critical to military readiness and to military quality of life. Our military personnel live, train, and work in the same location—in the same environment. We must not expose our forces, their families and military communities to environmental health and safety hazards. So we take care to limit their exposure to hazardous materials in the workplace. And we take great care to keep our base communities informed of what we are doing on base, and involve local citizens in making environmental clean-up decisions. These are people who work on our bases; who support our troops; and who are key members of our effort to maintain a quality force.

A second point is that defense environmental protection is good management, because as any good business manager knows, if you pollute today you pay tomorrow. We are paying the price right now, because years ago the Defense Department, like many industrial organizations, did not invest enough attention or resources in environmental protection. As a result, today our military installations contain about 10,000 contaminated sites. That's land we cannot use for training and operation. And on bases we're closing, that's land we must restore at great cost, before we can turn it over to local communities for reuse. Cleaning up these sites is costing us more than $2 billion a year, which is nearly

half of our overall defense environmental budget. We don't want to make these mistakes again.

A third reason for an emphasis on environment is that taking care of the environment is good citizenship. The Defense Department is the steward for over 25 million acres of public land. These lands include some of America's most pristine landscapes and precious resources; including rare and endangered species, national historic places and Native American burial sites. Many of our bases are part of civilian communities in close proximity to residential neighborhoods and schools. Military activities can have a significant impact on the quality of the land, air, and water that we all use. We protect a beautiful nation, and we must do our part to keep it beautiful. For all these reasons, environmental protection is a key task for every military manager. But it is also a fact that defense environmental protection is not an option. We in the defense department face the same local, state, and federal environmental laws and regulations that apply to every organization and institution in this country.

We take these laws and regulations seriously. . . .That is why, three years ago, we created the Office of Environmental Security at the Pentagon, and appointed Sherri Goodman to coordinate and lead our efforts at the highest levels. That is why the Services have each appointed a flag officer to lead environmental, safety and occupational health activities in the ranks. That is why, over the past several years, we have worked hard to reduce our damage to the environment. And it is paying off. From 1986 to 1992, we cut our hazardous waste in half. Our goal is to cut it in half again by 1999. Cutting waste not only improves environmental quality, it also quite obviously reduces disposal costs. Pollution prevention is a good classic investment. And it saves money that can be used for other defense programs.

All of this sounds like a good idea whose time has come. But over the longer term, we must deal with the problem of environmental pollution at its source. So we are designing environmental responsibility into our new weapons systems; by reducing hazardous emissions in the building of new systems; and by reducing the need for hazardous materials in the operation and maintenance of these systems.

. . .The U.S. military has a wealth of experience and expertise that it can share with the militaries of other nations. Our defense environmental programs are becoming another important tool in which to engage the militaries of new democracies. In doing so, we can make a small contribution to a better global environment; and have a positive influence on their approach to defense and the way they manage resources.

We are doing this, for example, with the Russians in the Arctic. Just two months ago, I signed a unique agreement with Russia and Norway in which our forces will work together to ensure that their military activities do not harm the Arctic environment. . . . Geographically, the Arctic is the closest route between the United States and Russia. So it is fitting that in preserving this route, we bring our nations closer together. We are also working with the Russians to use our intelligence capabilities to map out environmental contamination. Earlier this year, Vice President Gore and Russian Prime Minister Chernomyrdin exchanged maps that vividly depicted environmental conditions over Eglin Air Force Base in Florida and Yeysk Air Base in Russia. This exchange was unique because the United States produced the map of the Russian base, and the Russians produced the map of the American base. These bilateral exchanges not only provide us with important environmental science data; they are also another way of overcoming a half century of mistrust by working closely together on common pursuits.

All over the world, the U.S. military is helping to spread the word on how armed forces can protect the environment. . . .

. . .There is a great benefit when militaries of the world do their part to protect and preserve their environments. There is a greater benefit when they do this by working together. Not only are we making the world a cleaner and safer place; we are also bridging old chasms and building new security relationships based on trust, cooperation and warmth. That makes the world a more peaceful place. Thomas Jefferson once said, "The Earth is given as a common stock for man to labor and live on." All nations own shares of that common stock. And all nations share a common obligation to preserve it so that our common stock provides the capital for the labor and lives of future generations. I am proud that the U.S. military is playing a positive role; and you all should be proud too of the role that you're playing to make the U.S. military a leader in environmental security in the world.

Statements by John Deutch
Director of Central Intelligence

Director Deutch's Remarks to the World Affairs Council, Los Angeles, California
Excerpts from "The Environment on the Intelligence Agenda"
25 July 1996

. . .Environmental trends, both natural and man-made, are among the underlying forces that affect a nation's economy, its social stability, its behavior in world markets, and its attitude toward neighbors.

I emphasize that environment is one factor. It would be foolish, for example, to attribute conflicts in Somalia, Ethiopia, or Haiti to environmental causes alone. It would be foolhardy, however, not to take into consideration that the land in each of these states is exploited in a manner that can no longer support growing populations.

Environmental degradation, encroaching deserts, erosion, and over-farming destroy vast tracts of arable land. This forces people from their homes and creates tensions between ethnic and political groups as competition for scarce resources increases. There is an essential connection between environmental degradation, population growth, and poverty that regional analysts must take into account.

National reconnaissance systems that track the movement of tanks through the desert, can, at the same time, track the movement of the desert itself, see the sand closing in on formerly productive fields or hillsides laid bare by deforestation and erosion. Satellite systems allow us to quickly assess the magnitude and severity of damage. Adding this environmental dimension to traditional political, economic, and military analysis enhances our ability to alert policymakers to potential instability, conflict, or human disaster and to identify situations which may draw in American involvement.

Some events have already dictated that environmental issues be included in our intelligence agenda. When Moscow initially issued misleading information about the accident at the Chernobyl Nuclear Power Plant, U.S. leaders turned to the Intelligence Community to assess the damage and its impact on the former Soviet Union and neighboring countries.

During the Gulf War, when Saddam Hussein used ecological destruction as a weapon, policymakers and the military called on the Intelligence Community to track the movement of smoke from burning oil fields and the flow of oil released into the gulf. They asked whether damage to Iraq's Tuwaitha nuclear complex posed a danger to troops and local population.

In each of these cases, our answer to these questions was not and could not be, "the environment is not an intelligence issue." Our answers were classic intelligence analysis based on our data from collection systems and open sources. We were able to assess the magnitude of the Chernobyl accident; we were able to tell U.S. troops how to avoid lethal hydrogen sulfide from oil fires; and we were able to tell military planners that damage to the reactor was not a threat.

I would like to emphasize that the environment is not a new issue for the Intelligence Community. For years we have devoted resources to understanding environmental issues. Much of the work that now falls under the environmental label used to be done under other names—geography, resource issues, or research. For example, we have long used satellite imagery to estimate crop size in North Korea and elsewhere. This allowed us to forecast shortages that might lead to instability and to determine the amount of agricultural products a nation would need to import—information valuable to the U.S. Department of Agriculture and to America's farmers. We have also tracked world availability of natural resources, such as oil, gas, and minerals.

We have for many years provided the military with information on terrain and local resources. As our forces embark on military, peacekeeping, and humanitarian operations in remote and unfamiliar territory, they will need even better information on environmental factors that could affect their health and safety and their ability to conduct operations.

. . .Environmental intelligence will also be a part of our support to economic policymakers. They need to know, for example, whether or not foreign competitors are gaining a competitive advantage over American business by ignoring environmental regulations. Intelligence can provide valuable information.

In short, the demand on the Intelligence Community for information on environmental issues will grow. As the world population expands and resources such as clean water and arable land become more scarce, it will become increasingly likely that activities of one country will have an environmental impact that goes beyond its borders. U.S. policymakers will need warning on issues that are likely to affect U.S. interests and regional stability.

Maintaining a capability for environmental intelligence will allow us to answer important questions that are likely to come from our consumers in the future. For example, China's rapidly growing population and booming economy will translate into a tremendous increase in demand for the world's natural resources, including oil and food. What impact will this have on world markets? As in the past, we must be prepared to answer such questions.

We should also be willing to provide data from our collection systems to help experts answer less traditional questions, for example: what impact will increased burning of fossil fuel have on the global environment?

. . .In 1991, then-Senator Gore urged the Intelligence Community to create a task force to explore ways that

intelligence assets could be tapped to support environmental research. That initiative led to a partnership between the Intelligence and scientific communities that has proven to be extraordinarily productive for both parties.

The Environmental Task Force found that data collected by the Intelligence Community from satellites and other means can fill critical information gaps for the environmental science community. Furthermore, this data can be handed over for study without revealing information about sources and methods.

For example, imagery from the earliest intelligence satellites—which were launched long before commercial systems—can show scientists how desert boundaries, vegetation, and polar ice have changed over time. These historical images, which have now been declassified, provide valuable indicators of regional and global climate change.

Some of the scientists who participated in the Environmental Task force now make up a group called MEDEA. MEDEA works with the Intelligence Community to establish what we call the "Global Fiducials Program." Under this initiative, during the next decade we will periodically image selected sites of environmental significance. This will give scientists an ongoing record of changes in the earth that will improve their understanding of environmental processes. More importantly, it will greatly enhance their ability to provide strategic warning of potentially catastrophic threats to the health and welfare of our citizens.

. . .I would like to make one more key point about our work on environmental issues—the costs are small and the potential benefits enormous. The resources allocated to environmental intelligence are modest, perhaps one tenth of a percent of the intelligence budget for collection and analysis. We are using intelligence capabilities that are already in place. This important work requires no new capital investments.

. . .I think it would be short-sighted for us to ignore environmental issues as we seek to understand and forecast developments in the post-Cold War world and identify threats to our national welfare. Just as Secretary Christopher promised "to put environmental issues in the mainstream of American foreign policy," I intend to make sure that Environmental Intelligence remains in the mainstream of U.S. intelligence activities. Even in times of declining budgets we will support policymakers and the military as they address these important environmental issues.

Statements By Strobe Talbott
Deputy Secretary of State

Excerpts from Deputy Secretary Talbott's Remarks at the Environmental Issues in American Foreign

Statements by Secretary of State Madeleine K. Albright
as United States Permanent Representative to the United Nations

Excerpts from Ambassador Albright's Keynote Address to the 1994 Symposium for the Environmental Defense Fund on the Global Environment: International Issues and Institutions
April 21, 1994

. . . It's no secret that the Clinton Administration has a fundamentally different philosophy than its predecessors. We believe that America should be the world's environmental leader, not foot-dragger. We believe environmental awareness is a prerequisite to, not an obstacle to, economic growth. We believe that environmental degradation is not simply an irritation, but a real threat to our national security.

During the Cold War, we mobilized against the risk of nuclear Armageddon. The environmental risk is not as spectacular or as sudden. It does not focus the public's mind in quite the same way. But left unaddressed, it could become a kind of creeping Armageddon. It is both a product of, and a cause of, social disintegration. It is making uninhabitable increasing chunks of our planet. And it could, in time, threaten our very survival. . .

International cooperation on the environment is no longer an option; it is an imperative. The lines we draw on maps matter less and less. The forces that now shape our lives are global and interlocking. That is why sustainable development is not an economic policy or an environmental policy or an education policy or a health policy—it is all of those things and more.

Policy Seminar, National Foreign Affairs Training Center, Arlington, Virginia
10 September 1996

. . .This past February, on a tour of Latin America, Secretary Christopher visited Manaus and personally inspected the Brazilian rainforest....[The outing] underscored a strong, consistent, personal commitment to making environmental activism part of the day-in, day-out work of the Department of State. The rationale for doing so is simple: it's because the health and welfare of Americans are bound up with the quality of the land, air, and water everywhere in the world; the extinction of species in the tropics, the spread of pollutants through acid rain, the decline of stocks of fish in our oceans. All these are apparent in tangible, troublesome ways here at home. But struggles over land, water, and other natural resources affect our national interests overseas as well, since they can lead to instability in regions of critical importance to the United States.

Because threats to the environment are so often international in scope, no nation can, on its own, achieve lasting solutions. In the past 25 years, the United States has made important progress toward putting its own environmental house in order, but even our best efforts will be insufficient if our neighbors do not or cannot do the same. The State Department, as the agency of the U.S. government responsible for relations with other countries, obviously has a crucial role to play.

. . .Let me now refer to some specific areas of the world and how environmental concerns obtrude on our political, economic and security interests—and should obtrude more on both our analysis of what is happening there and on our diplomatic efforts to shape events in a way that will serve our interests.

I'll start, predictably perhaps, with the former Soviet Union. When Reactor Number Four at the Chernobyl nuclear power plant blew its top 10 years ago, it was more than an isolated accident; it marked the beginning of the meltdown of the USSR. That one disaster helped catalyze the policy of glasnost in Moscow and the independence movement in Ukraine. The death—more accurately, the murder—of the Aral Sea and the befouling of Lake Baikal fanned grass-roots outrage against the obtuseness of Kremlin rule. In short, Soviet ecocide was, to an extent few of us realized at the time, the beginning of the end of the Soviet regime, the Soviet system and the entire Soviet empire.

Today, in addition to all the other challenges they face, the people in that vast part of the world have to clean up the mess they inherited from the Communists. Half of Russia's water is undrinkable even after treatment. The health crisis in that country stems in large measure from atmospheric pollution. The economic and human toll of these conditions hinders Russia's attempts to move forward with reform.

The challenge for us is to help the Russians—and the other peoples in the post-Communist world—build systems and societies that treat natural resources and public health as core elements of their national interests. That's why the Gore-Chernomyrdin Commission includes an Environmental Committee that uses classified data from both sides to help scientists and government planners address ecological problems. Meanwhile, the Environmental Protection Agency is helping Russia clean up its drinking water, and the Department of Energy is helping Ukraine safeguard its nuclear reactors.

Environmental issues are equally important in the Middle East and the Gulf, a region of the world that has been especially on our minds of late. We focus on surface-to-air missiles, tanks and artillery, which are a dangerous mix with ancient hatreds and aggressive ambitions. But we mustn't overlook the more mundane ingredient of water, which has immense potential both for good and, in its scarcity, for ill. In no other region of the world are waterways and international politics so intertwined. Iraq, Syria and Turkey share the Euphrates River Basin; Israelis, Jordanians, Palestinians, Lebanese and Syrians all rely on the resources of the Jordan River Basin. That's why the Middle East peace process includes a multilateral working group on water resources.

In this connection, last month Secretary Christopher announced that our embassy in Amman, Jordan, will be among the first of 10 "Environmental Hubs" that will, by the year 2000, be located in all regions of the world. These hubs are an innovative departure for our Department, because they are designed as an additional inducement to our diplomats in a particular post, as they act locally, to think regionally.

In Central America, we have designated our embassy in San Jose, Costa Rica, as another environmental hub. In that neighborhood—which is, of course, our own—I've spent some time working with two countries that I'd like to mention. One is Panama. We will, as you know, return the Panama Canal to the Panamanian government and people at the end of 1999. But the path between the seas itself faces a potentially lethal ecological—and economic—threat. Various forms of environmental degradation could close the locks. We are committed to working in partnership with the Government of Panama to ensure that the Canal's protective buffer zones are managed in a way that guards against deforestation, erosion and the buildup of silt. Another country, even closer to the U.S., where I've

spent a lot of time, including in recent weeks, is Haiti. We all know about the legacy of the Duvaliers and the Ton-Ton Macoutes. Political violence is part of the gruesome background to the troubles besetting that country as it tries to consolidate a fledgling democracy. But there's another legacy that is just as hard to overcome and eventually expunge. Deforestation, soil erosion, and water shortages have combined to leave thousands without a livelihood and without much hope for the future.

. . .It was in this spirit that Secretary Christopher, in his Stanford speech, called for a New Partnership for Environment and Foreign Policy designed to forge new relationships between experts who might not otherwise see the common interests they share. Let me stress what the Secretary's Initiative is not. It's not about creating a new, separate, self-contained, and therefore by definition self-marginalized bureaucracy that will be off in a corner somewhere worrying about the fate of the earth while the rest of the foreign-policy machinery grinds on doing its traditional thing. Rather, it's an attempt to integrate a concern for and a can-do attitude toward-environmental issues into the way we approach virtually every major task.

. . .The well-recognized problems and solutions that arise in the interaction of nation-states are still very much with us, and they will be so for a very long time. History, the last time any of us checked, has not ended. But we are beginning to understand, perhaps for the first time, the sometimes devastating, sometimes promising, always complicating interaction between human history and natural history.

. . .Understanding—and acting on—the importance and interaction of global issues is an imperative for diplomats as well. The institution hosting this conference—the Foreign Service Institute—is to be congratulated, as it (like some of the rest of us baby-boomers) celebrates its 50th birthday, for integrating environmental issues into its core curriculum, from the junior officer orientation course to the Senior Seminar. A nine-month economics course now includes segments on climate change, trade and environment, biodiversity, and sustainable development.

But we as an institution and as a profession need to do more; we need to do it across a broader front and reach more deeply into the system, so that we continue to advance our national security while doing a better job on issues that know no boundaries, from environmental damage to international crime.

As a follow-up on his Stanford speech and his environmental initiative, the Secretary has asked me to use this occasion to affirm and amplify on an important principle: the foreign service officer of the 21st century must have significant experience in global issues. This can be accomplished in many ways, from working in Mexico City on border pollution, or in Beijing on population or energy matters, or here in Washington in a bureau that deals with international crime, terrorism, environment, refugee affairs, or the promotion of democracy and human rights.

. . .To everyone here, whether you're part of the government or the NGO sector, I'd make a final appeal. It has to do with money. We don't have enough. . . .As I say, the Congress has tried to put American foreign policy on a starvation diet. And precisely because global issues in general and environmental issues in particular represent a new agenda, a non-traditional enterprise, they are among the most vulnerable targets for financial squeezing and cutting.

Just a few examples: We haven't been able to come up with the seed funding for a project that would help reduce CFCs worldwide; The United States is the biggest debtor in the Global Environmental Facility, the principal international funding mechanism for the activities called for by the Climate Change Convention. We're currently in arrears to the tune of $100 million; Our environmental assistance to the New Independent States of the former Soviet Union has fallen from nearly $75 million in FY95 to less than $10 million in FY97, a dramatic retreat on a crucial front.

. . .We also need to persuade Congress that the international-affairs budget is a modest and prudent investment in our long-term safety and prosperity. And that means we need to persuade the American people on that score.

Part of Secretary Christopher's environmental initiative is a determination to raise public awareness of the importance of environmental issues to our national interest. We will do a better job of educating the public on this subject if we better educate ourselves. That's exactly what you are doing in this seminar today. For that I thank you—and I wish you well.

Statements By Timothy E. Wirth
Under Secretary of State for Global Affairs

Under Secretary Wirth's Remarks at the Center for National Policy
Excerpts from "Population Pressure and the Crisis in the Great Lakes Region of Africa"
18 December 1996

. . .I'm pleased to lead off this discussion of the long term causes of conflict in the Great Lakes region of Africa—a subject I began focusing my attention on in July

1994, when two million refugees poured out of Rwanda into neighboring countries. Secretary of State Warren Christopher had asked me to travel to the region, to take stock of what was shaping up to be one of the greatest humanitarian disasters of our time. One of the first things I noticed, as my flight entered Rwanda, were the terraced farms in the hills surrounding Kigali. It struck me as unusual that in the midst of Africa's vastness, farmers in Rwanda had managed to till every available meter of land, right up to the peaks of the hills in the countryside. Farmer's homes normally sit on the peaks of those hills—the only bit of land that is not used for farming. I didn't know then, that prior to the tragic events of spring and summer 1994, Rwanda's 7.6 million people were living on 25,338 square kilometers of land, a population density of about 290 people per square kilometer, among the highest in Africa. By comparison, at that time, the overall average for sub-Saharan Africa was 23, and most neighboring countries were all well below 100 people per square kilometer.

Why was Rwanda's population density so high? Because Rwanda was producing a lot of new citizens. In 1983, the total fertility rate for Rwanda stood at 8.5 children per woman. As John May, a demographer at The Futures Group will point out in a forthcoming article, even with a high mortality rate for children under five, Rwanda's population continued to expand at alarming rates because the population had become accustomed to rapid growth, because Rwandan ethnic groups had come to think of population growth as an asset, and because of an aversion to modern methods of contraception. In the 43 years from 1950 through 1993, the world's population grew from 2.2 billion to more than five billion—slightly more than doubling—while during that same period, Rwanda's population quadrupled. It seemed to me that in Rwanda, as in other parts of the world I have seen, there were simply too many people competing for too few resources. This is particularly true in Rwanda, where patterns of land use have increasingly become problematic, especially since independence in 1962. Rwandan society had, for at least several generations, relied upon subdivision of land among male heirs. In a country with a rapidly expanding population, this created many small plots, some too small to sustain even a small family.

It would be helpful here to review a bit of history. In 1963, the new Rwandan government developed a resettlement policy to deal with land scarcity, which involved transporting people to areas where arable land was available for cultivation. However, the plan was dropped shortly afterward because the number of people ready to relocate quickly outpaced the available plots. There were also strict controls in place on rural-urban migration. The government tried a second effort to find additional arable land for Rwanda's rapidly growing population in 1965, but this effort also failed because the available land was quickly exhausted. In fact, by the late 1980s, Rwanda's agricultural output was beginning to sag. From its position as one of sub-Saharan Africa's top three performers in the early 1980s, Rwanda's per capita output fell by nearly 20 percent in the early 1990s. Much otherwise arable land fell into disuse because of civil conflict and mine laying. Profound food shortages began emerging, particularly in the southern and western parts of the country. As more and more land came under cultivation in Rwanda, the agricultural frontier continued to close. Few people chose to remain in the rural areas where they were raised; but because they were not permitted to move to a town without having a job in hand, many moved into ecologically fragile upland and arid areas that yielded little new production.

Meanwhile, other events were taking shape in Rwanda that would change the course of the country's history, and would intensify into an enormous humanitarian tragedy....However, the genocide of 1994 is only one example of large-scale interethnic killing that has wracked not only Rwanda, but also neighboring Burundi, since the late 1950s. . . .

. . .In trying to explain these cycles of killing, exile, and revenge killing that have characterized much of the recent history of these lands, I frequently return to the reality of competition for scarce resources that underlies the tension. At the same time, there is a danger of assuming that scarce resources alone, such as land in Rwanda, *cause* conflict. As demographer Nicholas Eberstadt has pointed out, the problems of sub-Saharan Africa might occur (given underlying societal tensions) even if the population levels of these nations were stationary. But is it possible to rule out the enormous population change in Rwanda during the past 40 years as a critical factor in its recent ethnic turmoil? I believe not.

Population growth and extreme population movements certainly have a negative affect on political stability. When they happen in concert with environmental degradation, stalled economic development, weak governmental structures and ethnic rivalries, they serve as a powder keg into which a match can easily be tossed. Demographics alone do not cause or predict conflict, but the fierce competition for resources that population density creates compounds any effort to reconcile pre-existing historical and cultural differences. Had the security of resources and demographic disruption not been present in Rwanda, I am convinced that its society would have been more resilient, and less susceptible to the depravity of genocide.

. . .Thomas Homer-Dixon, a researcher at the University of Toronto, has written that "environmental scarcity often encourages powerful groups to capture valuable environmental resources and encourages marginal groups to migrate to ecologically sensitive areas. These two processes in turn reinforce environmental scarcity and raise the potential for social instability." In cases from around the globe, Homer-Dixon has illustrated how competition over scarce resources, such as land, contributes to conflict. For example, in Haiti, following the overthrow of the Duvalier regime in 1986, many farmers who were no longer able to raise crops on land that had become degraded, migrated to urban areas such as the capital, Port-au-Prince. There, they found relatively poor conditions with little infrastructure to absorb the quantity of new arrivals. During the military government that followed Duvalier, discontent over the disparity in land, competition for scarce resources and dissatisfaction with inequitable income distributions between the elites that ran the country and dispossessed farmers boiled over, and resulted in the civil strife that led to the intervention of U.S. forces in 1994.

Are the cases of Rwanda and Haiti unusual? Again, I suggest not. Each year, the U.S. intelligence community puts out a list of those nations where there is potential for humanitarian crisis. This year, the list included some 27 countries that were undergoing intense conflict, simmering conflict, severe government repression, cease-fires, political settlements, post-crisis mop-up or where there were potentials for new humanitarian emergencies. Of those 27, fully two-thirds have population densities higher than the global average. What this points out, above all, is that the work that we have done and continue to do around the world on population is vitally important. It is critically important that women in Rwanda, including those returning now to their homes, have access to information and services that empower them to determine the number, spacing and timing of their children. We know from experience that social investments in women—in their health, education and economic access—yield the highest returns to society. An educated woman is more likely to have fewer children, and her children in turn are more likely to be healthy and educated.

Naturally, there are other things that the international community must do to help Rwandans rebuild their lives. We must help returning refugees reintegrate into Rwandan society. Part of the $145 million that the United States recently pledged toward relief operations will help with just that. . . .

. . .I would like to leave you with a thought: even if it can never be proven that Rwanda and other troubled nations slid into chaos precisely because of the pressure of acute population increases, it is inarguable that a country doubling in population every 20 years, where women bear eight children each, where density is already staggeringly high—these countries are much, much more likely to run full speed into economic, environmental, social and political walls, frequently with disastrous results. I ask that all of us, and not only those who care about the Rwandan people, carefully think through this challenge as we move into the 21st century.

Statements By Sherri Wasserman Goodman
Deputy Under Secretary of Defense for Environmental Security

Under Secretary Goodman's Remarks at the National Defense University, Washington, D.C. Excerpts from "The Environment and National Security" 8 August 1996

. . .For "preventive defense" to succeed we must address the increasingly diverse threats to our security in the post-Cold War world. President Clinton in his 1996 State of the Union Address described these threats in his call to maintain America's leadership in the world: "The threats we face today as Americans respect no nation's borders. Think of them: terrorism, the spread of weapons of mass destruction, organized crime, drug trafficking, ethnic and religious hatred, aggression by rogue states, environmental degradation."

As the President recognized, the underlying causes of conflict and instability, such as ethnic cleavages and environmental degradation, may threaten our national interests in regions of strategic importance. Understanding the causes of conflict and instability, providing adequate warning of potential crises, and acting well before a crisis to avoid costly military interventions are at the heart of "preventive defense." Operationalizing "preventive defense" will pose what I believe is a primary challenge to policymakers in the years ahead. Policymakers are beginning to delve more deeply into the causes and consequences of conflict and instability in the post-Cold War world. It is increasingly clear that environmental degradation and scarcity play a key role in this complex question. In 1996, for the first time, the National Security Strategy recognizes that "a number of transnational problems which once seemed quite distant, like environmental degradation, natural resource depletion, rapid population growth and refugee flows, now pose threats to our prosperity and have security implications for both present and long-term American policy. . . ."

. . .Environmental scarcities can interact with political, economic, social, and cultural factors to cause instabil-

ity and conflict. Particularly in poorer countries, scarcities can limit economic options and therefore force those already impoverished to seek their livelihood in ecologically endangered areas such as cities. The "megacities" of the South are especially vulnerable. The developing world's urban population is expected to increase 1 billion in 1985 to 4 billion—or almost half of the world's population—by 2025. Such areas can become teeming areas for disease, crime, and social decay. The multiple effects of environmental scarcity, including large population movements, economic decline, and capture of environmental resources by elites, can weaken the government's capacity to address the demands of its citizens. If the state's legitimacy and capacity for coercive force are undermined, the conditions are ripe for instability and violent conflict. If the state's legitimacy and coercive force capacity remain intact or are bolstered, the regime may turn more authoritarian and challenge the trend of democracy and free markets around the world. Either way, our security is affected, and U.S. military forces may become involved, when environmentally linked instability spills over to other states in a key region, or when a complex humanitarian emergency results from environmentally rooted population movements.

. . .Even where environmental degradation or scarcity is not likely to be a cause of instability or conflict, military environmental cooperation can help promote democracy trust, and capability to address environmental problems. In this context, defense environmental cooperation supports one of Secretary Perry's three premises of preventive defense: that "defense establishments have an important role to play in building democracy, trust and understanding."

I believe our environmental security challenge now under "preventive defense" is two-fold. One challenge is to understand where and under what circumstances environmental degradation and scarcity may contribute to instability and conflict, and to address those conditions early enough to make a difference. The second challenge is to determine where military environmental cooperation can contribute significantly to building democracy, trust and understanding. These two elements together constitute the environmental security pillar of "preventive defense."

. . .In a speech on the Senate floor on 28 June 1990, Senator Sam Nunn spoke of the need to "harness some of the resources of the defense establishment…to confront the massive environmental problems facing our nation and the world today." That led to the establishment of the multiagency Strategic Environmental Research and Development Program (SERDP), which plays an important role in developing and analyzing the data needed for alerting us to possible security threats. Through SERDP, which was established in 1990, Senator Nunn and then-Senator Gore had the foresight to recognize that the U.S. defense posture had to be adjusted to meet the challenges of the post-Cold War world, challenges that include environmental degradation. SERDP has made significant contributions to our understanding of global environmental trends, with key projects including the Joint DoD/Energy Department Atmospheric Remote Sensing and Assessment Program, which monitors ozone levels; and the Acoustic Monitoring of the Global Ocean Climate, which measures global ocean temperature and incorporates these data into climate change models. This analysis is important to developing the types of warning systems I believe we need.

Military operators are also paying more attention to how we can be alert to potential crises. We were certainly surprised that Canada and Spain—two NATO allies—would nearly come to blows over fishing rights. This dispute, which happened just off the U.S. coast, proved that even among developed countries, there is the potential for fierce resource competition. This incident was a real wake up call to our military operators, who reviewed the origins of the dispute carefully and are now seeking to work with other organizations in improving international fisheries management. We have also begun looking at assessment and warning mechanisms with our NATO partners. "Environment and Security in an International Context," a new pilot study launched by NATO's Committee on the Challenges of Modern Society this past March, calls for the NATO representatives to work closely with representatives of the North Atlantic Cooperation Council and the Partnership for Peace countries. During the course of the study we will identify and assess security risks posed by environmental problems, prioritize those risks for action, and devise an action plan to address them—with a strong emphasis on preventive actions.

Promoting military environmental cooperation that contributes significantly to democracy, trust and understanding is the second element of the environmental security pillar of "preventive defense." Secretary Perry himself has acknowledged the unprecedented opportunity the Defense Department has today to establish and reinforce key relationships: "Our environmental efforts are also having a global impact. All over the world, American forces are sharing the wealth of their environmental experience with foreign militaries, showing them by example and instruction how to protect and preserve the air, lands, and waters in their own countries. This is one of many forms of military-to-military engagements our forces are conducting to help America build cooperative relations with new friends and former foes."

. . .At the end of the Cold War our European Command (EUCOM) initiated a military-to-military program in Central and Eastern Europe to encourage and facilitate the democratization process. Early in that program the environment emerged as an important area for cooperation as the militaries of these countries became aware of and sought to address their environmental responsibilities. Since the beginning of this "mil-to-mil" program we have engaged multiple federal agencies, state and local governments, non-governmental organizations, the public, and the military in programs geared toward meeting environmental challenges. We have shown our Central and Eastern European partners, through working with representatives of a wide array of organizations, that the military can and should participate easily and effectively in open and cooperative processes within a democratic framework.

. . .Cooperation with other key U.S. Government agencies is important to designing the most effective forms of environmental cooperation. Recognizing that the whole is often greater than the sum of its parts, on 3 July 1996, Secretary Perry, Secretary O'Leary, and Administrator Browner signed a Memorandum of Understanding calling for cooperation among the DoD, the Energy Department, and the EPA, to jointly address critical environmental concerns. Cooperative activities under the MOU will focus on enhancing other nations' abilities to identify and manage environmental threats, as well as on addressing the environmental consequences of both the military and civilian Cold War defense activities, and on strengthening ties with developing and democratizing nations. Methods of cooperation will include information exchange, research and development, monitoring, risk assessment, technology demonstration and transfer, emergency response training, regulatory reform, and environmental management. We plan to engage the other key U.S. Government departments and agencies in our MOU activities. In fact, we already are: last week, at DoD's invitation, we hosted a Polish delegation from the Ministries of Defense and Environment to develop bilateral, multiagency environmental cooperation involving the Environmental Protection Agency and Departments of State, Energy, and Commerce. By the end of the week, the Polish delegation had proposed five areas for defense environmental cooperation, the heart of which is making American environmental technology and services available to assist Polish environmental problems, both in the military and the commercial sector. . . .

Statements By Eileen B. Claussen
Assistant Secretary of State for Oceans and International and Environmental Affairs

Excerpts from Assistant Secretary Claussen's Remarks at the Chatham House Workshop on Multinational Corporations and Global Environmental Change, London, England
27 June 1996

. . .Let me assure you that governments now acknowledge the importance of global environmental concerns at the highest levels. They are raised in meetings of heads of state. . .to the highest levels of government. It means that we will make environmental issues an increasingly significant component of our bilateral relationships. It means that we will improve the capacity of our embassies around the world to address environmental concerns. It means that we will confront the problem of weak compliance with international environmental agreements. In a broader sense, it means that we will continue to make strong links between protection of the environment and continued economic strength, public health, and national security. . . .

Statements by John Gibbons
Advisor to the President on Science and Technology

Excerpts from John Gibbons' Remarks at the Conference on "Climate Change, Evolving Technologies, U.S. Business and the World Economy in the 21st Century," U.S. Department of State, Washington, D.C.
18 June 1996

. . .Through the past nine Presidents and 22 Congresses, our primary emphasis has been the battle for global security, based on the uneasy politics of disarmament, nuclear deterrence and containment. During that time, the second front has grown continually in both size and complexity, shaped by the forces of globalization, technological advance, population growth, environmental degradation, and social change.

As the image of the Cold War recedes, it is the "second front" which advances. It is the plethora of human and environmental stresses which now commands our collective attention. It is the human wants—for jobs, education, health, a sound environment—and threats—infectious disease, illiteracy, mass migration, terrorism, and global change—which now define the second front of security policy. In a recent speech at Stanford University, Secretary of State Warren Christopher again drew our attention to that broader concept of security—the "second front." He described how a lasting peace depends upon our ability to deal effectively and equitably with the social, economic, and environmental needs of a growing global population while continuing to deter military threats.

Secretary Christopher articulated what many of us intuitively grasp. We face a set of regional and global challenges which transcend agency missions, disciplinary divides, and political boundaries. Our traditional

notions of national security and the role of science and technology need to change. We must craft new policies and priorities which can both sustain our military deterrence capability and sustain environmentally-sound economic development. Last year, President Clinton took the first step in this direction by issuing the nation's first-ever National Security Science and Technology Strategy.

. . .Over the past two years, we have worked with many of you to define and implement a National Environmental Technology Strategy to support the development, domestic use, and export of environmental technologies by U.S. business. We met and brainstormed with over 10,000 people—from industry, academia, NGOs, and state and local governments—at more than 25 workshops across the country. We believe this strategy is unique; it was created with all the key stakeholders, and it capitalizes on the resources of more than a half-dozen federal agencies including EPA, DoE, Commerce, and Defense, and it includes public-private partnerships and an integrated set of policies which operate from the initial stages of R&D through commercialization and export promotion. The strategy leverages important trends that are taking place in industry, where more and more companies pursue environmental excellence as a competitive strategy. The strategy also looks beyond our borders and supports U.S. businesses seeking to capture rapidly expanding global markets for environmental technologies. We have:

•developed an Environmental Technology Export Strategy to provide strategic market analyses of large emerging environmental technology markets and support U.S. businesses interested in moving into these markets;
•developed an Initiative for Environmental Technologies (through USAID) to focus development assistance on critical environmental challenges in developing countries;
•established a new Environmental Directorate at the Export-Import Bank to assist U.S. businesses with loans for environmental projects overseas. Funding for environmental projects at Ex-Im now exceeds $1 billion;
•established the America's Desk (a State Department initiative) to help to solve problems for U.S. businesses overseas and bring business concerns to the forefront of the foreign policy process.

Statements by Ambassador Mark Hambley
U.S. Special Representative to the Commission on Sustainable Development and Special Negotiator on Climate

Ambassador Hambley's Remarks to the Workshop on International Environment and Security Issues at the National Defense University
Excerpts from "The Environment and Diplomacy: New Challenges for American Foreign Policy"
8 August 1996

. . .Nowadays, the importance of the environment to the health and well-being of each and every one of us has come to be recognized as a key priority for governments, both domestically and internationally. . . .

. . .Environmental issues are now in the mainstream of American foreign policy. No longer side-lined or placed in a second tier of interest, the environment is of importance to American diplomacy because of our general awareness about the potential for conflict engendered by resource scarcities and the concomitant, related problem of access to limited resources. Moreover, as the Secretary mentioned in his Stanford address, there are now global environmental issues which our diplomacy must address in order to preserve a world which is both healthy and sustainable for future generations.

Both of these considerations—the problem of resource scarcities and the specific environmental issues challenging us today—are worth exploring this morning in the context of our discussion of the environment and diplomacy. But before doing so, it would probably be worthwhile to underscore that, in many ways, a discussion of "environment and diplomacy" cannot be separated from the topic of "environment and security."

. . .Let's take a moment to look into the question of resource scarcities and see how diplomacy is working to reduce some of the conflicts which have developed over time because of them. First of all, it should be clarified that such scarcities are not usually the direct cause of violent conflicts around the globe, but they are often indirect causes. This said, the four resources most likely to contribute to conflict are *land*, *water*, *fish*, and *forests*.

Land scarcity is a recurrent theme in several low-level but persistent conflicts around the world. Scarcity can result from land degradation, unequal distribution of land, over-population, or some combination of these factors. The dynamic behind civil insurgencies over the past decade in both the Philippines and Peru looks remarkably similar. Lack of access to productive agricultural land combines with population growth to encourage migration to steep hillsides. These hillsides are easily eroded, and after a few years fail to produce enough to support the migrants. The result is deepened poverty which helps to fuel violence. In the Philippines, the New People's Army found upland peasants to be most receptive to its revolutionary ideology. In Peru, as well, areas of land scarcity and poverty have

often been Sendero Luminoso strongholds. Here, while diplomatic efforts have met with some success in the Philippines, peaceful reconciliation in Peru has not been possible.

Another resource that may cause conflict is water. This is in part because water shortages play a large role in constraining agricultural productivity. And, to state the obvious, water often moves from one country to another. Almost 50 countries have more than three-quarters of their land in international river basins; 214 river basins around the world are international in character. While resource constraints tend to threaten internal stability, water shortages in some regions threaten international conflict.

. . .Whether this will continue to be the case in the future remains very much problematical. Suffice it to say, that foreign policy experts are increasingly on the record as stressing that armed clashes over water and water rights are likely to be a major point of conflict in the future. To be sure, there are few issues where active diplomacy will have to be brought to bear to reduce the prospect for conflict over environmental issues of such potential sensitivity as those which are related to water.

This said, a third area of resource scarcity—one related to fish—is also much involved as a matter of environment and diplomacy. In the first instance, fish remain the most important source of animal protein in many developing countries. Yet, all of the world's major fishing areas—all 17 of them—are close to reaching, or have exceeded, what we perceive to be their natural limits.

. . .Finally, a fourth area of resource scarcity is in the area of forests. Forests are linked with the other resources in a variety of ways. Deforestation accelerates erosion, changes local hydrological cycles and precipitation patterns, and decreases the land's ability to retain water during rainy periods. Resulting flash floods destroy irrigation systems and plug rivers and reservoirs with silt. And when silted coastlines decimate fisheries, fishermen turn to agriculture and then join starved farmers in cutting down more forest—completing a vicious cycle.

. . .The questions of fish and forests as environmental issues provide us with a good lead into the second aspect of today's discussion, namely, those areas where our current diplomatic strategy is concentrated. In addition to these two areas, there are four others which are also worthy of mention in this context: marine pollution, chemicals, biosafety, and climate change.

. . .The use of certain toxic chemicals and pesticides (like DDT and PCBs) in developing countries and Eastern Europe and the newly independent states (NIS) is an increasing health threat to U.S. citizens. Most of these toxic chemicals were banned long ago in the United States, because they do not biodegrade and have serious negative impact on human health and the environment. These chemicals are transported long distances through the air and water, thus affecting populations far from their region of origin (they tend to travel from warmer to colder climates and are found with telling effects even in remote, non-industrialized parts of the Arctic). Because this poses a long-term health and environmental threat to the United States, we have placed a high priority on developing international agreements to regulate the trade, production and use of the most hazardous of these chemicals and pesticides, also known as persistent organic pollutants (POPs). We are in the process of urging all countries to work together toward an effective regime to address this issue. We are also working to provide improved mechanisms for addressing risks associated with other hazardous chemicals, including through participation in the development of a legally binding instrument for prior informed consent for the export of certain of these hazardous chemicals. This is one diplomatic effort which, with continued patience and initiative, should result in a meaningful result sometime during the next year.

The Parties to the Biodiversity Convention have decided to negotiate a "biosafety" protocol to regulate the transfer and handling of organisms that have been genetically modified through modern biotechnology. . . .

. . .Perhaps the leading environmental issue confronting the world today is the question of global warming or "climate change" as the problem is more accurately described. . . .The Administration has pushed for a sensible but progressive domestic and international approach to this problem, including the negotiation of stronger steps under the 1992 Climate Convention.

. . .In this regard, I think it is both important and appropriate to applaud the recent MOU signed by Secretary Perry, Secretary O'Leary, and EPA Administrator Browner to strengthen coordination of efforts to enhance the environmental security of the United States, recognizing the linkage of environmental and national security matters. This agreement is particularly timely given Secretary Christopher's initiative to better integrate environmental concerns into all aspects of our foreign policy. . . .

Memorandum of Understanding among the Department of Energy, Department of Defense, Environmental Protection Agency

3 July 1996 (excerpts)

The Environmental Protection Agency, the Department of Energy, and the Department of Defense (the Parties),

Recognizing that America's national interests are inextricably linked with the quality of the earth's environment, and that threats to environmental quality affect broad national economic and security interests, as well as the health and well-being of individual citizens;

Recognizing that environmental security, including considerations of energy production, supply and use, is an integral component of United States national security policy and that strong environmental security contributes to sustainable development;

Recognizing that environmental degradation can have global consequences that threaten the environment, health and safety in the United States;

Recognizing the central role of science and technology in promoting sustainable development and in responding to global threats to environmental security;

Recognizing the need to overcome the environmental legacy of the Cold War in order to promote prosperity and stability;

Recognizing that the Secretary of State has primary responsibility for the conduct of United States foreign policy;

Recognizing that each of the Parties has a different experience, expertise, and perspective and that their collaboration can uniquely assist in addressing international problems of importance for environmental security and can serve as a model for other countries;

Recognizing that each of the Parties has an important role to play in demonstrating and promoting approaches and technologies that achieve safe and effective environmental management in defense-related activities in the United States and abroad;

Recognizing that the Parties have established cooperation with the private and public sectors as a basis for jointly addressing sustainable development and environmental security; and

Believing that enhanced cooperation on international environmental protection issues that is consistent with United States foreign policy and national security objectives is of mutual benefit,

Have agreed as follows:

I. **Purpose**

1. The purpose of this Memorandum is to establish a framework for cooperation among the Parties to strengthen coordination of efforts to enhance the environmental security of the United States, recognizing the linkage of environmental and national security matters.

The Parties do not intend this Memorandum to create binding legal obligations.

II. **Scope**

1. The Parties shall develop and conduct cooperative activities relating to the international aspects of environmental security, consistent with U.S. foreign policy and their individual mission responsibilities, utilizing their legal authorities and facilities appropriate to specific tasks directed at achieving mutually agreed upon goals.

2. Cooperative activities under this Memorandum may be conducted in areas contributing to improved environmental security, where such cooperation contributes to the efficiency, productivity, and overall success of the activity. Such activities include: information exchange, research and development, monitoring, risk assessment, technology demonstration and transfer, training, emergency response, pollution prevention and remediation, technical cooperation, and other activities concerned with radioactive and non-radioactive contamination and other adverse environmental impacts on terrestrial areas, the atmosphere, hydrosphere, cryosphere, the biosphere (including human health) and the global climate system; defense or defense (strategic) industrial activities, energy production, supply and use, and related waste management; or other such matters as the Parties may agree upon, according to criteria to be mutually developed by the Parties.

3. The forms of cooperation under this Memorandum may consist of the following: participation in joint projects addressing the activities cited in paragraph 2 above, including sharing of technical expertise; cooperative work to institute and enhance environmental management systems related to defense activities; information management and exchange; participation in relevant symposia, conferences and seminars; development of joint scientific and policy publications; provision of equipment and associated materials to foreign entities through the appropriate instrument, consistent with United States law; temporary assignments of personnel from one Party to another; and such other forms of cooperation as the Parties may agree upon.

4. Each Party may use the services of and enter into agreements with appropriate institutions, such as universities and governmental and non-governmental organizations, to develop and conduct activities under this Memorandum, consistent with applicable law. Where required by law, applicable regulations or procedures, such agreements shall be subject to consultation with and the concurrence of the Department of State. [. . .]

Related Official Correspondence

[To Secretary of State Warren Christopher]
July 1996
Dear Mr. Secretary:

We are writing to apprise you of the collaborative action taken by the Department of Defense, Department of Energy, and the Environmental Protection Agency in the area of environment and security. Our action complements your initiative to incorporate environmental issues in the Department of State's core foreign policy goals.

As you stated in your Stanford speech: "The environment has a profound impact on our national interests in two ways: First, environmental forces transcend borders and oceans to threaten directly health, prosperity and jobs of American citizens. Second, addressing natural resource issues is frequently critical to achieving political and economic stability, and to pursuing our strategic goals around the world." In order to address critical issues related to environment and security most effectively, our agencies must work together to maximize our collective statutory and mission responsibilities, capabilities and resources.

The enclosed Memorandum of Understanding on Cooperation in Environmental Security is responsive to these concerns and establishes a framework within which our agencies can work more productively together, and with our foreign partners. Projects under this Memorandum will include work in both military and civilian fields and cooperation on a wide range of issues including scientific research and development, technology transfer, regulatory reform and environmental management. A goal of our projects is to enhance the capacities of foreign states to protect the environment.

Our first activities under the Memorandum include plans to characterize and address radioactive contamination and environmental degradation in the Former Soviet Union, to support the creation of an effective regional environmental framework in the Baltic Republics, and to enhance the work of the U.S. Energy Technology Centers in the Former Soviet Union, Eastern Europe and China. We expect that activities in all these areas will benefit the environment, further U.S. foreign policy goals and national security interests, and expand opportunities for private U.S. investment abroad.

As we pursue these and other activities under the Memorandum, we will continue to coordinate closely with the State Department in order to support the important issues of environment and security.

Sincerely,	*William Perry* *Department of Defense*	*Hazel R. O'Leary* *Department of Energy*	*Carol Browner* *Environmental Protection Agency*

[To EPA Administrator Carol Browner]
August 8, 1996
Dear Ms Browner:

It was gratifying to receive your letter regarding the Memorandum of Understanding Concerning Cooperation in Environmental Security which you recently signed with Energy Secretary O'Leary and Defense Secretary Perry. The roles of your three agencies in promoting environmental security are a significant contribution not only to protecting the environment but to pursuing our national interests in key regions.

This agreement is timely, given our initiative at the Department of State to better integrate environmental concerns into all aspects of our foreign policy. We are taking a number of steps towards this goal—from incorporating environmental planning into each of our bureaus to designating key embassies as environmental hubs to address region-wide natural resource issues. These regional hubs will help to coordinate with national governments, regional organizations, and the business community to identify environmental priorities. Your combined effort in the Baltics provides a good example for other agencies on the importance of coordinating transboundary environmental concerns.

We welcome the opportunity to collaborate with you as you begin activities under this agreement. The Assistant Secretary of State for Oceans and International Environmental and Scientific Affairs, Eileen Claussen, has designated her senior advisor, Sarah Horsey-Barr, to work with the program coordinators.

Sincerely, Warren Christopher

New Publications

Book Reviews

Fighting for Survival: Environmental Decline, Social Conflict, and the New Age of Insecurity
by Michael Renner
W.W. Norton and Company, 1996. 240 pp.

Reviewed by Peter Stoett

This book is part of the Worldwatch Environmental Alert Series edited by Linda Starke. Michael Renner is a Senior Researcher at the renowned Worldwatch Institute, and he has put together a text that is highly readable and informative. Though it might be criticized in academic circles as heavy on description but rather light on analysis, Renner's accessible style and conscious avoidance of jargon is best viewed as beneficial to the environmental security literature as a whole.

Renner describes the effects of environmental scarcity with reference to conflict, global warming, demographics, population movements, inequality, and—ultimately—the insecurity that characterizes the post-Cold War era. He links the global and local aspects of these developments, and argues that environmental crises of both orders can induce conflict. Yet he tempers his analysis with the realistic caution that "Typically there is no such thing as an exclusively 'environmental conflict'" (page 75). Many other factors will always be involved, and to Renner's immense credit he manages to discuss many of them within the space of this short, yet very ambitious, book.

In the second half of the book he moves beyond describing the problems we face and into what he considers more positive suggestions for change, including a new North-South compact of sorts, decreased militarism, funding for conflict prevention, and the redistribution of land in many southern states. While Renner certainly succeeds in convincing us that these things need doing, we get more about why than how in the end.

Nonetheless, *Fighting for Survival* offers the reader a broad overview of the burning security questions of our time. The author has made good use of his access to statistical resources (for which Worldwatch is so famous), and the writing flows from one page to the next. The book would make an excellent introductory text in environmental security studies, and should be considered for any course in global issues. One might argue that the book tries to do too much, but this is overcome by the fact that, given its intended general audience, it largely succeeds.

As such, complaints about the book are few. Renner includes two short case studies of Rwanda and Chiapas. These promising studies both reinforce the need to look at land tenure as a fundamental variable affecting conflicts over resource utilization. However, Renner does not provide enough detail in either case to make them a substantial contribution; nor does he make much of an attempt to identify the similarities and differences between the two.

Some statements are made without adequate treatment. The author argues on page 101 that "official definitions of what constitutes a refugee and who therefore is eligible for assistance and protection are outdated and overly narrow," without offering a better definition that would have any chance of political acceptance. He also tells us that, with the rise of NGOs in world politics, "No longer can governments engage in secret diplomacy against their own people, and no longer can corporations easily hide behind a smokescreen of proprietary information and private property rights" (page 152). This is of course an optimistic overgeneralization. Indeed, Renner might have expanded considerably on his implicit faith in NGOs, especially in the latter sections of the book.

When discussing his plans for a "Human Security Budget," Renner brings up the quickly shelved yet still promising idea of obtaining funding for conflict prevention and southern development by fees levied on "air travel, maritime shipping, telecommunications, and trade (including arms sales)." Though there are problems inherent in all these possible revenue sources, it is the "arms trade" notion that really needs explication. Do we want to finance environmental security with money from militarism? Do we want to legitimate arms sales in this fashion?

But these are small points. This book succeeds because it clearly outlines the problems we collectively face, even if it does not provide all the answers we need. It is aimed at a broad audience that needs to understand better key global trends. After all, esoteric theoretical discussions of environmental security paradigms have a limited (if devoted!) following. Renner's book not only serves as an excellent backgrounder, but may inspire others to question the meaning of security, and its policy implications, in our time.

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BUILDING BRIDGES: Diplomacy and Regime Formation in the Jordan River Valley
by Randy Deshazo and John W. Sutherlin
United Press of America, 1996. 190 pp.

Reviewed by Jeffrey K. Sosland

For the past half-century power politics have been the organizing principle for Middle East diplomats and scholars. Political realists have used the Arab-Israeli conflict as a proving ground for their pessimistic approach to international relations. Given that the region has been wracked by years of war and protracted conflict, the approach of these political theorists is understandable. However, with the advent of the peace process and with initial indications of a regional paradigm shift from conflict to cooperation, developing new models to understand the Arab-Israeli arena seems more germane. Water scarcity is a pivotal issue that offers a good testing ground for different theories of international relations for this region.

In *Building Bridges*, Deshazo and Sutherlin apply a multilateral institutional approach to explain the impact of water scarcity in the Jordan River Valley. Their study can be divided into three parts: (1) a historical overview of the Arab-Israeli conflict and the recent Madrid peace process; (2) an outline of various approaches to cooperation and of many different methods for testing these theories; and (3) a proposed model for a "Near Eastern water regime."

The authors conclude that for a regime to be effective, the institutions associated with it should have a legal structure, financing institutions, dispute resolution mechanisms and an epistemic community which is a professional group, such as water technocrats, whose members share common values; as well as a common understanding of a problem and its solution. The authors' multilateral institutional approach leads to their policy recommendation for a "peace pipeline" — a water conveyance system from Turkey to some of the water-poor states in the Middle East.

The authors are on the mark that cooperation will be more probable and lasting if there is a regime that has clear rules, available financing, an international community of experts that supports the regime and the means to punish states that cheat. Nonetheless, the book fails to address adequately the political and economic challenges of water scarcity in the Arab-Israeli arena. First, while the authors highlight the Arab-Israeli conflict, they do not adequately examine the political history of the conflict over water. While there may be a paradigm shift from conflict to cooperation, one lesson learned from the past is that Middle East states are suspicious of plans that would unnecessarily increase their dependence on imported water and, thus, diminish their autonomy. Second, the "peace pipeline" is a supply-side, mega-project which will probably never go beyond the planning stages because of the heavy costs and complicated politics. Currently, there are far cheaper and easier ways to address the region's water scarcity problems.

Improving water demand management offers a more realistic and effective approach to resolving the region's water scarcity problems than the "peace pipeline." The World Bank's emphasis is on reducing the amount of water allocated to agriculture, which Deshazo and Sutherlin argue against (p.100), while increasing the use of treated waste water in the farming sector. This incremental approach, which is similar to the method actually being pursued in the Middle East multilateral peace talks on water resources, involves an epistemic community, international funding and interstate cooperation. In contrast to Deshazo and Sutherlin's approach, the World Bank's and multilateral peace talks' institutional approach call for building many small bridges rather than a single onerous and enormously expensive water pipeline.

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THE ENVIRONMENTAL TRAP: The Ganges River Diversion, Bangladeshi Migration and Conflicts in India
by Ashok Swain
Department of Peace and Conflict Research
Uppsala University, Sweden
Report No. 41, 1996. 135 pp.

Reviewed by Deepa Khosla

Population movements both within and across states are a major concern for individual states and the international community in the post-Cold War era. Worldwide there are estimated to be some 20 million refugees with an additional 10 million people displaced within their own countries. The inter-relationships between such flows, environmental stresses, security, and conflict have received much attention in recent years. Swain's study is a valuable contribution to our growing body of knowledge in these areas as it helps further both theoretical clarity and empirical research on South Asia.

What constitutes a refugee and how to incorporate environmental stresses in such definitions are widely disputed topics among both scholars and policymakers. While the term "environmental refugees" is currently popular among some academics, Swain argues that clearer distinctions are required between forced (push) migration and movements based upon both push and pull factors. He focuses on the notion of migration, defining environmental migrants as those who are "forced to move away from their homes as a result of

the loss of their livelihood and/or living space due to environmental changes (natural as well as anthropogenic) and migrate (temporarily or permanently) to [the] nearest possible place (within or outside the state boundary) in search of their sustenance" (page 17). For him, economic migration is largely a voluntary process, although he concedes that push factors might be as relevant.

However, making such distinctions in practice can be problematic. Extreme poverty coupled with very poor economic conditions can push peoples to migrate both within and across states. For example, it can be argued that international economic sanctions and a deepening economic crisis pushed the Haitians to abandon their homes and seek refuge in the United States in 1994. Were the Haitians economic migrants or did the economic crisis just act as a trigger to the underlying environmental stresses leading to the exodus?

Efforts to refine a definition of environmental refugees are important for both conceptual and policy-relevant reasons. Currently, the United Nations definition of a refugee does not encompass internal migrants or those who migrate due to environmental degradation in their areas of residence. While new categorizations would be a valuable addition, the role of economic factors and their interaction with environmental stresses require further clarification.

In the study, Swain develops a sequential model to explain how environmental degradation can promote migration and potentially foster three forms of conflict. Conflict can arise between the state and its population due to migration from rural to urban areas. Secondly, cross-border migration can lead to disputes between migrants and indigenous groups in the receiving state. The third conceivable type of conflict is between the two neighboring states. This framework allows for multi-level analyses, drawing attention to how internal environmental stresses can become internationalized.

An expanded framework for future research could include another potential form of conflict: disputes between migrants and indigenous populations within an affected state. Violent intergroup conflict continues today in the Chittagong Hill Tracts of Bangladesh largely due to a significant influx of Bangladeshis into the tribal region. In addition, the role of international actors such as international and non-governmental organizations along with multinationals could be explicitly considered.

The water dispute between India and Bangladesh dates back to 1961 when India unilaterally decided to construct the Farakka Barrage on the Ganges River in order to increase its dry season flow of water. Although India and the lower riparian state, Bangladesh, negotiated several interim agreements to share the dry season flow, India has for the last two decades continued its unilateral withdrawals. Swain's study reveals that in southwestern Bangladesh, where some 35 million people rely on the Ganges River for their source of livelihood, the reduced water supply has led to environmental stresses such as decreased agricultural productivity and fish stocks, increased salinization, the destruction of forests, and an increased number of floods.

During the 1970s and early 1980s, he argues that high population density and limited economic prospects in the rest of Bangladesh stimulated many of these environmental migrants to cross into India. This large-scale migration into tribal states such as Assam, Mizoram, and Tripura promoted conflicts between the migrants and the indigenous groups who feared being overwhelmed by "outsiders." In Assam, for instance, violent attacks against the Bangladeshis and the state apparatus continue to be utilized to press for their deportation. A 30-year agreement reached between India and Bangladesh in December 1996 holds out the promise of a peaceful resolution of a potentially violent inter-state situation.

This case study expands our empirical base on the impacts of resource scarcity and raises some important conceptual questions. It can be particularly useful for policymakers as it clearly reveals how a powerful state can become embroiled in a violent regional conflict as a result of its development policies.

Future studies, including those that analyze the tentative resolution of the Ganges water dispute, could benefit by focusing more explicitly on the policy choices of both receiver and sender states. India, for instance, has often used the Bangladeshi refugees to counteract the separatist demands of its tribal groups. Migrants sometimes utilize their host societies or are used by the host government to advance conflicts within the sender state. Such actions can further complicate the relationship between the two affected states and potentially draw in other external actors. Research in areas such as these will supplement our knowledge about the complex relationships between the environment, conflict, and refugee flows along with aiding growing research on early warning systems.

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THE BETRAYAL OF SCIENCE AND REASON—
How Anti-Environmental Rhetoric
Threatens Our Future
by Paul H. Ehrlich and Anne H. Ehrlich
Island Press, 1996. 335 pp.

Reviewed by Stephanie Wolters

Paul and Anne Ehrlich's latest book, the *Betrayal of Science and Reason—How Anti-Environmental Rhetoric Threatens Our Future*, is not only a comprehensive and

well-argued refutation of the recent backlash against the environmental movement, but also a valuable insight into the difficult arena of policymaking, public information and the role of science in the environmental movement. The Ehrlichs' analysis of the many underlying reasons for the recent successes of the anti-environmental movement provides a useful tool for those working to protect the environment, as well as for anyone active in the public sector today.

The Ehrlichs describe the anti-environmental "wise-use" movement as motivated by loose political agendas designed to protect narrowly defined economic interests. They contend that the main objectives of the wise-use movement are to block further environmental regulation and to free business from the pressures of enforcing strict environmental standards. In their attempts to achieve these goals, the wise-use adherents have solicited the help of an increasingly large store of marginal science: science which, as the Ehrlichs argue, attempts, often on the basis of narrow scientific evidence, to refute the existing scientific consensus on such matters as global climate change, the impacts of pollution, and the importance of biodiversity.

It is within the context of this discussion that the Ehrlichs address the underlying issues of scientific integrity and the perception of science by the public: "while scientific research is not properly carried out by consensus,…, science policy should be. That is, in most cases, society's best bet is to rely on the scientific consensus—even though once in a while, the contrarians will prove to be correct and will eventually change that consensus. Society normally cannot afford to act solely on far-out views on scientific issues—most of which eventually prove to be wrong." The Ehrlichs assert that criticism is an integral part of the evolution of science policy, but strongly urge that this criticism be based on sound scientific work and not the need to bend realities to suit a political agenda.

As is frequently the case in the public setting, the environmental movement must struggle to gain the attention of the public and decision makers. The Ehrlichs point out that this has been hampered by factors which are at once endemic to the environmental movement as well as to public education in general. First the frequently intangible impacts of global climate change or toxic pollution make it difficult for individuals to identify with these issues. Second, many of the processes of environmental degradation are gradual and take place over the long-term; this too makes it difficult for people to perceive the need for immediate action. In addition, the basic lack of scientific knowledge on the vast part of the public have severely hindered the successes of public education and lobbying campaigns. Finally, the Ehrlichs argue that recent improvements in the quality of the environment have lead to a complacency amongst the general public, which wonders why continued or even increased regulation is necessary. The movement against environmentalists has capitalized on these factors and has helped to "create public confusion about the character and magnitude of environmental problems, taking advantage of the lack of consensus among individuals and social groups on the urgency of enhancing environmental protection."

It is to counter this trend that the Ehrlichs have written this eloquent defense of the environmental movement, and the need for scientific integrity. *The Betrayal of Science and Reason* refutes erroneous information provided by the anti-environmental movement, and provides accurate information to the public. In chapter five for instance, the authors tackle one of the biggest anti-environmental statements, that there is no overpopulation. The Ehrlichs write: "there is overpopulation when organisms (people in this case) become so numerous that they degrade the ability of the environment to support their kind of animal in the future." They point out that resources such as soils and water are already being depleted faster than they are being recharged. While technology may help to alleviate some of the pressure on such resources, widespread behavioral changes, especially on the part of those living in the industrialized world, would be necessary to support 6 billion people indefinitely. Other chapters address such anti-environmental myths as the anti-economic growth nature of the Endangered Species Act,

New Atlas Editions Assist Environment And Security Analysts

Two recently published atlases may assist many environment and security researchers: *The State of War and Peace Atlas* (1997) and *The State of the World Atlas* (1995). *The State of War and Peace Atlas*, edited by Dan Smith of the International Peace Research Institute of Oslo, features a table of wars from 1990-1995 and 34 sets of illustrated color maps, graphs and charts with accompanying text under the following categories: (1) Dynamics of War; (2) Wars of Identity and Belief; (3) Wars of Poverty and Power; (4) The Military World; (5) Dynamics of Peace. The volume's unique format gives shape and meaning to statistics about volatile countries and regions and to key issues such as terrorism and military spending. *The State of the World Atlas*, edited by Michael Kidron and Ronald Segal, similarly translates key political, economic and social indicators—from international debt levels to population trends to health statistics—into color maps and graphics. While both atlases contain only basic information about environmental and population trends, they are notable for their breadth of coverage and ability to graphically link a range of associated variables. Both volumes are published by Penguin Reference.

the unnecessary regulation of toxic pollutants such as DDT and the charge that environmental protection will cost jobs.

One of the underlying triumphs of this book is its insistence upon seeking solutions for the current dilemmas facing the environmental movement. In the final chapters, the Ehrlichs look beyond the rivalry between environmentalists and anti-environmentalists, and focus on some of the actors who have the ability to frame the debate in the minds of the public and policymakers: journalists and scientists. The Ehrlichs challenge the journalistic community to acknowledge the integral role they play, and to report accurately and critically on all environmental issues, not just those which are most sensational. In support of this effort, they also make the extremely important call to the scientific community to become more actively involved in popularizing the results of science, and to move out of the ivory tower and engage in public debate and education.

The Betrayal of Science and Reason practices what it preaches; its well organized and reader friendly format make it a useful resource for anyone interested in the subject matter and a prototype of the public education for which the Ehrlichs are calling. It can be read as a whole as a comprehensive analysis of the anti-environmental movement, or serve as a valuable reference guide to the current debates between anti-environmentalists and environmentalists. What emerges is not only a catalogue of sound arguments against the recent backlash, but perhaps more significantly: the truism that good science policy in support of the environmental movement can only be the result of interactions between scientists, journalists, policymakers, environmental groups and the general public.

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NATIONAL DEFENSE AND THE ENVIRONMENT

by Stephen Dycus

University Press of New England, 1996. 194 pp.

Reviewed by Adam N. Bram

The American people have long supported the development and maintenance of a strong national defense. For the last half-century, the United States has operated under a traditional security equation. With the Cold War over, the U.S. government and the American people have begun to reexamine the definition of national security. Assuming that quality of life is a primary component in the post-Cold War security equation, and good health and a clean environment are key elements of that calculus, *National Defense and the Environment* posits that environmental protection must become a fundamental directive for all U.S. agencies involved in the nation's defense.

With case scenarios and figures, Stephen Dycus illustrates the costly toll that the United States has incurred over the last half-century by building military might at the expense of the environment. For example, the remediation of the highly contaminated Jefferson proving ground—where the Army has fired about 23 million rounds of ammunition since 1941—is expected to cost $5 billion.

The Department of Defense and the Department of Energy have been the primary agencies for ensuring that the United States created and sustained a formidable military presence to preserve America's security. Environmental protection was not, however, a priority for those two agencies. Dycus notes that it is only within the last decade that both DoD and DoE have begun seriously to address this dark legacy of the Cold War and to change their environmental policies. In 1993, the Department of Defense formed the Office of Environmental Security to oversee the remediation of polluted military areas. For its part, the Department of Energy is no longer producing nuclear weapons and has promised to operate "all facilities in full compliance with applicable laws and regulations to [clean up] inactive sites and facilities so that no unacceptable risk to the public or the environment remains."

What needs to occur now, maintains Dycus, is that the policies of national defense must be reconciled with the popular will for clean air, land and water. *National Defense* poses the question, can the United States have both a strong national defense and a clean environment? Dycus answers in the affirmative, echoing the words of Former Defense Secretary Dick Cheney that "Defense and the environment is not an either/or proposition. To choose between them is impossible in this real world of serious defense threats and genuine environmental concerns."

The focus of *National Defense* is on the applicability and non-applicability of U.S. environmental laws and regulations to national defense activities. The author details the purpose of most domestic environmental laws, their limitations, and how Congress can amend the existing laws or pass new legislation; how the executive branch, namely the agencies, should enforce the laws; how the courts might better interpret the laws; and how the public should demand this necessary reconciliation of environmental protection and national defense.

Currently, a wide array of U.S. environmental laws mandate planning or require protection or restoration of the environment. However, until the late 1980s, DoD and DoE operated under informal policies of regulatory noncompliance. Insufficient pressure by Congress

and officials and a lack of public information helped foster this disregard for the environment. *National Defense* acknowledges that DoD and DoE have made rapid progress to correct their harmful policies. In 1995, DoE was spending over $6 billion a year on environmental programs. It spent $17 million on waste reduction alone. DoD had budgeted more than $2 billion in the same year for environmental remediation at active and formerly used military installations and $500 million for base closures. DoD has also begun implementing policies of source reduction and pollution prevention. While both agencies are presently providing good faith efforts to address their past injurious activities, decades of inactivity and flagrant abuse have scarred the land, air and water.

The current problem is not one of disregard, but one of scale, commitment, and dwindling resources. According to an annual report released in 1993 by the Department of Defense, a complete investigation and remediation at all DoD sites will cost between $25 and $42 billion dollars. Such a clean-up would take more than 30 years. Radioactive waste, hazardous waste, or mixed waste contaminate 137 DoE installations in 34 states and territories. The General Accounting Office estimates that the cost to restore the Department of Energy's nuclear weapon's complex ranges from $200 to $300 billion. "The environmental bill for nearly a half-century of Cold War has come due," proclaims Dycus. In these times of deficit reduction and budget cutting, a public debate must ensue that intelligently culminates with a price that Americans are willing to pay to defense-related environmental degradation.

National Defense compiles several dozen cases that loudly sound the public alarm. Probably the most convincing cases deal with nuclear processing and waste disposal. In 1993, DoE estimated that radioactive waste from its nuclear weapons complex totaled 600,000 cubic meters. This figure does not include the some 2,700 metric tons of spent nuclear fuel being held in DoE storage pools, dangerously waiting for permanent storage. Of separate concern is the fact that experts believe that DoE cannot account for as much as 1.5 metric tons of plutonium, enough to make three hundred nuclear weapons.

Much controversy exists over the selection of a manner or place to safely and permanently dispose of DoE's nuclear waste. The Clinton Administration recently announced a two-track strategy to dispose of the 50 tons of surplus plutonium from America's nuclear weapons stockpile. Under this plan, the United States will burn some of the plutonium, as a mix called MOX, in commercial nuclear power plants. The DoE will vitrify the remaining surplus in glass or ceramic logs and intern them in an approved underground storage site. Congress has proposed two permanent nuclear waste storage sites at the Yucca Mountain, Nevada and at the Waste Isolation Pilot Project (WIPP) near Carlsbad, New Mexico. The EPA is currently reviewing an application by DoE to use the WIPP site, making it a likely candidate to receive the logs and spent MOX fuel. Arms control advocates oppose the two-track plan because of fears of nuclear theft. Environmentalists fear that U.S. use of MOX for commercial reactors will encourage expanded plutonium production overseas. In *National Defense*, Dycus throws his voice to the opposition, raising concerns over DoE's ability to guarantee the safe consignment of high-level radioactive waste in underground sites for thousands of years.

One of the largest radioactive waste clean-ups is at the Hanford Reservation. Built in the 1940s as part of the Manhattan Project, this nuclear production facility in southeastern Washington produced plutonium for the nuclear weapons. Production ended in 1989, leaving around 1,700 sites contaminated with hazardous and radioactive wastes. Recent estimates to remediate Hanford were running at $1.4 billion a year and rising. DoE spent ten percent of its entire 1994 environmental budget ($200 million) just trying to remediate 177 underground tanks at Hanford; 68 of those tanks are probably leaking their contents of liquid or high-level transuranic wastes. Such wastes will remain dangerously radioactive for thousands, if not millions of years. Dycus suggests that it is uncertain what deleterious health effects have already been inflicted on Hanford employees, local residents and the ecosystems.

In contrast, scientists and health experts have calculated the precise public exposure of radioactivity from the Los Alamos National Laboratory near Albuquerque, New Mexico. In the last decade alone, this nuclear weapons research and development facility has released more than 3.2 million curies of radioactivity into the atmosphere—an amount equal to 250,000 times that of the release at the Three Mile Island accident.

Nonradioactive and mixed hazardous waste have also been major by-products of military activities. Two environmental laws are the primary regulations for hazardous waste: the Resource Conservation and Recovery Act (RCRA) and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Other laws frequently overlap, such as the Clean Water Act (CWA) and the Safe Drinking Water Act (SWDA). RCRA is the law that primarily applies to the treatment, storage and disposal of hazardous waste. Dycus reports that until 1992, when Congress passed the Federal Facility Compliance Act, EPA had not enforced RCRA in the same manner against federal facilities as it did against private ones. CERCLA overlaps with RCRA and is primarily responsible for clean-ups. The applicability and enforcement of RCRA and CERCLA and other laws to federal facilities are still being developed. *National Defense* provides several examples that demonstrate the need for Congressional intervention to address military site contamination.

Despite the bleak portrayal of the environmental blight left by the Cold War, Dycus finds reason for optimism. The author points to the American public's growing intolerance for needless threats to health or the environment. Dycus suggests that, despite some recent movements away from environmental protection, Congress will probably remain responsive to public demands. The Departments of Defense and Energy have been adopting programs and policies that show a genuine change in attitude among staff towards environmental compliance. While Dycus admits that administrative, financial, diplomatic, and political challenges remain, he states that America has no choice but to reconcile its policies of national defense and environmental protection.

The Cold War can teach U.S. policymakers some important lessons. *National Defense* clearly conveys that because there will always be "war and rumors of war," there will always be national sacrifices that affect the environment. Having demonstrated the enormous cost of military preparedness without regard to environmental protection, Dycus urges us "not to destroy the very thing we would fight to protect." Defense and the environment need not be an either/or proposition. Yet, when a choice must be made, the author argues that, as a nation, we must have settled procedures for determining when and how to choose.

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WHAT'S NEW IN PERIODICALS

"The Insecure State: Reflections on *the State* and *Security* in a Changing World"
by Stephen Del Rosso, Jr.
DAEDALUS: Journal of the American Academy of Arts and Sciences, vol. 124, no. 2
1995, pp. 175-207.

In his article, *The Insecure State: Reflections on "the State" and "Security" in a Changing World,* Stephen Del Rosso, Jr. discusses the pressing need to reexamine the state as the central focus of security. He also reviews various efforts to expand the concept of security to include non-military threats. The first half of this article focuses on the concept of "the state," and the way in which it has changed or been perceived to have changed since the end of the Cold War. Del Rosso acknowledges the "strict constructionist" school's fear that such a redefinition of security threatens to destroy the field's "intellectual coherence and make it more difficult to devise solutions..."; however, he argues that:

> "the inability of scholars and policymakers to fully comprehend the transformations taking place in the contemporary state is. . .a major factor contributing to the clouded perception of security in the final decade. . .of this century. . . .This persistent inability to understand the true nature of statehood, to mistakenly apply the outmoded notions of the past to contemporary affairs, is at the heart of the conceptual muddle surrounding the meaning of security in the post-Cold War world."

While there have been many efforts to reconceptualize the state, Del Rosso asserts that the state's "traditional" capabilities and authority have been undermined by recent advances in the world economy, advances in communication and transport, secessionist pressures, and environmental-health-demographic trends. The end result has thus been that territorial boundaries are becoming increasingly meaningless, and the state is increasingly being seen as unable to provide for the general welfare and protection of its citizens. In the second part of the article Del Rosso describes the growing desire for a new paradigm to replace the outmoded Cold War standard and the calls for a fundamental shift in focus from weapons, arms control and geopolitics to a new focus on geoeconomics. He argues that the most notable efforts throughout the 1960s, '70s, and '80s to expand the traditional concept of security failed to resonate widely in the Cold War climate. Only towards the end of the Cold War did appeals to redefine security win widespread attention. While Del Rosso concludes that the state will continue to provide a crucial frame of reference for the problems on the emerging security agenda, he argues that the world is in dire need of a new definition of the state that not only fully reflects its dynamic qualities, but that is capable of taking into account the unprecedented, and often poorly understood, changes taking place in the world.

by Janelle Kellman

"Broadening the Agenda of Security Studies: Politics and Methods"
by Keith Krause and Michael Williams
Mershon International Studies Review, vol. 40
1996, pp. 229-254.

This piece is divided into three well-crafted sections which together provide an overview of the contemporary discussion of redefining security. The first section argues that traditional security ideas and conceptions—based on the belief that the state is the primary object of security concerns—are incapable of incorporating

important non-military dimensions of security. The second section shows that traditional neorealist studies may be fundamentally flawed and unable to meet many of the standards that they impose on other disciplines. This section highlights several tensions and contradictions within the neorealist literature that render rather problematic its foundational claim to scientific objectivity. The third section parallels the first by evaluating alternative approaches to the concept of "security." Krause and Williams do a thorough job of raising significant challenges to both the traditional and alternative approaches. The authors do not conclude that one line of thinking is better than the other; rather, their efforts aim to further the debate by presenting an overview of both sides. Krause and Williams conclude that both views are needed. The authors conclude that it may be necessary to broaden the agenda of security studies to narrow the agenda of security; a more profound understanding of the forces that create political loyalties and give rise to threats can lead to the progressive removal of issues from the security agenda.

by Janelle Kellman

"Security Studies and the End of the Cold War"
by David A. Baldwin
World Politics 48
October 1995, pp. 117-41.

This piece argues that security studies might be more appropriate as a subfield of international relations, than as a separate discipline. Baldwin asserts that while today's world is very different than the period from 1945-55, some of the modes of thought, policy concerns, concepts of security, and discussions of statecraft from that time period appear more relevant to the post-Cold War period than those which emerged directly from the Cold War. The article is divided into three sections, the first of which reviews security conceptions from the interwar period to the present. Baldwin examines the tendency which emerged during the Cold War to overemphasize the military aspects of national security at the expense of historical, psychological, cultural, organizational, and political contexts. He asserts that the Cold War militarized American security policy, and security studies, making military instruments of statecraft the central if not the exclusive, concern of security specialists. In the second section, Baldwin assesses the relevance of security studies to the new world order, suggesting that the field's treatment of national security raises questions about its relevance to the post-Cold War world. Those writing before the Cold War not only defined national security in broader terms, but also had a more comprehensive view of the policy instruments with which security could be pursued. Such a broad view is likely to be more useful in the post-Cold War world than one confined to military statecraft. The third section offers proposals for the future study of security.

by Janelle Kellman

"The Greening of U.S. Foreign Policy"
by Richard A. Matthew
Issues in Science and Technology, vol. XIII, no. 1
Fall 1996, pp. 39-47.

This article discusses the possibilities for incorporating environmental issues into American foreign policy. Despite optimism that the Clinton Administration would bring environmental issues to the forefront of policymaking, Matthew argues that the first Clinton Administration was not nearly as aggressive on environmental issues as expected. He highlights Secretary of State Warren Christopher's promise made in April 1996 to "green" foreign policy, but he asks the reader to question the potential for any real change in the next four years. After outlining some of the current political obstacles to implementing Christopher's agenda and significant opposition in the Congress and in the security, intelligence and diplomatic communities, Matthew believes that there is indeed reason for optimism.

To understand fully environmental problems, policymakers must have both scientific knowledge and an understanding of the interactions between ecological and social systems. While Matthew agrees that Christopher's proposals are promising, he feels that they are unfocused and he recommends various moderate courses of action, to enhance the role of environmental issues into American foreign policy. According to Professor Matthew, there is much potential for progress in environmental diplomacy, and the United States must take the lead in improving its own activities. To achieve this objective, clearer goals are needed. Matthew outlines such goals and offers suggestions for making this agenda more manageable. He concludes that the United States must advance steadily on urgent issues while laying the foundations for more fundamental change through education and modifications to core values.

by Janelle Kellman

The Environment as Geopolitical Threat: Reading Robert Kaplan's 'Coming Anarchy'"
by Simon Dalby
Forthcoming in *Ecumene* 1996 3(4): 472-496.

Dalby comments both on the content and style of Kaplan's article, concluding that Kaplan's argument is "notable for its pessimism, forceful prose, and the absence of any suggested substantive political remedies for the immanent dystopia." Dalby asserts that Kaplan's ideas are reminiscent of earlier motifs, arguing that "fear of over-population and social hardship

has been a recurring political theme through the Cold War, albeit one that was less prominent than concerns with superpower rivalry." The 'Coming Anarchy' is an update of Malthusian themes that brings policy discussion of environmental security to the attention of a wider public." Despite bringing such attentions to the fore, however, Dalby maintains that Kaplan's article is riddled with inadequacies. It fails, for example, to examine many of the driving forces behind environmental degradation, is overly reliant on Thomas Homer-Dixon's highly debated work, and "ignores the larger transboundary flows and the related social and economic causes of resource depletion." Nonetheless, Dalby returns to Kaplan's focus on Malthusian themes and contends that a resurgence of such ideas may be instructive for future policy decisions.

by Janelle Kellman

Mideast Oil Forever?
by Joseph J. Romm and Charles B. Curtis
The Atlantic Monthly, vol. 277 no. 4
April 1996, pp.57-74.

Romm and Curtis argue that "Congressional budget-cutters threaten to end America's leadership in new energy technologies that could generate hundreds of thousands of high-wage jobs, reduce damage to the environment, and limit our costly, dangerous dependency on oil from the unstable Persian Gulf region." The authors foresee a world in which the Persian Gulf controls two-thirds of the world's oil for export and America imports nearly sixty percent of its oil. Romm and Curtis believe that the current political climate of fiscal retrenchment in the U.S. Congress is unknowingly undermining the Department of Energy's (DoE) long-standing programs to develop renewable energy sources. They predict a global energy revolution in the development of alternative fuels and renewable energy sources stimulated by growing energy needs and environmental concerns. In the highly competitive context of the global economy, the United States must act aggressively to maintain its leadership position. A well-funded DoE is a vital contributor to America's long-term leadership.

To defend these claims, the article lists some of the many technological innovations that DoE investments in R&D have made possible. For example, a genetically engineered organism discovered in 1994 enhances the fermentation of cellulose, increasing the rate of conversion and the yield of ethanol. This and other federally supported research has brought the cost of making ethanol from $3.60 a gallon fifteen years ago to about $1.00 a gallon today. Research is underway by the DoE's national laboratories and the auto industry to design and construct by 2004 a prototype clean car that has three times the fuel efficiency of existing cars.

Romm and Curtis believe that continued DoE investment in some of these key technologies will not only be good for the environment, but will be highly profitable for the U.S. economy. They warn that if Congress continues the thirty percent cuts in DoE energy program funding, the United States will miss what may well be the single largest new source of jobs in the next century: annual sales in renewable-energy technologies may hit $400 billion in 2040 and would support several million jobs.

by Michael Vaden

Pivotal States and U.S. Strategy
by Robert S. Chase, Emily B. Hill, and Paul Kennedy
Foreign Affairs, vol. 75, no. 1
January/February 1996, pp. 33-51.

"The United States needs a policy toward the developing world that does not spread American energies, attention, and resources too thinly across the globe, but rejects isolationist calls to write it off." The authors argue that the United States must "focus its efforts on a small number of countries whose fate is uncertain and whose future will profoundly affect their surrounding regions. These are the pivotal states."

The idea of a pivotal state derives from 19th century geo-political thinkers, such as Halford MacKinder, and was central to the foreign policies of American statesmen such as Dean Acheson and Henry Kissinger. The authors argue that recovering this approach offers three concrete benefits to the United States:

- promoting global stability by focusing on countries which have the greatest regional influence;
- addressing concerns of the public regarding our currently unfocused foreign policy;
- integrating traditional military security issues with new concerns, such as those related to environmental change.

The authors define a pivotal state as one with the "capacity to affect regional and international stability," and they identify the following as currently fulfilling this criterion: Algeria, Brazil, Egypt, India, Indonesia, Mexico, Pakistan, South Africa and Turkey. All of these states "face a precarious future, and their success or failure will powerfully influence the future of the surrounding areas and affect American interests."

As the United States faces new security threats, it must develop strategies which would encourage integration of the "...the new security issues into a traditional, state-centered framework and lend greater clarity to the making of foreign policy." The threats to the pivotal states include "...overpopulation, migration, environmental degradation, ethnic conflict...all phenomena that traditional security forces find hard to address." These issues should be of major concern to Americans "...because their spillover effects can hurt U.S. interests."

by Christa Matthew

New Scholarly Journal: *Environment and Security*

The Environment and Security (E&S) journal is a new social scientific journal devoted to the study of environmental forms of insecurity and to the national and international efforts to address these insecurities. The bilingual (French/English) journal primarily addresses the following topics: the evolution and meaning of the concept of environmental security and the relationship between domestic and international environmental security issues; the ways in which environmental security is perceived in different countries; the impact of environmental changes on the probability of conflict and cooperation at the national and international levels; the contribution of environmental security to the definition of new foreign and security policies; policies for the management of shared resources and the consequences of these policies; the links between armed conflicts and the integrity of natural ecosystems; organizational and legal mechanisms that enhance environmental security; and philosophical issues involving environmental security and other human values such as equity and social and economic development. This new journal tries to build on a new approach to environmental questions and to deal with their social, political and economic implications by linking the approaches of the natural and social sciences.

Issue 1 included the following English-language articles:

"Environmental Security: Issues of Conflict and Redefinitions"
by Geoffrey D. Dabelko and David D. Dabelko

"Definitions, Threats, and Pyramids: The Changing Faces of Security"
by Michael J. Edwards

"The Tumen River Economic Development Area: Environmental Challenge for Northeast Asia"
by Victor Loksha

Environmental Change as a Source of Conflict: More Work Needed"
by Jim MacNeill

"Water Scarcity: A Threat to Global Security"
by Ashok Swain

Issue 2 (forthcoming in 1997) will include:

"Armed Conflict and Environmental Security: An Overview"
by Arthur Westing"

"Protected Areas (Nature Reserves) and Biodiversity During Armed Conflict"
by Jeffrey A. McNeely

"The Laws of War and the Protection of the Environment"
by J. Ashley Roach

"Reconstruction and Development Following Armed Conflict: The Case of Eritrea"
by Naigzy Gebremedhin

"Land Mines: Dealing with the Environmental Impact"
by Jody Williams

"Nuclear Weapons Tests, Arms Control, and the Environment: The 1995 World Court Case and Beyond"
by Nico J. Schrijver

To subscribe, contact: The International Institute for Environmental Strategies and Security, GERPE, Edifice Jean-Durand, Université Laval, Québec City, Québec, G1X 7P4, Canada. Tel: 418-656-2316; Fax: 418-656-7908; E-mail: es.gerpe@fss.ulaval.ca.

Wilson Center Meetings

In November 1994, the Wilson Center inaugurated a series of monthly luncheon meetings on environment, population, security and global relations, consisting of experts from academia, Congress, government, the military, non-governmental organizations, and the private sector. Below are detailed summaries from nine of the 1996 sessions, including presentations and selected comments.

10 April 1996

Mock NSC Briefing

Environment and U.S. National Security Interests: Newly Independent States and Central and Eastern Europe

Zbigniew Brzezinski, Counselor, Center for Strategic and International Studies
Stephen Flanagan, National Intelligence Officer for Europe, National Intelligence Council;
Robert Hutchings, Director of International Studies, Woodrow Wilson International Center for Scholars;
William Nitze, Assistant Administrator for International Activities, Environmental Protection Agency;
David Sandalow, NSC Director for Global Environmental Affairs

Purpose/Format: This meeting was one in a series to explore how environmental issues might relate to U.S. security interests in specific geographic regions. The "Mock NSC" format was used in an attempt to bridge the gap that is created when environmentalists and traditional security thinkers wrestle with the question of how (or whether) to integrate environmental issues into national security decision-making. In each meeting the chairperson (the "National Security Advisor") heard two short, briefings on the security setting in a particular region—one from an environmental perspective and the other from a more traditional security perspective. The "traditionalist" outlined U.S. security priorities in the region, integrating any environmental issues he believed were important; the "environmentalists" outlined the environmental/demographic issues that will bear significantly on U.S. security interests. In this session on Central and Eastern Europe and the former Soviet Union, Zbigniew Brzezinski played the "National Security Advisor." The "traditionalist" briefings were given by Robert Hutchings (Central and Eastern Europe) and Stephen Flanagan (former Soviet Union). The "environmentalist" briefings were given by David Sandalow (Central and Eastern Europe) and William Nitze (former Soviet Union).

"Traditionalist" briefing by Robert Hutchings: Integration versus disintegration is the key issue for Europe and Eurasia. The question is whether the forces of integration, prosperity, stability and security in Western Europe can be extended eastward to encompass much of the formerly Communist world or whether the forces of fragmentation now on the loose in the East will overwhelm the self-confidence, cohesion and ultimately the institutions binding the Western democracies.

U.S. National Interests in Central and Eastern Europe

Two vital American interests are at stake. The first is the maintenance of a stable, democratic, prosperous Europe, which is essential to our future. The second interest is to prevent the emergence of a hostile power or a coalition of powers capable of threatening us or our allies. The countries of Central and Eastern Europe (CEE) sit at the crossroads of these two vital American interests.

Let me draw two contrasting scenarios to illustrate what this means. In the first scenario, Russia does not revert to authoritarianism after the June elections but rather continues on the path of democratizing reform. A follow-up force in the Balkans after the United States withdraws will be effectively in place. At its intergovernmental conference this summer, the European Union (EU) will set a timetable for admission of the Central European countries; the Atlantic Alliance is following a similar course. One can imagine under this scenario that the Central European countries continue to make steady progress toward stable democracy while the Balkans follow, even if at a slower pace.

In the second scenario, Russia does revert to authoritarian rule. It begins intimidating its neighbors in the "near abroad" and threatens countries more distant. In the Balkans, after the withdrawal of U.S. troops from the United Nations Intervention Force (UNIFOR), a wider Balkan conflict begins to develop, enveloping other states in the region. Under these circumstances, the European Union may not be inclined to take on new members. The result of this scenario could be one in which after all the hopes of the democratic revolutions of 1989, only the Czech Republic and Slovenia will emerge as stable and secure democracies. All the others—from the Baltic Sea to the Balkans—would be mired in some sort of semi-authoritarianism, subject to chronic regional conflict and nationalistic impulses. Russia meanwhile would incorporate forcibly or semi-voluntarily much of the territory of the former USSR.

Strategies for Achieving U.S. National Interests

It is worth noting that it is beyond our capacity to influence some of the determinants of these two scenarios. The proper orientation for U.S. policy is to focus on those elements—those determining factors—over which we do have some significant influence. First, we should expand economic assistance to Central and Eastern Europe and try to integrate these countries more rapidly into Western institutions. The European Union should take the lead, and it should set a date for accession by some Central European members. Even if that date is some years distant, the process should begin now. NATO enlargement should also proceed—perhaps a step behind EU initiatives—so that the two processes are kept in harmony. During this transition we should also support regional and subregional cooperation in tangible, not just rhetorical, ways. The most critical area is the Balkans. What is essential there is a Southeast European initiative to follow the withdrawal of U.S. forces from the former Yugoslavia. This initiative should involve all of the interested countries in a larger post-war strategy.

The United States should also promote a transatlantic free trade area. Although this would require four or five years of negotiation, it has several economic and political advantages. Qualified Central European countries should be full participants in negotiations from day one.

Environmental issues are interwoven with all of these issues. Environmental issues affect regional relations, the domestic economies and cooperation with the West. They cannot and should not be segregated from this larger strategic package. A possible exception is nuclear reactor safety, which is one area where there is a danger of posing a major security threat. But even there, the effort to address issues of nuclear reactor safety should be embedded in a larger strategic plan of reducing and diversifying the dependence on either nuclear reactors or Russian energy supplies.

Otherwise, Western environmental assistance has been sound and sensible. There is a coordinated strategy embedded in an Environmental Action Plan that was signed in Spring 1993 in which the United States and all of Europe, including CEE and the NIS, established a set of realistic priorities and common goals. The United States is devoting a substantial share—around 100 million dollars—of its economic assistance to environmental remediation. But the real resources are going to have to come from within these countries themselves. That is why U.S. assistance is focused on promoting economic growth so that the Central and Eastern European countries can develop the capacity to solve environmental problems on their own.

Environmental issues themselves are not likely to be a source of conflict in the region. They could, however, be an important source of cooperation. Within existing budgets we could do more to foster regional environmental cooperation. Transnational programs can promote integration into the larger European sphere. These strategies can be part of a long-term, sustained effort to support post-communist transition in Central and Eastern Europe and across Eurasia. This is a process on which the future of Europe and our own vital interests depends.

"Environmentalist" briefing by David Sandalow: The perspective of an environmental scientist is unusual for an NSC briefing. Were such a person with us today, he or she might note that alliances between states have been shifting and changing for centuries and will surely continue to do so for the indefinite future. The scientist might wonder, therefore, why so many talented people become so absorbed in discussing particular shifts and changes in these alliances over the course of relatively short periods of time, like years or decades. This environmental scientist might ask whether it might be more interesting, and ultimately more important, to consider something happening in our lifetime that is a unique and utterly unprecedented feature of our time—the ability of one species to alter the planet's physical characteristics.

Man's Impact on Earth

The recent population explosion is one example of the unprecedented ability of man to affect the Earth. It took 200,000 years, about 10,000 generations, for the world population to reach two billion people. Within the last 50 years, population has grown by more than two billion. If the trends continue, by the next century there will be more than nine billion people on this planet.

The technological revolution is another example of man's ability to affect the earth. Two examples support this statement. Since the beginning of history, we

believe that humans have engaged in violent conflict. Only within the last half century, however, have the tools of war threatened wide-scale destruction of the world. Also since the beginning of history, mankind has exploited the earth for sustenance. It is one thing to fish for food, however, and another to trawl the oceans with industrial driftnets capable of destroying vast ocean fisheries in a single decade. The earth's resources are becoming depleted.

When considering these unprecedented developments, the environmental scientist realizes that managing these threats depends upon the foreign policy professionals. That is because many of the environmental problems that mankind has created are global in scope. Cooperation among sovereign states is essential if these issues are to be addressed. Problems like ozone depletion, climate change, the loss of biodiversity and the depletion of fisheries have considerable global implications. These are global problems that require global solutions.

Global EnvironmentalConcerns Arising in CEE

I will discuss four global environmental threats, their potential impact on the United States and the importance of these threats to the countries of Central and Eastern Europe.

The first environmental threat is ozone depletion. The ozone layer is threatened by the release of CFCs and other gases. The potential impacts of ozone layer depletion include skin cancer, cataracts and ecological damage. The nations of Central Europe were constructive participants in the international arrangements to phase out ozone depleting chemicals.

The second global threat is climate change. It is well established that human activities, principally the burning of fossil fuel, are causing greenhouse gases to accumulate in our atmosphere at levels well above historic concentrations. It is also well established that global average temperatures have risen in the past century. The potential impacts in the United States of the build-up of greenhouse gases include heat waves or severe and frequent storms, more droughts and floods and the spread of diseases. At least for now, greenhouse gas emissions from Central Europe are not a major problem. The economic decline of the early 1990s led to marked declines in greenhouse gas emissions and as a result it appears likely that Central European countries will meet the international agreements for limiting greenhouse gas emissions to 1990 levels by the year 2000. The challenge will be to control greenhouse gas emissions in the decades ahead.

The third global threat is the loss of biodiversity. Scientists believe that we are witnessing the greatest loss of biodiversity since the dinosaurs went extinct 65 million years ago. Unlike in the tropics, the loss of biodiversity in Central Europe is not a major issue.

The final issue I would like to address is fisheries. While many foreign policy professionals tend to discount the importance of fish resources, countries more frequently and easily go to war over fish than they do over microchips. Spain and Canada were at the edge of hostilities over this issue in recent years. No major fisheries issues exist at this time in Central European countries.

Local and Regional Concerns Affect U.S. Interests

In examining local and regional concerns, the picture is much bleaker. Central and Eastern Europe has experienced some of the worst local pollution ever encountered on the planet. Most notable is the "Polluted Triangle" in Poland, the Czech Republic and Germany. Around the entire region, health professionals have found elevated levels of disease, especially in children. Dr. Brzezinski, as the "National Security Advisor" you are entitled to ask, and may be wondering, whether local and regional pollution problems in the CEE and elsewhere are a security concern for the United States. I would say that they are for four reasons.

The first is that addressing local pollution is a first step to addressing global issues. It is not plausible that countries will take on global environmental challenges unless they first address local problems.

Second, addressing local problems can contribute to U.S. economic security. Put simply, the environmental market in Central Europe is enormous. Controlling current pollution will require a vast amount of money. The German government estimates that investment in pollution control in the former East Germany alone will require 14 billion dollars per year over the course of the next decade. Finding resources of that magnitude will take many years. But as these economies rebuild and increasingly have foreign exchange available, their potential market for U.S. exports is staggering.

A third reason is that addressing local pollution problems can help prevent instability and conflict. The notion that environmental and resource degradation may play a role in conflict is probably more controversial today than it has been historically. Thirty years ago, Dean Rusk said that one of the oldest causes of war in the history of the human race is the pressure of peoples upon resources. Today, there has been very useful research done by Thomas Homer-Dixon and others to look empirically at this environmental stress that creates conflict. However, I am not going to dwell on it because I do not see that environmental stresses are currently a significant cause for promoting instability in Central Europe.

Finally, addressing local pollution problems can be a tool for deepening cooperation between our societies and ultimately for the exercise of American authority. I believe that by working with other people from

around the world to protect their environment and ours, we can build bridges between our societies and open the dialogue to be able to develop some policies.

"Traditionalist" Briefing by Steve Flanagan: The entire "NSC" staff has arrived at the conclusion that we need to take into greater account some environmental issues as part of our national security strategy. The three following problems address not only environmental issues, but legitimate and enduring national security challenges as well.

Environmental Concerns Posing National Security Risks

The first concern addresses the cooperative threat reduction program that is already underway in the current Administration—the efforts to clean-up the legacy of the Soviet nuclear weapons program. The second reflects U.S. efforts to ensure the development of alternative oil routes out of the Caspian region and the development of alternative pipelines elsewhere in Europe. These improvements will both stave off future environmental disasters and enhance energy security for the United States and for Western and Central and Eastern Europe. Finally, the United States should encourage a greater cooperation among the CEE, Russia and the NIS states to overcome the common legacy of the Soviet army's occupation, the legacy of poor Soviet technology and the waste generated by all of those activities.

Strategic Assessment

The Russian Federation remains a shadow of the former Soviet Union. Yet, it remains the one country on earth that can still threaten our existence. In that context, it is imperative that we continue to press along with some of the traditional agenda on arms control and confidence building in the security area. Whatever Russian government emerges, problems with compliance to existing arms control arrangements will remain. If the United States can continue to successfully press the Russians on these issues and achieve full implementation of the agreements, we will reduce the nuclear threat. As our security situation improves, the environmental picture in the former Soviet Union will also brighten.

Our second interest is to ensure that there is no one dominant or hegemonic power within Europe. There are at least some members of the current Russian government who seek to reestablish, if not the Soviet Union, then certainly a new Slavic union of states closely linked to and perhaps subservient to Russia. So it is imperative that we continue to provide Russia with a role in a new type of European security—one that provides for a fair amount of protection to the sovereignty and independence of CEE and NIS states. The role must show Russia that the re-division of Europe into spheres of influence is not the only way to proceed and protect its interests, but rather that by being a player with us in managing peace and promoting stability in Europe and elsewhere, it can respect the sovereignty and independence of these states.

It is also imperative that we pay increasing attention to bolstering those states of the NIS as they face continuing pressures from Russia towards integration. We certainly should not oppose mutually beneficial economic integration and political cooperation among the NIS, but we must be steadfast in resisting efforts by Russia to use various levers that it has, including energy dependence and debt, to pressure these states into a new kind of political and security relationship.

As we look down into the Caucasus, some real opportunities exist to both advance our security agenda in the region—that is to help strengthen those countries as they resist efforts towards integration with Russia—and at the same time enhance our own energy security. The oil and natural gas resources found in the Caspian basin are enormous. Maintaining our future access to those resources and ensuring that there are multiple pipelines out of the Caspian basin remains a critical national security objective. Countries such as Turkey are worried about an environmental disaster, such as an oil spill, in the Black Sea. U.S. involvement in developing this region would not only help to build access to these oil supplies, but also help to offset some of Turkey's concerns.

In the area of cooperative threat reduction, this Administration has made great strides by putting in safe and secure storage the enormous amount of spent fuel and other nuclear materials that could pose both environmental and security hazards. Much more needs to be done, but the continuation and invigoration of this program over the course of the next several years can be very clearly earmarked as not only a national security measure but also one that enhances the overall European environmental security situation. Additionally, we have helped a number of the countries in Central Europe by cleaning up bases that the Soviets left behind in a terribly degraded environmental state. The efforts to continue those programs will remain an important part of the strategy that deals with these twin challenges of addressing both environmental and national security issues.

With the approach of the Moscow nuclear summit, one other initiative creates an opportunity. Another common legacy that many of the states in the CEE, Russia and the NIS share is the legacy of Russian nuclear technology. We must encourage Russian cooperation with Central and Eastern Europe and the NIS to put these nuclear power plants into safe operating conditions and to ensure that the materials from them and other hazards that they pose are indeed disposed

of in an effective fashion.

"Environmentalist" Briefing by William Nitze: I will discuss the current and future activities that the EPA has planned in the Russian Federation.

Multiple Gains from Environmental Assistance

As you have already heard, the legacy of Communist rule in the former Soviet Union is probably the greatest environmental disaster in history. Radioactive chemicals and other forms of pollution have contributed to reduced birth rates, higher death rates, congenital abnormalities in children, various diseases and, generally, a degraded quality of life for a major portion of the Russian population. And yet, there is hope. We already have evidence that relatively cost-effective measures to reduce the amount of pollution at the local level can lead to improvements in the quality of life.

Furthermore, we believe that carefully targeted, selected interventions by U.S. government agencies, which directly improve the quality of life of Russian citizens at the local level, can help to build confidence and hope about their own abilities to build a better future for themselves and their children.

I will briefly describe four projects managed by the EPA to illustrate my point about early targeted intervention.

The first is an integrated resource planning project with Mosenerdo, the big electric utility in Moscow. EPA helped engineer Mosenerdo's entry into the Western capital markets through a private stock placement with Solomon Brothers. This stock placement yielded 22.5 million dollars. Through this placement, Mosenerdo is one of the first Russian companies that U.S. mutual funds can purchase. Mosenerdo now has plans to install gas turbines at one of its facilities which will produce more efficient power and the same or less pollution.

The second project is an air quality management project in Volgograd. This project has already led several Volgograd factories to reduce air emissions by implementing the low cost recommendations developed during audits by EPA. Savings on materials and other costs have led to greater efficiency and greater economic stability in the city. The city is already beginning to introduce air management techniques such as improved dispersion models and emissions testing that will lead to better management of this environmental problem sometime in the future.

The third project is an industrial pollution project. The installation of recycling equipment in a metal finishing plant cut nickel discharges by an estimated 35%. It saved the plant the cost of that nickel and allowed the plant to meet environmental standards.

Finally, we have a Moscow drinking water project which involves containment structures that handle animal wastes at the Kursakovo hog farm located west of Moscow. If you go to Moscow, do not drink the tap water, especially in the spring when floods and washouts pour such wastes into the drinking water supply. If we are successful with the approach that we have taken in this water district, then all of Moscow's water in the future will be potable.

Future EPA Projects in Russia

Those are just four examples. The EPA has plans to work on sustainable research management, particularly in energy and forestry areas, so that U.S. private investment would achieve immediate, improved environmental performance. We are focusing on collaboration with Russia on global issues such as climate change and ozone depletion. Finally, there is an interagency project focusing on radioactive waste management in northwest Russia. We have a project to upgrade a reprocessing facility in Murmansk which will help both the civilian and naval authorities to manage their wastes.

Opening Remarks by Chairman, Zbigniew Brzezinski: Policy recommendations for the President must bear on the national interest—which in this setting principally involves issues pertaining to national security. One purpose of this exercise is to identify how environmental issues pose problems or genuine threats to national security. However, the concept of national interest is broader than national security, as it also encompasses national well-being. Thus, participants in today's meeting might wish to discuss which of these problems bears on the national well-being of the American people and how we should respond to such issues—even if they are not primary threats to national security. In the discussion, participants should identify which of the foregoing also involve relatively short term threats that will need Presidential attention in the next three years. Longer-term issues that may pose very serious threats to future generations should also be identified. One might best proceed by differentiating between short-term threats to national security, short-term threats to national well-being, longer range threats to national security and longer range threats to national well-being. Beyond that, deliberations in a National Security Council setting should consider whether the issues in question impact very significantly any of the United States' principal allies or friends. There may be some circumstances in which a particular concern only poses a problem to the United States in the long term but presents a more immediate security threat to one of our allies. Such distinctions will help the group to address one of the tasks of this exercise, which is developing priorities for advising the President.

Concluding Remarks

Comment: When assessing threats and establishing priorities, one might also consider the timing of the onset of the threat, the duration of the threat, and the potential seriousness of the its consequences. Those factors might be evaluated using a grid that assesses the seriousness of a range of threats—both environmental and traditional.

Comment: A result of latent environmental disasters in the FSU and in CEE would be very large population movements. Such movements, arising from a nuclear disaster or from perceptions that death rates are rising quickly, could be destabilizing in some areas. In the longer term, energy issues should be a primary concern; in the immediate term, the NSC should focus on preventing a rekindling of Cold War antagonisms.

Comment: We should examine the range of problems and determine which U.S. priorities coincide with those of the FSU and CEE. We should also identify the priorities that, if addressed, might enhance efforts to build democracy in the region. Institutions building, for example, could improve both the environmental situation and strengthen democracies. Another top priority should be to correct energy pricing and remove artificial barriers to market entry. The result would be reductions in pollution, fossil fuel use and waste.

Hutchings: The more advanced countries of the CEE will be in a better position than the NIS to implement environmental solutions in the years ahead. Both Germany and the United States have strong commercial interests in the region, and should mobilize a Western consensus around action in this field. I strongly suggest that we build upon our already shared attitude toward EU and NATO enlargement to galvanize greater Western activity on the environment.

Brzezinski: The added advantage is that some environmental activities might stimulate regional cooperation—which is a key geopolitical objective throughout the region. Are there any short-term environmental problems that pose a security threat to the United States?

Comment: One important issue is a vestige of the Cold War: the safe and secure management of the former Soviet Union nuclear weapons and strategic forces.

Brzezinski: Is the nature of the threat that the weapons or materials can be stolen or restored and then used against us? That would be a conventional type of threat, so can you explain what new national security threats in the short term arise from the associated environmental problems?

Comment: Issues involving radioactive waste and radioactivity are more serious than most people appreciate. For instance, the Murmansk peninsula in the former Soviet Union has the greatest number of nuclear facilities in the world per square kilometer. This causes not only a direct threat to our allies, but also a threat to Alaska if the radioactivity travels by water. Unsafe nuclear facilities should be shut down, and the United States should help to provide the means for alternative energy supplies. Chemicals issues are also more serious than most people believe. In addition to the potential for chemical warfare, dangerous chemicals are released from the burning of fossil fuel. Russia's air pollutants may not affect us directly; but the resulting pyrenes, dioxins and bi-carbons do affect the United States directly. Neighboring countries are also threatened by the legacy of chemical weapons dumping in the Baltic Sea and other shallow waters; the weapons have either dissolved or hydrolyzed, so they pose threats to about 10 countries in the region. In the Black Sea, hydrogen sulfide in the water is increasing more than three meters per year; while it was 450 meters below the surface 30 years ago, hydrogen sulfide is now only 50 meters below the surface. If it encounters air and ignites—as it did in Lake Neosenchada—there would be hundreds of thousands of deaths, possibly including citizens in Turkey and other NATO allied countries.

Brzezinski: Many threats mentioned thus far are longer range threats, rather than direct ones. They will contribute to the general degradation of life and, thus, to the deterioration of American and other nations' well-being.

Comment: These threats are beginning to accumulate. If only one or two of these longer term threats were probable, there might be less of a concern. But when there are more than a dozen, and if they are growing and converging, there should be greater attention to them in the short-term.

Brzezinski: In advising the President, it is necessary to identify which problems to tackle first; which ones to address with others; and which ones are to handle with the international community as a whole. These are some additional criteria to bear in mind.

Comment: There are classic problems that are long-term in their impact but require short-term policy attention. The scientific consensus is that global warming is a serious problem, principally man-made, that will have serious impacts for most nations—especially coastal states. There is tremendous momentum behind climatic change, and policy choices must be made soon if we are to affect change in the long-term. These kinds of problems have not been addressed in a conventional

national security sense, but some ought to be.

Comment: I would like the presenters to comment more on a particular short-term security risk. The United States has a clear short-term interest in avoiding a return to authoritarian government in the Russian Republic. Mr. Nitze suggested that the environment was an important quality of life issue that could affect Russian voters and the political system. I am curious to hear him and others elaborate on that point.

Nitze: In the short-term, the environment probably will not have a strong, direct influence on the political system. The average Russian voter does not understand the connection between environmental degradation and health and economic well being. Much more important in the voters' minds at present are concerns about national pride, being exploited or humiliated by foreigners, etc. But as awareness grows about the links between environment, health and well being, the political impact will be much more significant.

Comment: Regarding priorities, I think that Central Europe should be higher on the list than Russia. Central Europe is manageable, the prospects for success are greater and the costs are lower.

Comment: That kind of a prioritization is dangerous, especially given the geostrategic importance of Russia to the United States. It would be helpful, however, to identify more clearly the links between environmental degradation and health. The health situation in Russia is unprecedented. Life expectancy has declined for four successive years, with male life expectancy down to 57 years. It is, of course, hard to assign the exact proportionate responsibility on environmental degradation. But it is clear that the degradation in water quality, in air quality and the breakdown in the public health system and sanitation is partly to blame. When a country faces such a dramatic deterioration in the health of its citizens, there could be serious effect on its stability and the permanence of its political structure.

Brzezinski: Would it be your view that if Russia adopts foreign policies which are hostile to American foreign interests, the United States should still pursue a policy of upgrading the Russians' quality of life?

Comment: I think it is in our interests regardless of Russia's foreign policy because we are probably dealing with a desperate population. The decline in life expectancy is being accompanied by greater incidence of sickness while people are still alive.

Comment: Our interests are in a relatively stable and satisfied Russia. So, it is in our interest to take some modest steps to help them deal with some of these environment-related, public health problems in order to introduce more stability in that situation—regardless of who gets elected.

Comment: In some countries, our environmental assistance is helping both to improve the quality of life and to foster pluralism. Let us take an example from Bratislava, Slovakia. In Slovakia, the development of a stable democracy is being threatened by people like Meciar. But U.S. environmental assistance and NGO activities are helping the Slovaks to better organize in a pluralist fashion.

Brzezinski: Investments in environmental quality to improve the quality of life in Central Europe may be a worthy goal for philanthropic reasons, but the nexus between environment and other foreign policy and security exigencies remains unconvincing. The situation is different, however, in China and Russia: both are major powers capable of conducting foreign policies that are antithetical to U.S. interests. This group might consider whether there should be a connection between foreign policy and all its concerns and a desire to improve the quality of life. It does not follow automatically that a frustrated public is necessarily to the U.S. disadvantage; nor does it necessarily follow that a happy, health and satisfied public is to the U.S. advantage.

Comment: In Russia and China, no environmental improvement can occur until there is improved capacity for public accountability. The NGOs that exist and environmental issues that dominate must currently pass through the filter of an authoritarian government—which by its nature is secretive.

Comment: If I read the political science literature correctly, the percent of the public supporting an active role in international and foreign affairs is about five to seven percent. If you look at the percent of the public supporting environmental initiatives, it is significantly greater. It would very interesting to link the two in order to recruit a large, new population concerned with international issues. With regard to short-term issues, we should consider environmental threats associated with land mines and other conventional weapons.

Summary of Closing Remarks

Brzezinski: With the remaining time, I would like to ask the four presenters to attempt an initial prioritization from their various perspectives.

Hutchings: The first priority may be to secure more funding, as the total amount of aid being offered is trivial compared to the problems at hand. Funding must go beyond specific attempts at environmental

remediation, and should extend to things like model programs and the transfer of technology and information. With the agreement of all the environmental ministers and their governments across this entire region, there is an existing set of priorities to pursue. Achieving these priorities will have the added advantage of bringing these countries closer to international norms—especially EU standards, which is a desirable goal by the United States and CEE. It would also extend the democratic community of nations closer to Russia.

Sandalow: I agree and would like to make two additional points. With respect to prioritization and time frames, any policymaker must of course prioritize. And it is natural and inevitable that policymakers will look to the immediacy of the threat as a basis for prioritization. But given the enormous mismatch between political timescales and natural timescales on the issues, it is a challenge for environmentalists to convince other policymakers to take action. Getting policymakers and the public to pay attention to important issues which do not pose any immediate political pressure poses an enormous challenge.

Brzezinski: Your argument may convince others that the National Security Council may not be the appropriate forum for deciding these issues. To some, Congress might be more suited to the task; after all, it is supposed to have a long perspective, given its Constitutional mandate and legislative responsibilities.

Sandalow: I am not impressed by Congress's ability to look far into the future. I think the National Security Council must deal with these issues because they involve relations between sovereign states.

Brzezinski: But those arguments alone may not capture the National Security Council's attention.

Sandalow: One additional point: earlier you noted that Russia and China exert more influence over U.S. interests through their foreign policies than the Central Europeans. With regard to global environmental change, it is worth noting that many countries—no matter how small or weak—have the potential to do damage to the global environment than larger countries. A smokestack in the Czech republic has as much impact on climate change as a smokestack in China.

Brzezinski: The point is well taken, but it does not explain why these issues need to be addressed at the President's table. Merely telling him the problem is serious is the beginning of his education—but beyond that, he must make some decisions. So what should he do? On what issues should he focus? One of the speakers argued in favor of differentiating in terms of geographical frameworks. That might work. One might differentiate in terms of the magnitude of the threat, but that does not solve the timeframe problems. One must also consider the compatibility between these initiatives and other foreign policy objectives. For example, if we want to promote the integration of Central Europe with Western Europe, the United States can engage in efforts that facilitate those nations working together. If we want to stabilize relationships between Russia and the NIS, we can create institutions in which all actors partake on an equal basis, addressing shared problems in consort. In other words, what other nexi exist between the environmental initiatives and strategic foreign policy objectives, given the setting in which we are operating?

Flanagan: Perhaps the key issue is deciding where and how to target U.S. assistance—and in so doing we can work very closely with EU countries. We might target some high visibility demonstration projects, particularly those where there is a pan-European dimension. Such projects would impress upon Russia and the NIS that there are ways to achieve environmental solutions cooperatively; in addition, they would instill a sense of hope in key areas that might be infectious. The long-term work must be done by the countries themselves, but such examples would certainly help.

Brzezinski: Which items would you particularly emphasize to instill hope?

Flanagan: For example, in Latvia or Bulgaria, we can help to create and implement a cooperative program to either encase or make safer the Russian-style reactors. We could begin working on a multinational consortium somewhere in the Ukraine or elsewhere in the NIS to show other states that they have common interests and that cooperative projects work. Hopefully, this will reinforce the notion that they must act together.

Nitze: Here are three top priorities: (1) there must be proper management of radioactive and chemical materials—especially in cases where materials could be misused militarily or could seriously degrade the global environment; (2) we should focus on proper management of global environmental changes—particularly climate change and biodiversity—where the U.S. cannot achieve its objectives without other countries' cooperation; (3) we should try to influence the behavior of potentially adversarial nations through environmental initiatives.

Comment: From the DOD perspective, I have three priorities for the National Security Advisor and for the President. (1) In the broadest sense, we should urge the President to use his office as a bully pulpit to broadcast the importance of these global issues—recognizing fully well that there are not very many short-term

national security threats to the United States posed by global environmental challenges. Because these problems will have to be faced by future generations, the President can use his office to help mobilize public opinion even when U.S. dollars are not expected to be the primary means to address the issues. (2) The U.S. can and should integrate into its foreign policy and its national security strategies in CEE the idea that environmental projects can be used to promote stability and democracy in those countries in a way that assists their integration into the EU and community of free democracies. There are already examples of military projects helping to build capacity among CEE and NIS militaries through technology, training and technical assistance. These projects are helping, for example, to clean up the former Warsaw Pact bases which are degrading their countries and limiting their ability to use the bases productively for economic growth. (3) Some of the environmental threats discussed today, while not short-term national security threats to the United States, do pose to some of our allies threats that they consider to be short-term (zero to ten years) in nature. A good example is Norway, which believes that the Russian management of its decommissioned submarines at Murmansk poses a threat to Norway's security and economy. This is because of the inability of the Russians to safely manage the nuclear waste products that are potentially threatening the fishing fleet—a large part of Norway's economy. In those instances, I believe we can make a modest effort to collaborate with other countries. We have the ability as a superpower to influence the Russian military to improve its environment—and are probably the only country capable of so doing. To the extent that militaries are part of the environmental problem—and can be reformed in societies for long-term benefit—such modest efforts can go a long way.

Brzezinski: We also have to address a domestic dimension of this—that is, to identify groups, constituencies and lobbies that might have a special interest in these issues. This means taking into account the interests of several communities while also considering certain fundamental values that are potentially at stake. I would like to close on a more general point. About 20 years ago, the United States started deliberately identifying itself with the cause of human rights. We often said to the world that human rights is an historical inevitability of our time. This was a meaningful response to the challenge posed by Communism, which projected itself as the inevitable revolution and as a challenge to human rights. That cause fortified the United States very effectively in the last phase of the great competition in the Cold War world. The time may have come for the United States also to carry forward the cause of human life. Human life is a vital cause, and the United States—as the most innovative and creative society in the world with the most enduring and vital democracy—is well poised to promote it, having also been successful in promoting human rights. The United States still must pursue geopolitical objectives, sometimes in a cold-hearted and brutal fashion. But if American foreign policy incorporates goals connected with promoting human life, it might be infused with a new sense of mission and attractiveness. This might also allow certain national interests to be framed in more positive terms, rather than in a strictly competitive and cold-hearted sense. In light of this discussion, perhaps the time is ripe for the President to say that the United States is identified with the cause of human life.

7 May 1996

Environmental Warfare: Manipulating the Environment for Hostile Purposes

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Warfare (armed conflict) inevitably results not only in death and destruction, but also in environmental disruption. Most of such environmental disruption is an incidental (collateral) outcome of military actions. Moreover, warfare can in some ways even have environmentally beneficial effects of an incidental nature. However, I am not dealing here in the first instance with either of those incidental environmental components of warfare. What I do wish to examine at this time is the deliberate manipulation of one component or another of the environment for hostile purposes. Although the intent of such deliberate manipulations is to weaken an enemy force, either directly or indirectly, environmental disruption is of course likely to be an added intentional or incidental outcome.

I should also explain at the outset that the notion of "environment" as employed here includes both the natural environment (of which precious little remains in the world) and the environment as re-arranged and added to by human actions, thus including for present purposes especially such semi-permanent features of the landscape as major dams, nuclear power stations, and certain industrial facilities.

My presentation is essentially in two parts: first I examine deliberate environmental manipulations during wartime, based on past examples and future possibilities or fantasies; and second, I examine existing constraints on such manipulations, both legal and cultural, as well as their usefulness.

Environmental Manipulations

Deliberate environmental manipulations during wartime fall into two broad (and perhaps somewhat overlapping) categories: (1) those that involve massive and extended applications of disruptive techniques; and (2) those that involve relatively small disruptive actions which in turn release relatively large amounts of disruptive energy, so-called "dangerous forces", or become self-generating. The first of these approaches would by some be considered a "crude" form of environmental warfare, the latter a more "elegant" form.

Moreover, intentional hostile disruption of the environment could, at least in principle, involve manipulations of any of the five following environmental domains: (1) the biota (flora and fauna); (2) the land (including fresh waters); (3) the ocean; (4) the atmosphere; and (5) the celestial bodies and space. I shall discuss, at least briefly, each of these five environmental domains in turn.

The biota (flora and fauna): In round numbers, the land surface of the globe is covered by perhaps 95 million square kilometers of vegetation and associated animal life: some 15 million of cropland (both annual and perennial); 40 million of tree-based (forest) ecosystems; 30 million of grass-based (prairie) ecosystems; and 10 million of lichen-based (tundra) ecosystems. And the ocean supports additional huge expanses of alga-based (marine) ecosystems.

It is often readily possible to alter portions of those several biotic components of the environment for hostile purposes in one or more ways, among them especially: (a) by applying chemical poisons (herbicides) more or less massively; (b) by contamination with radioactive isotopes, originating, for example, from nuclear weapons or nuclear power stations; (c) by explosive or other mechanical means, applied either massively or more selectively for the release of dangerous forces; (d) by incendiary means, perhaps with subsequent self-generating

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This text is adapted from a presentation delivered at the Woodrow Wilson Center on 7 May 1996. Arthur Westing is the author of numerous books and articles on war and the environment, including Environmental Warfare (1984) *and* Cultural Norms, War and the Environment (1988).

propagation; and (e) by introducing exotic living organisms, including microörganisms, which might well spread.

As one well known example of warfare involving intentional large-scale damage to the terrestrial biota, forest ecosystems were devastated by the United States during the Second Indochina War [Viet Nam Conflict] of 1961-1975. The disruption was accomplished by repeated, widespread applications of herbicides, by massive bombing, by the extensive use of large tractors, and—to a lesser extent—by fire, most of it concentrated in Viet Nam, but some of it also occurring in Cambodia and Laos. Killing of the flora led to a decimation of the wildlife, to soil erosion, and to disturbance of the nutrient balance. Substantial recovery of the affected ecosystems has, depending upon their type, been taking years to decades. Grassland and tundra ecosystems are similarly vulnerable to attack by such means.

As to other approaches, the release of exotic microörganisms could also do serious damage to forest, grassland, or tundra ecosystems. Damage resulting from the introduction of such microorganisms could be of many decades' duration, as has been discovered through non-hostile trials by the United Kingdom with *Bacillus anthracis*. And the release of huge amounts of oil into marine waters can bring about large-scale damage to marine ecosystems of several years' duration, as has been demonstrated by various major peacetime accidental oil spills and by the intentional releases by Iraq off the coast of Kuwait during the Persian Gulf War of 1991.

The land (including fresh waters): Of the approximately 149 million square kilometers of land on earth, perhaps 16 million is continuously ice covered, 18 million is desert, 8 million has permanently frozen subsoil (permafrost), 2 million is rugged mountainous terrain, and the remaining 105 million (mostly in the northern hemisphere) supports virtually the entire human population and its cultural artifacts.

Successful intentional manipulation of the land for hostile purposes would depend for the most part upon the ability to recognize and take advantage of local instabilities or pent-up energies, whether natural or anthropogenic. For example, some mountainous landforms are at least at certain times prone to soil and rock avalanches (landslides) and some arctic and alpine sites are prone to snow avalanches; presumably under the right conditions, either could be initiated with hostile intent. Permafrost could be adversely manipulated through killing the overlying tundra plant cover. In the case of rivers that flow from one country to the next, the upstream country could divert or befoul the waters so as to deny the use of those waters to a downstream enemy, which could be a major calamity in arid regions. On the other hand, the triggering of earthquakes, the awakening of quiescent volcanoes, and the liquefaction of thixotropic soils ("quick clays") for hostile purposes all remain beyond human capabilities.

For those countries with large dams or nuclear power plants, attacks on such facilities (whether overt or via sabotage) could under militarily propitious conditions release, respectively, impounded waters or radioactive gases and aerosols—what have come to be known as dangerous forces. Indeed, there now exist about 195 clusters of civilian nuclear power plants in 31 countries (plus a number of additional nuclear-fuel reprocessing plants and nuclear waste storage sites). Nuclear facilities represent a relatively new target of opportunity, all of them having been constructed since World War II, and 80% of them during the past 25 years. The few attacks to date on nuclear reactors—all located in Iraq (one attack by Iran [possibly Israel] in September 1980, one by Israel in June 1981, and two by the USA in January 1991)—are not known to have released radioactive contaminants into the environment. However, as the peacetime Chernobyl accident of April 1986 has demonstrated so well, a huge area can become seriously contaminated with iodine-131, cesium-137, strontium-90, and other radioactive debris. The contaminated areas would defy attempts at clean-up and would recover only very slowly—over a period of many decades—as has been demonstrated by the Pacific island and other test sites. Some industrial facilities would also lend themselves to attacks releasing dangerous forces, as suggested, for example, by the peacetime accident that released dioxin into the environment at Seveso, Italy in July 1976.

Turning to the threat of flooding, the human environment now contains almost 800 dams, scattered throughout 70 countries, that are at least 15 meters high and impound over 500 million cubic meters of water; in fact, more than 500 of these, in 63 countries, each impound over 1000 million cubic meters. Most (more than 90%) of these huge hydrological facilities were built since World War II, more than 60% of them during the past 25 years. A substantial proportion of all these many dams would make eminently suitable military targets, with devastating downstream effects. Indeed, the breaching of dams for the purpose of releasing the impounded waters has been spectacularly successful in past wars, including both World War II and the Korean War of 1950-1953.

It should be clear that the release of dangerous forces from nuclear, chemical, or hydrological facilities, whether the intended or unintended result of hostile action, now constitutes one of the gravest threats to the human environment in any major war of the future.

The ocean: The ocean covers over 360 million square kilometers of the earth's surface. Of the 192 current nations in the world, 152 border on the ocean (and of those 46 are island nations).

The hostile destruction of ships or other off-shore or near-shore land-based facilities that would release large quantities of oil, or else of radioactive or other-

wise poisonous pollutants, would—as mentioned earlier—disrupt marine ecosystems, both their flora and fauna.

A number of other hostile manipulations of the ocean have been suggested as future possibilities, including those that might alter its acoustic or electromagnetic properties—doing so for purposes of disrupting underwater communication, remote sensing, navigation, and missile guidance. However, such manipulations seem not as yet to be within human capabilities. Tsunamis (seismic sea waves or so-called tidal waves) occasionally cause enormous damage to coastal life and structures, but here again it has not been possible to generate them for hostile purposes. Diversion of the ocean currents also remains impossible.

The atmosphere: The earth's atmosphere extends upward many hundreds of kilometers, but becomes extraordinarily thin beyond approximately 200 kilometers. It is divided into the lower atmosphere, which extends upward to about 55 kilometers and represents more than 99% of the total atmospheric mass; and the upper atmosphere, which rests on the lower atmosphere (ca□55-200+ km up).

The lower atmosphere consists of the troposphere (ca 0-12 km up) and the stratosphere (ca 12-55 km up; lower stratosphere, ca 12-30 km up, and upper stratosphere, ca 30-55 km up). The troposphere is turbulent (windy) and contains clouds, whereas the stratosphere is essentially quiescent and cloudless. The lower stratosphere contains an ozone layer (ca 20-30 km up), which provides a partial barrier to solar ultraviolet radiation.

The upper atmosphere consists of the mesosphere (ca 55-80 km up) and the ionosphere (ca□80-200+ km up). The ionosphere is distinguished by its ionized (electrified) molecules, which serve to deflect certain radio waves downward, thereby making possible long distance amplitude modulated (AM) radio communication.

As to the lower atmosphere, two sorts of hostile manipulations were pursued during the Second Indochina War by the United States. First, various chemical substances were released into clouds over enemy territory in substantial attempts to increase rainfall so as to make enemy lines of communication more nearly impassable. Those attempts were unsuccessful. Second, unspecified substances were introduced into the troposphere over enemy territory in order to render enemy radars inoperable. The results of those efforts were never made public. Then during the Persian Gulf War, Iraq ruptured and set fire to over 700 Kuwaiti oil wells, thereby releasing immense amounts of dense soot and poisonous fumes into the troposphere for no stated purpose, but perhaps at least in part in order to reduce visibility. Deleterious effects of the smoke on the environment included insults to the health of the local biota (including humans). Whether local weather patterns were influenced at the time by the smoke remains unclear.

Regarding further hostile possibilities for the lower atmosphere, it has been suggested that it may become possible to temporarily disrupt the ozone layer above enemy territory for the purpose of permitting injurious levels of ultraviolet radiation to reach the ground (perhaps via the controlled release of a bromine compound from orbiting satellites). Control over winds—for example, the creation or redirection of hurricanes—remains as yet beyond human reach. As to the upper atmosphere, it is conceivable that means could be devised in the future to manipulate the ionosphere for hostile purposes—specifically, to alter its electrical properties in such a way as to disrupt enemy communications.

The celestial bodies and space: "Celestial bodies" refers to the moon and other planetary satellites, the planets, the sun and other stars, asteroids, meteors, and the like. "Space" (or "outer space") refers to all of the vast region beyond the earth's atmosphere—and thus, for all practical purposes, begins some 200 kilometers above the earth's surface.

It appears not to be possible to manipulate the celestial bodies for hostile purposes, Arthur C. Clarke, Isaac Asimov, and their compatriots notwithstanding. Nonetheless, the suggestion has been put forth that some day it might be within human grasp to redirect asteroids to strike enemy territory (as has been indirectly suggested, most recently, by statements of the Chinese government a few weeks ago). It also appears not to be possible to manipulate space for hostile purposes.

Legal Constraints

Having now made a rapid survey of past episodes of the intentional manipulation of the environment for hostile purposes, as well as of future possibilities, let us examine for a moment the law of war (here taken to include arms control and disarmament law) to see the extent to which such actions might be legally constrained—or, to put it another way, what relevant military actions might be construed as crimes of war and thus, if carried out, perhaps brought before some future international tribunal.

1977 Environmental Modification Convention: The legal instrument that comes to mind at once is the 1977 Environmental Modification Convention, which, in fact, came to be as an international response (initiated by the Soviet Union) to the U.S. attempts during the Second Indochina War to modify the weather and other components of the environment. This Convention prohibits its parties from engaging, among themselves, in the hostile use of environmental modification techniques that would have widespread, long-lasting, or severe effects as the means of damage. An environmental modification technique is for these purposes

defined by the treaty as any technique for changing—through the deliberate manipulation of natural processes—the dynamics, composition, or structure of the earth (including its biota, lithosphere, hydrosphere, and atmosphere) or of outer space.

The 1977 Environmental Modification Convention is valuable in having helped to explicitly incorporate environmental considerations into the law of war. However, its shortcomings are such that I can say little more about this treaty of a positive nature. Its inherent weaknesses make it very difficult to see what potential military actions the treaty might actually prevent. Not only would any actionable modifications have to have been admittedly (or somehow demonstrably) deliberate, they would additionally have to exceed in their environmental impact a threshold value that is defined in highly ambiguous terms (viz., widespread, long-lasting, or severe). However, even if those terms had been rigorously defined by the treaty (which the negotiators refused to do), the very notion of a threshold value below which deliberate environmental modifications are permissible—a notion inserted at U.S. insistence—thereby actually condones (and thus possibly even encourages) such actions up to some very ill-defined level. Finally, there is a procedural difficulty with the treaty, in that its complaint process depends upon the United Nations Security Council, in which any of the five permanent members can exercise a power of veto over any attempted investigation or other Council action.

1977 Protocol I: A second treaty that was born in the aftermath of the Second Indochina War is the 1977 Protocol I addition to the 1949 Geneva Conventions. Among numerous important social provisions, it admonishes its parties, among themselves, against the use in international armed conflicts of any methods or means of warfare that would cause widespread, long-term, and severe damage to the natural environment, no matter whether such impact were explicitly intended or merely to be expected. This otherwise undefined admonition is in essence a hortatory statement that helps to articulate and reinforce a vague cultural norm protective of the environment in times of interstate war. Moreover, the treaty actually specifies that a transgression of this admonition would not constitute a so-called grave breach, that is, a war crime. Nonetheless, the importance of this stricture is substantial because it has authoritatively inserted environmental considerations as such into the corpus of international humanitarian law.

Both 1977 Protocol I, which is applicable to international armed conflicts, and its modest companion 1977 Protocol II, which is applicable to non-international (internal) armed conflicts, prohibit their parties from causing, among themselves, the release of dangerous forces (with consequent severe losses among the civilian population) specifically (i.e., only) through attacks on dams, dikes, and nuclear electrical generating stations.

Additional treaties: Other components of the law of war of particular relevance to environmental manipulations for hostile purposes, whether intentional or not, include especially the following four: (1) 1899 Hague Convention II and/or 1907 Hague Convention IV, prohibiting the wanton destruction of enemy property in interstate war among the parties (or, perhaps, among all states); (2) the 1925 Geneva Protocol, prohibiting the use of chemical or bacteriological weapons in interstate war among the parties; reinforced by the 1972 Biological Weapon Convention, prohibiting the possession of bacteriological or toxin weapons to the parties; (3) the 1967 Outer Space Treaty and the 1979 Moon Agreement, prohibiting the parties from engaging in any hostile military activities involving the moon and most other celestial bodies; and (4) 1980 Protocol III of the Inhumane Weapon Convention, restricting somewhat the use of incendiary weapons against forests and other plant cover in interstate war among the parties.

Cultural Constraints

Some will argue that existing legal constraints on environmental manipulations during interstate warfare—and especially during the now far more prevalent instances of intrastate (internal) warfare—are ineffectual and should thus be strengthened. The problem is that the ambiguities and other weaknesses of the existing body of law reflect precisely the extent to which the military powers of the world are to date willing to bend in these matters. The legal norms established by the law of war are hammered out with meticulous care at the time they are being negotiated. If through some fluke they become either too restrictive or too weak—or too great a challenge to national sovereignty—they will simply not be adopted by any large number of states. That is to say, the legal norms in question can be no better than the cultural norms that underpin them. Thus, one pivotal lesson here is that pervasive environmental education, both formal and informal and in both the military and civil sectors, must precede any substantial attempts to strengthen the relevant legal norms. Fortunately, environmental consciousness is rising none too soon throughout the world, which will make that task somewhat easier. A second pivotal lesson here is that the cultural norms that underlie democratic processes and a respect for human rights must become far more pervasive if the frequency of intrastate (non-international) wars—now largely beyond the reach of the law of war, environmental or otherwise—are to be reduced in frequency.

Conclusion

Control over the forces of nature for the achieve-

ment of military aims has been a human fantasy throughout history. The ancient Greeks envied Zeus his ability to hurl thunderbolts. Moses was said to have been able to control the Red Sea so as to drown the Egyptian forces that were pursuing the Israelites. And we have seen that under propitious conditions today manipulation of the environment for effective hostile purposes is in fact possible, though at greater or lesser environmental cost. Thus, impounded waters have been deliberately released for military purposes with devastating environmental consequences, ready examples being provided by both World War II and the Korean War. Huge tracts of forest vegetation have been deliberately destroyed for military purposes with profound environmental consequences, especially during the Second Indochina War. Marine ecosystems have been knowingly disrupted with serious environmental consequences, most recently during the Persian Gulf War. And more fanciful attempts have been made to manipulate the weather for hostile purposes, although with indifferent results, during the Second Indochina War and perhaps also during the Persian Gulf War.

But social attitudes supportive of environmental protection are now developing throughout the world in step with the ever more lamentable deterioration of the global biosphere. It now remains to be seen whether these widely emerging pro-environmental cultural norms will suffice to anathematize wanton destruction of the environment even in times of war.

Appendix: Multilateral treaties mentioned

[Hague] Convention [II] with Respect to the Laws and Customs of War on Land. The Hague, 29 July 1899; in force 4 September 1900. (49 of 192 states parties [26%], including the USA; widely considered to be "customary" international law.)

[Hague] Convention [IV] Respecting the Laws and Customs of War on Land. The Hague, 18 October 1907; in force 26 January 1910. (36 of 192 states parties [19%], including the USA; widely considered to be "customary" international law. There are 53 of 192 states parties [28%] to 1899 Hague Convention II and/or 1907 Hague Convention IV.)

[Geneva] Protocol on Chemical and Bacteriological Warfare. Geneva, 17 June 1925; in force 8 February 1928; LNTS #2138. (132 of 192 states parties [69%], including the USA.)

[Geneva] Convention [IV] Relative to the Protection of Civilian Persons in Time of War. Geneva, 12 August 1949; in force 21 October 1950; UNTS #973. (186 of 192 states parties [97%], including the USA; widely considered to be "customary" international law.)

Outer Space Treaty. London, Moscow, & Washington, 27 January 1967; in force 10 October 1967; UNTS #8843. (94 of 192 states parties [49%], including the USA.)

Bacteriological and Toxin [Biological] Weapon Convention. London, Moscow, & Washington, 10 April 1972; in force 26 March 1975; UNTS #14860. (133 of 192 states parties [69%], including the USA.)

Convention on the Prohibition of Military or any other Hostile Use of Environmental Modification Techniques [Environmental Modification Convention]. Geneva, 18 May 1977; in force 5 October 1978; UNTS #17119. (63 of 192 states parties [33%], including the USA.)

Protocol [I] Additional to the Geneva Conventions of 12 August 1949, and Relating to the Protection of Victims of International Armed Conflicts. Bern, 12 December 1977; in force 7 December 1978; UNTS #17512. (143 of 192 states parties [74%], *not* including the USA.)

Protocol [II] Additional to the Geneva Conventions of 12 August 1949, and Relating to the Protection of Victims of Non-international Armed Conflicts. Bern, 12 December 1977; in force 7 December 1978; UNTS #17513. (134 of 192 states parties [70%], *not* including the USA.)

Moon Agreement. New York, 18 December 1979; in force 11 July 1984; UNTS #23002. (9□of 192 states parties [5%], *not* including the USA.)

Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons which may be Deemed to be Excessively Injurious or to have Indiscriminate Effects [Inhumane] Weapon Convention]. Geneva, 10 October 1980; in force 2 December 1983; UNTS #22495 — Protocol [III] on Prohibitions or Restrictions on the Use of Incendiary Weapons. (52 of 192 states parties [27%], *not* including the USA.)

7 June 1996

Mock NSC Briefing:

Environment and U.S. National Security Interests:

People's Republic of China

Jack Goldstone, Director of Center for Comparative Research on History, Societies and Culture; Professor of Sociology, University of California at Davis
Ronald Montaperto, Senior Fellow, Institute For National Strategic Studies, National Defense University
Stanley Roth, Director of Research and Studies Program, U.S. Institute of Peace

Purpose/Format: This meeting was one in a series to explore how environmental issues might relate to U.S. security interests in specific geographic regions. The "Mock NSC" format was used in an attempt to bridge the gap that is created when environmentalists and traditional security thinkers wrestle with the question of how (or whether) to integrate environmental issues into national security decision-making. In each meeting the chairperson (the "National Security Advisor") heard two short, briefings on the security setting in a particular region—one from an environmental perspective and the other from a more traditional security perspective. The "traditionalist" outlined U.S. security priorities in the region, integrating any environmental issues he believed were important; the "environmentalists" outlined the environmental/demographic issues that will bear significantly on U.S. security interests. This session covered China. Stanley Roth (the "National Security Advisor") chaired the meeting and was briefed by Ronald A. Montaperto (the "traditionalist") and Jack A. Goldstone (the "environmentalist").

"Traditionalist" Briefing by Ronald Montaperto: An underlying assumption of my briefing is that it is necessary to distinguish between the nature of various issues; some issues are strategic and some not. We can solve that other category of issues and problems better only if we start with the strategic relationship.

U.S. Interests in the Asia-Pacific Region

The primary interest the United States has in the Asia-Pacific region is to maintain a stable, regional security environment. A stable environment is one in which there is order and roles and relations between individual regional actors change. However, the relations change in ways that are regulated by various kinds of mechanisms, such as unspoken tradition or custom, conventions of international relations and law, bilateral relationships, and increasingly multilateral relationships. A second major interest to the United States is that we must have access to regional economic life. Our lives would be extremely different at every level if we did not have access to the economies of the Asia-Pacific region.

Third is that the United States must have complete free access to the region. However, we cannot support the rise of any hostile or potentially hostile regional hegemony. In other words, we cannot allow any other nation to deny our access to the region, which leads, of course, directly to China.

Integrating China

Our major interest with the People's Republic of China lies in taking steps to ensure that China's growing comprehensive national strength is not directed against the United States. We need to "integrate China" as opposed to "contain China." The real prize for the United States and the Asia-Pacific region is a stable, prosperous and vigorous China that abides by the rules of the international community. The U.S. relationship with China is first and foremost a strategic relationship. It also has an economic and environmental dimension.

If U.S. relations with China are stable, vigorous, and prosperous, then the entire region is stable, vigorous and prosperous. If U.S. relations with China go bad, then the other powers in the region are forced to choose sides. This leads to instability, which in turn threatens the economic development which can engender the kinds of circumstances and conditions which impede U.S. access.

It is imperative that the United States and China (and indeed the region as a whole) recognize the strategic nature of the ties that bind us. At present, we tend to get mired down in specifics—intellectual property rights

(IPR), human rights, proliferation and potential environmental issues. While these issues are extremely important, it is necessary to reconstruct or to establish something that will enable the United States and China to develop a strategic understanding that will discipline relations.

In the Cold War period, our relations with China were frequently troubled over Taiwan, trade issues, IPR or human rights. These issues have always existed. However, they were never permitted to disrupt the flow of relations because we had a larger strategic imperative: containing the former Soviet Union.

Major U.S. Concerns with China

Our major concern with China is proliferation. If we continue on the present course, then the United States and China are on somewhat divergent courses. China is an emerging great power. It is intensely nationalistic. It has a weak government and one that will remain so until the succession to Deng Xiaoping is solved, two to three years from now. It is very difficult to approach the Chinese under these circumstances. In the absence of any strategic understanding and ways to discipline our bilateral ties, there is a constant misperception about the U.S.-China relationship.

The Chinese believe the U.S. goal is containment. The proof of this is seen in a number of different areas, most specifically Taiwan. From the Chinese perspective, our alleged support for Taiwan and our recent posting of carrier battle groups to the Taiwan Straits is proof of our desire to keep China and Taiwan divided—to prevent China's coalescence as a major great power. If we had a larger strategic understanding of the importance of the China relationship, then there would be a much lesser likelihood of this perception.

China and the Environment

If we begin to raise issues related to the environment, the so-called "other tier" of issues will simply be factored into that essentially negative, competitive view that already exists between the United States and China. It will be much more difficult to come to any resolution of our disagreements and even more difficult to formulate a common agenda for dealing with these issues. However, if we get the strategic dimension of our relationship correct, then it is possible to make progress on these issues because the imperative would be to avoid focusing on the things that divide us and not allow individual issues of a different level to interfere with the overall relationship.

"Environmentalist" Briefing by Jack Goldstone: Our goal must be to integrate China as peacefully as possible into the economic and strategic plan for the region. But I differ on the role of environmental issues in that plan for integration. Environmental issues can be a positive element in helping integrate China into the region and the world.

Getting the strategic relationship right has become quite complicated. The United States and China had a common interest in the containment of the Soviet Union; focusing on that allowed us to overlook many other issues that potentially divide us. China now seeks to establish itself as the hegemonic power in the west Pacific and has other strategic goals, such as extending its territorial claims in the South China Sea, reuniting Taiwan, and integrating Hong Kong into the system of authority from Beijing. These goals are likely to result in some degree of conflict and tension with the United States and our allies. Therefore, we need to find new common goals to help establish a strategic relationship of integration.

Common Environmental Goals

The environment and the third tier issues (e.g. crime, medicine) can be a basis for cooperation because these are areas where we have common goals. China in the course of its industrialization has options with regard to how to produce energy, develop its transportation system, manage refrigeration and effect changes in diet. Changes that negatively affect China's environment are not in the interest of China's government. China is already encountering regional conflicts over environmental issues and facing problems of massive internal migrations and ethnic cleavages in Tibet and the Far West. The government needs bases for gaining popular support.

Thus, China's government should be amenable to calls to cooperate on issues of environmental protection. This is important for us strategically because in addition to projecting force, China can project other elements that can do us harm. Greenhouse gases, ozone depleting CFCs and high concentrations of particulate and sulfur dioxides that move in the upper atmosphere from the western to the eastern Pacific, all have the potential for creating deterioration in our weather, air quality and climate.

If environmental concerns form a common interest between the United States, China and other powers of the Western Pacific, then there should be a basis for regional cooperation. One should start planning to move forward on a multilateral basis to plan for regional pollution targets, arrange loan guarantees for China and other developing countries of the Western Basin and to help acquire alternatives to CFCs and other low polluting technologies. The U.S. Energy Department, as part of a strategic initiative, could help support research into low cost, low pollution energy production technologies, not just for ourselves, but for export to China and other large developing countries of Western Asia.

It is important to treat China as an emerging great power and to integrate it into the world on as many bases as possible. Trying to browbeat China to comply with environmental directives will increase the degree of tension and undermine the strategic relationship. However, cooperation on environmental issues could act as a positive catalyst in our efforts to create strategic integration.

Comments During Discussion

Comment: The basic argument regarding China is between those who want to focus on strategic principles and those who want to focus on what you might call "the List"—"the List" being all those particulars of concern that we have with the Chinese. It is very hard to develop a dialogue upon broad strategic principles when the President of the United States has been unwilling over the past several years to go to China and engage the Chinese leaders at the highest level. The problem is that the dialogue has been left to specialists, and therefore, has centered on "the List."

Comment: There is no longer any "magic bullet" in the U.S. strategic relationship with China. The United States should reconceptualize the relationship and see where environmental issues fit in. The relationship with China is at three levels. One is the basement, the line below which we should not allow the relationship to deteriorate, which lies in the lines of the Taiwan Straits and an assertion that it will not permit the resolution of that issue by the courts. The other level is the attic, which includes those issues that we want to focus on to promote cooperation with China, such as the Korean Peninsula.

In between the basement and the roof is a whole range of issues (e.g. human rights, trade and arms sales). These are the issues that never go away and come up one at a time. The battle is for a stalemate. If the U.S. is going to look at the identifiable, environmental arenas that have a bearing on our relationship with China, then we should ask ourselves which environmental issues can contribute to cooperation and enhance our overall relationship with China? Secondly, which environmental issues are of such compelling importance to us that we cannot expect to reach an agreement on them?

Comment: Canada has a number of low level committees that work on various issues on a regular basis and do not just react to crises. We need to start setting up committees (e.g. energy, environment) and have regular meetings to start developing common goals. Engagement should also take place between the scientific organizations of both countries, helping to bring China to an understanding about environmental dangers it (and the world) faces.

Comment: First, the concept of integration creates a problem. Trying to integrate Russia into the international system has caused problems. Thus, we ought to be careful with China. It is well beyond our capacity to integrate a country of China's size into anything. What we can do is to create a climate in which they are invited to participate.

Second, we should be more precise about the magnitude of the environmental danger that China poses. To address the magnitude of the problem in the context of a breakneck, unregulated, industrial campaign that the Chinese are likely to follow would require a much more serious effort than has so far been discussed.

Comment: The United States should not merely think in terms of bilateral relations, rather we should work with other allies and China. We have to keep in mind that environmental issues are inherently multilateral issues and that the U.S. should not be the only demander always. If we only look at this as a bilateral relationship the underlying anxieties between the two states are likely to be aggravated. The advantages of looking at this as a regional problem, acknowledging China's realm of influence, is to reduce some of the pressure in the U.S.-China relationship by: (1) making it look like the United States is pushing on its allies in certain instances, as well as the Chinese and (2) inviting the Chinese in, tacitly recognizing them as a regional hegemony.

Comment: We need to distinguish between internal or strategic environmental interests. The biggest danger is posed by the wrong choices China might make during its industrialization. China can actually undo, reverse and overwhelm anything the rest of the world might ever think of doing in terms of global issues. The United States must devise a strategy to engage China productively over the long-term. China and the United States share a common problem; both have extensive coal reserves and want to use them. Shared technology (and decisionmaking) to address this problem could be positive.

Comment: It would be disastrous for the United States to raise global issues, such as global warming and long-term degradation of soil and water, to the level of national security threats. The simple reason for this is: (1) we have no consensus in this country about the significance of those issues and (2) if we were to push these issues to the front burner in our relationship with China, the Chinese would view it as an attempt to contain not just their expansion, but their national development. No other country in the region shares our sense of urgency and desire to engage the Chinese aggressively on these issues.

Stanley Roth: I would like to ask this group if there

are any environmental issues which in your judgment are classically defined national security issues? For example, is the current course of Chinese economic growth and policies on several different sectors of such a nature that it poses a serious threat to U.S. interests in terms of global warming? What happens with a China that is growing so rapidly, industrializing, building cars and not building mass transportation at the same time that its oil production is flattening out? What does this mean for the South China Sea? Does this encourage bad Chinese behavior in an area where the United States does have an interest and where we have treaty alliances with other countries? What does it mean for China's policy towards the Persian Gulf if they see themselves as an importer? Are they going to be tilting towards one of the countries there? Are they going to be selling weapons in quantities that are larger than the United States has already seen?

Montaperto: The oil question is key. China will in the next year become increasingly interested in the Middle East because that is the only place at this time where China sees any potential to acquire the energy sources that it inevitably will need. That certainly will translate into yet another locus of U.S.-Chinese strategic competition, which will not be military. As in the past, the Chinese will simply develop a broad network of political relationships in the region that are stronger, more durable and richer in some ways than they are now. The Korean Peninsula illustrates this. Korea fears Japan and there is resentment towards the United States. China and Korea, on the other hand, are developing closer ties and there is not the faintest insinuation of direct competition.

Goldstone: Oil is a red herring. There are unexploited oil resources; a reserve has been discovered in western China that is possibly as large as Saudi Arabia. There are additional reserves of oil in Siberia and Kazakhstan. There is likely to be an increase in the demand for Mideast oil and oil reserves are likely to expand to meet market demand.

The bigger problem, assuming that China is able to meet its energy demands, is the effect on our climate with both direct heat and hydrocarbon releases if it embarks on an increasing per capita use of energy. Even expanding China's meat consumption, a direct result of increased affluence of some Chinese, may lead to big increases in methane gases from the animals.

The "National Security Advisor" asked for an estimate of the magnitude of the problem. The temperature difference between the end of the last Ice Age and the present in average world temperature is about 30 degrees. We have recently been seeing increases on the order of one degree or two, but that is just in a matter of decades. We do not know if global warming will accelerate, possibly causing another temperature rise of 5-10 degrees in the next fifty years or if some natural cycles of ocean or plankton absorption of CO_2 will remove the problem. Yet, if increased global warming ensues, the potential devastation will be great. We may have extended droughts, large parts of Louisiana and Florida could be inundated with water from the rising seas, and storms could cause huge increases in liability claims.

Environmental problems, like nuclear proliferation, are an area of great uncertainty. However, as environmental problems, like nuclear weapons, spread around the world they pose a serious threat to our society.

Given that the initial steps are to bring China actively (but peacefully) into continued engagement, we should try to multiply multi-level and multilateral contacts on environmental planning. Setting regional targets and working on implementation plans fit into our geostrategic plan of engagement. We should follow those up without first waiting for a definitive assessment of the environmental risk.

Montaperto: A more direct and immediate environmental risk in China is the question of state capacity and stability. We do not know what role environmental issues might play in a China whose government does not have much control. In that sense, some internal environmental problems are a national security interest of the United States.

Goldstone: China is facing deficits of arable land and water, and there is little disagreement that the central government is less able to meet the problems that arise from this in terms of regional conflicts and building its own resources. Due to China's internal environmental problems we have to take great caution in approaching its central government. We cannot do much directly to help China with these problems, rather, one has to hope that an increase in prosperity due to trade and sensible planning will help the government come to grips with these issues over time.

Comment: The Chinese have said that their most urgent environmental problem is access to fresh water. In 54 of 58 of their major cities the water is completely undrinkable and they also estimate that about 40 percent of their water is so heavily polluted with metals that it cannot be used for agriculture. This has serious short-term consequences in terms of access to water and long-term consequences for agriculture and continuing to feed a growing population. China's population will increase by 200 million in the next 15 years. Talking to China about water issues has become very delicate due to the setback caused by the Three Gorges dam project. We need to engage them on broader infrastructure issues and think about how we can incur private sector investment in water pollution cleanup to help them address this problem immediately.

Comment: The single most effective environmental program in China is birth control. In parts of northern China population is 98% of the problem. Rather than seek to persuade them of the wisdom of policies that the U.S. has adopted, I think we ought to persuade ourselves of the wisdom of China' s present course.

Roth: All environmental issues are not confrontational and all solutions to environmental problems do not require confrontation. There are political implications to environmental issues. China feels that environmental issues are largely a means of containing it.

This discussion needs to consider the following: (1) Areas where we might be able to work together. (2) What are the initial steps, mechanisms, issues and funding options? (3) How do we persuade China that a cleaner environment is in its interests and the rest of the world to go along with us? (4) The role of regional institutions, such as APEC. (5) Should we be developing another Asian regional environmental organization or be beefing up an existing one?

Montaperto: Any institution or set of institutions that might manage this would have to be neutral or have third-world bias or connection. Moreover, the United States and Japan and the rest of the wealthy industrialized world will have to pay for it. The American public is not likely to support unilateral development.

Comment: Cooperation could be achieved by declassifying some of our intelligence information. All good science and good policies are based on good data. We can start by sharing scientific information and some information from our archives with the Chinese.

Comment: It is clear that there is no significant external funding for whatever environmental remediation or containment is needed. The United States and Japan are locked in a ferocious global competition over the provision of environmental equipment and services. Japan has a very clear interest in keeping us out of the Chinese market in this area and, therefore, of finding ways to discourage a meaningful U.S.-Chinese bilateral debate over these things. All of these things lend themselves to a regional approach. APEC seems to be the institution best equipped to implement an environmental action plan whereby the East Asian countries agree to improve environmental conditions.

Comment: The money for energy and water would ideally be provided by multilateral institutions, and it is possible to convince the Congress that there is a good investment payoff to U.S. business in these areas. The third priority is transportation, which can be addressed by private construction and engineering firms.

Comment: An area that is most attractive for cooperation is environment as it has affected the health and well-being of the Chinese population, whether in reality or perception. Health issues allow for an end-to-end approach to the environment and for measurable results that can be objectively collected.

Dealing with non-governmental levels might be better than dealing directly with government. There are probably a large number of political interests involved and a wide range of political groups, economic groups and cultural factors that have to be taken into account. We have to involve people and organizations at all levels within China.

Comment: China recognizes the importance of environmental issues, and it sees them as a direct threat to its economic development. Environmental protection requires developing economic incentives, for example low cost-no cost management methods that are going to save their industries money. Expertise can be provided by the U.S. government and scientific and academic organizations. Moreover, the private industry can share technology at a very low cost.

China is really on two tracks right now. There is a huge state-owned industry and then there are the growing township and village enterprises. The state-owned industry is trying to privatize, which poses a number of problems. Perhaps addressing management methods at this point might be possible. At the same time, the township and village enterprises—the very small industries—are heavily polluting the water. Building economic incentives not to pollute requires a lot of training and capacity building, as well as increasing understanding at a local level.

Roth: I am less optimistic about the level of insight of China's leaders. In many senior-level meetings, Chinese leaders have explicitly compared the environmental issues to the human rights issues; they see this as a very open means of containment. The Chinese relate our own history and say the United States is asking China to behave better than the United States did, and they do not find that particularly satisfying. However, at the middle levels, particularly among the economic managers, there is probably greater recognition of the serious cost to environmental degradation.

Our basic policy is probably on the right track. We do not need a revolutionary switch in the focus of our policy towards China in order to deal with environmental issues. The overwhelming consensus is that there are at least pieces of the environmental issue on which we should be able to work cooperatively, even while not deluding ourselves that there are others that will be confrontational. We are constrained by funds or anything that needs congressional approval. There are also some significant constraints on the Chinese side, including the level of insight into the nature of the problem, as well as the need for a greater level of

trust, so that they do not see this as some kind of plot to contain them.

If we do not have the overall relationship on track, then the United States is not going to make any more progress on this issue than a lot of the other issues that bedevil its relationship. The United States should try to use the environment as one of the tools for getting the relationship back on track. We must show the Chinese that we are serious about the environment and willing to provide resources.

11 September 1996

Strengthening Compliance with International Environmental Agreements

Harold K. Jacobson, Professor of Political Science, Center for Political Studies/Institute for Social Research, University of Michigan
Edith Brown Weiss, Francis Cabell Brown Professor of International Law, Georgetown University Law Center

Purpose/Format: This meeting explored the compliance of eight countries and the European Union with five international environmental agreements. Harold K. Jacobson and Edith Brown Weiss presented an overview of their research, compiled for their forthcoming book, *Engaging Countries: Strengthening Compliance with International Environmental Agreements*. The discussion primarily focused on identifying what factors contributed to states' implementation and compliance and the role of the U.S. government and interested organizations. **Jacob Scherr** (National Resources Defense Council) and **David Sandalow** (National Security Council) launched group discussion following the Brown Weiss/Jacobson presentation.

Opening Remarks by Harold Jacobson: Edith Brown Weiss and I have nearly completed our book, and this is a wonderful chance both to present some of our conclusions and receive some reactions.

By 1992, when countries met in Rio de Janeiro for the United Nations Conference on Environment and Development, there were more than 900 international legal instruments concerned with the environment. These included binding agreements and significant non-binding instruments. Most had been adopted in the 20 years that followed the 1972 United Nations Conference on the Human Environment. Since Rio, states have drafted and accepted more legal instruments concerning the environment .

While it is always politically attractive to negotiate new agreements, it is important to determine whether states are implementing and complying with these agreements. It is often assumed that most countries comply with most international legal obligations most of the time. But there is substantial reason to question this assumption.

A Study of Nine Countries and Five Agreements

To understand the extent to which, how and why countries comply with international environmental agreements, we developed an international, multidisciplinary collaborative project with 40 scholars from 10 countries. The research focused on nine political units and five agreements, with all of the agreements in effect long enough to generate empirical data on compliance. The agreements are the London Convention of 1972 (ocean dumping), the World Heritage Convention, the Convention on International Trade in Endangered Species, the International Tropical Timber Agreement and the Montreal Protocol on Substances that Deplete the Ozone Layer. The political units include eight countries—Brazil, Cameroon, China, Hungary, India, Japan, Russia and the United States and the European Union.

We found that in assessing the behavior of parties to international environmental agreements, it is useful to distinguish between implementation, compliance and effectiveness. Implementation refers to the legislation, the regulations and other steps required to give effect to the agreement. Compliance asks whether the behavior of the parties to the agreement is in accord with the obligations that they have accepted. Compliance may be separated into a) compliance with procedural obligations, such as reporting; b) compliance with substantive obligations such as targets and timetables and c) compliance with the spirit of the agreements, as by foregoing actions, which, while technically not illegal, violate the spirit of the agreement. Many aspects of compliance are difficult to measure, and because international environmental agreements usually contain multiple procedural and substantive obligations, summary measures are particularly problematic. Effectiveness refers to whether the agreement actually achieves its established purposes and whether achieving these purposes ameliorates the problem the treaty was intended to address.

Remarks by Edith Brown Weiss:: The traditional stylized model of compliance assumes that countries accept

treaties only when their governments regard them as in their interest; that because of this, countries generally comply with their obligations under the treaties; and that if they do not, sanctions are used to punish offenders and deter violations.

But the reality is much different. While countries join treaties that are in their self-interest, there are many reasons why countries find them to be in their self-interest. These reasons affect whether they are willing to comply and have the capacity to do so. Countries may join a treaty because others are doing so, sometimes creating a "bandwagon" effect. There may be pressure from governments with leverage over them. Domestic interests may force the issue. In some cases, countries may join with no intention of immediately modifying their behavior and may even lack the capacity to comply. The second facet of reality is that the force of environmental accords does not come mainly from sanctions, but from the need to coordinate activities that affect the environment to ensure stable and predictable patterns of behavior.

The traditional framework for assessing compliance is hierarchic, static and focused on the nation-state. States negotiate international agreements, which are ratified and put into force through implementing legislation or regulations. States then ensure that the actors comply with these regulations. This approach is hierarchic in the sense that it reaches from the international agreement downward to the nation-state to the subgovernmental units and individual actors. It is static because it assumes a snapshot at some point in time will accurately capture compliance.

A more accurate framework for understanding compliance is non-hierarchic, includes many actors other than states and views compliance as a process that changes over time. Indeed, the agreements themselves evolve over time. In this new framework, states continue to be essential, but other actors are also important: intergovernmental organizations, secretariats servicing the agreements, nongovernmental organizations of various kinds and the private industrial and commercial sectors. These actors interact in dynamic and complex ways; patterns vary among agreements and among and within countries.

Findings of the Study

The study found that, in general, states' compliance increases over time, with countries often devoting more resources to compliance. But sometimes compliance declines in certain countries during certain times for particular agreements. Factors such as economic chaos, political instability and sudden decentralization cause compliance to decrease, particularly with agreements for which there is no strongly vested interest in securing compliance.

Many factors affect national compliance. The research confirms the conventional wisdom that the smaller the number of countries or firms involved, the easier it is to monitor and regulate the activity concerned. Activities conducted by large transnational corporations are easier to control than those conducted by small private entrepreneurs. What a country has traditionally done about the issue significantly affects its capacity to comply when it joins the agreement. Administrative capacity is important because a country needs an educated and trained bureaucracy with financial resources to comply effectively. Thus, relatively wealthy countries are more likely to be in compliance than those that are less economically well off. Economic chaos or collapse greatly impedes compliance, although changes in GNP or rate of growth appear to have few immediate consequences. Markets are important to compliance, but their effect is complicated. Market demand can harm compliance, as with the demand for endangered species under the Convention on Trade in Endangered Species, but market demand for environmentally acceptable products can also help compliance, as with the substitutes for the chlorofluorocarbons that are required to be phased out under the Montreal Protocol on Substances that Deplete the Ozone Layer.

A country's size and political system affects compliance. Large countries have a more complex task in complying than smaller ones. Central governments have difficulty controlling areas at the periphery. There is a great need to coordinate widely dispersed activities and several levels of political authority within countries. Nongovernmental organizations are crucial, although not all NGOs necessarily boost compliance. Because democratic societies are more likely to have powerful NGOs dedicated to environmental protection and an informed and engaged citizenry, it is not suprising that democratic countries are more likely to be in substantial compliance than those that are not democratic. Individuals also make an important difference, whatever the political system.

With regard to the international environment, international momentum affects compliance. When more countries participate actively in an agreement, it encourages other countries to join and to comply. It may also be easier for them. International conferences, such as the Stockholm and Rio conferences, raise public consciousness and may enhance compliance.

Finally, international secretariats to the agreements play important roles. Formally, they are responsible to parties to the convention and act at their request. But secretariat officials are often the most knowledgeable sources about who is doing what and where under the convention. Increasingly, they investigate more, jawbone various actors into compliance and advise actors on how to comply. Secretariats serve as focal points for interactions among governments, NGOs or corporations and others. In recent years, they are spending

more time on monitoring training, assistance and compliance related activities.

Different Types of Countries

Strategies for strengthening compliance need to be differentiated to take into account the differences among countries. Our analysis highlights two basic points. The first is that special emphasis must be given to the large countries that contribute the most to the problem being treated. Ensuring the compliance of Brazil, China, the European Union, India, Japan, Russia, the United States and other large countries such as Indonesia, Nigeria and Pakistan is crucial to the effectiveness of any international environmental agreement. In addition, an important lesson from the study is that "leader" countries among these large countries are essential to the negotiation of an effective agreement and then to promoting implementation and compliance with it. In the cases studied, it is hard to see how effective progress would have been made without the efforts of leader countries.

The second basic point is that strategies need to take into account the differences among countries with respect to both their intentions and their capabilities. Two dimensions are particularly important: intention to comply and ability to comply. Some countries clearly intend to comply with the obligations that they have accepted. They have considered issues of compliance and either believe they are already in substantial compliance or have a clear idea about steps needed to bring their practices into compliance. Other countries accept obligations without having thought through how to bring their practices into compliance. Still others may be more cynical, in that they sign knowing they will not comply. Sometimes a government may be divided. For instance, the foreign ministry intends to comply, while other branches have no intention of abandoning practices that contravene the accord.

Many assets are important for effective compliance, such as an effective and honest bureaucracy, economic resources and public support. Countries have different endowments of these resources when they join an agreement, and these endowments change over time. Bureaucracies that are effective and honest can become ineffective and corrupt. Surpluses in government budgets may disappear and be replaced by deficits. Public support for leadership or particular policies may increase or particular policies may increase or diminish.

Countries that intend to comply but lack the ability need assistance in capacity building. Countries that unconsciously or consciously have not accepted the obligation to comply need actions directed toward changing their attitude.

Strategies for Strengthening Compliance

International strategies to encourage compliance are of four kinds: *sunshine methods,* such as monitoring, reporting, peer review, transparency, on site monitoring, and nongovernmental participation; *positive incentives,* such as special funds for financial or technical assistance, access to technology or training programs; *negative incentives* in the form of penalties, sanctions and withdrawal of privileges and *other traditional public international law remedies* for breach of an agreement as set forth in the Vienna Convention on Treaties and in customary international law. Agreements can be designed to include institutional measures that encourage compliance, as in the Montreal Protocol with its Implementation Committee and Non-Compliance Procedure. Moreover, compliance plans, with benchmarks, could be submitted as part of the process of joining agreements.

Parties rely primarily on sunshine methods and positive incentives to induce compliance with international environmental agreements, resorting to penalties and sanctions as a last resort. They largely ignore formal dispute settlement procedures, even if the agreement provides for them.

The sunshine approach builds upon a democratic culture. Publics see environment as an issue in which they should have access to information and an opportunity to participate in decisionmaking and hold actors accountable. Governments are becoming accustomed to non-state actors as influential participants in the policy process, whether formally or informally.

The approach consists of a suite of measures that are intended to bring the behavior of parties and targeted actors into the open for appropriate scrutiny. These include regular national reporting, peer scrutiny of reports, access to information by nongovernmental organizations and participation of NGOs in compliance monitoring, on site monitoring and regular monitoring of behavior as through regional workshops, corporate or private sector networks or consultants working on site.

National reports are useful instruments to monitor performance under the agreement and for educating officials and sometimes broader publics with respect to issues involved in effective implementation and compliance. They ensure that at least some officials are involved with implementing the agreement. But they also distract from other functions that officials might perform to improve the environment and have high administrative costs. Agreed reporting formats, sharing of information and consolidation of reporting could help.

Those using reports to gauge compliance need to pay attention to inaccuracies and the fact that countries are often reluctant to publicize their own shortcomings in compliance through the reporting process.

In the future, parties may turn increasingly to on site visits to monitor compliance with treaty obligations and to verify accuracy of reports. Consultants that carry out country projects may also provide a form of on site monitoring, particularly of corrupt behavior by national and local officials.

Nongovernmental organizations have played a major role in strengthening compliance with all the agreements studied. At least one treaty incorporates NGOs into the implementation process. Another relies on an NGO to computerize data on exports and import permits and to track national trade in endangered species for it. However, not all NGOs will necessarily assist compliance. Some have purposes that are anathema to enhanced compliance with the treaty. Thus, developing a nuanced approach to NGO participation in promoting compliance is essential.

The positive incentive approach is the other most significant strategy for promoting compliance. It is appropriate for those countries that intend to comply but lack capacity, as well as for those countries that neither intend to comply nor have the ability to do so, since incentives may persuade countries that they should comply after all.

There are many sources of financial and technical incentives: funds established by the treaty, projects funded by the Global Environmental Facility, multilateral development bank projects, bilateral assistance from governments and technical assistance from the private sector, as in implementing the Montreal Protocol. Funds are important because they have built local capacity to comply and have contributed to the perceived equity of the treaties and, hence, their acceptability.

Training and educational measures also provide incentives. However, the research reveals that training seems to be more effective if carried out at the regional or local level, if a significant portion of people trained remain on the job for a while and if efforts are directed toward "training the trainers."

While sanctions have not played a major role in promoting compliance, they have value as a "weapon" of last resort. Other measures include the provision of regular scientific advice to the parties (as in the Montreal Protocol), institutional procedures for addressing issues of noncompliance (as in the Montreal Protocol), public dissemination of information about the treaties and meetings of the parties (as in electronic bulletin boards and newsletters) and the development of regional institutions to implement the agreements. Regional centers help to engage surrounding countries and to ensure that various requirements and functions are properly tailored to local needs and properly monitored in light of local conditions. They also facilitate exchanges among officials in the region, so that they can learn from each other.

Research on compliance should yield useful policy advice for conducting negotiations, designing treaties, structuring financial assistance, involving NGOs and the private sector, enhancing information transparency and using new technologies to facilitate compliance. In the end, the countries and the relevant actors in the countries need both the will and the capacity to comply with their commitments. They must become engaged.

Remarks by Jacob Scherr: This topic is extraordinarily important, not just from a standpoint of the negotiation and implementation of existing treaties, but also for the credibility of the entire system of international environmental and sustainable development norm-setting. Over the past two decades, there has been an extraordinary growth in the creation of international environmental treaties and in the adoption of agendas, plans of action and other such declarations. Just in the last few years, we have added major new treaties on climate change, biodiversity, and desertification.

Showing Results for the Efforts

This process of norm-setting appears to have outstripped the capacity of most, if not all nations to meaningfully comply and implement them. There is real risk of loss of public support for a system which appears to generate only more commitments and conferences. International institutions and structures must be able to demonstrate real results if they are to be sustained.

The United States can play an extraordinarily important role in the implementation of treaties and other international commitments. We can provide real leadership in terms of the example set by our own actions at home and of the financial and other incentives we provide to other countries. However, the role of the United States has been weakened, in part by the dramatic cutbacks in our foreign affairs and assistance budget. Many of us in the non-governmental community would like to see the U.S. leadership restored, but we find that it's difficult to persuade the American public that all of these international conventions, conferences, and institutions are really having an impact.

I would suggest that we need to rethink whether treaties—or negotiated detailed agendas—are really the most effective way to stimulate action in the field of sustainable development. A different approach might involve less formal international initiatives, such as those now underway on leaded gasoline phaseout and coral reefs. With a tighter focus and the involvement of multilateral agencies, it may be possible to secure more change and action at the national level in other nations where it really matters.

Second, we might want to focus more attention on bilateral cooperation with a small number of key nations. From a global perspective, it may be much more

useful to focus on improving the capabilities and performance of countries like Russia, China, or Brazil than on attempting to establish and implement treaties involving a number of cases in over 100 nations.

The era of broad agenda-setting should be over. As we approach the start of the 21st Century, we need to encourage nations to begin to set some priorities and to achieve some real results. Otherwise, we will never succeed in reaching the goals we have set.

Remarks by David Sandalow: First let's look at the Climate Change Convention. In July, Undersecretary of State Timothy Wirth went to Geneva and talked about the U.S. position of rejecting unrealistic public proposals that have been put forth by some countries. He said that the United States supports a program that would create international targets with maximum responsibility and reiterated the U.S. position that all countries under the Climate Change Convention must participate, including developing countries. The possible binding nature of this agreement will affect industry and many other sectors. The negotiation of this convention will certainly bring hostile dialogue on the Hill.

At the ministerial level, many people are experiencing a certain sense of fatigue over the issue of international environment agreements. Within the U.S. government, we are constantly meeting to decide whether or not we should agree to a certain target and how vigorously we should push other issues. In addition, we are always in the position of determining how to allocate scarce resources within the government. The U.S. has to sort out its role in various multilateral institutions, such as the World Trade Organization.

Comments during Discussion

Comment: In terms of the sunshine model and checking things out on site, in certain instances where land-use change is doing well, there is tremendous power in a sense of unity. Indonesia is taking care of its own problems and investing in the imagery of its forests. Yet, nobody else has had any access to that imagery. NASA has been engaged in an exercise, building up the picture of forest cover in Southeast Asia, and as soon as that is available, it will really change the whole game. With respect to your reference to intention versus capacity and the suggestion that there may have been instances in which capacity has been built, leading to stronger intentions, can you give us a concrete example?

Brown Weiss: Cameroon is an excellent example.

Jacobson: The other commonly cited case is the implementation of the Montreal Protocol and the activation of its noncompliance proceedure.

Comment: On the question of the role of sanctions, in the case of the Montreal Protocol, the trade provisions, which are not sanctions, per se, have been very important in ensuring widespread participation in the treaty. Given the sensitivity of this issue in the international political arena, I hope that your study would not lead people to the conclusion that these provisions are not important and can be sacrificed.

Comment: Some of us are exploring the idea that there should be some relationship between a country's access to the flow of capital that comes from being in a joint implementation regime or an emissions-trading regime and the status or the level in which that country is playing in the system. In other words, full trading might be between countries which each have emissions budgets and joint implementation that might be available at a better rate of return for the credits when the investment is in a country that has a good program compared to a country that has no program. That will tend to steer the investment towards a country with a better program and send a message to the countries with a better bond rate. The EPA is exploring and will continue to explore these ideas and how they might affect participation in these international environmental agreements.

Comment: We should consider how to structure a conference that stimulates people to think about a variety of strategies that might be used, depending on individual country conditions and situations.

Another idea that the State Department has to consider is whether it is trying to wreak havoc on the environment in some instances. In most countries the environmental ministries are the weakest ministry in a given government. They are usually not involved in negotiations of international agreements; treaties are all being negotiated by foreign ministries who do not even talk to their environmental ministries. Environmental ministries might think about packaging themselves in ways that they can pick up a little speed and power for them in their own countries. For instance, with countries in transition where there is no privatization going on, the environment ministries can provide a really important service to privatization by resolving the environmental liability issues that come up in that context. In Poland, the Czech Republic, and to some extent Hungary, environment ministries have started doing real regulatory work in that context and have provided a useful service. Another example lies with climate change. If you call it climate change, that is an idealistic, futuristic issue. But if you call it waste minimization, energy efficiency or just plain economic improvement, it has a bigger impact. The environmental ministries can then get the governments to allow them to contribute.

Brown Weiss: One of the large questions that was raised is how do you go about effectively getting things done? Our research suggests that it is important to have international agreements as part of a country's strategy. However, one must look at the instruments in context. Non-legally binding instruments are not necessarily less complied with than binding instruments.

In response to the question about how I see the international system emerging—it is becoming both more integrated and more fragmented. There is a growing identification with something other than the nation-state. Sometimes it is religious loyalty or sometimes it is ethics or otherwise. So the question is how do you keep a unified system for common values or norms? You do not want people opting out of the system. It is better for all the desperate communities to still try to use the international system in some way to get what they want. There needs to be a push for more common values, which may mean more instruments of various kinds that shape common values. The United States should be very careful about pursuing only bilateral arrangements without paying attention to the need for unifying norms among countries and among people.

Jacobson: Most secretariats only consist of half-a-dozen to twenty people and they are on very short-term contracts. So, they are not getting the quality people that you get at the national level. While the staff at the secretariats work hard, they cannot commit the necessary time. Furthermore, they are terribly underfunded. Some of the most effective activities of secretariats are not actually conducted by the secretariats, but are conducted outside them. For instance, the conservation monitoring group in Cambridge, England, has the infrastructure to do computerized analyses and does analysis for Cites.

We must consider the administrative capacity of the different countries—even large, important countries. India, China and Russia are all very weak in terms of their ability to get things done. China has a hard time getting its edicts enforced outside of Beijing. Complicated arrangements are going to be very difficult for countries to comply with. We began with the assumption that big, key countries are the ones who are going to have to be engaged. We perceived that not only are developing countries going to have difficulty complying, but the United States will be resistant to comply if it feels there is a significant free rider issue.

Comment: We should not think about this as either a bilateral or multilateral proposition because these memorandum and understandings are extremely reinforcing in getting these key countries to comply.

Comment: Are there any generalizations regarding the constructive roles of NGOs?

Scherr: There is a very important political dimension to the question of implementation. NGOs can play a critical role in creating pressure on national leaders to fulfill international commitments.

Comment: I am concerned about a system where it is relatively easy for a political leader to sign a treaty for a political agenda and then not worry too much about compliance. Can we get a firm commitment, a limitational audit, impact or assessment, to implementation issues before the leaders sign?

Comment: We are discussing countries that may have elaborate domestic environmental audit systems, but in reality do little in terms of compliance. So, you have a very difficult problem.

17 September 1996

The DoD-DoE-EPA "Environmental Security Plan":

Enhancing Interagency Cooperation on International Environmental Issues

Abraham Haspel, Principal Deputy Assistant Secretary for Economic and Environmental Policy, Department of Energy/Office of Environmental Policy
Alan Hecht, Principal Deputy Assistant Administrator for International Activities, Environmental Protection Agency
Gary Vest, Principal Assistant Deputy Under Secretary for Environmental Security, Department of Defense/Environmental Security

Purpose/Format: The Memorandum of Understanding (MOU) is a cooperative initiative on environmental security which was signed on 3 July 1996 by the Department of Defense (DoD), the Department of Energy (DoE), and the Environmental Protection Agency (EPA)(See page 124 of this *Report* for excerpts from the MOU). The MOU, recognizing the connection between environment and security issues, calls for "a focused integration of government authorities, expertise and resources on environmental priorities, and also establishes a framework for cooperation in several areas. Methods of cooperation will include information exchange, research and development, technology demonstration and transfer, regulatory reform, emergency response training and environmental management." Initially the collaborative efforts of the three agencies will be focused on projects in the Baltic States, Russia and the NIS, and Central and Eastern Europe. The agencies hope that their efforts will have a lasting effect on not only the environment, but on international peace and stability as well.

Opening Remarks by Gary Vest: In an international sense, environmental issues are by no means new to the Department of Defense. In the 1970s, we began to address international environmental issues as a natural part of our mission. In 1980, there was a very important meeting in Munich sponsored by the NATO Committee for Challenges to a Modern Society, which is EPA-led in this country. That meeting marked the beginning of a series of discussions on environmental standards related to military activities.

Throughout the 1980s there were a number of activities within U.S. agencies, regarding the military and the environment. During this time, the other 15 NATO nations began to develop an environmental program in the military. This program allowed the NATO countries at the end of the Cold War to make environmental matters part of the outreach to Central and Eastern Europe (CEE). From both outside and inside the former Soviet Union and Warsaw Pact, it was readily apparent that environmental factors associated with the Cold War posed a significant post-Cold War challenge.

The United States began the process of cooperating with the former militaries of Central and Eastern Europe. As we pursued CEE cooperation, agencies of the former Soviet Union and Warsaw Pact developed greater interest in bilateral and multilateral action with American agencies. That forced the Department of Defense into a process of cooperation that was truly unprecedented between 1970-1980.

Interagency Projects in the Russian Arctic and the Baltics

The Department of Defense realized that while our military was interacting with foreign militaries, other U.S. government agencies were also engaged with their respective counterparts of those same foreign governments. DoD wished to explore the possibility of a U.S. interagency cooperation on projects in foreign countries. There are two examples that warrant mention here: the Russian Arctic and the Baltics.

Considerable environmental damage has occurred in the Russian Arctic, and there exists potential for continued damage. This has led to great concern about the area. In addition to the formation of the International Arctic Cooperation, Norway has started an initiative, focusing on minimizing the threats to Norwegian activities from both past and present Russian activities. Initially, the Norwegians, acting through their Ministry of Foreign Affairs, were having some difficulty getting the Russians to actually engage in cooperative matters. The

Norwegian government decided that engaging the militaries of various nations would be more effective. Thus, the Norwegians sought and obtained the involvement of the U.S. military. The combined solicitation of Russia by the U.S. Department of Defense and the Ministry of Defense of Norway led to what is now the Arctic Military Environmental Cooperation. In late September in Bergen, Secretary Perry and the Defense Ministers of Russia and Norway will sign a new international agreement, officially creating the Arctic Military Environmental Cooperation and launching several new initiatives.

On the U.S. side, the Executive Branch has been cooperating on the Russian Arctic issues. The Department of Energy, the Environmental Protection Agency and the Department of Defense all have something to contribute to this partnership. Through DoD's initiative, these three agencies have learned a great deal about the potential value of pooling resources.

The United States is still trying to develop a plan for addressing the Baltics. As part of this plan, the Paldiski Peninsula Project was initiated to deal with radioactivity issues, a legacy of a former Russian submarine training base with full-scale training simulators, submarines and reactors. The Department of Defense recently became involved in the Baltics when the Estonian government asked DoD to visit Estonia to see what assistance DoD could offer to improve the environmental situation of the former Soviet bases. DoD agreed to help, only to find unexpectedly that there were already a number of U.S. government activities in Estonia.

After agreeing to develop a proposal of cooperation to be considered by our respective governments, the Department of Defense expanded that proposal to all three Baltic nations by virtue of a letter sent by Secretary Christopher to Secretary Perry. Despite our progress in developing a proposal, we eventually learned that the three lacked the necessary authority and resources to proceed. Therefore, last month we began talking with other agencies about how we could cooperate on comprehensive international issues.

Quality of life and environment promote peace and stability. One way to achieve this is to work with the military. Virtually every nation in the world has a military. Most militaries will try to emulate the U.S. military. Since the United States has changed the environmental culture of its military, why not make the rest of the world's militaries environmentally sensitive?

International environmental security is something that DoD has only recently begun to address. We need to transform the militaries of the world into environmentally astute organizations. We must do so in cooperation with the State Department and DoE.

Remarks by Alan Hecht: One may wonder where EPA has a role to play in the international arena. When confronted with environmental problems and the international domain, the U.S. government has frequently asked the EPA to lend its expertise. Several years ago we had negotiated a convention which banned the dumping of radioactive waste in the Arctic ocean. Russia could not comply because it lacked the technical capabilities to do so. We asked ourselves what the EPA might be able to do to make it possible for Russia to sign the convention.

While working with the Norwegians on this problem, we focused on a facility in Murmansk that was processing oil and radioactive waste for the civilian sector and discussed its potential for expansion to process oil and radioactive wastes from the military sector. While in Norway to actually work on this facility, Russian participation in the larger problem emerged.

From those early stages started probably two or three years of rather intense interagency discussions in the National Security Council about whether such a project should go forward. Agencies, such as the Defense Department and the Energy Department, approached the possibility with very different perspectives. We agreed to proceed, and it ultimately became a cooperative initiative. Obtaining U.S. funding, expanding into Russia and overcoming all the interagency hurdles presented huge bureaucratic difficulties. The three agencies concluded immediately from that first project that if we were ever going to do things together like this, we had to pool our resources for a better foundation on which to operate. This was a rather important stimulus for the Memorandum of Understanding. The EPA was the stimulus to begin this whole process.

Defining the Interagency Mission

From that example, we gave a lot of thought to the broad concept of international environmental security issues. Environmental security has been broadly defined and could encompass a myriad of projects. Yet, this interagency effort is not an ill-defined pursuit that is going to address every conceivable issue that might be put under the umbrella of environment and security. The three signatory agencies are in discussion about the implementation of a strategic plan, the projects that we would support and the roles that we would play.

There are some other things that have given us stimulus to consider how we might ultimately structure our thinking. One is the National Security Strategy. A quote from the report states that "even when making the most generous allowance or advances in science and technology, one cannot help but feel that population growth and environmental pressures will lead into immense social unrest and make the world substantively more vulnerable to serious international pressure." We are now trying to specifically address those "environmental pressures."

The legacy of the Cold War was another stimulus in our case. The legacy meant that the management of radioactive chemical and biological facilities, the transition of what were formerly military facilities to civilian facilities, and the various other problems associated with the democratization processes all contributed to environmental security issues. We could see that these issues were only going to get more serious because implementation of the SALT agreements meant the decommissioning of greater numbers of nuclear submarines and the generation of greater quantities of liquid and solid waste.

Future Interagency Roles for the EPA

The EPA science advisers published a report last year in which they made specific suggestions to the agency to look at future environmental risks, to identify them, be able to monitor them and to use EPA expertise to address them. They also indicated that the EPA should be working with other agencies on issues of national security.

Thus, we are now discussing with other agencies the criteria for cooperative action. We are currently considering a multi-prong approach, where we would: (1) consider direct threats to the United States; (2) comply with international regimes/agreements; (3) address regional problems of significance to the United States which may be direct or indirect in the sense that they serve the political interests of the United States and; (4) embrace a preventive defense to eliminate social unrest and the potential conflict between environment and development, which is a real threat among nations.

We have accomplished our bureaucratic goal and have laid down a policy direction. Given the resources for which we are asking and the expertise of our agencies, we now need to locate the appropriate funds for implementation.

Opening Remarks by Abraham Haspel: When we started to put this MOU together, we became aware that one of our greatest assets was pure synergism. With our specific legislative authorities, DoE could in many instances do things that neither DoD nor EPA had the authority to do. In that sense, by working as a team, we manage to take each others' authorities and use them to the interests of the United States.

Although we have been involved in a number of environmental activities in other countries for many years we have never with a clearly articulated policy on environmental concerns as has been made by the Secretary of State. Having the policy has moved us to a higher level of discussion with cooperating foreign governments on joint action plans and on defining appropriate institutional and technology responses to environmental concerns. Recent political and economic changes also require that the involved U.S. Departments make participation by non-governmental interest organizations and the U.S. private sector a major element in addressing environmental concerns within any U.S. proposed regional development strategy.

Budgetary Constraints

Both EPA and DoE, more so than Defense, have severe budgetary constraints. As a result, environmental security issues are not often considered. Yet, there are threats to our security, stemming from environmental issues which can cause large migrations of people or diminished food production, leading to famine or the spread of diseases in some parts of the world. There are many types of environmental security risks that could be mitigated in the future by military action. We can talk about environmental security and preventive defense, but without sufficient funds, it is pointless.

Comments During Discussion

Vest: We are very serious about what we are doing in terms of cooperation. Three weeks ago we had an environmental security strategy session which was open to any agency that wanted to attend. State, EPA and DoE were there the entire time. Last week, we had the first Asia-Pacific defense environmental conference, sponsored by the U.S. Department of Defense, the Australian Department of Defense, the Canadian Department of National Defense, the Society of American Military Engineers, the American Defense Preparedness Association and the National Security Industrial Association. Thirty-five nations, and every principle agency of the U.S. government were represented.

We are also creating a partnership with the American private sector. We need to work with the private sector to help it take advantage of the market and to help them understand what we are trying to accomplish from a U.S. government policy stance.

Comment: What was the State Department's role in this effort?

Vest: We conceived this idea ourselves and invited State to participate in the Memorandum of Understanding (MOU) negotiations. They chose not to do it, and I do not want to give their reasons for this. However, that did not exclude them from helping us both with the letter from Secretary Christopher and in formulating his response. [Ed. Note: See page 125 of this *Report* for text of Warren Christopher's speech]. We expect that State will play a role as this develops. I think we were able to crystallize our thinking and move more quickly. Our activities preceded Secretary Christopher's Stanford University speech.

Comment: Some of the issues that you alluded to cer-

tainly escape AID's responsibilities, including issues of population and development. Unless these issues are addressed, this consortium will fail. A lot of agreements come and go, but this could be a revolutionary development. A sustained effort is needed because it is kaleidoscopic, interest varies and the whole thing may collapse. This understanding has to be institutionalized, and that's going to take a lot of work and time.

The complex issues with which you are dealing cannot be singly addressed. An attractive part of this cooperation is that you are pooling expertise, perspectives and professional backgrounds.

Haspel: Like the EPA, DoE is beginning a process of institutionalization. As we go forward, environmental security, like energy security, will be another thread that runs throughout the agency.

Vest: We are of an opinion that you do not have to plan the institutional alliances, so much as just implement them. A month ago, we hosted a Polish delegation, headed by the Deputy Minister of Defense. The delegation also went to EPA and DoE and learned how we do business in the United States. We have plans to host a similar delegation from Hungary.

Haspel: In the long run the MOU is the kind of program that needs bipartisan congressional support. We will be presenting it to the new Congress. While the level of resources is still to be determined, there is no question that to continue with the level of effort made to bring all three agencies to the table, we will need congressional endorsement.

Comment: All three of your agencies have a number of initiatives which require public-private partnerships. To what extent has the MOU anticipated the need to not just pool your resources, but to pool resources from private investments?

Comment: The budget question is key—particularly for Armed Services where a few years ago, the new Republican majority stated in a special section of their final committee report that environmental security was not part of national defense. There is a real skepticism that has grown on the part of the Republican majority about the defense budget. Would you also address what is being done about cooperative risk reduction for the nuclear weapons in Russia, which is one of the most serious and potentially deadly legacies of the Cold War that we have today?

Comment: I am really interested in the approach to dealing with environmentally caused instability. When you look at the two ways of cutting into this problem, by geography or by environmental issue area, what priorities do you set? Also, how do you institutionalize this approach?

Vest: We are working with industries and the private sector. There is great potential to work with the private sector on strategic threat reduction As far as defining priorities, it is probably best to do so geographically.

Comment: The formula for success is to establish a project for which we have opportunities for success and hope it will be bipartisan in nature. Sitting down at the table, identifying those projects and prioritizing them is the first step after the plan and strategy. Has that been done? If so, on what projects have the three agencies planned to work, has the division of labor been worked out?

Hecht: The role we are playing is vital to overcoming problems that exist at bureaucratic levels. Post-election, we will also be very busy forming a new relationship with China. We anticipate numerous developments and have acted upon these anticipations.

We are looking at a way of institutionalization that shows that when NATO, the European Union or Germany takes on more than just U.S. initiatives, it has a greater amount of attraction. Cooperation with foreign governments is very important to us. In terms of institutionalizing it, Congress is clearly on our agenda.

The private sector and the NGOs are also involved. We have canvassed the NGOs already for their perception of the issue and how they would feel about being involved. There is also a lot of emphasis on the private sector. Furthermore, there is the role of the NSC. We have heard from the Vice President and kept his office informed. As this begins to grow, other agencies are looking at it with the possibility of signing. Involving lending institutions is a part of our strategy in the Baltics and the CEE. In the early stages, we created a document which captured all of these ideas, and we are now using that as the next element of our strategic plan.

Haspel: I would like to end with the notion of competitive engagement. A few successes go a long way in getting funding. Our attempt right now is to come out of the Baltics with a winner. With the three agencies together, we feel confident that this type of work will be institutionalized. Whether this Congress or others want to say this is a part of national security is still an open ended question.

Nevertheless, we must involve both the right and the left and hopefully get environment out of the constant attack, so we can deal with the problems that are facing not only this country, but a lot of other countries as well. When we have done that, we will be able to move forward and the institutionalization will occur. Institutionalizing things in the government requires

people who are willing to fight for this interagency cooperation, take it into the bureaucracy and make it part of the institution.

Vest: How are we going to build a new program without sufficient funding? Everything we are doing involves integration. A lot of people do not understand that there is a world-wide network of military commanders and commanders-in-chief who are unified. They have commands that have a wide range of responsibilities that require interacting with each other. They also have a wide range of tools at their disposal. At the Asia-Pacific conference, there were four sponsors: three governments and the commander-in-chief of the Pacific Command. Every commander-in-chief in the Pacific attended and participated in that conference because they understand that environment and military are a major issue. Integrating environmental protection into our other activities has become as important to some militaries as logistics.

We need to focus on building organizational infrastructure. We must start by identifying what partnerships already exist and where there are capabilities. We should have a coordination process here in Washington, so we can deliver to ambassadors information that provides them with the capability to do the right thing in the context of their specific country. This should not diminish the need for capitalizing on the tremendous capability that exists in this country. The government should build partnerships with the private sector. One of the things that DoE and DoD have done, in the context of a NATO project, is to catalogue public and private sources of financing for these kinds of projects anywhere in the world.

24 October 1996

U.S. Environmental Priorities and National Interests in China, Eastern Europe and the Newly Independent States

Chairpersons:

Richard Bush, National Intelligence Officer for East Asia, National Intelligence Council

John Herbst, Deputy Advisor to the Secretary of State on the Newly Independent States

Barbara Jancar-Webster, Professor of Political Science, State University of New York at Brockport

Robert Kaiser, Managing Editor, *The Washington Post*

Will Martin, Deputy Assistant Secretary for International Affairs for National Oceanic and Atmospheric Administration

Jessica Tuchman Mathews, Senior Fellow at the Council on Foreign Relations

Scott Thayer, Special Assistant, Department of State Office of East European Assistance

Purpose/Format: This meeting assessed U.S. environmental priorities in three regions: Central and Eastern Europe (CEE), Russia, Baltics and the Newly Independent States (NIS) and the People's Republic of China (China). Regional experts met first in three small working groups, then in a larger plenary session. Each working group reviewed a list of environmental issues and developed priorities given overall U.S. interests and objectives in the region. Working groups also identified elements of effective strategies to achieve these objectives. Working group rapporteurs were **Susan Fletcher** (Congressional Research Service) for China, **Robert Hutchings** (Woodrow Wilson International Center for Scholars) for CEE and **Eliza Klose** (ISAR: A Clearinghouse on Grassroots Cooperation in Eurasia) for the former Soviet Union.

Rapporteur's Report on Environmental Priorities in The People's Republic Of China (China): During our discussion, a frequent underlying theme was that China's top priorities may have no direct impact on the United States. An exception is when a domestic concern in China may have a major impact on stability in the region, arising from Chinese or regional demand and competition for resources.

Due to China's immense size, the United States must gauge impacts in every area, especially as we look into the future. Reforming China's energy policy is critical; the use of coal creates greenhouse gas emissions and transboundary air pollution. The demand for resources such as timber and fisheries has already degraded and reduced many of the resources within the country. China is also increasingly turning to the international markets, which is creating a whole new surge of problems. There are both global and regional stability questions involved with these resource demands.

Another underlying theme was the important role of the private sector. China is just beginning to develop—in some cases, 80% of its development lies ahead—in the use of energy, infrastructure and transportation. There is thus an enormous opportunity for the private sector to play a role in the development of innovative technologies for pollution reduction.

U.S. Environmental Objectives in China

We considered a list of environmental objectives in China. These included slowing the growth of greenhouse gases; reducing the use of ozone-depleting chemicals; promoting adherence to international environmental conventions and agreements and encouraging engagement and participation in international fisheries conservation and management. We agreed that these objectives are of major concern to U.S. interests and that they often have a direct impact on our own resource use and on the global environment. However, they may not be a priority for the Chinese.

Also on the list of environmental objectives in China were reducing urban pollution, especially in coastal areas, industrial issues and waste treatment, promoting better management of water resources to alleviate chronic flooding and safeguard aquifers, promoting better land management practices, steps to slow the population growth rate and nuclear safety. We felt that the Chinese had a high interest in these areas, except in the case of

population. It was hard to determine a direct U.S. interest, however, except through the stability issue. To the list, we added nuclear safety.

U.S. Environmental Priorities in China

The promotion of clean technology and environmentally sound management was our group's mission statement for engaging China on the environment.

We had four major groupings for issues that should be U.S priorities and that would also be in accord with China's agenda. First, promoting adherence to international agreements such as the Montreal Protocol and the Climate Change Convention.

Second, the development of safe and sustainable energy technology, which has considerable overlap with the issue of climate change. China faces expanding needs for extensive energy development, and its choices of development pose significant concern for the environment, especially if it continues to emphasize the exploitation of its vast deposits of high-sulfur coal. Hydro-electric development is another avenue that the Chinese are exploring. Energy development alternatives that the United States would prefer include promoting energy efficiency, developing renewable technologies for the long-term and using cleaner energy sources, especially natural gas and the cleanest possible coal technologies. Nuclear energy, however, is not favored by the U.S. environmental community. While nuclear energy use may address the greenhouse gas issue, it poses serious environmental concerns in terms of nuclear waste disposal and accidents.

The reduction of urban pollution (including coastal zone pollution) is a third priority; solutions involve developing infrastructure for sewage treatment and water quality. A fourth priority is to promote sound natural resource management; included in this area are problems associated with food security, loss of arable land, fisheries management and water resources management.

China's primary national interests may be viewed as: stability, economic growth and quality of the population (health, education). A problem may arise where environmental goals appear to conflict with these interests. However, environmental goals increasingly appear in China's policies and discussions as contributing to the country's various interests. Where there is congruence, rather than conflict, Chinese officials will be more receptive to the environmental priorities. In some sectors of China's government, the case still needs to be made for how environmental goals will enhance China's other national interests.

Several perspectives are important. In addition to recognizing the Chinese national government's perspective, the United States must recognize the interests of the citizens and the provincial and local governments, which often differ from those of the national government. Furthermore, our activities in China would have to engage not only U.S. government interests, but those of U.S. citizens.

U.S. Strategies for Addressing Environmental Priorities in China

There is a need to develop a detailed rationale for an environmental initiative that would include U.S. participation with the Chinese. The Chinese are very interested in U.S. assistance and participation. Yet, cooperation is not the highest environmental priority for the Chinese. It is therefore important to document, for instance, the cost of pollution—not only the cost of instituting preventive measures, but also the cost of inaction.

A high-level commission might be useful to cope with the breadth of challenges to implementing the strategies. The United States and China already have a high level sustainable development forum, it just needs to be regularized. A large number of government agencies are currently participating with China, but their activities are relatively ad hoc and not coordinated.

Congress should consider removing the prohibition on aid to China. However, if U.S. AID were able to be involved in China, it would still need an enormous increase in its resources to be effective. The U.S. AID's Asia environmental partnership strongly emphasizes the private sector and might be a leveraging opportunity, but at present, China is prohibited from participating. The President should have discretion to allow participation in activities that do not necessarily involve huge sums of money and where the Executive Branch could leverage private resources.

At the working level, bringing Chinese people to the United States to see how technologies work is a very good way to inexpensively introduce new concepts and new ways of doing things. This should be a two-way exchange.

Institutions, such as the multilateral development banks—ASEAN and APEC—need to be involved. ASEAN already has a major environmental effort underway. Although APEC has been relatively narrowly focused on trade, its sustainable development initiative and its environmental arm offer some real opportunities.

Rapporteur's Report on Environmental Priorities in Central and Eastern Europe (CEE): The Central and Eastern Europe working group tried to keep the discussion linked to broader issues of interest to the United States and to European security. The CEE region is important because two world wars and one Cold War originated there. The issue for the United States is whether this region will continue to be a chronic source of instability and recurrent conflict in the heart of Eu-

rope or whether it can be successfully integrated into a larger zone of democratic prosperity, tranquility and good neighborliness. Therefore, U.S. interests center around continued successful democratic and economic development in the region. This includes the development of stable governing structures, the steady integration of these countries into the larger European mainstream, principally by accession to the European Union, and the development of patterns of regional cooperation in a part of the world that has known precious little in its modern history.

We identified four principal priorities. The first is to avert a nuclear catastrophe at one of the nuclear power plants. This engages U.S. interests in a variety of ways. In addition to the potential dire consequences for human life and well-being, a nuclear catastrophe could severely arrest prospects for economic and political development in the country where it occurs. Furthermore, a nuclear catastrophe could spill over into a regional problem, possibly producing regional conflicts. The safety and security of these facilities are related to the issue of the spread of weapons of mass destruction as well as to safe waste disposal in the region. Finally, substantial U.S. commercial interests come into play in the area of remediation of unsafe nuclear reactors.

The United States is already implementing some strategies to address these objectives. Given the financial constraints and the scarcity of resources that can be deployed against this problem, the priority should be to ensure the safety of existing nuclear power plants as well as to promote the diversification of energy to allow these countries to become less reliant on unsafe nuclear plants.

The existing member countries of the European Union are going to play the greatest role in nuclear safety, and we ought to support that. The United States might start shifting its focus toward those countries that are not destined for accession to the European Union in the first wave because they will not be able to avail themselves of the EU structural and harmonizational funds.

The second priority is sustainable development. It is the logical successor to the priority of macroeconomic stabilization, which dominated U.S. and European efforts in the first few years of post-communist transition. The bulk of U.S. and European resources has gone there. Through the entire modern period, this region has been two to three generations behind most of continental Europe. It needs to close this gap if it is ever to become fully part of the European mainstream and overcome endemic poverty. This means attention to a whole set of related issues that have been largely neglected in this region. These issues include transportation patterns—the rapid development of automobiles and subsequent air pollution; urbanization; and demographic factors. For example, demographics alone will reduce the Polish agricultural population dramatically in the next 10-15 years. Development trends should thus occur within a context that pays attention to sound, future environmental practices because there is little we can do to remediate past environmental damage.

A specific recommendation would be for President Clinton to set as a high priority the reinvigoration of U.S. commitment to the Lucerne process (the Environmental Action Plan agreed to at Lucerne in 1993), which included a framework agreement of an environmental action plan embracing the entire region. This process is something that the Central and Eastern Europeans as well as the Western Europeans take very seriously, but also something from which U.S. attention has begun to wane. It will be a natural follow-up to Secretary Christopher's Stanford University speech to reassert U.S. interests in the Lucerne process as embedded in the new transatlantic initiative. It is not just a matter of high level leadership, it is a matter of engaging on very practical programs through the European Bank for Reconstruction and Development and other elements. The continued cultivation of the NGO communities and women's leadership in these organizations are also important areas that need to be targeted.

The third area is to improve energy efficiency and reduce dependence on foreign sources. This cuts across economics, politics, the environment and security and has a bearing on nuclear safety. It would also help reduce some of the waste that has cost these economies so heavily as they are trying to move forward. Energy efficiency is more easily amenable to remediation than other areas of environmental devastation in the region. As U.S. official assistance diminishes over time, the relative share that goes into stimulating private sector involvement in this region ought to go up. This could include direct incentives to U.S. firms to get involved.

The final priority is water and soil contamination. We focused on water pollution—particularly those areas that have cross-boundary implications—as a way of preventing potential cross-border conflict and encouraging one area of important regional cooperation.

With regard to U.S. strategies, funding is a chief concern. The U.S. assistance budget for this region devoted to environmental issues is shrinking from seven to three percent. The overall assistance budget is shrinking perhaps more rapidly than events in the region justify. In 1989 and 1990 when the U.S. official assistance program was being set up, it was assumed that this would be a fairly short term assistance program to help these already industrialized countries get back on their feet. It is clear that our estimations for economic transition were much too optimistic. Yet, the funding falloff has continued to follow this old, now discredited logic. It ought to be reconsidered.

Rapporteur's Report on Environmental Priorities in Russia, the Baltics and the Newly Independent States

(NIS): The Russia, Baltics, and Newly Independent States (NIS) working group settled on five priorities. We kept as an overarching consideration that less than half of the NIS territory is more polluted than probably anywhere in the world, approximately the same percentage is more pristine wilderness than anywhere else and the remaining ten percent is like everywhere else in the world.

The first environmental priority should be radioactive waste problems connected with the military. The United States should promote efforts to help the former Soviet republics, particularly Russia, clean up the radioactive pollution created by their military activities and weapons production, particularly in the areas around the Arctic Ocean and the Kola Peninsula. We need to go beyond working with government entities to working with non-government organizations to tap into their knowledge and innovativeness.

There has been a lot of success in military-to-military cooperation. The DoE has made some very successful lab-to-lab efforts. Another useful strategy would be to expand the circle of players to include Europeans, Asians and others who are concerned about the Kola and Arctic areas and to press for ratification of the London Convention.

The second priority is nuclear reactor safety. The United States must continue its activities in the areas of technology transfer and training to make the post-Soviet nuclear reactors safer. Many of them, particularly the RBMKs, are terribly flawed and should be shut down. But as long as they continue to operate, the United States should do all it can to help make them safer. The United States should make sure that the Ukraine receives all the funds it has been promised by the G-7, conditioned on Ukraine adhering to the agreements to which it has bound itself. Since many European countries are tremendously concerned about the safety of NIS nuclear reactors, it is important to use the leverage of European Union membership to promote better safety standards.

One member suggested that nuclear safety was such an important issue that Congress should end the "Buy America" policy regarding contracts in this field. It is worth trying to make some changes in the policy because the congressional requirement has seriously slowed down important nuclear safety efforts. The United States should also continue with its joint exercises with NIS countries to mitigate nuclear emergencies. Finally, the United States should promote the rationalization of the power sector throughout the former Soviet Union. This is an area that has not been given sufficient consideration, but it is one in which the United States has enormous expertise to offer.

The third priority is energy efficiency. Huge economic and environmental gains can be made rather quickly by implementing relatively simple improvements in energy use. U.S. businesses have a great deal of technology to offer NIS countries in the field of energy conservation and efficiency, and much can be achieved simply by enhancing the possibilities for U.S. companies to invest in Russia. To offset the risks of working in the region, the United States should develop measures to support American companies that are prepared to work in the energy field.

The emphasis on energy efficiency should be increased in the Gore-Chernomyrdin Commission and adopted as a focus in the new Gore-Kuchma Commission. Another important area is promoting higher standards of energy efficiency in the factories and industrial plants in small towns all over the region. The United States should make careful diplomatic efforts to work with NIS governments to promote better tax and pricing policies, ending subsidies for energy use and inefficient plants. The United States should also concentrate on targeted energy conservation efforts like installing thermostats in residential buildings. NGOs and professional associations could play a vital role in educating the public about the real economic and environmental value to the region of developing energy efficiency strategies.

The fourth priority is public health, which is a major concern not only for the local populations throughout the NIS, but for the United States and its allies because of the instability that can arise in countries threatened by widespread health problems. The United States should concentrate on addressing the problem of water pollution. Practical strategies that would address public health problems include: lining the canals in Central Asia, re-lining municipal water pipes or adding chlorine to water purification systems. In addition, the United States should assist in public education efforts, so that local authorities, NGOs and others can inform the public about how to make better, more efficient use of water and about how to prevent water-related health problems. American companies, municipalities and NGOs have lots of experience in managing water systems, which they could easily and inexpensively offer to appropriate entities in the NIS.

A fifth priority should be to assure the long-term integrity of Russian forest resources in order to maximize the long-term economic return, minimize the impact on global atmospheric carbon, and maintain the integrity of biological communities. The vast Russian forest is in many ways as important as the Amazon forest. It is being lost at almost the same rate due to logging, fires and pest problems, and its rate of regeneration is very slow. Assistance should be provided by the United States in developing better sylvaculture, logging and marketing practices, developing more wood-processing industries in places closer to the forest resource, managing protected areas to assure sound environmental policies and promoting community economic development to reap the benefit of sustainable timber industries.

A lot of U.S. AID's projects in the Russian Far East are geared towards developing saleable timber and non-timber products, so Russia will not be limited to exporting raw logs. The program includes providing loans to small and medium-sized businesses, such as sawmills, to foster the kind of industry that will enable the country to use its extraordinary resources in a much more effective way. The United States should continue such projects and hold American logging companies that want to work in Russia to international environmental standards, if they are to receive support through OPIC and other government-funded agencies.

The United States should publicize the important role that Russia's forests can play as a carbon sink in addressing the problem of global climate change. Consequently, it would make sense to develop some standards by which to measure the value of the forest. In this regard, it is important to support NGOs that are working to educate the public about protecting the forest and to work with international groups to make this a more multilateral effort.

Finally, the issue of the disposition of Russia's huge stockpile—almost 200 tons—of plutonium should not be a neglected priority. Russia does not adequately safeguard its plutonium stocks, so it has become a target for terrorists and a major international threat.

Comments During Discussion

Robert Kaiser: I have not yet heard of an effective U.S. strategy regarding the pursuit of the priorities listed. How can we get a recalcitrant Congress and an uncertain Administration to actually concoct a strategy that might be pursued on these fronts?

P.J. Simmons: What should be the roles of various parts of the government? Who exactly should be taking the lead on these issues? Within the State Department, for example, some bureaues and actors may have a comparative advantage in addressing certain issues. How can agencies best work together on these issues? And how should State and other agencies allocate their resources?

Comment: The State Department needs to leverage other agencies for environmental activities. For instance, the Department of Energy engages in a lot of activities which can be applied overseas. If environmental problems are really going to get solved, the State Department should also actively include private sector businesses and the NGOs.

Comment: As a non-governmental person, I was surprised to learn of the specificity of the programs the government maintains, especially when the funds for all U.S. foreign programs have been reduced drastically over the last several years. During the NIS discussion group meeting, despite our awareness of the funding problem, we avoided discussing it. As a result, the question of how we get more money out of Congress and the Administration did not arise.

Kaiser: How do you persuade the governments, particularly the Chinese, but also the Eastern Europeans and Russians, to sacrifice economic development considerations on behalf of environmental considerations when they are all desperately trying to increase their wealth?

Comment: There is a direct application of this issue to CEE. Within the past month, Ritt Bjerregaard, the new Environmental Commissioner of the European Union, told CEE states that if they do not adopt roughly 200 international standards and practices they are not going to get admitted to the European Union. That certainly could have some leverage. If we could apply that leverage elsewhere, it would be very useful.

Comment: The public is an effective force for putting pressure on the government to think about environmental issues. In the United States, public pressure and political will have brought about a lot of environmental change and policy.

Kaiser: To what extent are U.S. interests in these three regions separable from Europe, Japan, Australia or any other nation? Are there unique U.S. interests?

Comment: U.S. interests are more conversant with Germany than they are with France or Great Britain in CEE. Therefore, U.S. engagement is required to maintain this communality. Without the United States, there is a danger that the rest of Europe would not share Germany's preoccupation with its eastern borderlands, and, in response, Germany would take care of business on its own. A historical precedent exists.

Comment: The United States must maintain its economic and commercial interests in the Asian markets. At the same time, the United States must also consider change in these countries. The United States might ask, what are the conditions in which countries and industries innovate, and do countries and industries innovate in circumstances where there is a tremendous amount of growth? The greatest economic growth is going on now in Asia. The U.S. government, American companies and American NGOs should try to affect policies and public outlooks. Furthermore, developing countries are looking at Asian countries as development models. Other countries may not feel like they can currently replicate the United States, but they do think they can replicate Korea, Taiwan or Singapore. So to the extent that the United States can influence these other countries, we will have a much broader

impact on the global economy.

Comment: Without considering U.S. business interests or humanitarian aid, how would environmental problems directly affect the United States? In Alaska for example, radiation pollution is a possibility if an accident occurs at the Filiginov nuclear power plant, which is only 800 miles from that state. However, I disagree with the final conclusion of Senator Stevens' committee report. There is no clear and present danger to the Arctic Ocean from the radioactivity. The figures that the Office of Technology Assessment used were not accurate.

Comment: If we consider major environmental disasters, like nuclear facility accidents, the U.S. military is really the only organization in the world that has the wherewithal to expeditiously move equipment, personnel and other resources. The United States, just by the fact that it has a large logistics organization, is going to have a unique capacity relative to other countries.

Kaiser: Is the idea of the public as a force for reform in environmental improvement realistic at this stage of these CEE countries' development? Are we seeing Eastern Europe and other emerging nations entering a very materialistic and environmentally unconscious stage of development? Studies from the Regional Environmental Center and elsewhere suggest that while CEE countries are developing institutional structures, compliance and enforcement are very lax, both on the part of the administrators and on the part of the public. Are we still a long way off from real enforceable laws, self-policing and a strong environmental consciousness within these countries?

Comment: Building a consensus behind environmentally sound practices has a better chance of success, if it is tied to a positive incentive structure. These post-Communist transitions (in NIS and CEE) have been painful enough as it is, and they have already lost a huge constituency which helps account for the comeback of Communists (leftists) in most of these countries. As CEE countries understand, the costs of joining the European Union could generate a backlash against the EU, the environmental camps and against the existing environmental regulations. That would be a strategic catastrophe.

Comment: NGOs in the Former Soviet Union have had a mixed record for success. Their effectiveness varies upon how close in time the NGO movement is to a major accident and whether the politicians become energized. The NGOs were able to stop the building of a dam through public protest, but they were not able to stop the government from launching its new program to build ten or eleven more nuclear power plants.

Kaiser: There seems to be so much concern about bullying China that nobody has mentioned the role that democracy could play in bringing about environmental change. There is too much emphasis on the private sector and on buzzwords like "jump-start" and "technology." China could absorb all of U.S. AID's funding and possibly show no positive change. The United States could bring about change in China's environment by encouraging our environmental community to work with the human rights community.

Comment: Regarding China, while we completely lack an assistance program there, the greatest U.S. interests are global. The prioritization process in the other two groups was influenced by the fact that the United States has assistance programs in those regions. We have to keep that in mind when we are trying to set the environmental priorities. Businesses are trying to develop cleaner productions to compete in the international markets, but the United States must go one step further and incorporate that language into the international trade agreements. Until now, most of those agreements do not allow us to use environmental performance as an advantage for selecting trading partners.

Comment: The China working group was optimistic because the Chinese government has gone a long way towards acknowledging their environmental problems. The United States and China are still at the rhetoric stage, and relations may not even progress beyond that stage. We did not discuss NGOs at all. There was an underlying sense that the NGO situation was not going to change very soon in China. We also did not address the consumption patterns, although we talked about drastically increasing resource use and the competition for resources that might result from it. It is interesting that without an aid program in China, the extent to which we did talk about strategy was limited. We did talk a lot about financial strategies, but realized that it would consume a vast amount of U.S. resources. Fortunately, the private sector has been eager to fill that void. There is a major opportunity for private sector involvement and environmentally friendly investment can occur.

Comment: A precondition for doing anything regarding China's environment is the preservation of good political relations between our two countries. This is difficult because of our conflicting political agendas and problems. In the United States, we are emerging from total indifference and our government can approach China with a long-term strategy. The Japanese or the Koreans, who have an even greater interest in environmental issues in China than the United States, have other agenda items that may begin to overwhelm their abilities and attention to the environment. The principal national priority for every country in the area, in-

cluding the United States, is going to be political and military security. If we let our relations with China flounder over trivial issues or differences about long-term Japanese security objectives, then the United States can forget about the agenda that we have been discussing today.

19 November 1996

Genetic Resources, National Interests and Security

Thomas E. Lovejoy, Counselor to the Secretary for Biodiversity and Environmental Affairs, The Smithsonian Institution
George M. Milne, President of Central Research Division, Pfizer, Inc.

Opening Remarks by Thomas Lovejoy: To discuss the topic of biodiversity and national security, I first analyzed the information as a scientist, breaking each topic area into classifications and creating a "scientist's taxonomy." Then to discuss the issues from a policy perspective, I evaluated them in terms of human well-being, national economies and security.

Links Between Biological Diversity and the Physical Environment

Global environmental change is usually thought of first in terms of physical changes to the planet (e.g. climate change, ozone depletion), but people rarely think of massive land use changes which affect biological diversity. People think of biological diversity in very practical terms, such as endangered species, esthetic considerations and medicinal sources. They do not think of it in a comprehensive manner.

Yet, all changes to the physical environment and to biological diversity are intimately linked; the connections run in both directions. Basically, all ecological goods (direct use genetic resources) and services (e.g. watershed function, generation of soil fertility, recycling of nutrients) come from biological diversity.

Viewed incrementally, loss of individual species seems inconsequential, particularly given that the majority of species are unknown to science and, of those species that we do know, we do not know much. However, there is virtually unanimity among professional scientists that given present trends the planet is likely to be ravaged biologically with the predicted loss of a quarter to a half of all species within a century. Thus, it seems appropriate to examine the relation of genetic resources to questions of national interest and security.

Human Well-Being

The first area of national interest is the health and well-being of individuals. In this regard, biodiversity makes important contributions to agriculture. For example, there has been a continuing contribution of wild genes to disease resistance, pest resistance and productivity of domestic crops. In the age of genetic engineering, this includes possibilities never before imagined like the frost resistance conferred upon the russet potato from a winter flounder.

Another way of looking at health and well-being is through the value of wild species to agriculture and other forms of harvest from the natural world. There is a major, ongoing exercise in biological controls in the United States and in the world. In the United States, billions of dollars are saved per annum by pest control through the introduction of various species. One of the dramatic examples involves a mealy bug which was attacking cassava crop several years ago in West Africa. The introduction of the natural enemy of the mealy bug from Paraguay averted a massive famine. The introduction of the proper pollinators offered for domestic crops around the world can mean the difference between whether the crops are successful or not. The Australian and New Guinea fisheries were being choked off by an exotic, floating water plant until a weevil species was introduced as a control organism.

The value of wild species to medicine is a second way in which biodiversity contributes to health and well-being. For instance, both diagnostic medicine and the human genome project use the polymerase molecule from *Thermus aquaticus* from a Yellowstone hotspring. Also important is pharmaceutical research and the development of new medicines which depends to a significant degree on genetic resources from nature.

At the level of entire ecosystems, it is important to mention physical threats from the failure of ecosystems services. Such failures can have very dramatic consequences. A classic example is the way deforestation in Nepal contributed to flooding and loss of life in downstream Bangladesh and Pakistan.

Finally, probably the most ignored aspect of biodiversity's contributions to human health and well-being is what I consider a library function. The growth of life sciences depends to a great degree on studies of how other

organisms works and solve problems which then become useful in very direct ways to people. Examples of this library function are the Penicillium mold which led to the discovery of antibiotics and the studies of a British butterfly which led to an understanding of the genetics of Rh negative babies.

National Economies

When it comes to national economies, loss by theft is a concern. For instance, the shipment of rubber tree seeds by Sir Henry Wickham around the turn of the century became the sole genetic stock to support the Southeast Asian rubber industry and undercut the Amazon rubber boom. That kind of security threat should not occur today because of the Convention on Biological Diversity, which gives each nation sovereign rights to species it maintains.

Another threat that can sometimes have dramatic effects on economies is the problems caused by the introduction of alien species. Hawaii has more alien than native species; the alien species often drive out the native species and thus reduce biological diversity on a global basis. Yet, in most instances, people would not consider that individual alien species could pose a great economic threat—certainly not a security threat. On the other hand, in certain situations, the concern is much greater than one would expect. For example, a $250 million collapse of the anchovy fishery industry in the Black Sea was caused by the accidental introduction of a comb jellyfish from the coastal waters of the Americas into the Black Sea. In the United States, we have examples of this, such as the collapse of the lake trout fishery in the Great Lakes due to the introduction of the lamprey.

Another important way to examine the economic issue is to look at man-made activities that reduce naturally occurring biological barriers, making it possible for species introduction where they can cause problems. It is extremely important to never build a sea level canal in Panama in order to avoid the introduction of species specific to the Caribbean. The Suez Canal continues to foster a slow leak of Red Sea fauna into the eastern Mediterranean sometimes with negative effects on fisheries.

A further effect on economies is in the area of ecosystems services. Smithsonian scientists once calculated that deforestation of the Panama Canal watershed would result in the siltation of three million cubic meters per year.

Physical damage to territory is another way to measure an effect on economies. For example, the waterway improvements for the Parana-Paraguay drainage currently under consideration can potentially cause the same problems the United States has with the Everglades and the Mississippi. Brazil is interested in maintaining the integrity of the Pantanal even to the extent of making the abandonment of a dam project the *quid pro quo* for helping the President of Paraguay survive a recent coup. Uruguay also has a vested interest in the drainage to avoid a greater vulnerability to storm surge, caused by erosion.

The last area of interest is the linkage of genetic resources, science and economic growth. There is a strong agreement about the growing importance of biotechnology to economic growth of nations like the United States. Economic growth depends on maintenance of and access to stocks of biological diversity. That is why the failure of the United States to ratify the Convention on Biological Diversity is a matter of real concern. Finally, the pharmaceutical industry has an obvious interest in preserving biological diversity. For example, molecules derived from nature are still a highly important source of new medicines.

Security Issues

Most of these examples are likely to contribute to tension rather than be sole causes of actual conflict.

First, there is the protection of strategic goods. While generally thought of in terms of resources like oil or strategic minerals, it is conceivable that critical genetic resources might on occasion fall into this category. In the past, the plantation rubber of Southeast Asia was an important target during World War II for the Japanese.

In the area of conflict over resources, fishery resources is a good example. Spain and Canada had a recent altercation over fisheries. The extent of this conflict often relates to how large the resources are within the countries' overall economy and the sophistication of the countries in question. In addition to considering the quantity and management of resource stocks, one has to consider how pollution affects biological resources. An example of how pollution can affect fisheries is the growing anoxic spot in the Gulf of Mexico linked to U.S. agricultural runoff into the Mississippi River.

Biological resources can also be vital sources of intelligence data. The 1996 National Medal of Science recipient Ruth Patrick identified the provenance of a Japanese submarine by looking at the algae scraped from its hull. Detailed knowledge of the distribution of organisms can be very useful in this regard. The ability of some organisms to do things like accumulate heavy metals or radionuclides can provide useful intelligence about weapons manufacture.

There is also the issue of environmental paranoia. Although it is never mainstream, fear arises periodically in Brazil that the world is going to take away the Amazon.

On the positive side, environment can be used for conflict prevention and confidence building. The United States currently has a common agenda with

Brazil, India, Japan and China. Transboundary park projects fit into this category. Most recently, there has been the potential to get North and South Cyprus working together on water issues.

Finally, the recent controversy over a road building exercise in Panama highlights the potential for the military to negatively and positively affect the environment, including biological diversity. Demilitarized zones are often wonderful wildlife refuges. The Korean Demilitarized Zone is a haven for at least two endangered bird species. DoD is actively engaged in the inventory and protection of biological diversity on its lands. Intelligence information can also be useful for environmental management

Conclusion

All of the foregoing examples tend to fall more into the realm of national interest than into that of the traditional, narrow view of security. Often they are contributory factors rather than sole causes of tension, conflict or confidence building.

Skeptics raise the question of possible substitution. One could deforest the biologically diverse Panama Canal watershed forest and replace it with a single species plantation forest, but it would be an expensive undertaking and unlikely to occur well. In fact, New York City has found it more economical to purchase its watershed than to build elaborate water treatment plants. Medicines can be synthesized only if the molecules are not particularly complicated and can be substituted in some cases but not in others. The bigger issue is how to treat something which in the aggregate is clearly disastrous, but incrementally seems of little importance.

Opening Remarks by George Milne: There is a pervasive tendency to view genetic diversity as an exploitable natural resource, like minerals or lumber, rather than as information. Knowledge of the genetic basis for an organism's ability to respond to its environment has been collected, stored and is accessible to whomever needs it, like books in a library. What would happen if one person were allowed to unilaterally own that library? It is fears like these that promote the stalemate in developing effective international policies regarding genetic diversity. James Madison once said that, "Knowledge governs ignorance, and people need to be their own governors and arm themselves with the power that knowledge gives." If all nations subscribed to this philosophy, no country, including the United States, could obtain unilateral control of biological information.

There is no question that deciphering the genomic codes of plant, animals and humans will greatly impact our society and economy, dwarfing any of the technological discoveries of the last century. This is why we must have a strong and fully developed intellectual property law that clearly defines measures to protect the conversion of knowledge derived from genetic material to beneficial commercial enterprise. In a recent U.S. judgment concerning patent law, Judge Fortas said that, "a patent is not a hunting license. It is not a reward for the search, but compensation for its successful conclusion."

The United States will have tremendous opportunities over the next decade to capitalize on the available genetic knowledge to address plant, animal and human disease. This will be critical to the human species, survival and be of great benefit to the world's population. The health care industry is a greater than $2 trillion enterprise worldwide and as the population ages, this number will increase even further. In addition, people are demanding greater quality in their health care, a demand being fueled by the Internet. This technology allows individuals to ascertain whether they are getting the highest quality health care possible. There is a fundamental opportunity for innovative technologies to solve the unmet concerns of health care and consumers. Genetics and genetic diversity will be at the heart of these dynamics. Therefore, to meet health care needs in a way that is both effective and economically advantageous, it makes sense to start in the United States. The U.S. already has much of the technology in place, and we can observe how the interplay of genetic diversity and the health care industry proceeds. However, within the United States, there are important issues that require attention.

The leadership of the United States in genetic science results from a synergistic triad of government-sponsored research at the National Institutes of Health (NIH), hospital-based biomedical research and the pharmaceutical industry. However, this arrangement is being threatened from several directions. Government funding of this collaboration has not yet met industry needs. Continuing regulations limit the freedom of researchers, driving biomedical research outside the United States. Moreover, the biomedical research infrastructure in teaching hospitals is being undermined by managed care.

There have also been increasing threats to return investments. It takes a pharmaceutical company about 15 years to develop an idea from a genetic observation. Only a small percentage of those ideas reach full fruition as a marketable drug. My yearly task is to convince our board of directors to give me $1.7 billion of the current income to produce products that will probably not pay off for 15 years. Consequently, we must seriously consider any threat to that investment.

Lessons from the Amazon

Looking beyond our national borders, other countries want to know how genetic research will affect them

and their economy. Unfortunately, there is an unfounded belief that new drugs will come directly from materials from locales such as the Amazon, generating a steady source of income. This is misleading for several reasons. The number of indigenous people who possess the shamanic knowledge of plant-derived therapy is decreasing. This limits our access to knowledge of the medical benefits of the local flora; we won't know what plants to procure. Moreover, discovering a plant with a useful medical property does not guarantee that it can be reproduced as a drug. Drugs are quite complex. To ward off insects, a plant may produce a certain chemical that, while medicinally interesting, may not be fit for human consumption. Drug companies must often modify what they find. As a sustainable source of national income, therefore, native flora does not meet current expectations.

This underscores the importance of the pursuit of knowledge. We must study areas like the Amazon by combining sophisticated genetic techniques with careful observation to distill knowledge from nature, to understand how organisms respond to environmental stresses and to convert that knowledge into practical application. On the issue of Brazil, we must assist in the creation of an intellectual infrastructure that can promote useful knowledge under the protection of fair and effective patent laws. Instead of searching the rain forest for a magic bullet, we should work with a country's government to develop a long range investment strategy that utilizes native knowledge, both identifying and preserving useful plants species.

Conclusion

Genetic resources are not commodities because they cannot be bought and sold. It is unlikely that there is some gene that is so unique that it cannot be found in some plant or animal elsewhere in the world. Even insects possess many of the genetic motifs found in man. We need to consider this in our discussion of U.S. policy regarding genetic resources.

We need to determine how we will share information obtained from genetic resources without relinquishing our legal rights. To strengthen our health care system, the United States can contribute by funding genetic research and making innovation strong in this country. To encourage innovation, we must focus on the application of knowledge derived and protect those who produce the end product.

Finally, we must take a long-term approach to working with countries that possess a wealth of diverse species to build a system that encourages investment. To date, few pharmaceutical companies have entered the Amazonian rainforest. Is there some sort of disincentive? There are great opportunities, yet companies have to deal with the realities of investment.

These issues will become more pronounced as the threat to biodiversity increases. In order for mankind to realize the greatest benefit from the genetic diversity of nature, we must address these issues promptly and effectively.

Comments following Discussion

Simmons: The group may wish to consider the ways in which these ideas are rhetorically presented to Congress and to the public—which tend to think of biodiversity only in terms of endangered species or medicinal applications. It may also wish to think about how other nations view the connection between biodiversity and their interests. Second, how might Dr. Lovejoy's and Mr. Milne's ideas change the way one thinks about priorities? Finally, how might today's discussion help to develop response strategies?

Comment: When we take all the considerations—ecology, conservation, security, anthropological realities, energy and drugs—the issue of genetic resources in Brazil is quite complex. We should have multilateral and bilateral meetings that include nongovernmental organizations to produce further knowledge on the value of the Amazonian environment.

Comment: For those working in the genetic industry, what is the potential? From natural resources, are there laboratory solutions where scientists can engineer a microbe designed to attack certain problems? Has the power of the technology outstripped the way we have been thinking about the paradigm of natural resource capabilities?

Lovejoy: Genetic research is increasing the importance of and highlighting the library function. The value of this information tends to be paramount.

Milne: The speed with which one can uncover secrets of the human genome is extraordinary. We have greater ability to view a magnified section of DNA. Furthermore, we can insert a given human gene into a mouse and create genetic abnormality that mimics human disease, such as we have done with diabetes. It is only a modest step to do similar work on plants to confer properties which are even outside of the traditional genetic realm. An example is the research that has been done on maize.

One can think of the possibilities for gene therapy where mutated genes are injected into human populations to cope with certain predispositions or diseases. This may not all happen tomorrow, but it will happen. The technology is proceeding at a rate far faster than people's thinking. Policy will have to adapt.

Because the Amazon is such a nutrient poor environment, it is remarkable that agriculture can survive. The density of survival experience is extraordinary.

From these naturally occurring capabilities will flow a wealth of information.

Comment: In the United States the introduction of the Zebra mussel happened over a long period of time, and it was only within the last 20 years that they took hold and created a problem. Non-indigenous species introduction could be a national security problem. Another nation could try to engineer a disruption by introducing non-native species. It would be great if genetic engineering could serve as a control.

Has there been any impact on species from outside the Mediterranean coming into the Suez canal and affecting the fisheries there?

Lovejoy: The introduction into the Suez canal has occurred over a long period of time. As the barriers become more permeable, the great salt lakes in the middle of the canal lose their salinity, and more species come through.

Comment: In addition to benefits that man will receive from genetic research, I was struck by the potential risks. The introduction of unanticipated, non-native species relates to the risks associated with biological technology and genetic engineering. The library function allows us to harness this new scientific knowledge responsibly to assure that unintended consequences do not occur. I hope that we can really control this new technology.

Lovejoy: Technology is neutral; it can be used for good or for bad. We have to handle it carefully and strike a balance.

Comment: How does one communicate to policy makers some of these issues, translate some of this scientific knowledge into useful information and have an effect on the policy debate. Is the Amazon the best model for this debate? Should there not be a set of models?

Lovejoy: The Amazon has an icon-like status, but there are important resources right in our backyard. For instance, antibiotics found in the Pine Barrens of New Jersey. In fact, there may be extraordinary microorganisms in toxic waste dumps which like to be there and can be used to clean up some sites. Therefore, we must make policy makers and the public aware that genetic resources are everywhere.

Comment: What is the worst case scenario for genetic engineering and the introduction of non-native species that might happen someplace on the planet? What might be done to prevent your greatest concern?

Lovejoy: When you genetically engineer an organism to be able to do or resist something, you need to think through all the contexts if that organism were widely distributed. The other way to look at it is to use genetic engineering to ensure that organisms do not spread into other environments. For instance, you can use built in temperature sensitivity.

Milne: We are already having genetic experiments in nature. New species are continuously introduced. The issue is not one of kind, but of degree. Beyond that, there is power that comes from the new technology. In vaccine research, you can produce infectious viruses that are capable of getting into human cells and replicating only once to immunize.

I make a plea for not hiding behind issues such as privacy. While privacy is an appropriate issue, it is a thin wall. If I can get one of your cells, I can determine a great deal about your genetic make-up. To stop me, you will have to catch me. Affordability of health care and other concerns are going to win out over privacy concerns. Relying on old paradigms is probably one of our greatest risks.

Comment: The responsibility for genetic resources is in the hands of the people and governments of the countries where they are found. It is not the role of industrialized countries to manage and harvest the resources of the world. Countries have a global obligation to handle them responsibly.

We need to examine the maturity of a country's political system to understand how various countries will deal with their natural resources and accompanying issues. Each country must have the backing of the society and not just the government.

How do we introduce intelligent management of genetic resources in all countries? In many countries, certainly in Latin America, the management of genetic resources is part of a country's foreign policy. In some countries there is a systematic attempt to build up a genetic library with information from their rainforests. This foreign policy development comes into play both when the countries deal with the multinational pharmaceutical companies and when they interact in the international community. At present, the role of the private sector with respect to genetic resources in a country's relationship with another is being molded almost exclusively by developed countries' private, industrial multinational companies. But developing countries are starting to see the profitability of genetic resource management. Finally, development agencies of developed countries should work resource management into their policy formats.

Comment: First, is it appropriate to pressure Congress to fund research into genetic resources of other countries? How likely is it for developing countries to export its genetic resources here? Finally, what are the

potential dangers from the export of foreign genetic resources.

Milne: While many people today have expressed their concern over the dangers of genetic engineering, nature has conducted almost as many genetic experiments as you can fathom. It simply wants to be treated with respect.

As far as investments go, the best partnerships are between strong partners. Investments by biotechnology companies in developing countries, are not enormous. I would applaud greater investments.

Comment: The State Department accepts the notion that we are experiencing a paradigm shift in looking at genetic resources. Dr. Milne, what are the sort of structures from the government's perspective that you will want to see in place for the government to settle its domestic and international public policy regarding this topic?

Comment: How are our institutions set up to deal with our concerns? Does the Convention on Biological Diversity address these concerns? Should negotiations on these issues be conducted bilaterally by governments or by the private sector?

Comment: Is 10 years the outer limit for genetic experiments to pose a risk to human populations? In the Aral Sea, there is an island housing a secret Russian biological weapons complex where a land bridge is getting closer to the shore. In 15 years, would not a disease, like Anthrax, still pose a serious threat to humans?

Comment: Are there not still threats to rubber as a strategic good? How can we protect this and other strategic resources?

Milne: To answer the paradigm shift question, turning to an innovative-based health care system will help to contain costs.

In terms of the question of infectious diseases, my comments were not related to microorganisms that can live in the soil, but to those that live in a laboratory. As the population of the world increases, combating disease will create greater demands. Genetic research is a way of addressing infectious diseases.

It is important to find a non-Amazonian model. Countries should make it their responsibility to develop their foreign policy as it relates to their genetic resources. Self-interest is the best motivator.

Lovejoy: First, with respect to rubber, the reason the Amazon rubber boom collapsed was because the trees in the natural forest in Brazil were widely dispersed and could not practically be used in plantation style farming. In South East Asia, plantation-style farming was possible. Originally, the South East Asian rubber trees were susceptible to disease because they were from one seed variety, but now there is more genetic variety. Also, today, rubber is grown in many places throughout the world and is not looked at as a strategic resource.

In terms of the Biodiversity Convention, the real issue for a non-signer is two fold: 1) to really be able to participate in the decisions which are in the interest of everyone, including the United States and 2) the issue of access to biological diversity by scientists.

It would be worth spending some intellectual energy developing some innovative and creative ways for the private sector to invest and to encourage the protection of genetic resources.

In terms of pharmaceuticals or whatever is applied by the private industries, it is important to build partnerships. The best way to transfer technology is by private enterprise.

Finally, how do we get the public and governments to acknowledge an issue that incrementally does not loom large, but in the aggregate is very consequential?

26 November 1996

Environmental and Health Problems in the Former Soviet Union: Do They Matter to the United States?

Murray Feshbach, Professor of Demography, Georgetown University

Environmental and health problems in the former Soviet Union (FSU) directly affect the United States and our allies. There is a growing awareness and understanding of the potential consequences of population growth, ozone depletion, climate change, deforestation, desertification, the decline of ocean fisheries and loss of biodiversity. The spread of concerns about these environmental security issues has led not only to new statements of purpose and activities by the Department of State, the Department of Defense, U.S. AID and other federal agencies, but also to the formation of new organizations which focus on environmental issues.

- A Memorandum of Understanding [MOU] between the Environmental Protection Agency, the Department of Energy and the Department of State regarding cooperation on environmental security was designed "to enhance environmental cooperation between the United States and foreign partners, including the Baltic States, Russia, Eastern Europe, other states of the FSU, and Asia-Pacific nations through information exchange, research and development, technology demonstration and transfer, regulatory reform, emergency response training and environmental management."
- The Department of Defense has adopted environmental security cooperation as part of Secretary Perry's strategy of preventative defense. Furthermore, environmental security cooperation promotes U.S. economic and security interests.
- Brian Shaw, of the Pacific Northwest National Laboratory, in his work for the Department of Energy's Office of International Policy and Analysis, advocates linking environment and national security issues and the need for a more complex study of the issues.
- In September 1996, the Environmental Minister of the European Union, Ritt Bjerregaard of Denmark, stipulated that Central European countries will not be admitted to the European Union until they more vigorously address their environmental problems. They must bring many laws, standards and rules in line with those of Western Europe, incorporating into national law over 200 European environmental-related directives.
- The *World Health Report 1996: Fighting Disease, Fostering Development* states that infectious diseases are the world's leading cause of premature death. ...the re-emergence of infectious diseases is a warning that progress achieved so far towards global security in health and prosperity may be wasted unless effective development policies are formulated, and commitments are made to implement them nationally and internationally. The *WHO Report* also notes that migration and the mass movement of populations provide "fertile breeding grounds for infectious diseases."

Environmental Issues in the Former Soviet Union

Air Pollution

The emission of solid particulates, sulfur dioxide and nitrogen oxide, in addition to posing the greatest region-wide environmental security problems to Central Europe and the FSU, also cause trans-border pollution. For example, atmospheric pollution from the non-ferrous metallurgical plants Severonikel and Pechenganikel on the Kola peninsula has serious implications for Northern Europe, Finland and Norway. In September 1996, the U.S., Norwegian and Russian governments signed an agreement to clean up Kola's environment, especially that of the nuclear submarines which have been decommissioned. Unless additional specific abatement procedures are implemented, however, decommissioning will not lead to proper treatment of environmental haz-

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ards. Andreyev Bay, only several kilometers from the Norwegian-Russian border, has a large number of decommissioned nuclear submarines with nuclear fuel on board. In other instances, the Russians have removed the submarine reactors but stored them in ramshackle storage sites, exposed to the wind and water of the Arctic region. About 70 "environmental time bombs" are awaiting full decommissioning, and 40 more over the next several years are expected to need similar treatment.

The U.S. Department of Defense and the Department of State share Norway's urgency to redress the hazards left by the FSU. The DoD-DoE-EPA MOU plus major cartographic efforts by AMAP, CIESIN, the European Environmental Agency and other organizations seek to map the spread of radioactivity in the area, including the potential hazards to Alaska and Scandinavia. Hopefully, the scientific research as well as the applied dismantling of these submarines and other reactors will be performed in sufficient time to avoid serious nuclear accidents.

While the overall average amount of emissions of acid rain precipitators in Russia and Ukraine is no higher than in many western European nations, the emissions from many specific FSU plants and facilities are so great that the forests in the given regions are totally dead. For example, forests within a 20-kilometer radius of Monchegorsk, the site of the Severonikel plant, are reported to be completely dead. Countries affected by acid rain originating in Russia include not only Norway, but also Kazakhstan, Finland, Ukraine, Belarus and Sweden.

It is not only acid rain that affects flora. The fallout of heptyl (unassimilated dimethyl hydrazine, a liquid rocket fuel) in the Plesetsk testing range area has killed vast areas of fauna as well as flora. An American process is being used to detoxify the stocks of this liquid rocket fuel, but given the size of the stock, it may take quite a while. Again this largely affects Russia, but when the Baltic States took control of their countries, there were several incidents where the local governments refused to move into military sites where heptyl had not been removed by the Russian military because of the danger of this supertoxic, nerve-paralyzing, carcinogenic and volatile material.

When one is concerned about societal stability and the underlying health of a population, water quality is of major importance. As a vector of disease, poor water quality is responsible for many illnesses. Seventy-five percent of all surface water in the FSU is polluted and could be getting worse. In 1990, a polymer plant in Belarus accidentally discharged tons of an organic cyanide compound into the Daugava River, leading to a massive fish kill in Latvia.

The spread of cholera remains possible due to the activation of epidemic processes and the constant risk of the infection being imported to any country of the world. Cholera outbreaks have spread from Russia and Ukraine to other FSU states, Finland, Poland and Turkey. Recently, the border from Mongolia to Russia was closed due to an outbreak of cholera in Mongolia.

Heavy metals, such as lead, cadmium, mercury, and vanadium are at much higher levels in the FSU than in the CEE. There is also a danger to the United States and its allies through the insertion of heavy metals into the Arctic Ocean from the rivers emptying into it.

The environmental pollution by DDT (produced in the FSU until at least 1989 despite an international convention to which they were a signatory in 1972), PCBs, and dioxin in the land and atmosphere seems to be mostly a local, albeit serious problem and does not pose an immediate ecological threat to Europe or nearby Asian countries.

Sea

Regarding the seas, the U.S. Government and Congress has focused most of its attention on the Arctic Ocean. The Arctic region is a virtual laboratory which can give early warnings of environmental damage, as it did with ozone layer depletion due to chemicals from Europe (including the Kola peninsula), which turned up in ice, sediments and polar bears of this region. The newly established European Environmental Agency is paying particular attention to the Arctic region because of the concern of its member states and wariness that the currents in the Arctic Ocean will bring additional pollution dangers from earlier Russian dumping to its member states.

U.S. concern is mostly manifested in issues related to nuclear submarine dismantlement, dumping of nuclear submarines with intact nuclear reactors and fuel rods and undersea nuclear waste dumping sites which might affect the Norwegian, Barents and Kara Seas.

Recently international reaction and fear led to an agreement between the United States and Norway to provide technical and financial aid to help Russia dispose of nuclear submarine reactors and other radioactive waste. The potential destruction of the Norwegians' fishing zones provides at least one compelling reason to fear nuclear mismanagement at sea.

The destruction of fishing zones and related ill-health effects for Alaskan citizens impelled Senator Stevens of Alaska to have the late Office of Technology Assessment prepare a major report on the potential danger to his state. While the report found no clear and present danger, it did not exclude future problems. However the research of Dr. Ted de Laca at the University of Alaska-Fairbanks indicates that a significant source of potential danger—major internal FSU river estuaries—was not incorporated in the estimates for radioactivity emanating from Russia. In addition, the work of Dr. Dan Jaffe, who is building wind direction

models, showed that a nuclear accident at Bilibino would impact Alaska in four days.

The Baltic Sea contains increasing concentrations of mercury, cadmium, lead, nitrogen compounds, petroleum products, detergents and organic wastes. Equally important for environmental dangers emanating in and from this Sea is the large amount of chemical weapons which were dumped in the post-World War II period: between 100,000 and 300,000 tons of poisonous compounds, mainly sarin and mustard gas at a depth of a few dozen meters. Even more of a danger to the 10 littoral countries of the Baltic Sea is the earthen dam containing nuclear wastes at a site in Sillamae, Estonia. This dam is separated from the Gulf of Finland leading to the Baltic Sea by just 10 meters. The United States and its allies should at the minimum spray concrete on the dam perimeter. In mid-September 1996, the Estonian government allocated $400,000—less than 20 times the amount needed—to seal the banks of the lake.

The Black Sea and the Baltic Sea have been polluted by rivers flowing through Eastern Europe, as well as by a number of rivers from Ukraine and Russia, containing increasing concentrations of mercury, cadmium, lead, nitrogen compounds, petroleum products, detergents and organic wastes. There are even reports of nuclear waste being dumped by the Soviets into the Baltic Sea. Adding to the problem is the fact that there were 10 major oil spills in the Baltic in the mid-1980s alone.

Hydrogen sulfide is another potentially serious problem not only for the FSU, but also for other countries such as Bulgaria and Turkey. Its toxicity is such that a five minute exposure to 800 ppm has resulted in death; inhalation of 1,000 to 2,000 ppm may cause a coma after a single breath. It is flammable in the air, and its combustion products (sulfur oxides) are also toxic when inhaled. To date, little has been done to address this problem. The water is heavily saturated with hydrogen sulfide 100 meters below surface. Since the late 1970s, the boundary of water poisoned by hydrogen sulfide has risen from a depth of 200 meters to 50-85 meters, rising to the surface at a rate of two meters per year. If the gas reaches the surface, an explosion might be triggered which could destroy all living creatures in the sea and kill hundreds of thousands of inhabitants of the former Soviet region, Turkey and the former East European countries bordering the sea.

In addition to these pollutants, ammunition was systematically dumped by Soviet military authorities into the Black Sea without permission from Ukraine's environmental agencies. Reportedly, poisonous chemical weapon compounds (mainly mustard gas) were dumped at a depth of only 50 meters.

While the rising Caspian Sea sea level does not present a direct ecological threat to Europe, it could influence climatic changes in Europe. It also could result in pollution throughout the Sea from the flooding of developed oil/gas deposits and adjacent territories.

In 1941, mustard gas was dumped at a depth of one kilometer in the Sea of Japan not far from Vladivostok; in 1995, expired ammunition was dumped in the Aniv gulf near Sakhalin Island and between 1966 and 1992, nuclear waste was dumped in the East Sea near Kamchatka. Only three percent of Vladivostok wastewater discharges are currently processed in the city's purification system. Whether the subsequent pollution will affect Japan is not known; but it should be noted that it is unlikely given the hydrolyzing effect of water movements in the Sea area.

The Aral Sea area incorporates a number of important international as well as domestic issues of immediate concern. The shrinking of the Aral Sea has been caused by water diversion irrigation schemes. To make the situation worse, the canals diverting water from the Amu-Darya and Syr Darya are not lined; consequently, there are losses due to the water seeping into the desert. In addition to the water lost to evaporation, only 30 percent of the water diverted away from the Aral Sea reaches its destination.

Changes have occurred in weather patterns due to the drying up of the Aral Sea—salt storms, desertification—causing hotter, drier summers and longer, colder, snowier winters. Records show that the disappearance of the Aral Sea will inevitably have an effect, and possibly already has, on the climate of not only all of Central Asia, but on Southeastern Europe, India and China as well. For instance, the growing season in the impacted regions has already been shortened by two months.

Another neglected concern is the possible consequences of the dessication of the Aral Sea and the land bridge to Voskreseniye Island resulting from this dessication. When it is no longer an island in the middle of a sea, the probable residues of biological weapon activities in the past may well lead to illness or deaths.

Ozone Layer and Global Warming

Reports from Russia indicate that heavy emissions of chlorofluorocarbons (CFCs) have reduced the ozone layer over central Siberia by some 40 percent in 1995. Nonetheless, the manufacture of CFCs continues in the country. Even President Boris Yeltsin has acknowledged that most of the international smuggling of fluorocarbons originates in Russia.

The loss of forest cover causes the loss of carbon sinks in Siberia, contributing to global warming and its environmental and health consequences. Some two million hectares are felled and replaced each year officially; in reality, only 60 to 70 percent are replaced. The best estimates indicate that a further 7-10 million hectares are felled illegally and are not replanted. Added to that figure are losses from pest damage, fires, soil

erosion and neglect. According to one source, if the present rate of loss continues, the forests will disappear completely within the next 30 years.

The reduction of the carbon sink from such high losses of Siberian forest cover may be more significant than the loss of the Amazon forests. Boreal, small leafed forests of Siberia absorb some 75 percent of the carbon dioxide absorbed by the large-leafed forests of the Amazon region. According to Yablokov, the former environmental advisor to President Yeltsin, Russian forests accumulate some 40 billion tons of carbon and "play an enormous role in the stabilization of the entire climate of the world."

The World Bank's present activity is insufficient to address the severity of the problem. Significant tracts of primary forests in European Russia, such as in Karelia, are threatened with unsustainable practices. These are not addressed by the World Bank's draft Russian Federation Forest Policy Review, nor are the forests in Siberia and in the Russian Far East. The destruction of forests also leads to local soil erosion and the disappearance of small rivers and streams; as a consequence, the number of catastrophic floods in Russia is increasing.

International agencies are currently examining how global warming and the consequent growth of insect populations can increase the spread of infectious diseases. Yet, the World Health Organization's activities have been limited and mostly focused on diphtheria.

Biodiversity

Conserving Russia's vast, relatively intact ecosystems is crucial to maintaining land tracts that are large enough to allow ecological processes and wildlife populations to fluctuate naturally. An international project exists to develop a multivolume text entitled *Flora of North-East Eurasia* that will incorporate a standardized collection/analysis of flora of North America, China, Mongolia, Europe and the Eurasian territory. This could lead to activities to prevent the destruction of rare plants, which may also lead to useful discoveries, such as isolating potential medicines.

Nuclear Issues

There is an ongoing jurisdictional struggle over whether Gosatomnadzor, the equivalent of the U.S. Nuclear Regulatory Commission, has the right to inspect and order corrections in the operations of the civilian and military sites operated by the Ministry of Atomic Energy. This struggle also has direct impact on the United States' knowledge of the nuclear safety of these sites, regarding explosions, the potential for terrorist actions and thefts and their potential use by individuals, organizations and/or governments against us or our allies.

For many years, the dumping of liquid and solid nuclear waste in the northern seas was accomplished by dumping in relatively shallow waters, far above the minimum depth agreed to by the Soviet authorities in the London Convention. Temporarily suspended, at least until land-based repositories are even filled to capacity, this pattern of dumping raises much concern in Scandinavia.

There are radioactive waste facilities across the FSU, many of which are already full. Russia also has more than 80 operational nuclear submarines and two nuclear-powered cruisers stationed at the bases of the Kola. In addition, there are 70 scrapped submarines, of which only 20 have had their spent nuclear fuel removed, partly because of lack of storage sites. These and other nuclear ships produce spent nuclear fuel and radioactive waste constantly.

There have been uncontained underground injections of radioactive waste in at least three places in the FSU: Dmitrovgrad on the Volga, Krasnoyarsk on the Yenisey and Tomsk near the Ob River. Leakage from these sites would be particularly dangerous to U.S. security and the security of other northern nations, in that the Ob and Yenisey Rivers empty into the Arctic Ocean.

The international community has begun activities to address the issue of radioactive waste containment and treatment: South Korea established a task force to counter the 30-year radioactive waste dumping in the East Sea and near Kamchatka by the FSU; there is a South Korea/Russia study in which Moscow will provide the survey vessels and Seoul will provide the funding; South Korea has also initiated a tripartite survey with Japan and Russia.

The 1996 Arctic Military and Environmental Cooperation (AMEC) pact of the United States, Norway and Russia seeks to change the environmental conditions in the Russian Arctic region. Of their six projects, four concern radioactive waste, including the joint development of prototype containers for the interim storage of spent nuclear fuel and work on technology for the treatment of liquid and solid radioactive waste. A treatment plant for low-level liquid radioactive waste is already being built in Murmansk under an earlier joint effort by Norway, Russia, and the United States.

There is also an unknown quantity of radioactive material in secret cities and sites. *The London Times* even reported about the theft or disappearance of nuclear materials in Chechnya. That is another reminder of the dangers inherent in an unstable society with rampant crime—not only to the domestic society, but to other countries, as well.

The 1993 Gore-Chernomyrdin agreements underscored the importance of using remote sensing as a device to prevent secrecy. The list of possible uses of remote sensing includes: timely tracking of impending ecological disasters; determination of ecological disaster areas; reaction to emergency situations; track-

ing geological processes, such as earthquakes; noting land degradation; ice movements on rivers; forest diseases, pest infestation, pollution impacts on tree cover; pollution of surface and underground waters; assisting in cartography and in addition to locating mineral deposits, determining how the deposits are exploited and whether land reclamation is part of the operational program after mining is completed.

Infectious diseases

Risks to U.S. citizens' health exists from the potential spread of disease from travel to or from the FSU, as well as from former residents with latent or actual disease vectors. Given our low level of immunization for many of these preventable diseases, the effort to increase coverage domestically is of great urgency.

Currently diphtheria, tuberculosis, cholera and polio pose the greatest threat. There were 40,000 new cases of diphtheria in Russia and another 60,000 in the remainder of the FSU. Tuberculosis has officially been reported as 70,000 new cases each year in Russia, with a possible figure of some 100,000 for that republic alone if the medical statistics system could incorporate the homeless, forced migrants and refugees who are practically not counted.

One can legitimately wonder whether the 1996 spread of polio in the southern tier of Europe—Greece with 5 cases in September 1996; Yugoslavia with 20 cases reported between August 1 and October 21, 1996 and Albania with 134 cases (14 deaths)—emanates from the newly revealed explosion of polio in Chechnya. Partial coverage of the Chechnya area revealed 137 cases in the 9 months between March and November 1995 (in addition to the approximately 150 cases in 1994). Immunization of the Albanian population seems to have reduced the new incidence to low levels during the second week of October 1996. Finally the European Union and the World Health Organization took note of the new emergence of polio and have succeeded in providing medical supplies and in carrying out immunization in most of this region.

There is a clear and present danger of a potential explosion of HIV/AIDS in the FSU. At the beginning of 1995, only 185 cases of HIV were reported in the Ukraine. In 1996, it was reported that there were 8,000 cases in Ukraine. These data reflect the vast expansion of use of hard drugs transiting through and remaining within the country and the use of unclean syringes and needles.

Moreover, there has been a shocking explosion in recent years of syphilis among juvenile females, with the number of 10- to 14-year old girls infected increasing by 30 times between 1990 and 1994 and males 18 years of age infected increasing by 11 times from 1993 to 1996. There are reports of major increases in other venereal diseases, all considered as potential precursors to HIV and then AIDS. Poor hospital conditions and a much larger gay population at risk than previously estimated lead to the conclusion that HIV and AIDS undoubtedly will explode in and possibly out of the region.

Any expectation that the local and regional authorities will spend the necessary amounts for health (as well as for environmental controls) is extremely optimistic. The diverse patterns that emerge should also lead to major differentials in disease incidence and potential losses of life among the population. Health insurance efforts have been an overwhelming failure to this date despite efforts by U.S. AID, the World Bank and other outside donors. The consequences for social stability or rather for "social disintegration" as feared by UNICEF in a December 1993 publication, also has implications for the United States if disarray occurs in Russia and the leadership transfers to an even less democratic, more authoritarian leader or, alternatively, if the Russian empire breaks apart.

Resolution of the health and environmental problems of the country is required in order to avoid the negative feedbacks to the economy and the future of the country and its population. Labor productivity is inextricably linked to the health of the individual worker or employee, as are the environmental burdens on the individual at their workplace or the city of residence.

Secrecy would greatly hinder progress in the attempts to improve public health. In the past, health statistics and practically all studies on the harmful effects of environmental and occupational factors on human health were labeled "top secret" or "classified." After censorship, most scientific publications contained no factual data, and their scientific and practical value was zero. Until 1988, no environmental statistics were published in the USSR. Health statistics were also limited.

Conclusion

Russia still poses an immense danger to the environment and health of other countries due to the legacy of the Soviet regime, the lack of resources and the will to rectify the domestic scene. There are those who cite the World Health Organization's estimate that the environment is responsible for "only" 20 to 30 percent of all illness in a region or country. But this is the worldwide average—they have not provided specific figures for the former Soviet Union or Russia. In many areas, the share or underlying etiology of illness from environmental hazards may be as much as 50 percent.

The Russian government may be willing to gamble on how it allocates its resources, betting that the West will, in its own self interest, try to solve Russia's problems to defend itself against the dangers of chemical weapon stocks and its detoxification or the spread of

pollution or disease. This is part of a dangerous game that the Russians are playing with us—a game that we must contemplate.

14 January 1997

The Environment in U.S. Foreign Policy

The Honorable Warren Christopher
Secretary of State

Summary: Secretary of State Warren Christopher, senior officials from the State Department and other agencies, and leading environmental experts met to discuss how to advance the goals and priorities set forth in the Secretary's April 1996 Stanford University speech on the environment and American foreign policy. The meeting was chaired by **Thomas Lovejoy**, Counselor to the Secretary for Biodiversity and Environmental Affairs, The Smithsonian Institution, and featured remarks by Secretary Christopher.

Opening Remarks by Thomas Lovejoy: The purpose of this meeting is to discuss environmental priorities within regions, how these priorities intersect with other key U.S. foreign policy goals, and how they might be more effectively integrated into the day to day workings of the Department of State.

We are honored that Secretary Christopher, whose clarion call to consider the environment as a fundamental aspect of U.S. foreign policy surely represents a historical development, chose the Project to organize this meeting. Those of us who have long worked on environmental issues have been immediately heartened by Secretary Christopher's stalwart leadership in taking this beyond rhetoric to a sustained commitment, through a variety of initiatives which need no enumeration here.

Secretary of State Warren Christopher

Good morning. I am very glad to have the opportunity to meet with this group one more time, and to hear your thoughts on making our new environmental diplomacy effective at the regional level. Let me begin by thanking Tom Lovejoy for all his support and counsel—from the Amazon to the Potomac. I also want to congratulate P.J. Simmons and the Wilson Center's Environmental Change and Security Project for its pathbreaking work. As many of you know, Tom accompanied us to the Amazon Research Institute in Manaus, Brazil last February. He was such a perfect guide that I was charmed into exchanging my normal diplomatic uniform for an open shirt, khakis, and sneakers. In my next incarnation, that may become the uniform of the day.

International environmental issues still seem new and exciting to someone of my generation. When I finished law school in 1949, Rachel Carson was still more than a decade away from publishing *Silent Spring*. The world's population then was about half of today's level. As recently as 1977, when I became Deputy Secretary of State, policymakers had barely heard of global warming—and only loosely recognized the connection between the environment and national security.

By the 1990s, the situation had changed, and President Clinton and Vice President Gore came into office with a strong commitment to safeguarding our environment. I arrived at the State Department determined to put environmental issues where they belong—in the mainstream of American diplomacy. We began by naming Tim Wirth the first Under Secretary for Global Affairs, to focus his energy and expertise on these as well as other transnational issues. We were making progress, but I was not satisfied. So last year, with advice and support from Tim, Eileen, and many of you, I launched a wide-ranging initiative to integrate environmental issues into every aspect of our diplomacy—to promote the health and prosperity of Americans and to advance our strategic interests around the world.

Of course, this is only a beginning. I know that the President, the Vice President, and my successor Madeleine Albright intend to build on the foundation we have put in place. They will have effective help from the team that has supported me so ably over the last four years.

This new Administration is well-placed to take on the major environmental issues of 1997, many of which we began to address following the Rio Earth Summit five years ago. These issues include climate change, stopping production and trade of the most dangerous chemicals, setting global standards for protecting our oceans and forests, and stabilizing population growth. Leadership in these efforts is vital to forging regional environmental alliances—and it is in our national interest.

Take just one example—our work with Russia and the other New Independent States to address the poi-

sonous legacy of the Soviet Union. I visited Chernobyl victims at a children's hospital in Kiev and was saddened by the aftermath of that terrible accident, which is visible even in newborn babies. Across the region lives have been ruined, national budgets strained and economic potential undermined by environmental health disasters. That is why we and the G-7 are working with Ukraine to shut down the Chernobyl reactor and prevent future accidents. We have also helped to install water treatment facilities and to develop health education programs in the former Soviet states of Central Asia. With our NATO allies, we are looking at ways to encourage Russia and the Baltic states to cooperate in cleaning up contamination at former Soviet military bases.

Each of our regional bureaus has taken up the challenge of developing significant regional environmental policies that advance our national interests. They have made environmental cooperation an important part of our relations with countries such as Japan, India, Brazil and—of great importance—China. We have chosen six regional "hub" embassies. Funding has been identified and officers are being selected for all six hubs, and they will open this summer.

From San Jose, we will help our neighbors meet the rising environmental standards of our hemisphere, while in Tashkent we work to strengthen local environmental organizations and through them civil society. Our hub in Addis Ababa will address desertification and deforestation, while in Amman we focus on conserving scarce water resources—developing new regional cooperation in both places.

I can announce today that our South Asian hub will be in Katmandu, and our East Asian hub in Bangkok. In South Asia, we have the chance to preserve the environment while promoting cooperation between India and Pakistan—a remarkable opportunity to help longtime foes find common interests. And in East Asia, we will work with countries from Australia to Vietnam on marine and urban pollution. I myself have been struck on my travels in the region by the challenges facing massive Asian cities like Jakarta and Manila.

To sustain these efforts over the long haul, environmental diplomacy requires a global presence and strong international leadership. And if the United States is to maintain its leadership, our diplomacy must have the financial resources to train our people, fund our posts, and support our initiatives. We cannot ensure effective regional action to preserve coral reefs or rain forests if we are forced to close embassies in smaller countries. And we cannot help American businesses, like the one that made a $1 million sale of wind turbines to Indonesia, if we cannot come up with $25,000 for a demonstration project, as USAID did in that case.

The American people are strong supporters of preserving our natural resources—thanks in large part to the educational efforts of NGOs. Now we must work together to show Americans how protecting the environment abroad, and promoting regional cooperative efforts, helps protect us at home.

I believe we can forge a new consensus in support of resources for American diplomatic leadership. Our foreign policy pursues the values and goals of American citizens who belong to an environmental business alliance, support the World Wildlife Fund, or campaign for clean air and clean water in their communities. But I will tell you candidly that the State Department can hardly build that consensus alone.

I ask you to work with the team we have assembled at the State Department to make clear to Congress and the American people how foreign policy matters to their lives and livelihoods, and that foreign affairs spending is an essential investment in their interests. That is what it will take to make sure we have regional policies which meet our national and global interests. This is what it will take to fulfill the promise of environmental diplomacy which I hope will be a lasting legacy of the Clinton presidency.

Remarks by Timothy Wirth (Under Secretary of State for Global Affairs): Congratulations to Secretary Christopher for extending his initial legacy, begun more than 20 years ago, of attention to human rights issues to include an even broader legacy of policy commitment to global affairs. Secretary Christopher has shown a strong commitment to environmental issues and he has endeavored to break down institutional barriers by allowing the environment to be a priority.

Introductory Remarks by Thomas Lovejoy: It is clear that with key environmental issues identified, with the establishment of environmental hubs—6 already today, with 6 more expected by the year 2000—with the signing of common agendas on the environment with nations like India, China, Japan and Brazil, that environmental matters are on their way from being considered as concerns on their own to ones that are linked with other key U.S. objectives and truly integrated throughout the foreign policy apparatus. But moving this process forward will require moving *beyond* discussions of lists to setting environmental priorities—region by region—and carefully analyzing how they relate to, and how they can be integrated with, economic, political and security goals.

It also requires recognizing that the environment represents not only a series of problems to address but also a set of opportunities which can often become positive elements in bilateral relations, which, in turn, advance other U.S. strategic goals. For instance, the environment, and water issues in particular, may well provide the first basis for positive interaction between North and South Cyprus. To obviate the need for further mention, I will list many of the key environmental issues prior to each regional discussion.

Asia

Introduction to Asia region by Thomas Lovejoy: The issue that almost always comes first to mind is that of energy consumption driven by human population increases and explosive economic growth. While often thought of primarily in the context of climate change, this issue has fundamental implications for the stable development and integration of the region into the world marketplace, for U.S. energy industry opportunities, as well as for political and strategic relationships, from the Spratly Islands to as far away as the Persian Gulf. Linked to this issue is China's own estimate of a 19% hit to GNP from pollution, problems of rapid urbanization, land degradation, resource scarcities including agricultural, scarcities with associated implications for world grain prices, and strategic and environmental problems relating to nuclear power. Water scarcity and rapid growth in the chemical industry are additional issues. I would like to open the floor for comments regarding priorities and how they intersect with other U.S. strategic interests.

Remarks by Winston Lord (Assistant Secretary of State for East Asian and Pacific Affairs): Environmental concerns have increased greatly since I first listed the environment as one of the top 10 goals in the Pacific community four years ago. Asia is the key to the global environment because half of the world's population lives there and they have one of the fastest growing economies in the world. There is no greater challenge, and no greater opportunity, to promote U.S. goals than to address environmental issues in Asia. There are four ways of moving environmental goals forward in the region: bilaterally, regionally, globally, and by promoting U.S. technologies.

Bilateral relations are the key for better relations with China, and in areas such as sustainable development and energy, the environment would be a building block for better relations. Regionally, APEC needs to become more focused on this issue and to recognize that the environment is not a zero-sum gain in terms of economic growth. If APEC makes this transition, the environment will move more towards the center of discussion, and can be used as a way to promote regional stability.

Global issues affect the American way of life more than any others. Crucial global issues to be considered include climate change, land based sources of marine pollution, and sustainable development for forests. Finally, the exchange of U.S. technological information is essential for meeting the needs for energy in the region; not only can a transfer of technology help address problems, but, at the same time, it can have a positive impact for American prosperity and jobs.

Remarks by Allen Hammond (World Resources Institute): Urban populations are surging throughout Asia, a process that has just begun. In China alone, the urban population is expected to increase from 350 million to 620 million between 1995 and 2010. The pull of economic opportunity is a major cause of the urban surge, but increasingly, rural scarcity of land, water, and other resources are also pushing migrants from rural areas. The sheer scale of Asian urban expansion means that it will have a major impact on local, regional, and global environmental conditions.

Urban expansion concentrates pollutants, absorbs prime farmland, and threatens important ecosystems (especially coastal ecosystems, because 40% of the world's large cities are located in coastal regions). Cities are in fact the main source of greenhouse gases, air pollution, and toxic releases and a major source of water pollution; the manner in which cities develop is thus critical to regional and global environmental problems. Cities are generally failing to build infrastructure fast enough to keep up with the surge in migration. The result is that squatter settlements are expanding around virtually all cities—creating additional environmental, health, and social problems. Since many of the urban migrants are young, they create a volatile group that could pose security and stability problems, especially in the event of an economic downturn.

Remarks by Robin Raphel (Assistant Secretary of State for South Asian Affairs): There are greater population pressures in South Asia than in China, and South Asia is at a lesser state of economic development. Population and other environmental pressures are connected with three important policy areas. The first area is regional security, with tension between India and Pakistan as an example. In this instance, environmental issues can provide an excellent way to get opposing governments to talk with one another. The second area is trade and investment: as economies have started to open up to foreign investment, there has been increased opportunity for the export of cleaner and more environmentally-friendly technologies. The third area, sustainable development, involving, for example, forestry conservation management, is also an area where environmental issues and economics do indeed intersect. There is much appreciation for Secretary Christopher's advancement of environmental issues in Asia and there is excitement that an environmental hub will be opened in Katmandu to examine issues such as air quality and emergency preparedness. In conclusion, there is already an awareness that the United States has a mutual interest in environmental issues with South Asia; we have already established a "common agenda for the environment" in India. But we need to push for increased discussion of environmental issues and consensus building across borders.

Remarks by Susan Sechler (Global Stewardship Ini-

tiative): Population issues in China are extremely important. Political consciousness has begun to shift, and debates over environmental issues, such as population, which are being played out along North-South lines, are increasingly being seen as a U.S. problem; for this reason and many others, Secretary Christopher's political steadfastness on environmental issues must be passed on.

Remarks by Charles Curtis (Deputy Secretary of Energy): The importance of Secretary Christopher's support for the global environment as a key consideration in U.S. foreign and security policy can be demonstrated by trends in China. From an energy perspective, developments in China have enormous influence on world energy and environment patterns. China is already the world's third largest commercial energy consumer. Its rapid economic growth is expected to drive energy demand growth of about 4 percent per year to the year 2010, comprising roughly 20% of the total increase in world energy demand over this time frame. And coal will continue to provide over 70% of China's energy demand.

China's rapid energy growth and heavy reliance on coal has led to severe environmental pollution. If current trends continue, China's carbon dioxide emissions could double, and account for 25% of the increase in global carbon dioxide emissions between now and the year 2010.

China has recognized the need to address environmental problems and its plans include an increased emphasis on energy efficiency, renewable energy sources and clean coal technologies.

Meeting China's energy expansion needs while reducing impacts on the global environment calls for improving efficiency in all sectors, particularly in the industrial sector, and deploying environmentally sound technologies including clean coal technologies and renewable energy.

The United States can influence this outcome by building on our bilateral cooperation with China. There is real potential for intensified collaboration between the United States and China on energy and environmental technologies and policies. They are the two largest producers and consumers of coal; China is interested in U.S. clean coal technologies as well as U.S. experience in coal utilization and transportation. U.S. capabilities in energy efficiency, integrated resource planning, demand side management and enhanced competition in electricity supply have enormous applications in the Chinese market. And China is looking to the United States for wind, solar, and other renewable technology systems. We can promote practical ways to advance this collaboration in ways which enhance energy security, the global environment and markets for U.S. industry.

Remarks by Scott Hajost (International Union for Conservation of Nature and Natural Resources): With respect to China, three additional items merit attention: The first is China's impact on marine conservation and biodiversity in the Pacific region. The second is the possibility that China may become the leading chemical producer early in the next century, which has implications for phasing out persistent organic pollutants. Finally, we should all take note of U.S. participation in the China Council for International Cooperation on Environment and Development.

Central Europe and the Former Soviet Union

Introductory Remarks by Thomas Lovejoy: For Central Europe and the Former Soviet Union, nuclear cleanup and safety is a dominant issue. While it has important environmental implications for the region in terms of toxic contamination and effects on human health and agriculture, as well as links to energy efficiency, it is also clearly coincident with U.S. strategic interests with respect to potential theft, transport, and sale of nuclear material. Other issues which threaten the possibility of economic and political stability include: chemical waste, polluted inland waterways and lakes, leaking pipelines, air pollution with associated declines in life expectancy, exploitive forestry practices, the destruction of the Aral Sea, and biodiversity loss.

Remarks by Jacob Scherr (Natural Resources Defense Council): The U.S. government has undertaken a number of important activities to address the continuing health, safety, and environmental hazards posed by the continuation of Soviet-style approaches to nuclear weapons production and nuclear power. There remains an overriding need to reform the Ministry of Atomic Energy (Minatom) which is almost a state-within-a-state. At the June 1997 G-7 Summit, there should be discussion of increased assistance to modernize and rationalize the entire Russian energy sector. One encouraging sign in Russia is the recent release from jail—after urging by the State Department—of a former Russian naval officer who was arressted and held for several months for his research on environmental problems associated with the Russian naval base on the Kola Peninsula.

Remarks by Ambassador Jim Collins (Special Advisor to the Secretary of State for NIS): More work needs to be done, and there are three ways in which environmental issues may be addressed in this region: through senior political level commitment to the environment on a bilateral agenda, e.g. the Vice-President's relationship with the Prime Minister of Russia; by illustrating, through the explanation and dissemination of information, that addressing environmental issues is in the self-interest of those people that are affected; and through regional cooperation, asserting that if countries do not

cooperate, with water issues for example, there will be increasing rivalry and the issue will continually appear to be a zero sum gain. One of the biggest challenges in the region right now is Caspian energy development.

Remarks by Allen Hecht (Principal Deputy Assistant Administrator for International Activities, EPA): There are three ways to address environmental issues: through offering assistance to help Russia to improve basic economics and to better develop a rule of law; by working with the Russian government to elevate and to give much needed attention to environmental issues thereby ensuring that the environment is given full consideration; and by striving to overcome the legacy of the Cold War, e.g. radioactive dumping in the Arctic, by promoting safe handling of nuclear material and the sustainable exploration for gas in Northern Russia.

Remarks by Eliza Klose (ISAR): Support for non-governmental environmental organizations must be part of the U.S. strategy for dealing with the grim environmental legacy of the Soviet Union. Whether the chosen priority be dealing with radioactive waste created by the Soviet military, safeguarding flawed nuclear plants, promoting alternative sources of energy, responding to pollution-caused public health problems or protecting the vast forests of the Russian Far East, green NGOs are the most effective agents for identifying, publicizing and addressing the issue, especially at the local and regional level.

The severe environmental problems facing the countries of the former Soviet Union have a direct impact on international security, causing or exacerbating issues of U.S. foreign policy concern, such as growing refugee populations, ethnic rivalries and civil unrest. A strong NGO movement ensures public access to information, promotes volunteerism, supports a free and independent media and stimulates citizen involvement. By helping to surface critical problems and speed the search for their solution, activist groups can play a key role in creating a more secure and stable base for the transitional societies of the former Soviet Union.

Environmental disasters like the Chernobyl accident galvanized mass public protest in the 1980s and helped bring down the Soviet system. Today the NIS green movement, thanks in considerable measure to U.S. assistance, has become more sophisticated and professional. Committed, well-educated activists are now linked by U.S.-funded E-mail systems. U.S. grants support local citizen initiatives, networking activities, legislative change and U.S.-NIS NGO partnerships. These efforts are less visible than mass demonstrations, but they are building the kind of NGO infrastructure and citizen advocacy capabilities that are vital to environmental protection throughout the world. American science, industry and technology have much to offer environmental efforts in the former Soviet republics, but it is the local NGOs who make change happen in their communities and assure that these valuable offerings are put to good use.

Remarks by Frank Loy (League of Conservation Voters): One of the things about the energy sector in certain developing countries that can cause such enormous damage is that often the generation equipment is bought and sold according to cost, without any concern for environmental standards. As a result, there is a "race to the bottom" among suppliers—many with financing and guarantees from the Export-Import Bank and similar institutions. We need to make the harmonization of standards for environmental assessment among such institutions a priority. However, that can only happen with a commitment by the U.S. government to push that all the way to the G-7 level. This is only one answer to the question: "what else can the U.S. government do?"

Latin America

Introductory Remarks by Thomas Lovejoy: Sustainable development is fundamental to the maintenance of stable democracies and the expansion of trade with our closest neighbors. Inequity of income and land distribution are basic hurdles in many of these countries; environmental deterioration through inappropriate forms of development can combine with these hurdles to make refugee problems even greater. It is in our interest for these nations to export products, not people. Sustainable development, its relation to free trade zones and U.S. industry when competitors have lower and cheaper standards, is tightly linked to the environment. Other issues include deforestation, biodiversity loss, as well as massive urbanization with many attendant problems, a point rarely made, with the surprising advantage in some cases of reduced pressure on remaining wild lands. Another key issue is the proliferation of infrastructure projects from hidrovias to highways, pipelines and railroads, all of which have major potential for environmental destruction as well as facilitating drug movement.

Remarks by Jeffrey Davidow (Assistant Secretary of State for Inter-American Affairs): We begin with a clear vision of where the hemisphere is heading, a vision which was crystallized in the December 1994 summit in Miami. It is increasingly obvious that U.S. security improves with stable Latin American governments. These governments increase in stability by addressing key issues such as the environment. However, it is important to focus on "brown" issues as well as "green" because politically important urban dwellers must see some benefits from environmental improvement before they will give their support; this can best be achieved by improving water quality and availability, and by decreasing pollution. Efforts to address environmental concerns are enhanced most by the existence of a community of democratic nations working together. Fur-

thermore, the best way to tackle such issues in Latin American countries is for the United States to integrate environmental matters into its daily interactions with those countries. In order to assist the spread of democracy, people, especially in the less developed countries, must see the issues in terms of their cities, and in terms of their own lives; the people of these countries must understand that environmental issues are critical to free trade and economic development, and that the success of one does not have to preclude the success of the other. The key to success in this region is to integrate environmental issues on a daily basis.

Remarks by Christiana Figueres (Center for Sustainable Development in the Americas): While much progress has been made in the hemisphere on advancing sustainable development, neither the North nor the South has mainstreamed it. There are a number of challenges that must be overcome in Latin America. One of the greatest challenges is for all countries to truly understand what is meant by the term "sustainable development." This challenge was painfully evident in negotiating the agenda for the recent Bolivia summit. The widespread belief in most of Latin America is that North American "sustainable development" merely boils down to "environmental control." In Latin America, the environment is seen as a luxury item that can only be addressed after other urgent matters have been addressed. The gap lies in demonstrating the profitability of sustainable development, an effort which has already been initiated through practices such as bioprospecting and ecotourism, as well as joint implementation projects. But many more concrete examples are needed. The South needs to identify the opportunities; the North must increase their investment in such opportunities. Sustainable development will move forward today only if it is not seen as exclusively protecting the future, but even more importantly, as providing solutions for the present.

Remarks by Ruth Bell (Resources for the Future): The first step in addressing global environmental issues is a global agreement to act. Too often, however, this is treated also as the last step—that signature and ratification marks the end, not the beginning. The issue of implementation is too often swallowed up in the push for new initiatives. The resolution of environmental problems requires domestic efforts, domestic will, and domestic commitment. Secretary Christopher's April speech identified the importance of compliance issues to the United States. This has legitimized and focused attention on one of the most important and previously least discussed aspects of the international environmental regime: the task of creating a culture of compliance in the international regime will assure the success of these hard won agreements.

Africa

Introductory Remarks by Thomas Lovejoy: In Africa, where in many countries the lack of effective government seems a major impediment to so much, the issues of food security and land scarcity seem both the causes and consequences of the state of governments. Linked to these are human population growth, desertification, and high rates of malnutrition, all of which are contributors to humanitarian crises almost on a chronic basis. The promotion of long-term political stability and economic development, attractive to the private sector, not only will help prevent humanitarian and political crises, but also is in U.S. interests and certainly less demanding of resources than crisis-riven African foreign policy at a time of dwindling foreign assistance. Other issues are urbanization and biodiversity loss.

Remarks by Judith Johnson (Principal Deputy Assistant Secretary of State for African Affairs): Africa's greatest needs are for sustainable development and economic growth. In no other continent is there a more immediate connection between environmental progress and overcoming poverty and overpopulation. Environmental goals of primary importance in the region include halting erosion, stopping deforestation and desertification, and conserving species' diversity. The new regional economic hubs should help us to address environmental issues transnationally.

Remarks by Robert Paarlberg (Wellesley College): Africa's number one environmental problem is rural agricultural resource destruction, including soil nutrient depletion (caused by farming without adequate fertilizer use or fallow time), rangeland destruction (caused by overstocking or by displacement of pastoralists onto fragile lands), and rapid deforestation (5 million hectares a year, two thirds of which is caused by clearance for farming).

Farmers in Africa today are cannibalizing their own future; they are in the process of destroying the soil, rangeland, and forest resources that their own descendants will need to thrive and prosper. Already the lower crop yields and the lagging agricultural productivity growth, brought on in part by resource abuse, have worsened the food production crisis in Africa; this is the only region in the developing world where agricultural production growth per capita is currently negative, and is expected to remain negative over the next 20 years. As a consequence, Africa is the only region in the developing world where absolute numbers of hungry people are expected to increase over the next 20 years. In East Asia, South Asia, and Latin America, hunger will be a rapidly declining problem over the next two decades, but in Africa (according to current FAO projections) the number of chronically malnour-

ished people will increase by 70 percent.

Does the United States have an interest in addressing this worsening "eco-malthusian" crisis in Africa? Some try to argue that we have a vital political interest because of the suspected contribution this crisis makes to violent conflict and state failure in Africa. In fact, it is sufficient that we have a *values*-based interest, in seeking to avoid a 70 percent increase in chronic malnutrition over the next two decades.

In the past few years it has been politically convenient to argue that there is nothing the United States can do about this crisis, as long as African governments are doing so little at their end. This is a fair complaint, up to a point. But the United States loses its right to criticize when it cuts its own international agricultural and family planning assistance budgets as sharply as it has in recent years. Since 1992 USAID contributions to international agricultural research centers have fallen by roughly 50 percent. U.S. contributions to family planning assistance abroad were cut by roughly one-third last year alone.

The United States prides itself in leadership, but this looks to Africans like abdication. These cuts may seem to us a legislative branch problem more than an executive branch problem (and it would be a good idea to include members of Congress in meetings of this kind in the future), yet from the vantage point of Africans there is only one government, and the sooner a posture of leadership can be restored, the sooner the African policies of the U.S. government can regain influence and effectiveness.

Remarks by Kate Newman (World Wildlife Fund): The highest environmental priority in Africa today is sustainable land use, particularly in areas that harbor important biodiversity, such as tropical moist forests and the highly productive savanna and grassland ecosystems. Loss of ecological productivity on these lands is important to U.S. and African interests: (1) Rural Africans still depend heavily on biological resources for basic needs and economic growth. The loss of productivity leads to scarcity of valuable resources and degradation of critical agricultural lands; (2) Scarcity leads to migration, conflict and humanitarian crises, keeping humanitarian assistance and conflict resolution constantly in our budgets; (3) Scarcity of biological resources exacerbates the increasing poverty that has led to socio-political instability, the poor health of much of the population, and the potential loss of future markets for American products; (4) Finally, unsustainable land use means the loss of potentially critical genetic material for biomedical and agricultural research.

There should be a concerted effort to integrate land use concerns at the macro level and in all sectors—particularly in bilateral and multilateral assistance and policy development. For example, environmental sustainability should be a major consideration in infrastructure development, such as road building in forest zones. It should be a part of health assistance, through the examination of gathered foods as components of rural nutrition. And finally, it should be incorporated into democratization efforts—such as promoting devolution of resource management authority to local levels.

The Middle East

Introductory Remarks by Thomas Lovejoy: The long term political stability of the Middle East is a vital U.S. interest, particularly as world oil consumption increases and Middle Eastern sources become yet more important. That political stability is threatened by water scarcity, shortages of arable land, and high rates of human population growth. Yet, at the same time, water negotiations present an opportunity for positive engagement in very concrete ways for Israel and its neighbors.

Remarks by Peter Gleick (Pacific Institute for Studies in Development, Environment and Security): There are clear and direct links between fresh water issues and international security and politics. Water is widely shared and increasingly scarce due to population growth, economic development, and changing patterns of use. Water resources are connected to everything we do: the production of food and energy, human and ecosystem health, industrial production, transportation, and the disposal of wastes. Because of their importance, water and water-supply systems have been the goals of political and military action in the past, and tools, targets, and weapons of war. One of our most important goals must be to identify ways to reduce the risks that water will be either a source of tensions and conflicts or a weapon or target of war.

On a regional basis, water resources play important roles in every corner of the world. The connections between water and conflict are particularly strong in the Middle East, where conflicts over the Jordan River basin and the groundwater of the West Bank have already become priority problems in the multilateral and bilateral peace talks, in the Israel-Jordan peace treaty, and in the agreements between the Israelis and the Palestinians. In the coming years, however, current and new tensions over the Euphrates River, shared by Turkey, Syria, and Iraq, may prove to be even more important and difficult to resolve than the current issues over the Jordan. The United States must better evaluate its interests and security ties here and might also play an important role in bringing these parties to the table to negotiate an equitable and reasonable solution.

In Africa as a whole, water is integrally connected to the problem of food security and self-sufficiency, which in turn has strong ties to economic and political

stability. There are also growing disputes over the waters of the Okavango River, shared by Namibia, Angola, and Botswana; unresolved allocations in five rivers that originate in South Africa, flow through Kruger National Park, and into Mozambique; and serious national and international concerns over the cost, scope, and impact of the Lesotho Highlands Project, which affects the nations of Lesotho, South Africa, and Namibia.

In Latin America there are growing concerns over the 1994 U.S.-Mexico Treaty on the Colorado River, with some calls for re-negotiation to address water flows to the Delta, reallocations among current users, and conflicts among agricultural, urban, and environmental interests on both sides of the border. In Asia there are disputes over the Mekong River and dam construction in Laos, major water constraints in Pakistan, continued concerns between India and Bangladesh (despite recent progress on the Ganges/Brahmaputra), and continued overdraft and non-sustainable use of groundwater in India. Over the next several years, food security and self-sufficiency concerns in Asia will grow as populations continue to rise rapidly. In the former Soviet Union and Eastern Europe there are a large number of newly international rivers that have no river allocation agreements or treaties. New negotiations are urgently needed in several places.

It is vital for the United States to better understand the connections between shared water resources and international politics. Without this understanding, the risks of conflict or international tensions will go unaddressed. The United States and the State Department can continue to play a role in facilitating negotiated settlements and bringing parties together, and the United States can identify existing or new mechanisms to resolve particular conflicts. Finally, we must collect, analyze, and share data on environmental conditions and resources.

Remarks by C. David Welch (Principal Deputy Assistant Secretary of State for Near Eastern Affairs): Environmental efforts are the quiet, less heralded parts of the peace process. As Dr. Gleick indicated, water issues are extremely important, and we need additional efforts to cooperate on environmental issues, such as the regional desalinization efforts in Muscat, Oman. Joint efforts, such as those in Oman, foster an arena for scientific discussion while simultaneously contributing to peace within the Middle East.

Interagency Cooperation

Remarks by Timothy Wirth (Under Secretary of State for Global Affairs): One of the hallmarks of Secretary Christopher's tenure has been his close relationship with Secretary Perry, a relationship which has been of utmost importance to achieving environmental goals, since the State Department is dependent on DoD for help on environmental issues.

Remarks by Sherri Goodman (Deputy Undersecretary of Defense for Environmental Security): The DoD is trying to integrate environmental cooperation into its overall defense policy. The DoD is committed to sharing environmental knowledge with others, including the FSU, NATO, and Eastern European countries. Examples include Arctic military cooperation with Russia and Norway; U.S. assistance to Hungary, Poland, and the Czech Republic in developing capabilities; a Regional conference that was held in the Asia/Pacific region on defense and environmental issues; and finally, a similar Western hemisphere defense environment conference to be held in the near future in Miami. Environmental issues are an excellent opportunity to help overall foreign policy and defense objectives and to promote non-military means of cooperation.

Conclusion

Concluding Remarks by Secretary of State Warren Christopher: Congratulations to all the participants for a job well done. The meeting itself has been a good illustration of the relationship between environmental and political issues. For example, China's failure to produce oil is the basis for its interest in fostering a good relationship with Iraq and Iran; the environment and politics interact in Russia's claim that it must find markets for its nuclear products to support its economy; the surge in refugee problems resulting from the massive overpopulation problems in Africa and similar refugee problems in the Near and Middle East have resulted in conflict; and the Syrian government has repeatedly expressed concern over water shortages, as evidenced by its concern about water in peace talks with Israel. In all these regions, environmental issues have consistently shown themselves to be at the center of diplomatic issues and foreign policy.

Non-Governmental Activities

Foundations

The John D. and Catherine T. MacArthur Foundation, Program on Peace and International Cooperation
The Program seeks to enhance prospects for peace and international security through grants for public outreach, policy studies, and academic research and training. Within these grantmaking categories, it fosters the global exchange of ideas by bringing together people with differing national, institutional, professional and cultural perspectives across a broad array of security issues. In the coming year, the Foundation will develop a grantmaking program that integrates the work of the Peace, Population and World Environment and Resources programs. Funds for integrated projects will be available in 1999. For information, contact: The John D. and Catherine T. MacArthur Foundation Program on Peace and International Cooperation, 140 South Dearborn Street, Chicago, IL 60603. Tel: 312-726-8000; Fax: 312-917-0334; E-mail: 4answers@macfdn.org.

The Rockefeller Brothers Fund, Programs on "One World: Sustainable Resource Use" and "One World: World Security"
The goal of the Fund's sustainable resource use program is to "foster environmental stewardship which is ecologically based, economically sound, culturally appropriate and sensitive to questions of intergenerational equity." The Fund's grantmaking in the area of world security, in recognition that world peace is threatened "also by frustration and aggression arising from inequities in the sharing of the food, energy, goods, and services the world economy produces," is currently under review. Until new guidelines are adopted, probably in 1998, no new grants are being made in the international relations field. The Fund's three geographic areas of grant activity are the United States, East Central Europe and East Asia. For information, contact: The Rockefeller Brothers Fund, Inc., 1290 Avenue of the Americas, New York, NY 10104-0233. Tel: 212-373-4200; Fax: 212-315-0996; E-mail: rbf@mcimail.com.

W. Alton Jones Foundation, Sustainable World and Secure World Programs
The W. Alton Jones Foundation seeks to build a sustainable world by developing new ways for humanity to interact responsibly with the planet's ecological systems as well as a secure world by eliminating the possibility of nuclear war and providing alternative methods of resolving conflicts and promoting security. The Sustainable World Program supports efforts that will ensure that human activities do not undermine the quality of life of future generations and do not erode the Earth's capacity to support living organisms. The Foundation addresses this challenge with a tight focus on issues the resolution of which will determine how habitable the planet remains over the next century and beyond: maintaining biological diversity; ensuring that human economic activity is based on sound ecological principles; solving humanity's energy needs in environmentally sustainable ways; and avoiding patterns of contamination that erode the planet's capacity to support life. The Secure World Program seeks to build a secure world free from the nuclear threat. The Foundation addresses this challenge by: promoting common security and strategies related to how nations can structure their relationships without resorting to nuclear weapons; devising and promoting policy options to control and eventually eliminate existing nuclear arsenals and fissile materials; stemming proliferation of nuclear weapons and related materials; addressing threats to global sustainability by preventing the massive release of radioactive material; and assessing and publicizing the full costs of being a nuclear-weapon state. For information, contact: W. Alton Jones Foundation, 232 East High Street, Charlottesville, VA 22902-5178. Tel: 804-295-2134; Fax: 804-295-1648; E-mail: earth@wajones.org; Internet: http://www.wajones.org/wajones.

Non-Governmental Organizations

Cambridge University, The Cambridge Global Security Programme
The Global Security Programme (GSP) attempts to build understanding across the areas of international relations, development studies and environmental studies. The Programme pursues this interdisciplinary approach through teaching, research and policy development. An independent project entitled the Global Security Communications Initiative also operates under the auspices of the GSP. For information, contact: Gwyn Prins, Director, Global Security Programme, Botolph House, 17 Botolph Lane, Cambridge, United Kingdom CB2 3RE. Tel: 1223-33-45-09; Fax: 1223-33-50-65; E-mail: gsp-admin@lists.cam.ac.uk.

Canadian Foundatrion for the Americas, Governance and Security Programme
The Governance and Security Programme of the Canadian Foundation for the Americas examines the nature of governance and security issues in the Americas under a broad definition of security. The Programme focuses extensively on non-military threats while assessing the behavior of states on the international scene as well as in the conduct of their internal affairs. Foundation projects and research examine: confidence and security building measures; arms control and disarmament; conflict prevention and peacekeeping; narco-trafficking; and environmental security. The Foundation also works in partnership with the Facultad Latinoamericana de Ciencia Sociales in Chile. For information, contact: Denis Berthiaume, Canadian Foundation for the Americas, Murray Street, Ottawa, ON, K1N 5M3, Canada. Tel: 613-562-0005; Fax: 613-562-2525; E-mail: focal@focal.ca; Internet: http://www.focal.ca.

The Canadian Global Change Program
The Research Panel on Environment and Security of the Canadian Global Change Program (CGCP) explored key issues and research priorities for Canada. The objective of the Panel was to prepare an issues document that included: a brief overview of the issues and current state of knowledge in the research area; an overview of the current state and plans for Canadian research; and recommendations and prioritization of further Canadian research. For information, contact: David Henderson, Canadian Global Change Program, 225 Metcalfe Street, #308, Ottawa, ON, K2P 1P9, Canada. Tel: 613-991-5640; Fax: 613-991-6996; E-mail: dhenders@rsc.ca.

CAREER/PRO
CAREER/PRO, a project of San Francisco State University's San Francisco Urban Institute, helps communities that host or have hosted U.S. military installations address the legacy of military environmental degradation. CAREER/PRO operates a widely used Internet newsgroup, holds training workshops for members of Restoration Advisory Boards, and consults with citizens and community groups both within the United States and abroad. Project staff participate in numerous advisory committees dealing with military base cleanup. CAREER/PRO publishes the newsletter, *Citizens' Report on the Military and the Environment*, which is available from CAREER/PRO free of charge. In September 1995, it published the *Military Contamination and Cleanup Atlas for the United States –1995*, which mapped and listed military contamination in all U.S. states and territories. For information, contact: SFSU CAREER/PRO, 425 Market Street, Suite 705, San Francisco, CA 94015. Tel: 415-904-7750; Fax: 415-904-7765; E-mail: aimeeh@igc.apc.org.

The Center for Defense Information
The Center for Defense Information (CDI) is a non-profit, non-government organization which believes that strong social, economic, political and military components and a healthy environment contribute equally to the nation's security. CDI opposes excessive expenditures for weapons and policies that increase the danger of war. CDI also has a weekly television show, *America's Defense Monitor,* on Channel 32 (WHMM – Washington, DC) at 12:30 p.m. on Sundays. For other local showing times, as well as access to extensive resources on military and security issues, contact CDI's Internet: http://www.cdi.org. For information, contact: Center for Defense Information, 1500 Massachusetts Avenue, NW, Washington, DC 20005. Tel: 202-862-0700; Fax: 202-862-0708; E-mail: info@cdi.org.

The Center for Economic Conversion
Founded in 1975, the Center for Economic Conversion (CEC) is a non-profit organization dedicated to creating positive alternatives to dependence on excessive military spending. One of the CEC's top priorities is "green conversion," the transfer of military assets (money, talent, technology, facilities and equipment) to activities that enhance the natural environment and foster sustainable economic development. This work includes: studies of green conversion efforts already underway in industry, national laboratories and military bases; a pilot project in green military base conversion; the promotion of public policies that encourage green conversion; and various educational activities that build support for green conversion. For information, contact: Michael Closson, Center for Economic Conversion, 222 View Street, Mountain View, CA 94041. Tel: 415-968-8798; Fax: 415-968-1126; E-mail: cec@igc.apc.org; Internet: http://www.conversion.org.

The Center for Security Policy
The Center for Security Policy exists as a non-profit, non-partisan organization to stimulate and inform the national and international debates about all aspects of security policy, including their strategic and environmental implications, particularly as they relate to the all-encompassing question of energy. The Center is committed to preserving the credibility of U.S. antiproliferation efforts, and the message to allies and potential adversaries

that the U.S. is serious about ensuring the safe and benign global development of nuclear energy. The Center has extensively studied the Chemical Weapons Convention, the Cienfuegos nuclear power project in Cuba, and expressed concern over the Department of Energy's Environmental Management program for cleaning up the nuclear legacy of the Cold War. In addition, the Center calls for increased attention to the strategic importance of the vast oil reserves of the Caspian Basin, and to the deterioration of the sensitive ecosystems and waterways of the region (for example Turkey's imperilled Bosphorus Straits). The Center makes a unique contribution to the debate about these and other aspects of security and environmental policies, through its rapid preparation and dissemination of analyses and policy recommendations via computerized fax, published articles and electronic media. For information, contact: The Center for Security Policy, 1250 24th Street, NW, Suite 350, Washington, DC 20037. Tel: 202-466-0515; Fax 202-466-0518.

The Climate Institute

The Climate Institute has an ongoing Environmental Refugees Program that seeks to assess and respond to likely changes across the globe concerning people displaced from their homes due to land degradation, drought, desertification, deforestation and other environmental problems. The Program, whose Principal Investigator was Norman Myers, has already produced a report entitled, *Environmental Exodus: An Emergent Crisis in the Global Arena*. According to that report, there are at least 25 million "environmental refugees" today—a figure that may double by the year 2010. The Program's next phase will include work with national and international government bodies to generate a consensus on response strategies to these critical issues. For information, contact: Christopher Dabi, The Climate Institute, 120 Maryland Avenue, NE, Washington, DC 20002-5616. Tel: 202-547-0104; Fax: 202-547-0111; E-mail: cdabi@climate.org.

Consortium for International Earth Science Information Network

The Consortium for International Earth Science Information Network (CIESIN), is a private, nonprofit consortium of leading universities and non-government research organizations dedicated to advancing understanding of the human dimensions of global environmental change and sustainable development. As the World Data Center (WDC-A) for Human Interactions in the Environment, it specializes in the access and integration of physical, natural and socioeconomic information across agency missions and scientific disciplines. CIESIN's efforts are directed toward making data collected by U.S. government agencies, the scientific community, NGOs, and international governmental organizations available for widespread use in scientific research, public policy-making and education. Its information cooperative provides a mechanism for obtaining data from approximately 70 major archives and resource centers worldwide. CIESIN has been involved with a number of projects relating to environment and security issues—including work with Vice President Gore's Task Force on State Failure. It also implemented a project in the Strategic Environmental Research and Development Program (SERDP) designed to disseminate recently declassified and civilian data involved in global environmental and population research.

CIESIN's Environmental Treaty and Resource Indicators (ENTRI) database provides online access to international environmental treaties, associated status information and a wide range of national-level environmental, socioeconomic and political variables, including data from the World Resources Institute and Freedom House (http://sedac.ciesen.org/entri). CIESEN's work encompasses: (1) building global and regional networks and information systems that are the center of the emerging global information infrastructure; (2) developing new approaches to science data management that make data from disparate and distributed sources instantly accessible, and allow at-your-desktop integration and visualization to aid research and decisionmaking; (3) creating decision support systems and tools that help decision makers visualize the effects of their choices and understand the forces that influence those choices; and (4) providing training, education and consultation to develop skills needed to access and share information effectively. CIESEN operates the Socioeconomic Data Applications Center (SEDAC) for the U.S. National Aeronautics and Space Administration and the Global Change Research Information Office for the U.S. Global Change Research Program. For information, contact: CIESEN User Services, 2250 Pierce Road, University Center, Michigan 48710. Tel: 517-797-2622; E-mail: ciesin.info@ciesen.org; Internet: http://www.ciesen.org.

Cornell Program on Environmental Conflict Management

The Cornell Program on Environmental Conflict Management (CPECM) strives on both domestic and international levels to provide a forum for resolution of environmental conflicts. The Program builds partnerships among private and public institutions through conferences and workshops. For information, contact: Kasia Grzelkowski, Cornell Program on Environmental Conflict Management, 200 Rice Hall, Center for the Environ-

ment, Ithaca, NY 14853. Tel: 607-255-7879; E-mail: kg17@cornell.edu.

Ecologic – Centre for International and European Environmental Research
Ecologic was established in 1995 as a not-for-profit institution for applied research and policy consultancy. Ecologic is part of the network of Institutes for European Environmental Policy with offices in Arnhem, London, Madrid, Paris and Brussels, as well as a wider network of associated researchers. The mission of this network is to analyze and advance environmental policy in Europe. The main themes of Ecologic's work are: strategic dimensions of environmental policy, European environmental policy, multilateral environmental agreements, trade and environment, environment and development, environment and security policy, environmental policy instruments, green finance, regulation and enforcement, as well as various issues of air pollution control, waste management, and water management and policy. Ecologic works for diverse sponsors and clients including: the German Federal Parliament, the German Federal Ministry of Environment and Federal Environment Agency, the French Ministry of Environment, the German Federal Ministry of Economic Affairs, the Länder Working Group on Water, the Ministry of Environment of North Rhine-Westphalia, the Environment Agency and the Office of Water Services in the United Kingdom, the German Foundation for International Development, as well as Directorate-General XII (Research) of the European Commission and the Organization for Economic Co-operation and Development. In addition, research is carried out for or in cooperation with industry, trade unions, and environmental or conservationist NGOs. For information, contact: Ecologic, Friedrichstrasse 165, 10117, Berlin, Germany. Tel: 49-30-2265-1135; Fax: 49-30-2265-1136; E-mail: office@ecologic.de; Internet: http://www.envirocom.com/ieep/.

Environmental and Energy Studies Institute
In 1992, the Environmental and Energy Studies Institute (EESI) organized a series of round table discussions between members of Congress and experts in various fields interested in environment and security. The program, entitled, *Environment, Economy, and Security in the Post Cold War World*, produced nine commissioned papers. EESI's current efforts in this area focus on how development assistance might be retooled to address environment and security problems and prevent state failure. For information, contact: Ken Murphy, EESI, 122 C Street, NW, Suite 700, Washington, DC 20001-2109. Tel: 202-628-1400; Fax: 202-628-1825.

The Fridtjof Nansen Institute
Established in 1958, the independent Fridtjof Nansen Institute (FNI) conducts applied social science research on international issues of energy, resource management and the environment. Placing a particular emphasis on an interdisciplinary approach, FNI strives to meet academic quality standards while producing user-relevant and topical results. Projects of particular relevance for environmental change and security include the International Northern Sea Route Programme and the *Green Globe Yearbook*. For information, contact: Willy Østreng, Director, The Fridtjof Nansen Institute, Fridtjof Nansens vei 17, Postboks 324, Lysaker, Norway N-1324. Tel: 47-67-53-89-12; Fax: 47-67-12-50-47; E-mail: iliseter@ulrik.uio.no.

The Global Environmental Change and Human Security Project
In May 1996, the Scientific Committee of the International Human Dimensions of Global Change Programme (IHDP) formally adopted the Global Environmental Change and Human Security (GECHS) initiative developed by the Canadian Global Change Programme and the Netherlands Human Dimensions Programme as an associated project of the IHDP. Associated projects are those which are developed and maintained as joint ventures between the IHDP and one or more national HDP committees. At present, there are three other major projects in the IHDP: Land Use and Cover Change (LUCC), which is a joint initiative with the International Geosphere-Biosphere Program (IGBP); Institutions; and Industrial Transformation and Energy Use. GECHS will be coordinated by the Canadian Global Change Programme and the Netherlands HDP Committee, in conjunction with the IHDP. Other national HDP committees are expected to join the project once it is operating. The coordinating committee, is under the directorship of Steve Lonergan (Canada), Nico Schrijver (The Netherlands) and Gerd Junne (The Netherlands). The objectives of the project are three-fold: (1) to promote research activities in the area of global environmental change and human security ("human security" recognizes the essential integrative nature of the relationship among individual, community and national vulnerability to environmental change); (2) to encourage the collaboration of scholars internationally; and (3) to facilitate improved communication and cooperation between the policy community/user groups and the research community. For information, contact: Steve Lonergan, Department of Geography, University of Victoria, P.O. Box 3050, Victoria, BC, V8W 3P5, Canada. Tel: 250-721-7339; Fax: 250-595-0403; E-mail: lonergan@uvic.ca.

Global Green USA Legacy Program/Green Cross International

The Legacy Project aims to "accelerate the clean-up of the environmental legacy of the Cold War" by facilitating cooperation and dialogue among the military, environment, citizens, business, and scientific and government communities. Current efforts include a Washington, DC office focused on public education and policy advocacy to strengthen military-related pollution clean-up, and CHEMTRUST, a three-year project designed to build public participation in Russian and American decisionmaking for chemical weapons demilitarization. For information, contact: GG USA Legacy Program, 1025 Vermont Avenue, NW, Suite 300, Washington, DC 20005-6303. Tel: 202-879-3181 or 202-879-3184; Fax: 202-879-3182; E-mail: rudy@igc.org.

Global Survival Network

The Global Survival Network (GSN, formerly the Global Security Network/Russian Marine Mammal Council) and its research division, the Investigative Network (IN), comprise a non-profit environment and human rights organization. IN identifies and highlights threats to global security in the post-Cold War era and GSN assists in the development and implementation of remedial programs. IN conducts investigations into problems such as the cross-border trade in endangered species, weapons of mass destruction and the effects of industrial development on marine mammal life. GSN then establishes relationships with hosts of local organizations, such as the Russian Marine Mammal Council (RMMC). RMMC is a Moscow-based registered Russian public organization focused on oceans research in the former USSR, conservation of marine mammals, and marine clean-up and enforcement strategies to address the growing problems of pollution and poaching in Russian/NIS waters. The RMMC is comprised of dozens of marine scientists, including President Yeltsin's Ecological Security Advisor Alexei Yablokov. GSN is also helping to fund the Russian Ministry of Environment's "Operation Amba," which oversees forestry patrols in the Russian Far East working to protect the Siberian Tiger and other endangered species. For information, contact: Global Survival Network/Investigative Network, P.O. Box 73214, T Street Station, NW, Washington, DC 20009. Tel: 202-387-0028; Fax: 202-387-2590; E-mail: ingsn@igc.apc.org.

Harvard Center for Population and Development Studies

The Common Security Forum is an independent international grouping of public leaders and scholars who seek to promote reflection and communication about the nature of security and to advance practical policies to ensure peace and development. The Human Security Program of the Common Security Forum, based at the Harvard Center for Population and Development Studies, was established to explore the human dimensions of security. The program is pursuing several complementary research initiatives in the following areas: ethics and international policy; human survival crises during complex humanitarian emergencies; and population and security. For information, contact: Harvard Center for Population and Development Studies, 9 Bow Street, Cambridge, MA 02138. Tel: 617-495-0417; Fax: 617-495-5418.

Institute of War and Peace Studies, Columbia University, Environment and Security Project

The Institute of War and Peace Studies (IWPS) at Columbia University studies military and nonmilitary aspects of international relations. A grant from the United States Institute of Peace is allowing the IWPS to investigate the relationship between environmental degradation, resource scarcity and violent conflict in the developing world. Specifically, the IWPS Environment and Security Project seeks to explore the various pathways whereby environmental and demographic changes interact with state elites and institutions to produce civil strife. The project will include a number of single and comparative case studies of environmentally-induced violent conflict in Africa, East-Central Europe, the Middle East, and South Asia. For information, contact: Colin Kahl, Institute of War and Peace Studies, 13th Floor, International Affairs Building, 420 West 118th Street, New York, NY 10027. Tel: 212-854-4616; Fax: 212-864-1686; E-mail: chk12@columbia.edu.

International Clearinghouse on the Military and the Environment

The International Clearinghouse on the Military and the Environment (ICME) collects and disseminates a wide variety of data on the relationship between the military and the environment and the effects of war (and preparations for war) on the environment. For information, contact: John M. Miller, Coordinator, ICME, P.O. Box 150753, Brooklyn, NY 11215. Tel: 718-788-6071; E-mail: fbp@igc.org.

The Institute for Foreign Policy Analysis, Inc.

The Institute for Foreign Policy Analysis (IFPA) is a non-profit policy research organization affiliated with the Fletcher School of Law and Diplomacy at Tufts University. Founded in 1976, the Institute has performed a wide range of studies of a variety of foreign policy and security affairs issues, as well as the sources, scope and impact of ethnic conflict in the post-Soviet security environment. The Institute also has a long-standing interest in

issues of resource scarcity; the security implications of energy extraction, transit and processing; and the linkages between economic development, environmental degradation and political stability. IFPA is well-known internationally for its ability to organize a wide range of fora that bring together key decisionmakers and experts from the international community. These meetings have included senior-level, formal gatherings involving the participation of heads of state and government, leaders of key multinational organizations and senior parliamentarians; expert-level workshops and round tables; and seminar series on Capitol Hill and elsewhere. With offices in Washington, DC and Cambridge, Massachusetts, IFPA has extensive resources upon which to draw in both the worlds of policy and academe. For information, contact: Institute for Foreign Policy Analysis, Inc., 1725 DeSales Street, NW, Suite 402, Washington, DC 20036. Tel: 202-463-7942; Fax: 202-785-2785.

Laval University, The International Institute for Environmental Strategies and Security, Gerpe
The International Institute for Environmental Strategies (IIESS) and International Secretariat of the Groupe d'Etudes et de Recherche sur les Politiques Environmentales (GERPE) are both located at Laval University in Québec, Canada. The IIESS examines the interplay between variables such as culture, economy, society and the environment and addresses environmental insecurity as it relates to human perceptions of insecurity. Proposed research topics include environmental risks and the policy process and an examination of the environment and foreign policies of all states beginning with the Group of Seven. Regional Programs in New Delhi and Mexico are also commencing. The GERPE is an international network of approximately 80 institutions, most of which are academic, whose primary purpose is to organize debate and intitate research in environment and security. The GERPE seeks to stimulate cross-discipline research and regional cooperation on environmental security initiatives. Two seminars on environmental security are upcoming including one in Barcelona this year and another in 1998. The 1998 seminar is expected to launch a major research project on the topic. For information, contact: Dr. Paul Painchaud, IIESS, International Secretariat of the GERPE, Faculty of the Social Sciences, Edifice Jean-Durand, Université Laval, Québec City, Québec, G1K 7P4 , Canada. Tel: 418-656-2316; Fax: 418-656-7908.

International Institute for Sustainable Development
The International Institute for Sustainable Development (IISD) seeks to integrate sustainable development into Canadian and international policy decisionmaking. The Institute targets research and activities to public, business, academic and policy audiences. Programs include: Trade and Sustainable Development, Great Plains Agriculture; Measurement and Indicators; Business Strategies; Community Adaptation and Sustainable Livelihoods; and Information and Communication. Themes of environment and development integration and security are common across all program work. For information, contact: International Institute for Sustainable Development, 161 Portage Avenue East, 6th Floor, Winnipeg, Manitoba, Canada R3B 0Y4. Tel: 204-958-7700; Fax: 204-958-7710; E-mail: reception@iisdpost.iisd.ca.; Internet: http://iisd1.iisd.ca/; Linkages: http://www.iisd.ca/linkage.

International Peace Research Institute, Oslo
The International Peace Research Institute, in Oslo, Norway (PRIO), was founded in 1959. PRIO is financed by Norwegian ministries, research councils, the UN system and various international institutions. Researchers at PRIO have published significant theoretical contributions on the concept of security while also investigating the specific linkages between environment, poverty and conflict. Future projects center on connections between the natural environment and conflict and migration. PRIO also makes ongoing contributions as the editorial home to both *The Journal of Peace Research* and *Security Dialogue*. For information, contact: Dan Smith, Director, International Peace Research Institute, (PRIO), Fuglehauggata 11, 0260 Oslo, Norway. Tel: 47-22-54-77-00; Fax: 47-22-54-77-01; E-mail: info@prio.no.

IUCN: The World Conservation Union
IUCN is a unique international conservation organization due to its membership that includes over 900 states, government agencies and non-government organizations across some 140 countries, and scientific and technical networks. The mission of IUCN is to influence, encourage and assist societies to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable. It has been an important actor in promoting effective global governance through contributions to multilateral agreements such as CITES and the Biodiversity Convention, in environmental mediation (e.g., OkaVango Delta, Victoria Falls) and at the regional and national levels (e.g., national conservation strategies and transboundary ecosystem management). The triennial meeting of IUCN's members, held in Montreal, Canada in October 1996, was also the site of the first IUCN World Conservation Congress. The Congress was the largest gathering of conservation experts since the Rio conference. The theme of the Congress, *Caring for the Earth*, mapped out

Quantitative Findings that Environmental Stress and Population Density Increase the Probability of Civil Conflict

In an pathbreaking new study, European researchers Wenche Hauge and Tanja Ellingsen used quantitative analyses to test whether environmental scarcity and population density contribute substantially to civil conflicts and/or civil wars. After examining environmental, population, economic and political data associated with civil wars between 1980-1992 and armed conflicts between 1989-1993, Hauge and Ellingsen presented the following findings at the March 1997 Annual Convention of the International Studies Association in Toronto:

- Countries suffering from environmental degradation—and in particular from land degradation—were more likely to experience [between 1989-1993] civil conflict than countries that did not experience degradation. The authors assign percentage values reflecting statistical probability throughout the paper.
- High population density further increased the risk of civil war and of armed conflict.
- In a comparative perspective, economic and political conditions have a much higher effect on civil war than environmental factors; in contrast, environmental degradation has a much higher relative impact on armed conflicts—even higher than poverty.
- Of the environmental factors, land degradation appears to be the one with the greatest impact; this is true for both armed conflicts and civil wars.
- The close linkages between economic, political and environmental variables underscores the important need to analyze the synergistic effect of these factors.

The Hauge/Ellingsen research is particularly significant because it builds upon the field's leading case studies by Thomas Homer-Dixon and his University of Toronto research team. Homer-Dixon and others used case studies to identify the role of depletion and degradation of renewable resources, combined with population pressure and unequal distribution of resources, in civil conflicts. Hauge and Ellingsen's study addresses critiques of past research on environment and conflict—including the assertion that case studies have thus far failed to offer comparative evidence (because they did not allow variation in both the dependent and independent variables and only examined cases in which both violence and environmental scarcities were present) and did not identify the relative importance of environmental scarcities as causal factors in conflict formation.

From Hauge, Wenche and Tanja Ellingsen, "A Multivariate Approach to the Relationship between Environmental Stress and Civil Conflict," prepared for the 38th Annual Convention of the International Studies Association, Toronto, Ontario, Canada, 18-22 March 1997.

For more information, contact Wenche Hauge at PRIO, Fuglehauggata 11, 0260 Oslo, Norway. Tel: 47-22-54-77-00; Fax: 47-22-54-77-01; E-mail: info@prio.no.

IUCN's three year conservation and sustainable development program. The program included meetings on water scarcity, population and environment, and environment and security. For information, contact: Scott A. Hajost, Executive Director, IUCN-US, 1400 16th Street, NW, Washington, DC 20036. Tel: 202-797-6594; Fax: 202-797-5461; E-mail: shajost@iucnus.org.

Military Toxics Project

The Military Toxics Project (MTP) unites community groups, environmental justice networks, veterans' and labor organizations in the struggle to clean up military pollution, safe-guard the transportation of hazardous materials, and to advance the development and implementation of preventative solutions to the Department of Defense's toxic, radioactive, and electromagnetic threats to the U.S. environment and our Americans' health. MTP provides resources and assistance to the public and generates a number of publications on issues such as: depleted uranium and conventional munitions; military use of ozone depleting chemicals; and public participation. MTP also publishes the newsletter, *Touching Bases*. For information, contact: Military Toxics Project, 471 Main Street, 2nd Floor, Lewiston, ME 04240. Tel: 207-783-5091; Fax: 207-783-5096; E-mail: mtp@igc.apc.org.

Monterey Institute of International Studies Monitoring Commonwealth of Independent States Environmental Developments

The Monitoring Commonwealth of Independent States Environmental Developments (MCISED) seeks to assist environmental recovery in the states of the former Soviet Union by monitoring environmental problems and providing policy-oriented training, research and public outreach activities. In addition to serving as a clearinghouse for information about nuclear and non-nuclear environmental concerns in the countries of the CIS, the MCISED staff collect and abstract Russian, Ukrainian and English language articles and other documents for publication in the *CIS Environmental Watch*, the semi-annual journal of the Project. The publication also features analytical articles on specific nuclear and non-nuclear related environmental problems in the former Soviet Union. In cooperation with the MIIS Center for Nonproliferation Studies, the MCISED also maintains the CIS Nuclear Environmental Abstracts Database, part of the CIS Nuclear Databases. These databases contain the most comprehensive open-source collection of information on nuclear proliferation and nuclear safety issues in the former Soviet Union. The CIS Nuclear Environmental Abstracts Database consists of summaries of articles on the most pressing nuclear-related environmental developments in the region. For information, contact: Tamara C. Robinson, Monterey Institute of International Studies, 425 Van Buren Street, Monterey, CA 93940. Tel: 408-647-3538; Fax: 408-647-3519; E-mail:trobinson@ miis.edu; Internet: http://www.miis.edu.

The Nautilus Institute for Security and Sustainable Development

The Nautilus Institute is a policy-oriented research and consulting organization. Nautilus promotes international cooperation for security and ecologically sustainable development. Programs embrace both global and regional issues, with a focus on the Asia-Pacific region. Nautilus has produced a number of policy-oriented studies on these topics which are available on the Internet and in hard copy. Current projects include a U.S.-Japan Policy Study Group focused on transboundary environmental and security issues arising from rapid energy development in Northeast Asia. This group is identifying specific areas for cooperation and collaboration between the United States and Japan to mitigate the negative impacts of the growth in energy use. The Energy Futures project focuses on the economic, environmental and security implications of future energy resource scenarios for Northeast Asia including coal, nuclear power, natural gas, and increased efficiency and renewable sources. The Institute is also launching a project which will take a close analytical look at the concept of "energy security" in Japan, exploring the decision-making options to increase energy security without presupposed conclusions as to the implications for the use of nuclear technology. The Institute also leads dialogues on environmental security issues in the Korean Peninsula and conducts research on trade and environmental issues in the APEC region. The Northeast Asia Peace and Security Network (NAPSNet) and the Asia-Pacific Environmental Network (APRENet) are two information services the Institute offers to subscribers free of charge via E-mail. For information, contact: The Nautilus Institute, 1801 2nd Street, Berkeley, CA 94710. Tel: 510-204-9298; Fax: 510-204-9298; E-mail: info@nautilus.org; Internet: http://www.nautilus. org.

Natural Resources Defense Council

The Natural Resources Defense Council (NRDC) is a U.S. non-profit environmental protection organization with over 350,000 members and a staff of attorneys, scientists and specialists addressing the full range of pressing environmental problems. The NRDC has long had an active program related to environment and security. It has undertaken research, analysis and advocacy related to nuclear weapons production and dismantlement, nuclear materials and proliferation, and nuclear energy in the United States, the former Soviet Union, China and elsewhere. The NRDC has encouraged the U.S. government to address global common problems and environmental challenges in developing countries, which may adversely affect our own nation's security. Since the 1992 Earth Summit, the NRDC has worked to establish mechanisms to hold governments accountable for the commitments they have made to move toward "sustainable development." Other than nuclear issues, the NRDC's current priorities include climate change, energy, fisheries and forests. For information, contact: S. Jacob Scherr, Senior Attorney, NRDC, 1200 New York Avenue, NW, Washington, DC 20005. Tel: 202-289-6868; Fax: 202-289-1060.

National Wildlife Federation

The International Office of the National Wildlife Federation (NWF), lobbies members of Congress to reform foreign aid and security budgets, advocating increased allocations for international environment, sustainable development and population stabilization programs. NWF advocates reforms in the World Trade Organization and inclusion of environmental issues within new, post-Cold War security policies. For information, contact: Barbara Bramble, Director, International Office, National Wildlife Federation, 1400 16th Street, NW, Washington, DC 20036. Tel: 202-797-6600; Fax: 202-797-5486.

Pacific Institute for Studies in Development, Environment, and Security
The Pacific Institute for Studies in Development, Environment, and Security, directed by Peter H. Gleick, is an independent, non-profit center created in 1987 to do research and policy analysis in the areas of environmental degradation, sustainable development and international security. The Institute has three broad goals: (1) to conduct policy-relevant research on the connections between international security, global environmental change, and economic development; (2) to facilitate communication between individuals and institutions working on problems in these three areas; and (3) to educate policymakers and the public on the nature of these problems and the need for long-term strategies to deal with them. The Institute has been a leader in research on how resource issues may fuel instability and conflict, particularly focusing on freshwater resources, forestry and resource management. Recent projects include: regional case studies on the Philippines, Southern Africa and the Middle East; examination of U.S.-Mexico border water issues; and research into sustainable water planning and use. For information, contact: The Pacific Institute for Studies in Development, Environment, and Security, 1204 Preservation Park Way, Oakland, CA 94612. Tel: 510-251-1600; Fax: 510-251-2203; E-mail: pistaff@ pacinst.org; Internet: http://www.pacinst.org/pacinst.

Pacific Northwest National Laboratory, The Center for Environmental Security
The Center for Environmental Security (CES) provides a venue to debate and evaluate environmental issues that impact national security for the purpose of addressing underlying motivations for weapons acquisition and developing regional tension-reduction and confidence-building measures. The Center has established a web site to enhance the level of debate and evaluation, and to share information in an interactive medium. The Center provides an open forum for government officials and others who are interested in environmental security to act on their interests through the sharing of ideas, experiences and needs regarding nonproliferation, national security policy and related tools, and compliance with arms control and environmental treaties. The CES seeks to involve a wide range of technical contributors, beginning with the academic community and including non-governmental organizations. Examples include: publishing in key academic journals, inviting members of the academic community to speak at Center-sponsored forums, actively participating in conferences sponsored by academic institutions and research organizations, and networking throughout the research community. The Center adds an environmental dimension to regional security questions. It therefore builds on traditional concerns about regional security, such as political, socio-economic or military disparities combined with a lack of trust between border or resource-sharing countries. Findings from the analysis will inform policy options for effective development of tension-reduction and confidence-building measures. The policy studies and recommendations from the web site will be the culmination of the Center's activities – the result of the Center's success at integrating interagency needs, contributions of the academic community, and capabilities of the national laboratory system. Interim steps along the policy development path will require the Center and those affiliated with it to prioritize areas of focus, accurately frame questions for exploration within a regional security context, conduct the analytical activities to recommend policy options and utilize interagency decisionmaking processes to select a policy response. For information, contact: Brian R. Shaw, Manager, Center for Environmental Security, National Security Divsion, Pacific Northwest National Laboratory, 901 D Street, SW, Suite 900, Washington, DC 20024-2115. Tel: 202-646-7782; Fax: 202-646-7838. Or contact: James L. Fuller, Nonproliferation Programs, Pacific Northwest National Laboratory. Tel: 509-376-4065; Fax: 509-373-0716. (See Department of Energy, Office of Nonproliferation and National Security on page 208).

Population Action International
Population Action International (PAI) promotes the early stabilization of world population through policies that enable all women and couples to decide for themselves, safely and in good health, whether and when to have children. PAI's Population and Environment Program supports this work through research and publications on the relationship of population dynamics to the sustainability of natural resources critical to human well-being. The program is also expanding its research to economic, health and safety issues. Program staff were instrumental in preparing PAI's most recent publication, *Why Population Matters*, which is available in short and long formats for public education and mass distribution. Other publications have addressed population's impact on fisheries, climate, cropland and renewable fresh water. For information, contact: Robert Engelman, Director, Population and Environment Program, Population Action International, 1120 19th Street, NW, Suite 550, Washington, DC 20036. Tel: 202-659-1833; Fax: 202-293-1795; E-mail: re@popact.org.

Population Reference Bureau
The Population Reference Bureau (PRB) provides information to policymakers, educators, the media, opinion leaders and the public around the world about U.S. and international population trends. PRB examines the

links between population and a range of issues, including links between population, environment and security. PRB has recently initiated a cross-national project on population, environment and consumption in collaboration with research institutes in Mali, Mexico and Thailand. For information, contact: Alene Gelbard, Director, International Programs, PRB, 1875 Connecticut Avenue, NW, Suite 520, Washington, DC 20009-5728. Tel: 202-483-1100; Fax: 202-328-3937; E-mail: popref@igc.apc.org.

Space Policy Institute, The George Washington University, Earth Science Research and the Challenges of Environmental Security

This project examines how NASA could use its science data and information tools to provide advance warning of emerging resource scarcities throughout the world by examining issues such as: What earth science information is most critical in identifying and monitoring environmental scarcities? How can the results of earth science research add to the understanding of environmental changes that might engender violent conflict? What new analytic directions should NASA consider in order to make some of its current research of greater direct benefit to the foreign policy and national security communities? What utility would data from the new commercial satellites have in addressing these problems? The Space Policy Institute has hosted two multidisciplinary work shops that explored the environmental data and information needs for environmental security. The workshops concluded that too little attention has been devoted to identifying and collecting the data and information required to understand and mitigate the effects of environmental degradation. Teasing out information from the myriad data sources and complex, interwoven factors requires sophisticated analytical tools. It also requires a close working relationship with experts informed about the social and political factors that influence conflict. Workshop discussions also noted that environmental security issues are closely linked geographically and by type to other environmentally-related issues such as sustainable development, public health, large-scale population displacements and disaster relief. In many cases, researchers lack even basic large-scale data sets to assist in studying land use and land cover questions related to these issues. Putting the results of such research to work in reducing the chances of conflict will require close coordination among federal agencies, scientists and experts in international development. The Institute is focusing particular attention to food security and the factors that contribute to increased urbanization in Africa, Asia, Latin America and North America. The Institute will publish a report early in 1997. For information, contact: Ray A. Williamson, Space Policy Institute, 2013 G Street, NW, Stuart 201, The George Washington University, Washington, DC 20052. Tel: 202-994-6451; Fax: 202-994-1639; E-mail: rayw@gwis2.circ.gwu.edu.

Stanford University Global Environment Forum, Institute for International Studies

The Institute for International Studies (IIS) at Stanford University has established an integrated teaching and research program in environmental studies to aid in the discovery and dissemination of knowledge related to global issues such as population growth, human health and nutrition, climate change, toxic wastes, and loss of biodiversity. IIS has established five main research areas that combine both science and policy-related studies: (1) global change; (2) ecology, agriculture, biodiversity and regulation; (3) health, population, and resources; (4) technological approaches to biodiversity assessment; and (5) market-based approaches to environmental preservation. These issues are currently the

University of Toronto, Project on Environmental Scarcities, State Capacity, and Civil Violence

The Project on Environmental Scarcites, State Capacity, and Civil Violence at the University of Toronto has investigated the impacts of water, forests and cropland resource scarcities on governmental capabilities in the developing countries of China, India and Indonesia. The Project asks, if capacity declines, is there an increased likelihood of widespread civil violence such as riots, ethnic clashes, insurgency and revolution? The two-year project has targeted its findings for the public and policy-makers in Canada, the United States, China, India and Indonesia. Funding for the Project has been provided by The Rockefeller Foundation and The Pew Charitable Trusts. For information, contact: Thomas Homer-Dixon, Principal Investigator, Peace and Conflict Studies Program, University College, 15 King's College Circle, University of Toronto, Toronto, Canada M5S 1A1. Tel: 416-978-8148; Fax: 416-978-8416; E-mail: pcs.programme@utoronto.ca. For information on the various Peace and Conflict Studies Department projects, contact the following Internet locations: The Peace and Conflict Studies Program: http://www.library.utoronto.ca/www/pcs/pcs.htm; The Project on Environment, Population and Security: http:// www. library.utoronto.ca/www/pcs/eps.htm (an abstract of those results was published in ECSP Report #2); The Project on Environmental Scarcities, State Capacity, and Civil Violence: http://www.library. utoronto.ca/www/pcs/state.htm; The Environmental Security Library & Database: http://www.library.utoronto.ca/www/pcs/catalogue/libintro.htm.

focus of the Environmental Policy Seminar, a weekly series that is conducted by IIS for faculty members and their graduate students throughout the University. The goal of the Seminar is to generate new interdisciplinary, collaborative research as well as teaching, which will be linked to the establishment of international research centers in Latin America and Southeast Asia and to existing Overseas Studies Centers in Berlin and Kyoto. The seminars are project-focused, and are tied to ongoing research by faculty and graduate students throughout the University and to other academic, governmental, or industrial institutions sharing an interest in solving or implementing solutions to the problems presented. For information, contact: Donald Kennedy or Stephen Schneider, Co-Directors, Global Environment Forum, Encina Hall, Room 200, Stanford, CA 94305-6055. Tel: 415-725-9888; Fax: 415-725-2592; E-mail: hf.exn@forsythe. stanford.edu.

Stockholm International Peace Research Institute
Financed by the Swedish Parliament, the independent Stockholm International Peace Research Institute (SIPRI) was established in 1966. SIPRI's international staff pursues research on a variety of defense and disarmament issues, including the links between environment and security. SIPRI publishes the *SIPRI Yearbook*, an annual collection of articles on world armaments and international security. For information, contact: Stockholm International Peace Research Institute, Frosunda, S-171 53 Solna, Sweden. Tel: 46-8-655-97- 00; Fax: 46-8-655-97-33; E-mail: sipri@sipri.se.

Swiss Peace Foundation (Berne)/Center for Security Policy and Conflict Research at the Swiss Federal Institute of Technology, Zurich, Environment and Conflicts Project
The Environment and Conflicts Project (ENCOP), completed in 1996, investigated the causal relationships between human-made environmental transformation and both actual or possible violent conflicts. The project published a final report (in German) and a comprehensive set of regional studies (most of them in English): *Environmental Degradation as a Cause of War*, *Vol I-III*. ENCOP's two leading institutions, started a follow-up project—Environmental Change, Consensus Building and Resource Management (ECOMAN) in the Horn of Africa. Based on the systematic analysis provided by ENCOP, the new project aims to investigate practical approaches to the prevention and resolution of conflicts arising from environmental degradation. For information, contact: Kurt R. Spillman, Center for Security Policy and Conflict Research, Swiss Federal Institute of Technology, ETH Zentrum, 8092 Zurich, Switzerland. Tel: 41-16-32-40-25; Fax: 41-16-32-19-41; E-mail: postmaster@sipo.reok.ethz.ch. Or contact: Guenther Baechler, Swiss Peace Foundation, P.O. Box 43, 3000, Bern 13, Switzerland. Tel: 41-13-11-55-82; Fax: 413-13-11-55-83; E-mail: swisspeace@dial.eunet.ch; Internet: http://www.fsk.ethz.ch/encop/.

Tampere Peace Research Institute
Researchers at the Tampere Peace Research Institute (TAPRI) have convened conferences and published research on the environment and security nexus in the context of a larger peace research agenda. TAPRI's contributions include theoretical as well as case studies as found in Director Jyrki Käkönen's edited volumes, *Green Security or Militarized Environment* (1994) and *Perspectives on Environmental Conflict and International Politics* (1992). Other recent works on the topic are Jyrki Käkönen's, *Perspectives on Environment, State and Civil Society: The Arctic in Transition*, Research Report No. 5, from EPOS, Uppsala and Linköping Universities (1994) and *Conflicts, Security and Environment* (in Finnish) (1995). Researchers focus on environment, security and conflicts in the context of wider research projects on Regionalization in Europe, Political Change and Security in Europe and the Mediterranean, a meeting place of two cultures. Director Jyrki Käkönen has a project on *Resource and Environmental Conflicts in International Relations*. For information, contact: Jyrki Käkönen, Director, Tampere Peace Research Institute, Akerlundinkatu 3, 4th Floor, P.O. Box 607, FIN 33101 Tampere, Finland. Tel: 358-03-215-7689; Fax: 358-03-223-6620.

Trade and Environment Database Project
Since 1992, the Trade and Environment Database (TED) Project, directed by James Lee, has investigated the intersection of trade and the environment. One effort has built and made available over 350 case studies on trade and its relation to the environment. The cases are posted on a website which can be sorted by legal, trade, geographic and environmental clusters. Other projects of the TED include research on economic impacts on trade and the environment, the *Trade and Environment* newsletter, and a video project seeking to convey trade and environment issues through a multi-media forum. For information, contact: James Lee, Director, TED Project, School of International Service, American University, 4400 Massachusetts Avenue, NW, Washington, DC 20016. Internet: http://gurukul.ucc. american.edu/ted/ted.htm.

The 2050 Project

The 2050 Project was established to study ways to achieve a more sustainable global environmental system by the year 2050. Computer modelling and in-depth policy studies address issues of social inequity including: the relationship between human behavior and conventional economic theory; the likelihood of societal instability under conditions of systematic inequitable asset distribution; the inevitability of the inequitable distribution of wealth; and the effects of war, disease, environmental degradation, cultural identity, government controls, and the availability of credit on the evolution and viability of civilizations. The Project is a collaborative effort by the Brookings Institution, the Santa Fe Institute and the World Resources Institute. For information, contact: World Resources Institute, 1709 New York Avenue, NW, Washington, DC 20006. Tel: 202-638-6300; Fax: 202-638-0036.

Worldwatch Institute

Worldwatch has a long-standing interest in how environmental issues relate to security; Worldwatch President Lester Brown wrote some of the earliest articles on environment and security issues. The Institute recently published *Full House: Reassessing the Earth's Population Carrying Capacity*, by Lester Brown and Hal Kane, which addresses the effects of food scarcity on global and regional political stability. Worldwatch researcher Michael Renner published in late 1996 a book on international security and environment/sustainable development entitled, *Fighting for Survival: Environmental Decline, Social Conflict, and the New Age of Insecurity*. Various Worldwatch papers have dealt with international security issues, especially those by Mr. Renner—most recently Paper 122, *Budgeting for Disarmament: The Costs of War and Peace* and Paper 114, *Critical Juncture: The Future of Peacekeeping*. Worldwatch Paper 125, *The Hour of Departure: Forces that Create Refugees and Migrants*, by Hal Kane, also deals with security issues and the environment. Many other Worldwatch publications discuss redefining security in the context of global environmental and social issues, and Worldwatch will continue these analyses. For information, contact: Worldwatch Institute, 1776 Massachusetts Avenue, NW, Washington, DC 20036. Tel: 202-452-1999; Fax: 202-296-7365.

Governmental Activities

The Centers for Disease Control and Prevention

The Centers for Disease Control and Prevention (CDC) is addressing the public health aspects of environment and security links by developing a strategy to confront the spread of infectious diseases. The CDC outlines this strategy in *Addressing Emerging Infectious Disease Threats: A Prevention Strategy for the United States*, published in April 1994. The plan contains four goals:

Surveillance: The CDC will expand and coordinate surveillance systems for the early detection, tracking and evaluation of emerging infections in the United States; develop more effective international surveillance networks for the anticipation, recognition, control and prevention of emerging infectious diseases; improve surveillance and rapid laboratory identification to ensure early detection of antimicrobial resistance; strengthen and integrate programs to monitor and prevent emerging infections associated with food/water, new technology and environmental sources; strengthen and integrate programs to monitor, control and prevent emerging vectorborne and zoonotic diseases.

Applied Research: The CDC will expand epidemiologic and prevention effectiveness research; improve laboratory and epidemiologic techniques for the rapid identification of new pathogens and syndromes; ensure timely development, appropriate use and availability of diagnostic tests and reagents; augment rapid response capabilities for vaccine production and delivery and expand evaluation of vaccine efficacy and the cost effectiveness of vaccination programs.

Prevention and Control: The CDC will use diverse communication methods for wider and more effective delivery of critical public health messages; establish the mechanisms and partnerships needed to ensure the rapid and effective development and implementation of prevention measures.

Public Health Infrastructure: The CDC will ensure the ready availability of the professional expertise and support personnel needed to better understand, monitor and control emerging infections; make available state-of-the-art physical resources (laboratory space, training facilities, and equipment) needed to safely and effectively support the preceding goals and objectives.

For information, contact: Centers for Disease Control and Prevention, 1600 Clifton Road, Mailstop D-25, Atlanta, GA 30333. Tel: 404-639-3286; Fax: 404-639-1623.

Department of Agriculture/Natural Resources Conservation Service/International Conservation Division

The NCRS is addressing the food security and land security aspects of environment and security issues through its International Conservation Division (ICD). The ICD of NRCS is dedicated to assisting in the management and conservation of global resources by collaborating with foreign country institutions in several fields: managing and conserving natural resources; improving capacity for sustainable agriculture; and enhancing capabilities for addressing problems of food security, income generation and the environment. ICD assists foreign nations in these fields through several means: technical assistance; scientific and technical exchange; international meetings and workshops; and the development of project proposals and reviews of ongoing programs. Additionally, the NRCS with the U.S. Forest Service recently established an interagency center for the international agroforestry development, technology transfer and international exchange at the University of Nebraska. For information, contact: Hari Eswaran, Director, or Gail Roane, International Training Specialist, International Conservation Division, USDA/NRCS, P.O. Box 2890, Washington, DC 20250. Tel: 202-720-2218; E-mail: Hari.Eswaran@usda.gov; or E-mail: Gail_Roane@ usda.gov.

Department of Commerce/National Oceanic and Atmospheric Administration

Office of Global Programs

In November 1995, the National Oceanic and Atmospheric Administration (NOAA) collaborated with the NSF, NASA and the DoE to organize the International Forum on Forecasting El Niño: Launching an International Research Institute. Chaired by NOAA Administrator James Baker, and hosted by the President's Science Advisor, John Gibbons, the Forum launched a multinational effort to support scientific research and climate forecasting activities of direct relevance to societies around the world sensitive to climate variability. The Forum was attended by 40 countries and more than 20 international and regional organizations, as well as members of the

international physical and social science communities. The Forum provided a broad consensus for creation of an International Research Institute (IRI) and network for climate prediction that would embody an "end to end" capability for producing experimental climate forecasts based on predicting the ENSO phenomenon, and generating information that could be incorporated by decisionmakers worldwide to mitigate climate related impacts in sectors such as agriculture, water management, disaster relief, human health and energy. For information, contact: Jim Buizer, Director, Forum Executive Secretariat (FES), NOAA/OGP, 1100 Wayne Avenue, Silver Spring, MD 20910. Tel: 301-427-2089 (ext. 24); Fax: 301-427-2082.

Department of Defense/Environmental Security/International Activities

The U.S. Department of Defense (DoD) has a vibrant and growing role in enhancing international environmental security. DoD considers environmental protection as integral to national security. The U.S. military's role in environmental protection is manifold: it demonstrates leadership in the United States and abroad, helps guarantee access to the air, land and water needed to train U.S. forces and helps promote environmentally sustainable behavior on the part of other militaries around the world. If environmental degradation can incite tension, instability and conflict over scarce resources, environmental protection can advance democratic processes and environmentally benign economic development around the world.

DoD's view of "environmental security" is comprised of the following: (1) ensuring environmentally responsible action by military units wherever they may be; (2) ensuring adequate access to land air and water to conduct a defense mission; (3) protecting DoD's war-fighting assets (people, equipment and facilities); (4) understanding where environmental conditions contribute to instability and where the environment fits into the war and peace equation; (5) bringing defense-related environmental concerns to the development of national security; (6) studying how defense components can be used as instruments of U.S. global environmental policy.

Globally, the military figures prominently in environmental issues, both because of its past and potential effects on the environment and its ability to protect the environment. DoD has been a leader in such environmental efforts. In the international community, the DoD has been recognized as a premier example of how to institutionalize environmental protection within a military organization. Based on experience within the DoD, it is clear that militaries can do much to avoid having a negative impact on the environment. Furthermore, militaries of other nations have expressed increasing interest in adopting a similar approach to environmental protection. Such efforts contribute directly to improving the quality of life in these countries and regions, and, in turn, assist in maintaining national and regional stability. Among the many intitiatives the DoD has undertaken are the following:

• In July 1996, the DoD, the Department of Energy and the U.S. Environmental Protection Agency signed a Memorandum of Understanding (MOU) on international environmental cooperation. Implementation is currently underway with pilot efforts in the Artic and the Baltic Sea areas. This is one of many DoD international environmental efforts conducted in close cooperation with the State Department and other U.S. agencies.

• In September 1996, the Secretary of Defense signed a Declaration with the Defense Ministries of Norway and Russia on Artic Military Environmental Cooperation (AMEC) in which the three nations' forces will work together to ensure that their military activities do not harm the Artic environment. Under AMEC, Russia, Norway, and the United States are undertaking projects on safe handling and storage of radioactive materials, the proper disposal of contaminated materials, and the exchange of information on risk assessments and cleanup technologies and methods.

• Since 1980, the DoD has participated in a number of NATO environmental efforts. Currently, the DoD chairs, co-chairs or participates in 10 NATO environmental multiyear studies. The DoD officials also helped negotiate a draft NATO environmental agreeement with Russia.

• DoD and the Swedish military recently published *Environmental Guidelines for the Military Sector*, a handbook to be used by militaries throughtout the world to assist them in establishing or enhancing their environmental programs.

• DoD engages in bilateral environmental cooperation with Germany, Norway, Sweden, Russia, Poland, the Czech Republic and Hungary. Discussions for bilateral cooperation are underway with Finland, Turkey and Spain.

• DoD participates in an active Environmental Trilateral with Australia and Canada. In September 1996, this trilateral, in conjunction with CINCPAC, sponsored the first Asia-Pacific Defense Environmental Conference attended by military and civilian officials from approximately 40 nations and representatives of the environmental and engineering industries of the three sponsoring nations. Planning is underway for additional meetings on a regional basis to address specific issues of common interest.

• In conjunction with CINCSOUTH, DoD will gather in Miami in 1997 with the militaries and environmental agencies of the Western Hemisphere nations for the first regional conference on environmental security cooperation.

DoD's Office of Environmental Security established an Outreach Directorate to integrate non-governmental and public participation into the process of shaping and implementing DoD environmental policies. For information, contact: Noel Gerson, Outreach Director, ODUSD(ES), 3400 Defense Pentagon, Washington, D.C. 20301-3400. Tel: 703-695-3329; Fax: 703-693-0493; E-mail: gersonnl@acq.osd.mil.

Department of Energy

The Department of Energy (DoE) engages in a variety of activities related to environmental security. Over one-third of DoE's budget is spent addressing the legacy of environmental mistakes in the manufacture of nuclear weapons. DoE also engages in activities to help reduce U.S. dependence on imports of oil. DoE also runs a number of programs devoted to technology development and to the sustainable use of resources:

Office of Fossil Energy

The broad range of Fossil Energy (FE) technical approaches to oil and gas exploration, development and utilization, and coal processing and coal-powered electricity generation, provide a base for evaluating and determining the most appropriate technology for international applications. FE provides insights into environmental sensitivities that are necessary for multinational problem resolution. Additionally, FE's environmental security initiative provides the opportunity to enhance cooperative efforts with the Environmental Protection Agency and the Department of Defense. Current FE projects include: coalbed methane production and brine disposal in the Upper Silesia region of Poland; Krakow Clean Fossil Fuels and Energy Efficiency Program; and Electrownia Skawina (Krakow, Poland).

Office of Energy Efficiency and Renewable Energy

The Office of Energy Efficiency and Renewable Energy (EE) conducts research to develop more cost-effective and innovative energy efficiency and renewable energy technologies. These technologies form part of the vital link between national and international development and the environment by assisting in the development process while reducing U.S. dependence on imported fuels and lowering consumption of potentially polluting energy resources. EE's focus areas include utilities, building, transportation, and electric power generation sectors and cross-cutting efforts with foreign partners. EE has also established channels to promote the transfer of technologies to emerging nations which involve cooperation between the government, private sector, financial community, international organizations, and other interested parties. Organizations for the deployment of such technology include the Committee on Renewable Energy Commerce and Trade (CORECT) and the Committee on Energy Efficiency Commerce and Trade (COEECT). Both are interagency programs which facilitate the worldwide use of U.S. technologies and services by bringing together potential foreign customers and decision-makers, funding sources and U.S. industry representatives. The programs are designed to assist industry to export goods and services in order to promote sustainable growth, the conservation of environmental resources, and to expand capacity for economic growth.

Office of Nuclear Energy

The Office of Nuclear Energy (NE) provides technical leadership to address critical domestic and international nuclear issues and advances U.S. competitiveness and security. In cooperation with international partners, NE supports the environmental security initiative through the improvement of nuclear activities. For example, NE supports enhancing the safety of Soviet-designed nuclear energy plants and helping host countries upgrade their nuclear safety cultures and supporting infrastructures.

Office of Nonproliferation and National Security

Within the DoE, the Office of Nonproliferation and National Security has sponsored research and workshops that focus on regional environmental security, instability, and the proliferation of weapons of mass destruction.

The Office's focus is on regions where nuclear proliferation is an existing concern and its analysis has two goals: (1) determine how environmental issues may intensify or generate regional instabilities; (2) assess the potential for enhancing regional stability through the use of confidence building measures which focus on environmental problems. The focus on environmental issues also provides and opportunity for scientists and officials to familiarize themselves with the technology and process of cooperative monitoring and verification for environmental issues before applying them to arms control issues which may be more sensitive. The DoE's Pacific Northwest National Laboratory, in consultation with the Departments of State and Defense, opened an environmental security center in August 1996. The Center will bring together the extensive environmental resources and programs of the Laboratory to concentrate on security issues. (See the Pacific Northwest National Laboratory, Center for Environmental Security **on** page 202).

Office of Environmental Management
The Office of Environmental Management (EM) interacts with foreign governments, international corporations, and international regulatory and consensus standards bodies. Principle topic areas include: characterization, handling, transport, and storage or nuclear and chemical wastes; addressing the decontamination and decommissioning of nuclear facilities; developing systems with foreign partners to ensure proper control and monitoring. EM's international agreements allow the United States to obtain unique technical capabilities and engage in exchanges of scientific and technical data and expertise unavailable from U.S. experience like comparative designs of waste storage systems.

Office of Energy Research
The Office of Energy Research focuses on the production of knowledge needed for technology to fulfill the DoE's energy, environment, and competitiveness missions. Research supports the environmental security initiative by providing information on: regional and global environmental change and the consequences of that change; advanced and alternative technology to prevent and/or mitigate environmental pollution (including bioremidiation methodologies); advanced health information on toxic pollutants; advanced tools to diagnose and treat human disease; and risk management methodologies. The Office of Health and Environmental Research is responsible for managing the DoE's seven National Environmental Research Parks which operate under the premise that appropriate research can aid in resolving environmental problems locally and internationally.

Climate Change
Through the Office of Policy and International Affairs, the DoE participates in U.S. international delegations that implement Administration policy and negotiate international agreements. DoE provides analysis of policy options for limiting emissions, works with stakeholders, and articulates Administration policy in a wide variety of fora. The DoE co-manages with the EPA the U.S. Country Studies Program (USCS) and the U.S. Initiative on Joint Implementation (USIJI). USCS assists over sixty developing and transition economy countries in conducting studies on emission inventories, technology options, climate impacts, and migration options. USIJI is a pilot program to develop projects which reduce emissions of greenhouse gases in other countries.

Department of State/Bureau of Intelligence and Research
The Bureau of Intelligence and Research (INR) at the State Department works on environment and sustainable development issues, most recently in support of the Department's environmental diplomacy initiative. INR believes that environmental security research needs to focus on linkages between increasing ethnic tensions (mostly at a sub-national level) and resource scarcity. This view explains INR's focus on sustainability issues and the need for reliable sustainable development indicators. INR's Office of the Geographer and Global Issues (GGI) deals with the following: (1) UN and humanitarian concerns; (2) territorial conflicts and cartography; and (3) environmental and sustainable development. It publishes a classified bi-weekly newsletter, *Environmental and Sustainable Development Update*. INR believes most international environmental issues can best be analysed from open sources.

Department of State/Bureau of Oceans and International Environmental and Scientific Affairs
The Bureau of Oceans and International Environmental and Scientific Affairs (OES) is the Department of State's focal point for foreign policy formation and implementation in global environment, science and technology issues. Key priority issues for OES include global climate change, toxic chemicals, marine pollution, fisheries, forests, biodiversity and emerging infectious diseases. OES works closely with the White House, U.S. Government agencies, Congress, U.S. universities, nongovernmental organizations, private citizens and other bureaus

Environmental Protection Agency/ Office of International Activities

America's environment and security interests do not stop at U.S. borders. The protection of U.S. citizens and the global environment requires cooperation with other countries. The EPA's international programs aim to: protect U.S. citizens from air, water and land pollution along our borders; reduce global environmental threats, such as pollution of the atmosphere and oceans; serve important U.S. economic, foreign policy and national security interests. An EPA report from the Science Advisory Board entitled, *Beyond the Horizon*, contains the following recommendation: "EPA, as well as other agencies and organizations, should recognize that global environmental quality is a matter of strategic interest."

There is little doubt that political, economic, and environmental events in other countries can affect environmental quality in the United States. Even when such events do not affect the U.S. environment directly, they can affect international environmental and economic resources in which the United States has a strategic interest. Consequently, to protect both the national interest and the environmental quality of the United States, it is essential that global environmental quality be recognized, as a strategic interest of the United States. To meet these goals, outlined below are some of the EPA's international programs.

To protect direct threats to U.S. citizens, EPA has active programs and strong forms of cooperation with Mexico, Canada, the Caribbean and the Arctic. Recognizing that global environmental threats can also affect U.S. national security, EPA has programs to address stratospheric ozone depletion, climate change, marine and coastal pollution and the loss of biological diversity. EPA is working through environmental programs in Central and Eastern Europe and the NIS to promote democratization and healthy free-market economies. The EPA's participation in the U.S.-Asia Environmental Partnership and other programs has helped strengthen environmental protection efforts in a region undergoing enormous economic and environmental changes, which can impact national security. The EPA is an active participant in the water activities under the Middle East Peace process and has modest programs in Africa to help those nations where environmental factors can affect a country or region's stability.

Acting on President Clinton's belief that a strong environmental program is crucial to U.S. security, economic and health interests, DoD, DoE and EPA launched a cooperative effort on environmental security in 1996. A Memorandum of Understanding (MOU) was signed by the three agencies calling for a focused integration of government authorities, expertise and resources on environmental priorities, and for the creation of a framework for cooperation in several areas. This collaboration is already in place to address issues of concern in the Arctic dealing with radioactive waste and non-radioactive contamination, and the DoD/DoE/EPA "team" intends to expand its efforts to other parts of the world, such as the Baltics. The EPA believes that the establishment of the inter-agency framework under the MOU will link respective mission responsibilities to achieve U.S. environmental and foreign policy objectives.

The EPA has a major role to play in this interagency program as it has long been recognized internationally for its pioneer development of approaches to protecting the environment against a wide range of threats. As a result, EPA has a world-wide network of agreements, technical exchanges cooperative efforts and general contacts; a broad base of expertise to address environmental and public health issues; and the means to address problems from the research level through policy development and the regulatory legal process. The EPA has also provided training and information on a worldwide basis to governmental and non-governmental organizations seeking to develop their own environmental protection infrastructure and has been recognized for its current efforts to address the more complex second generation of environmental problems in the context of a limited national resource base through its development of risk-based approached to environmental protection.

For information, contact: Wendy Grieder, International Activities Specialist, U.S. Environmental Protection Agency, 401 M Street, SW, Washington, DC 20460. Tel: 202-260-4887; Fax: 202-260-8512.

in the Department of State to formulate U.S. foreign policy on these and other global environmental concerns. Within the OES, the primary responsibility for considering issues of environment and security rests with the newly created office of Regional Policy Initiatives (RPI). Established just last year, RPI's main goal is to ensure that environmental objectives are fully integrated in U.S. foreign policy efforts. With officers covering each of the world's major geopgraphic regions, RPI examines how problems such as resource scarcity, urban growth and pollution affect U.S. strategic interests. For information, contact: RPI, U.S. Department of State, Room 7831, Washington, DC 20520. Tel: 202-647-3472. Internet: www.state.gov/www/global/oes.

The INFOTERRA Network/USA National Focal Point/Environmental Protection Agency
INFOTERRA is the international environmental research and referral network of the United Nations Environment Programme (UNEP), and as such is a major resource for environment and security experts. It is composed of 170 National Focal Points in as many member countries. This system was established in accordance with the decisions of the 1972 United Nations Conference on the Human Environment in Stockholm, Sweden. Its goal is to serve as a link between those who are seeking environmental information, and those who have the knowledge and expertise. The National Focal Points represent their countries in the INFOTERRA system and carry out work at the national level. The U.S. National Focal Point for INFOTERRA responds to 400-500 requests per month from governments, NGO's, universities, schools, industries, and concerned citizens inside and outside the United States. It conducts research on international environmental topics, identifies and locates international and U.S. Government documents, compiles customized bibliographies, provides requesters with copies of EPA documents in hardcopy or microfiche, refers patrons to experts around the world, briefs international visitors and conducts database searches on over 400 databases. For information, contact: INFOTERRA/USA, U.S. EPA (3404), 401 M Street, SW, Washington, DC 20460. Tel: 202-260-5927; Fax: 202-260-3923; E-mail: infoterra@epamail.epa.gov.

The Intelligence Community (IC)
The Intelligence Community (IC), as a whole, engages in environmental activities in three distinct ways: It provides traditional environmental intelligence support for foreign policy and military operations; it provides information from classified collection systems to scientists and civil agencies to help experts answer critical environmental questions, such as the impact on the environment of burning fossil fuels; and it provides information to support foreign and domestic disaster relief operations. The IC supports a wide range of customers of environmental intelligence, from policy officials to military commanders. For example: it provides environmental support for military operations, such as assessment of environmentally-related health risks to deployed troops; it provides intelligence support during negotiation of environmental agreements and assesses subsequent compliance; it monitors critical resource issues, such as North Korean agricultural output and deforestation; it responds to policy makers' concerns regarding environmental crises, such as oil spills and the Chernobyl nuclear accident. The Environmental Task Force (ETF) was an initiative proposed by then Senator Al Gore to pursue opportunities for exploiting the technical assets of the Intelligence Community to address environmental problems. The ETF was supported by a group of approximately 60 U.S. scientists, now known as MEDEA. The ETF found that data collected by the IC from satellites and other sensors can fill critical information gaps for the environmental science community. The ETF and its following activities are now known collectively as the Environmental Intelligence Applications Program (EIAP). An example of the positive interaction between the intelligence and scientific communities is the Global Fiducials Program. MEDEA scientists are working with the IC and other government agencies to designate selected sites around the world that are of environmental interest. The IC will periodically image these sites over the coming decades. This will give scientists a record of changes that will help them understand environmental processes and will enhance their ability to warn of potential catastrophes. With EIAP support, Vice President Gore and Russian Prime Minister Chernomyrdin have established the U.S.-Russian Joint Commission on Economic and Technological Cooperation—the Gore-Chernomyrdin Commission—to share unclassified products derived from intelligence assets that will help assess environmental issues. This dialogue has led to an ongoing series of joint U.S.-Russian projects on issues of common interest, all of which use intelligence derived products. For example, the United States and Russia jointly produced a CD-ROM on the Artic Ocean, which more than doubles the scientific holdings of oceanographic data available to U.S. scientists, and will be distributed internationally on the Internet and through the World Wide Web. This information will help scientists understand and predict global climate change. The United States and Russia also exchanged imagery-derived diagrams of environmental damage over a 25 year period at Eglin Air Force Base in Florida and Yeystk Airbase in Russia. These products identify currently contaminated areas as well as potential sources of future contamination, and can support remediation activities. Another example of a joint U.S.-Russia project is the ongoing environmental risk assessment of oil and gas development projects in Artic and subartic regions that will enable environmentally safe development of these resources. The IC provides data in aftermath of both foreign and domestic disasters, such as fires, floods, earthquakes, hurricanes and volcanic eruptions to help relief organizations prioritize and target their efforts. Within 12-24 hours after a disaster, conditions of roads, airports, hospitals, and potential threats to sites such as dams and nuclear facilities are provided to relief organizations. The IC can also provide warning before a disaster strikes. For example, when a volcano on the Caribbean Island of Monterrat was in danger of erupting in the Spring of 1996, the IC provided warning that allowed authorities on Montserrat to evacuate over 5,000 people to a less dangerous area of the island.

Update on the Task Force on State Failure

Background

In response to a request from Vice President Gore in 1994, the CIA established "the State Failure Task Force," a group of researchers under contract to examine comprehensively the factors and forces that have affected the stability of the post-Cold War world. The Task Force's goal was to identify the factors or combinations of factors that distinguish states that failed from those which averted crises over the last 40 years. The study represents the first empirical effort to identify factors associated with state failure by examining a broad range of demographic, societal, economic, environmental, and political indicators influencing state stability.

Before entering its second phase of study, three members of the Task Force shared their preliminary findings at a May 1996 meeting at the Wilson Center: **Jack Goldstone**, Department of Sociology, University of California at Davis; **Daniel Esty**, School of Forestry and Environmental Studies, Yale University; **Ted Robert Gurr**, Department of Government and Politics, University of Maryland. The commentator at the meeting was **Thomas F. Homer-Dixon**, Peace and Conflict Studies Program, University of Toronto. During their presentations, the researchers emphasized that their preliminary findings do not represent the official view of the U.S. government or the Intelligence Community.

Preliminary Findings

The Task Force identified more than 100 serious political crises, or state failures, between 1955 and 1994 that posed security and stability threats. These crises took the forms of ethnic and revolutionary war, overthrow and collapse of regimes, and genocide or politicide. Effects of about 75 possible independent variables on state failure were examined—including demographic, social, economic, environmental and political variables. The Task Force found that three clusters of variables had significant correlations with subsequent state failures: (1) quality of life; (2) openness to international trade; (3) the level of democracy. It is the interaction among these variables that provided the most important insights.

Quality of Life

Low levels of "quality of life" indicators—including high infant mortality, low nutrition, low per capita incomes, low access to safe drinking water, etc.—were strongly correlated with higher risks of state failure. Among a dozen such variables, the level of infant mortality was found to be the best proxy for overall quality of life as it related to risks of state failure.

Openness to International Trade

Countries that had a higher volume of international trade relative to GDP had a lower risk of state failure. Higher and more open trade is associated with greater stability.

Level of Democracy

Democratic countries were generally less likely to experience state failure. However, the effect of democracy was strongly significant *only* when combined with the other clusters of variables. Non-democratic regimes were more vulnerable if they were not relatively open to international trade. But for democratic regimes, quality of life variables had much stronger effects; indeed, democratic countries experiencing low quality of life indicators had especially high risks of state failure.

There were wide disparities in the quality and availability of data available to the researchers, with notable deficiencies in the environmental data. The researchers were careful to note that the study has thus far identified factors associated with state failures but its models do not establish cause and effect relationships. The study suggests avenues for additional research and analysis examining political state instability and concludes that Task Force work should be augmented with intelligence information before making judgments about the prospects for states to fail.

Office of Science and Technology Policy/National Security and International Affairs

The White House Office of Science & Technology Policy (OSTP) advises the President on science and technology priorities that support national needs, leading interagency coordination of the Federal Government's science and technology enterprise, and fostering partnerships with state and local governments, industry, academe, non-governmental organizations, and the governments of other nations. OSTP also acts as the Secretariat for the National Science Technology Council (NSTC) created by President Clinton in November 1993 to strengthen

interagency policy coordination. One of the principal priorities of OSTP is strengthening the contribution to science and technology to national security and global stability. Working with the NSTC, OSTP's works to promote the role of science and technology in sustainable development including areas such as protecting the environment, predicting global changes, reducing the impact of natural disasters, promoting human health, bolstering the fight against infectious diseases, fostering the information infrastructure, and assuring food safety. As effective progress in these areas requires an international response, OSTP is engaged in priority bilateral and multilateral activities that address these goals. These included ongoing dialogues with Russia, China, Japan, South Africa and the Ukraine, and in the APEC, the OECD, the Summit of the Americas and the G-7.

U.S. Geological Survey

The U.S Geological Survey (USGS) has begun distributing film negatives, positives, and paper prints from declassified satellite photographs collected by the U.S. intelligence community during the 1960's and early 1970's. The sale of photographs to the public has begun with the initial transfer of 2,650 of the total 18,000 rolls of film slated for delivery to the USGS from the Central Intelligence Agency. The entire collection of these declassified photos will incrementally reach USGS National Satellite Land Remote Sensing Data Archive at the Earth Resources Observation Systems (EROS) Data Center in Sioux Falls, South Dakota by the end of the summer of 1996. The online catalog will be updated daily as new rolls are added to the archive. A World Wide Web accessible graphical catalog and image browse capability for the photo collection is accessible for searching, at no charge, on the Internet through the U.S. Geological Survey's Global Land Information System (GLIS). It is highly recommended that users view the browse images before purchasing the photographs since over 40% are obscured by clouds. For information, contact: U.S. Geological Survey, EROS Data Center, Customer Service, Sioux Falls, SD 57198. Tel: 605-594-6151; Fax: 605-594-6589; E-mail: custserv@edcserver1.cr.usgs.gov; Internet: http:// edcwww.cr.usgs.gov/glis/hyper/guide/disp.

Academic and Professional Meetings

31 May-4 June 1994: Global Development and Environment Institute and the International Consortium for the Study of Environmental Security

"Population/Environment Equation: Implications for Future Security"

Held at Tufts University, this conference brought together experts to exchange research findings, explore new ideas and plan for future studies on major environmental threats to security. A full conference report was published. For more information, contact: William Moomaw, The International Environment and Resource Policy Institute, The Fletcher School, Tufts University, Medford, MA 02155. Tel: 617-628-5000 (ext. 2732).

27 September 1994: North East Africa Seminar

"The State of the Environment: Conflict and Degradation in North-East Africa"

This workshop assembled experts from universities and NGOs, mainly from the United Kingdom, to discuss links between conflict and environmental degradation in Africa. For more information, contact: Patricia O. Daley, School of Geography, Mansfield Road, Oxford, OXI 3TB, England, UK. Tel: 44-865-27-19-19; Fax: 44-865-27-19-29.

29-31 September 1995: The Gorbachev Foundation USA

"The State of the World Forum"

This international conference, led by former Soviet President Mikhail Gorbachev, brought together leaders from the scientific, political, spiritual and business communities to discuss the challenges of the 21st Century. The group identified sharp cuts in nuclear weaponry and actions to protect the environment as main priorities. The forum is expected to convene annually over the next five years to continue to study international security and environmental problems. For more information, contact: Terry Whitehair, Administrator, The Gorbachev Foundation, The Presidio, P.O. Box 29434, San Francisco, CA 94129. Tel: 415-561-2345; Fax: 415-561-2323.

10 October 1995: U.S. Global Change Research Program

"Signals of Human-Induced Climate Warming"

At this seminar, which is part of a series on global climate change, Thomas Karl, of the National Oceanic and Atmospheric Administration's National Climate Data Center, presented models on the causes and effects of climate change, with specific focus on the United States. For more information, contact: Anthony D. Socci, U.S. Global Change Research Program Office, 300 D Street, SW, Suite 840, Washington, DC 20024. Tel: 202-651-8244; Fax: 202-554-6715; E-mail: tsocci@usgcrp.gov.

12-14 November 1995: The Greening of Industry Network

"Learning to Build Sustainable Industries for Sustainable Societies"

At this conference, researchers, policy makers, business leaders and different interest groups assembled to encourage the development of a shared understanding of the current and future issues of sustainable development. Conference themes included: International Perspectives and National Practices for the Greening of Industry; Research and Practice: The Role of Research in Policy Formation and Implementation; Learning to be Greener and more Sustainable; The Greening of Technology and the Move toward Sustainability in a Social Context. For more information, contact: Nigel Roome, Haub Program in Business and the Environment, Faculty of Administrative Studies, York University, 4700 Keele Street, North York, ON M3J 1P3, Canada.
Tel: 416-736-5809; Fax: 416-736-5762; E-mail: as001450@orion.yorku.ca.

22-26 April 1996: Conversion for the Environment International Foundation

"The Second CFE Conference on Sea-Dumped Chemical Munitions"

Held in Bellagio, Italy, this conference featured representatives of the military, industry specialists and journalists. The participants assessed current government action and proposed solutions on the problem of sea-dumped chemical munitions. An action program was developed by those attending the conference to increase public awareness about the seriousness of this problem to the environment. For more information, contact Alexander Kaffka, CFE International Foundation, Zviozdny Boulevard 4-13, 129515, Moscow, Russia. Tel/Fax: 70-95-286-35-87; E-mail: CFE@glas.apc.org.

16 May 1996: Pacific Northwest National Laboratory

"Environmental Dimensions of Regional Security Workshop"

Through a series of presentations, this workshop discussed concepts and illustrated methodologies for the inclusion of environmental resources as part of a regional security analysis. Among the issues discussed were: the linkages between regional security issues; national security and non-proliferation; the changing definition of stability from the cold war to the present; and the impact of multi-lateral agreements on the stability of the region. For more information, contact: Karen Walker, Environmental Technology Division, Pacific Northwest National Laboratory, 901 D Street, SW, Suite 900, Washington, DC 20024-2115. Tel: 202-646-7794; Fax: 202-646-7794.

20 May 1996: The Refugee Policy Group, The American Refugee Committee and the Dian Fossey Gorilla Fund

"Open Workshop on Environmental Protection Programs"

This workshop, held in Nairobi, Kenya, convened environmental experts involved in reforestation, household energy supply, and park protection. The meeting sought to compare the results of different projects in Zaire, Tanzania, Rwanda and Burundi aimed at protecting the environment and meeting the fuel and shelter needs of displaced persons. For more information, contact: Dian Fossey Gorilla Fund, 800 Cherokee Avenue, SE, Atlanta, GA 30315-1440. Tel: 1-800-851-0203; Fax: 404-624-5999. Or, American Refugee Committee, P.O. Box 39694, Brookside Drive, Westlands, Nairobi, Kenya. Tel: 254 -2-448-113; Fax: 254-2-448-270; or, Refugee Policy Group, 1424 16th Street, NW, Washington, DC 20036. Tel: 202-387-3015; Fax: 202-667-5034.

12-16 June 1996: International Peace Research Institute, Oslo and Russian Academy of Sciences

"Conflict and the Environment"

Held in Bolkesjø, Norway, this Advanced Research Workshop brought together a distinguished group of experts to discuss the linkages between environment, conflict and security. Participants were drawn from sectors such as government research institutes, universities, and non-governmental organizations. See page 220 for the rapporteur's report of the proceedings. For information, contact: Nils Petter Gleditsch, International Peace Research Institute. Fuglehauggata 11, N-0260 Oslo, Norway. Tel: 47-22-55-71-50; Fax: 47-22-55-84-22; E-mail: npg@prio.no.

8-12 July 1996: International Peace Research Association

"16th General Conference of the International Peace Research Association"

Within the 16th General Conference of the International Peace Research Association (IPRA), the Commission on Ecological Security sponsored a cluster of papers on questions of ecological security. Paper topics ranged from environmental security as a paradigm for peace to local strategies for achieving sustainability. For more information, contact: Katrina Rogers. c/o High West Center for the Environment, 8470 Slayton Ranch Road, Flagstaff, AZ 86004. Tel: 520-714-0313; Fax: 520-714-0320; E-mail: 104074.3577@Compuserve.com.

10 July 1996: Project on Pivotal States and U.S. Security, Yale University

" Pivotal States: An Appropriate Approach to the Developing World?"

This one day seminar included welcoming remarks by Maureen Steinbrenner, President, the Center for Policy Studies; an introduction by Paul Kennedy of the Project on Pivotal States and U.S. Security; a keynote address by Timothy Wirth, Under Secretary of State for Global Affairs; and a roundtable discussion on U.S. policy and the Pivotal States Strategy. For more information, contact: Paul Kennedy, Yale University, P.O. Box 208206, New Haven, CT 06520-8206. Tel: 203-432-5596; Fax: 203-432-2504.

30 July 1996: Pew Global Stewardship Initiative

"Public Opinion Research Briefing"

This strategy session examined effects on target audiences of messages regarding population and the environment. In addition, a review of media trends and news coverage of population issues was presented. For more information, contact: Kathy Bonk, Communications Consortium, 1200 New York Avenue, Washington, DC 20005. Tel: 202-326-6767; Fax: 202-682-2154; E-mail: kbonk@ccmc.org.

8-9 August 1996: Office of the Deputy Under Secretary of Defense (Environmental Security), Institute for National Strategic Studies of the National Defense University and the Directorate for Advanced Concepts, Technologies and Information

"International Environment and Security Issues in Professional Military Education and Research Workshop"

The objective of this workshop was to advance the state-of-knowledge regarding the relationships between the

environment and security issues. The workshop convened academics and policymakers to focus on the concrete steps that could be taken to improve the integration of environment and security into current curricula and research agendas. For more information, contact Mike McNerney, Acting Assistant Director of International Activities, ODUSD(ES)/IA, 3400 Defense, Pentagon, Room 3E792, Washington, DC 20301-3400. Tel: 703-695-3321; Fax: 703-693-0493.

10 September 1996: Foreign Service Institute, U.S. Department of State Policy Planning Staff and the UNA Chapman Cox Foundation

"Environmental Issues in American Foreign Policy"

At this seminar, Deputy Secretary of State Strobe Talbott acknowledged that environmental issues are indeed global in scope and thus nations must work together to effectively address these issues. Panel presentations on global climate change; environmental issues and U.S. national interests; and international trade and the environment followed. For more information, contact: The Environmental Change and Security Project, 1000 Jefferson Drive, SW, Washington, DC 20560. Tel: 202-357-2063; Fax: 202-633-9796.

3-4 October 1996: Global Green USA

"Moving Toward Sustainable Base Conversion"

This third annual forum brought together representatives from NGOs and the private and public sectors to discuss sustainable conversion and reuse of military toxicities. Former Soviet president Mikhail Gorbachev, discussed the impact and future consequences of the Cold War on the environment. For more information, contact: Global Green USA, 1025 Vermont Avenue, NW, Suite 300, Washington, DC 20005-6303. Tel: 202-879-3181; Fax: 202-879-3182.

10-12 October 1996: International Studies Association - West Region

"Global Ecology, Global Economy, Global Security: Making Linkages"

This academic conference featured a broad range of environmental security panels. Discussions featured debates among traditional security, environment and gender perspectives. For more information, contact: Ronald Mitchell, Department of Political Science, 1284 University of Oregon, Eugene, OR 97403-1284. Tel: 541-346-4880; Fax: 541-346-4860; E-mail: rmitchel@oregon.uoregon.edu. Or, access the conference program at http://darkwing.uoregon.edu/~rmitchel/rmitchel/isawestprogram.shtml.

17 October 1996: Forum for Environmental Law, Science, Engineering and Finance (FELSEF)

"National Security, Diplomacy and the Environment"

This international luncheon focused on the topic of greater coordination between U.S. environmental, diplomatic, military and intelligence policies. FELSEF (pronounced "Failsafe"), an outgrowth of the Environmental Law Committee of the Bar Association of the District of Columbia, is an inter-professional program platform sponsored by the Bar Association, the Environmental Bankers Association, the American Insurance Association and the Hazardous Waste Action Coalition of the American Consulting Engineers Council. The luncheon brought together expert panelists from the U.S. EPA, the DoD, the DoE, and the Intelligence Community who agreed that greater coordination between the agencies could increase their ability to respond to newly recognized environmental threats to national security and acknowledged that the underlying causes of these threats, particularly uncontrolled population growth, continues to escape U.S. influence. For more information, contact: Michael G. Frodl, Chairman, FELSEF, 35 E Street NW, Suite 407, Washington, DC 20001-1516. Tel: 202-737-6853; E-mail: mgfrodl@nicom.com.

10-12 November 1996: The Defence Evaluation and Research Agency (DERA) and the Royal Institute of International Affairs (RIIA)

"Approaches to Strategic Analysis for the 21st Century"

This symposium, held in Farnborough, UK, brought together 105 participants representing industry, military, academia and government departments from 13 different countries to present, compare and discuss approaches to strategic planning in the context of the international security environment. While the main objective of the symposium was to present DERA's "Insight" project for critical review, it also sought to expose complementary approaches, to identify areas of convergence in thinking and to build consensus on possible ways to improve methodologies and their implementation. Driving the debate was a recognition of the need to conceive new ways of thinking about the future that can facilitate the transition away from well-defined threats and help to institutionalize thinking in a way which allows the flexibility to respond to rapid change and complexity. For more information, contact: The Environmental Change and Security Project, 1000 Jefferson Drive, SW, Washing-

ton, DC 20560. Tel: 202-357-2063; Fax: 202-633-9796.

11-12 November 1996: NATO and Committee on the Challenges to Modern Society (CCMS) Pilot Study

"Environment and Security in an International Context"

This meeting, held in Ankara, Turkey, was the second of the Pilot Study which examines preventive measures to counter violent conflicts caused in part by environmental degradation as well as conflicts over natural resources. An interim report was prepared for the meeting which identified the role of environmental degradation and resource scarcities as causes of violent conflicts and pointed to significant gaps in current knowledge about the relationship between the environment and security. The Pilot Study is to be finalized during the second half of 1998. See page 224 for the Rapporteur's Report of the proceedings. For more information, contact: Mike McNerney, Acting Assistant Director of International Activities, ODUSD(ES)/IA, 3400 Defense, Pentagon, Room 3E792, Washington, DC 20301-3400. Tel: 703-695-3321; Fax: 703-693-0493.

14-16 November 1996: Center for International Development and Conflict Management, University of Maryland

"Workshop on Risk Assessment and Crisis Early Warning Systems"

This conference, held in College Park, Maryland, featured a paper on environmentally-induced conflict by Günther Bächler, co-director of the Swiss Environment and Conflicts Project (ENCOP). Many of the presenters, both policymakers and academics, included environment, poverty and population variables in their models on risk assessment and the development of early warning systems. For more information, contact: John Davies, Department of Government and Politics, Tydings Hall, University of Maryland, College Park, MD 20742. Tel: 301-314-7709; Fax: 301- 314-9690; E-mail: jdavies@bss1.umd.edu.

10-12 December 1996: Lawrence Livermore National Laboratory, Massachusetts Institute of Technology, Stanford University and the Woodrow Wilson Center

"Environmental Threats and National Security: An International Challenge to Science and Technology"

This workshop provided a broad discussion of international law, national policy and governmental activities relevant to environmental issues and interactions; specific global and regional resource and health issues which could threaten U.S. interests; and the role of science and technology in reducing these threats and mitigating conflict. See page226 for the Rapporteur's Report of the proceedings. For more information, contact: Thomas J. Gilmartin, Lawrence Livermore National Laboratory, P.O. Box 808, L-019, Danville, CA 94551. Tel: 510-422-9793; E-mail: gilmartin1@llnl.gov.

18 December 1996: Center for National Policy (CNP)

"Squaretable on Central Africa"

This policy luncheon focused on the conflict in central Africa's Great Lakes Region and on the broader question of foreign aid as part of a proposed long-term solution to that conflict. Also discussed was how to prevent or mitigate future conflicts. CNP Chairman and former Congressman Michael Barnes moderated the event which included a discussion led by Under Secretary of State Timothy Wirth and a panel that included Ambassador Theogene Rudasingwa of Rwanda, Heman Cohen of the Global Coalition for Africa and Doug Bandow of the CATO Institute. For more information, contact: Michael Calabrese, Senior Fellow, The Center for National Policy, One Massachusetts Avenue, NW, Suite 333, Washington, DC 20001. Tel: 202-682-1800; Fax: 202-682-1818; E-mail: cnp@access.digex.net; or see the CNP Internet Homepage: http://www.access.digex.net/~cnp/index.html.

21-22 January 1997: NATO and Committee on the Challenges of a Modern Society (CCMS) Pilot Study

"Environment and Security in an International Context"

The Area 1 Working Group session discussed an outline for the analysis of environment and security issue indicators as well as conceptual issues regarding modeling. Area 1, a working group on definition and modeling, was established at the second meeting of the Pilot Study group held November 11-12, 1996. For more information, contact: Mike McNerney, Acting Assistant Director of International Activities, ODUSD(ES)/IA, 3400 Defense, Pentagon, Room 3E792, Washington, DC 20301-3400. Tel: 703-695-3321; Fax: 703-693-0493.

7-8 February 1997: Council on Foreign Relations, the Center for Oceans Law and Policy and the Center for National Security Law at the University of Virginia School of Law

"Security Flashpoints: Oil, Islands, Sea Access and Military Confrontation"

The Center for Oceans Law and Policy hosts an annual conference on a subject of interest to the oceans community. This year, the conference was co-sponsored by the Council on Foreign Relations and the Center for Na-

tional Security Law. The conference offered an opportunity for an even-handed and dispassionate examination of issues underlying oceans disputes throughout the last year such as sovereignty, national security, access to the sea, freedom of navigation, ownership of petroleum and fishing rights. For more information, contact: Donna Ganoe or Pat Humphrey, Center for Oceans Law and Policy, 580 Massie Road, Charlottesville, VA 22903-1789. Tel: 804-924-7442; Fax: 804-924-7441; E-mail: BBH3j@Virginia.edu.

13-18 February 1997: AAAS Annual Meeting and Science Innovation Exposition

"Environmental Security: Integrated Regional Stability Implications"

The panel brought together political science, environmental science, and policy perspectives to develop an integrated concept of environmental security. Paper topics covered risk assessment, the environmental problems in the Former Soviet Union and the Middle East, the changing definition of arms control stability, and integrating environmental concerns into security thinking. For more information, contact: Brian R. Shaw, Manager, Center for Environmental Security, National Security Division, Pacific Northwest National Laboratory, 901 D Street, SW, Suite 900, Washington, DC 20024-2115. Tel: 202-646-7782; Fax: 202-646-7838.

18-22 March 1997: International Studies Association (ISA)

"Coping with Insecurity: Threats More Than Enemies"

This annual meeting of mostly academics featured multiple panels on environmental security, environment and conflict, environment and cooperation and redefining security. Held in Toronto, Canada, the ISA convention commonly highlights the most current academic work before it is widely published. For more information, contact: International Studies Association, University of Arizona, 315 Social Sciences, Tucson, AZ 85721. Tel: 520-621-5780; Fax: 520-621-7715; E-mail: isa@arizona.edu; Internet: http://www.isanet.org.

22-23 March 1997: International Human Dimensions of Global Change Programme

"Global Environmental Change and Human Security"

This invitation-only workshop helped formulate the content and structure of a research plan for the new Global Environmental Change and Human Security Project. This workshop was held in Toronto, Canada immediately following the International Studies Association annual convention. See the GECHS Project description on **page xx.** For more information, contact: Steven Lonergan, Chair, GECHS Project, Department of Geography, University of Victoria, PO Box 3050, Victoria, BC V8W 3P5, Canada. Tel: 250-721-7339; Fax: 250-595-0403; E-mail: lonergan@uvic.ca.

27-29 March 1997: Population Association of America

"Population Association of America Annual Meeting"

This conference, which annually brings together professional demographers from across North America, included two sessions on "population and environmental change", one featuring the U.S., the other featuring developing countries. For more information, contact: The Population Association of America, 721 Ellsworth Drive, Suite 303, Silver Spring, MD 20910. Tel: 301-565-6710; Fax: 301-565-7850; Internet: http://boserup.qal.berkeley.edu/paa97/.

20-22 May 1997: NATO and the Committee on the Challenges of a Modern Society (CCMS)

"Environment and Security in an International Context"

This Pilot Study meeting will take place at the Center for Strategic Leadership (United States Army War College) in Carlisle Barracks, Pennsylvania. For more information, contact: Mike McNerney, Acting Assistant Director of International Activities, ODUSD(ES)/IA, 3400 Defense, Pentagon, Room 3E792, Washington, DC 20301-3400. Tel: 703-695-3321; Fax: 703-693-0493.

12-14 June 1997: International Human Dimensions of Global Change Programme

"1997 Open Meeting of the Human Dimensions of Global Environmental Change Research Community"

To be held at the International Institute for Applied Systems Analysis in Laxenburg, Austria, this conference features a special plenary session on environmental security. This plenary session will include a number of panels that promise to bring an interdisciplinary approach to environmental security. The activities of this conference will further develop the research agenda of the new Global Environmental Change and Human Security Project described on page 197. For more information, contact: Steven Lonergan, Chair, GECHS Project, Department of Geography, University of Victoria, PO Box 3050, Victoria, BC V8W 3P5, Canada. Tel: 250-721-7339; Fax: 250-595-0403; E-mail: lonergan@uvic.ca.

Fall 1996-Spring 1997: The Woodrow Wilson International Center for Scholars' Environmental Change and Security Project

"Discussion Group Meetings and Public Seminars"

Below is a list of meetings hosted by the Environmental Change and Security Project between September 1996 and February 1997. (See pages 136-193 of this *Report* for summaries of these meetings.)

21 May 1996 "Environmental and Demographic Factos in State Capacity and Violence," Daniel Esty, School of Forestry and Environmental Studies, Yale University; Jack Goldstone, Department of Sociology, University of California at Davis; Ted Robert Gurr, Department of Government and Politics, University of Maryland; and Thomas Homer-Dixon, Department of Peace and Conflict Studies, University of Toronto. For summary, see box on page 212.

11 September 1996: "Strengthening Compliance with International Environmental Agreements," Harold K. Jacobson, Professor of Political Science, Center for Political Studies/Institute for Social Research, University of Michigan; and Edith Brown Weiss, Francis Cabell Brown Professor of International Law, Georgetown University Law School.

17 September 1996: "The DoD-DoE-EPA Environmental Security Plan: Enhancing Interagency Cooperation on International Environmental Issues," Abraham Haspel, Principal Deputy Assistant Secretary for Economic and Environmental Policy, Department of Energy; Alan Hecht, Principal Deputy Assistant Administrator for International Activities, Environmental Protection Agency; and Gary Vest, Principal Assistant Deputy Under Secretary for Environmental Security, Department of Defense.

24 October 1996: "Evaluating U.S Environmental Priorities and Strategies in the NIS, Central and Eastern Europe, and China in the Context of Overall U.S. Interests," Moderators were Richard Bush, National Intelligence Officer for East Asia, National Intelligence Council; John Herbst, Deputy Advisor to the Secretary of State on the Newly Independent States; Barbara Jancar-Webster, Professor of Political Science, State University of New York at Brockport; Will Martin, Deputy Assistant Secretary for International Affairs, National Oceanic and Atmospheric Administration, Department of Commerce; Jessica Tuchman Mathews, Senior Fellow at the Council on Foreign Relations; Scott Thayer, Special Assistant, Office of East European Assistance, Department of State; and Robert Kaiser, Managing Editor, *The Washington Post*.

19 November 1996: "Genetic Resources, National Interests and Security," Thomas E. Lovejoy, Counselor to the Secretary for Biodiversity and Environmental Affairs, Smithsonian Institution; and George M. Milne, President of Central Research Division, Pfizer, Inc.

26 November 1996: "Environmental and Health Problems in the Former Soviet Union: Do They Matter to the United States?" Murray Feshbach, Department of Demography, Georgetown University. (Sponsored by the Kennan Institute).

26 November 1996: "Environmental Issues in China-U.S. Relations," James Baker, Undersecretary for Oceans and Atmosphere, National Oceanic and Atmospheric Administration, Department of Commerce; and Michael McElroy, Professor of Atmospheric Science at Harvard University.

14 January 1997: "Environment and U.S. Foreign Policy," the Honorable Warren Christopher, Secretary of State; Charles Blitzer, Director, Woodrow Wilson International Center for Scholars; and Thomas E. Lovejoy, Counselor to the Secretary for Biodiversity and Environmental Affairs, Smithsonian Institution.

4 February 1997: "International Population Trends and Policy Choices: An Overview," John Bongaarts, Vice President and Director of Research Division, The Population Council; and Judith Bruce, Director of Gender, Family, and Development, The Population Council.

Rapporteurs' Reports

Following are three rapporteurs' reports of academic and professional meetings which convened over the past year. The conferences addressed issues ranging from Environment and Conflict to Environmental Threats and National Security.

"Conflict and the Environment"

Report on the Proceedings of a North Atlantic Treaty Organization (NATO) Advanced Research Workshop (ARW), Division for Science and Environmental Affairs

12-16 June 1996, Bolkesjø, Norway

by Geoffrey D. Dabelko

The Advanced Research Workshop brought together a distinguished group of experts on the linkages between the environment, conflict, and security. Participants were drawn from government, research institutes, universities, and nongovernmental organizations in Latin America, Western and Eastern Europe, the former Soviet Union, South and East Asia, and North America. The workshop was organized and directed by Nils Petter Gleditsch of the International Peace Research Institute, Oslo and Renat Perelet of the Russian Academy of Sciences.

This rapporteur's report of the ARW represents the views held by most participants. However, it has not been submitted to any formal vote among the participants, and no individual participant should be held accountable for these views. Many of these points provide direction for future research agendas and policy attention. This report also recognizes points of contention among participants to facilitate further investigation and possible resolution.

The policy relevance of the workshop was underscored by Sverre Stub, deputy director general, Department of Natural Resources and Environmental Affairs, Norwegian Ministry of Foreign Affairs. In his introductory address, he stated:

> Unresolved environmental issues can lead to regional instability and conflict.... Environmental security threats may not in themselves cause military conflict between states. But together with other sources of tension, like ethnic discrimination for instance, they may lead to violent conflicts.... Environmental problems, including natural resource scarcity, are normally first felt locally. In the medium and long term, however, the most serious environmental threats are those that are shared by many states, or that are even global in character. Such threats are normally not directed against an enemy.... Confusion with the traditional concept of security may make it more difficult to agree on the decision-making mechanisms and instruments that will be necessary to deal with new national and international security threats. If we are to move from environmental insecurity to environmental security, the nations of the world must take joint responsibility and find a common response. The responses must be at local, national, regional, intergovernmental, and global levels.

Much of the current environmental literature indicates that environmental degradation, poverty, population growth, and unsustainable development are potential threats to peace and stability in the long term. These variables may pose threats by contributing in some measure to violent conflict. Because of the increasing impacts of human activity on the resource base, conflicts with an environmental ingredient are thought likely to increase in the future.

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Therefore, a primary objective of the ARW on conflict and the environment was to clarify the conditions under which environmental problems are likely to escalate into violent conflict. A second objective was to clarify the conceptual links between the environment, conflict, and security. A more general objective was to identify clearly the state of research and knowledge in the subject area, the perceived gaps in that knowledge, and the questions that must be asked and answered to fill those gaps.

Focal Points

The paper presentations and workshop discussions were organized around eight topics within the area of conflict and the environment. The following paragraphs outline those topics and significant points from the paper presentations and accompanying discussions.

The Environment and Security: Theoretical and Conceptual Issues

The theoretical discussions focused on conflict and the environment and the concept of environmental security. Some participants favored reference to environmental degradation and depletion (environmental stress) when examining linkages to conflict, while others favored environmental scarcity as an independent variable that includes degradation and depletion as well as population and distributional components. Participants debated methods to delimit the concept of environmental security in order to end its provisional usage. Some participants advocated a minimalist perspective that narrowed the scope of environmental security to questions of conflict and the environment. Others offered a maximalist perspective for integrating environmental security into a larger comprehensive security framework and moving security out of the exclusive domain of military threats and military responses. Other issues discussed included the importance of perceived scarcity, the need to develop indicators for environmental security, the danger of environmental determinism in designing inquiry, and the need to distinguish among levels of conflict.

Water as a Source of Environmental Conflict

Discussions were critical of the common hyperbole that water will be a future cause of conflict. Water scarcity and misuse are significant threats to sustainability. Other intervening social factors were stressed as critical for conflict outcomes. Paper presenters stressed the necessity to differentiate among water availability and water quality, the multiple uses of water, and the multiple causes of water scarcity. Of particular concern when examining causes of scarcity was the necessity of considering social and economic variables, commonly in the form of water mismanagement. Considerable debate focused on the utility of precise thresholds (e.g., 1,000 m^3 per person per year) for defining scarcity. Discussion included specific cases in the Middle East, Central Asia, the Iberian Peninsula, Central and Eastern Europe, South Asia, Latin America, and North America. Cases varied in terms of producing cooperative or conflictual outcomes, leading some participants to draw initial conclusions about critical variables for peaceful sharing of water resources.

Current Armed Conflict, the Environmental Component

Presentations and discussion centered on quantitative analyses of population pressure and international conflict, environmental change and civil war, strategic minerals and military intervention, and environmental change and stability in Russia. Countries with high population growth, but not high population density, were somewhat more likely to be involved in international conflict from 1930 to 1989. Population growth and density rates did not appear related to the likelihood to initiate conflict or to escalate conflict. These findings challenge a number of assumptions in the literature. Regarding environmental change and civil wars, high levels of soil erosion did appear to be linked to civil war. However, other social and political variables carried more explanatory weight for civil war. Regarding strategic minerals, no connection was found between strategic minerals in Third World countries and military interventions by major powers to secure those minerals. Regarding Russian stability, the instability of the transition from communism and military preparations have aggravated local environmental conflicts. Discussion also centered on methodological advantages and disadvantages of case-study versus quantitative approaches. Methodological critiques of research to date include linking variables by definition, focusing on a single causal factor, formulating overly complex models, ignoring control groups, using the future as evidence, ignoring reverse causality, suffering from limited or missing data, placing too much faith in assumptions of rationality, giving little attention to intrastate conflict, and glossing over the complexity and the particular characteristics of given cases.

Case Studies: Successes and Failures

The current research on environmental stress or environmental scarcity and violent conflict identifies the environmental role as a contributing factor to social effects that may in turn contribute to violent conflict. The environmental variable is not identified as a necessary or sufficient factor to cause violent conflict, but can be jointly sufficient in combination with other causal variables. Most environmentally induced conflict occurs at the intrastate level. Renewable resources such as forests, fisheries, soil, and fresh water are most commonly the environmental resources relevant to violent conflict. Global issues such as climate change and ozone depletion are not identified as contributors to violent conflict. Places where violent conflict is com-

monly cited as having environmental elements include Chiapas, Mexico; China; the Philippines; the Gaza Strip; Rwanda; Bangladesh; and India. Paper presentations particularly featured China and Russia. Some participants stressed the need for more policy-relevant problem-solving approaches in the literature. Others responded that policy recommendations are easier to make when theoretical frameworks and models are developed, a process still ongoing in this issue area.

Fisheries

Conflicts involving fish stocks have historically centered on relative scarcity and distributional differences. According to paper presenters, absolute scarcity now also contributes to conflicts over fish stocks. Conflicts, in this context, are not necessarily violent conflicts. In fact, violence is often sporadic and rarely lethal. Conflicts over fish stocks often occur outside areas of sovereign state control. International law has attempted to address distributional issues in commons areas, but typically states with large coastal regions obtain preferential arrangements. Conflicts over fisheries, in some cases, have pushed parties to negotiate and find a cooperative solution. This pattern, exhibited in the Canadian–Spanish turbot case, needs to be studied further for policy lessons. How were conflicts repressed, put off, and/or transformed? Further research should also investigate equity and distribution issues, types of fish conflicts (quantity versus quality, cultural value, equity, straddling stocks, control and sovereignty), types and amounts of violence, and costs.

Environmental Refugees

The term environmental refugees presents definitional ambiguity for identifying, recognizing, and providing rights for environmental migrants. Like environmental security, the term environmental refugee was originally a rhetorical tool. Estimates of environmental refugees range from zero to 100,000 million, illustrating the limitations of the term in its present form. Presenters stressed that most environmental migrants do not cross state boundaries, a prerequisite for protection under international law. Furthermore, peoples moving on the basis of environmental push (or pull) factors are not granted protection under international law. Presentations and discussion offered models for narrowing the definition of environmental refugee (or environmental migrants or environmentally displaced persons) to increase precision and utility. The element of time (sudden versus gradual onset of environmental problems) helps to distinguish between environmental push and pull motivations for moving. Furthermore, distinguishing whether movement is caused intentionally or by accident may help narrow the term environmental refugees to a more practical and operational category.

Environmental Consequences of Arms Races and Armed Conflict

When developing a framework for evaluating the environmental consequences of war and the preparations for war, a number of parameters must be considered: anthropocentric versus ecocentric points of view, direct versus indirect consequences for the environment, unfavorable versus favorable consequences for the environment, unavoidable versus avoidable consequences for the environment, and unintentional versus intentional consequences for the environment. Participants presented a historical account of political attempts to address these environmental consequences, analysis of public opinion following the Chernobyl nuclear plant accident, a detailed account of how one country (Hungary) deals with the toxic legacy of basing Soviet military troops, and a preliminary assessment of military impacts on the environment. Some participants challenged the assumption that transferring resources from the military sector would necessarily be positive for the environment. Participants stressed that alternative resource uses vary and could be either more or less environmentally harmful than military activities. Other participants pointed to past and possible future roles that the military may play in advancing environmental understanding and protection. These roles included monitoring, crisis response, and scientific data-sharing.

Countermeasures: Regional Cooperation, International Law, Environmental Conflict Resolution

Presentations explored multiple responses to environmental security issues. Some presenters suggested that among bodies of international law, humanitarian law carries the most (yet limited) promise for environmental protection. In contrast, others supported the creation of international juridical institutions to mediate and settle environmental disputes. Drawing on theories of integration, participants asserted that the common threat of environmental conflict may be a cause of cooperation and integration of developing countries. Increasing military experience with peacekeeping may suggest a future role for military forces in addressing environmental disasters and environmental conflict. The Global Environmental Facility (GEF) is an institution addressing global environmental concerns. Yet the impact of loan and grant programs such as those distributed by the GEF is limited by inadequate levels of funding, tight donor-country control of decisionmaking, institutional complexity in receiving countries, and a limited global agenda that fails to address many concerns of developing countries. Other participants stressed public opinion (information and learning) as an effective basis for demanding environmental controls.

Key Themes

Participants were largely in agreement that future methodological approaches for studying conflict and the environment must be balanced according to different traditions. Additional case studies and comparative cases studies are needed. More studies utilizing quantitative methods are also needed, as the research area continues to develop.

Participants commonly cited the necessity of examining and comparing cases where environmental scarcity existed but violent conflict did not occur. There were at least two motivations for examining such cases. First, analyzing them would help pinpoint the precise roles environmental factors play in contributing to conflict. Second, cases where environmental scarcity led to a peaceful outcome and sometimes cooperation rather than conflict might provide practical lessons for steering other cases in the direction of peace and/or cooperation.

Participants agreed on the multiple causality of conflict. No participant claimed environmental scarcity was the single cause of conflict or even the most important cause of conflict. Some participants stressed the need to avoid privileging environmental factors in the design or presentation of research on violent conflict, lest environmental issues be perceived as being singular, predominant, or determined causes of violent conflict.

Some participants expressed dissatisfaction with the common theoretical and empirical focus on interactions between states and particularly interstate conflict. There were at least two reasons for this dissatisfaction. First, the majority of current violent conflicts are intrastate or subnational in character. Focusing on interstate violence downplays or ignores these conflicts. The findings of research on the environmental component in conflict also place priority at this intrastate level. Second, environmental scarcities pose challenges most efficiently examined at levels below and above the level of the state. Theories and data that facilitate analyses at individual, group, regional, and global levels should accompany state-centered theories and data.

Participants agreed that the concept of environmental security had its origins as a rhetorical tool for placing environmental issues on the high-politics agenda of policy-makers and researchers. These origins, combined with issue-framing differences, help account for the lack of consensus on the definition and utility of the term environmental security. Participants largely agreed that the term was difficult, at this juncture, to operationalize as an analytical tool or a policy instrument. For the same reasons, ranking priorities for policy action on the basis of the concept of environmental security is also problematic. Discussions did produce concise proposals for definitional clarity and differentiation among the several parallel tracks in which environmental security conceptions are currently developing (environmental security as pertaining to violent conflict, human well-being, ecosystem well-being, the military's toxic legacy, and other issues).

Participants expressed the need to develop anticipatory, cooperative, and preventive mechanisms for addressing environmental scarcity and violent conflict. Reactive policies are likely to address only the symptoms of deeper problems rather than the causes. Reactive policies often are more costly and less effective than proactive policies.

Institutional design for environmental security should vary. The causal complexity surrounding violent conflict demands highly complex policy responses, pursued at different levels by governmental, intergovernmental, and nongovernmental institutions. Furthermore, which institutions undertake environmental security efforts helps to determine the means that will be employed and the goals that will be pursued. Institutions are already pursuing programs under the rubric of environmental security and need to be systematically studied.

The participants exhibited a high level of consensus in identifying key issues across the East–West axis. Participants strongly supported continuing this dialogue while simultaneously developing more links between researchers and policy-makers across the North–South axis. Since environmental scarcity and conflict research focuses primarily on developing countries, increased participation from Southern countries is critical to deeper understanding and more effective redress.

Participants supported an interdisciplinary approach to researching and addressing environmental security issues. The ARW adopted this approach with participants from engineering, ecology, geography, political science, sociology, economics, and hydrology. At a fundamental level, this interdisciplinary approach provided a constant reminder that social, political, and economic variables cannot be neglected when studying ecosystems, and vice versa.

Report on the Meeting

Environment and Security in an International Context

NATO CCMS Pilot Study

Ankara, Turkey, 11-12 November 1996

by Alexander Carius

Following the first meeting on April 17-18, 1996 in Waldbröl, Germany, the second meeting of the NATO CCMS Pilot Study "Environment and Security in an International Context" took place at the headquarters of the Scientific and Technical Research Council of Turkey (TÜBITAK) in Ankara, Turkey, from November 11 to 12, 1996. The meeting was co-chaired by the Pilot Study directors, Mr. Kurt M. Lietzmann (Federal Ministry of Environment, Nature Conservation and Nuclear Safety of the Federal Republic of Germany) and Mr. Gary D. Vest (United States Department of Defense). In their introductory remarks both underlined the focus of the Pilot Study which is on preventive measures to counter violent conflicts caused in part by environmental degradation and conflicts over natural resources.

Discussion of the Future Work of the Pilot Study

A Pilot Study Interim Report entitled "Environment and Security in an International Context: State of the Art and Perspectives" (see above) had been prepared for the Pilot Study meeting in Ankara. At the meeting, Mr. Alexander Carius and Dr. Sebastian Oberthür of Ecologic, the Center for International and European Environmental Research in Berlin, Germany, presented the Pilot Study Interim Report that identifies the role of environmental degradation and resource scarcities as causes of violent conflicts as the main subject of the Pilot Study. Moreover, gaps in the current knowledge about the relationship between environment and security were pointed to. As to policy options, international and multilateral policies deserve particular attention because of the international dimension inherent in environmental threats to security. Designing appropriate international organizations and effective international agreements related to the environment as well as building capacities through multilateral policies are the main policy options in this respect that need to be further investigated. Two clusters of possible research subjects were identified as a result of the Interim Report.

Commenting on the Interim Report, several representatives suggested expanding the analytical focus provided in the Report slightly by differentiating between interstate and domestic conflicts and by paying more attention also to non-violent conflicts. Several presentations were made on the state of the discussion on environment and security in different countries and contexts.

Based on the Interim Report, the German Federal Armed Forces Office for Studies and Exercises (FAFORSE) introduced a proposal for the future working structure of the Pilot Study by distinguishing three research areas that would be addressed by separate working groups:

Area 1: Definition and Modeling

1. Update existing lists of violent conflicts in which conflicts over natural resources and the environment played a major role.
2. Development of criteria for assessing to which degree a conflict has been caused by environmental degrada tion and natural resource scarcities.
3. Elaboration of criteria for assessing the security risks associated with environmental problems.
4. Development of different categories of environmental problems according to the extent which they are rel evant to security.
5. Definition of indicators and reasonable thresholds of severity of environmental problems that indicate height ened danger of their causing or contributing to violent conflict.
6. Development of a taxonomy for indicator-oriented data collection.

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Area 2: Definition and Development of a Database and a Decision Support System

1. Collection of data on a representative sample of environmental threats to security at different levels of conflict based on the results of the taxonomy elaborated in Area 1.

2. Definition of early warning indicators and ways of integrating relevant environmental factors into existing early warning systems.

3. Developing a decision support system.

Area 3: Risk Analysis and Recommendations for Environmental Politicsand Security Politics

1. Comparative threat assessment of major global and regional environmental problems in order to set priorities as regards their security relevance.
2. Integrated threat assessment for the NATO region as well as for other regions particularly relevant to NATO.
3. Evaluation and further development of selected en vironmental policy responses to environmental threats to security.
4. Evaluation and further development of selected se curity policy responses to environmental threats to security.
5. Elaboration of recommendations for improving and redesigning international institutions so as to address effectively environmental threats to secu rity by supporting and strengthening sustainable development.

Decisions Taken

This working structure was generally agreed by the participants with the notable qualification that the term "violent conflicts"—especially with regard to its usage in the work program of Area 1—should be read as "serious conflicts." The issue of how to coordinate the whole Pilot Study process will be discussed by the two Pilot Study directors and decided during the next Pilot Study meeting. Following a suggestion by Mr. Vest, it was agreed that analyses should be made of existing interstate and domestic conflicts in which the environment played a major role as well as environmental problems and resource scarcities that may potentially lead to conflicts, grievance or threat.

Following related offers by Germany and the United States, it was decided that both countries would co-chair the work of Area 1 together, while each country would take on a leadership role as co-chair of one of the remaining Areas (USA: Area 2; Germany: Area 3). The other co-chairs of Areas 2 and 3 are to be determined before the next Pilot Study meeting. Meetings of the co-chairs will take place to ensure that work in the Areas is integrated into the overall framework. Integration within each working group is to be enhanced by holding one or two workshops for each area. These are to be arranged in combination with regional expert meetings but apart from official Pilot Study meetings.

Several representatives expressed interest in contributing to specific aspects of the work of the Pilot Study. Romania announced its intention to assist in the development of early warning indicators (Area 2.2). Sweden declared its willingness to contribute to comparative threat assessments (Area 3.1). The representative of the Regional Environment Center in Budapest expressed its general interest in Area 3 and in hosting a workshop in 1997. The Polish delegation expressed its interest in contributing to Area 1 (1.2 to 1.5). Poland also invited the Pilot Study for one of the upcoming meetings. This invitation was gratefully accepted by the participants, and it was proposed that a Pilot Study meeting take place in Warsaw during the fourth quarter of 1997. Other participants appeared to be willing to contribute to specific aspects of the Pilot Study, but needed to consult other government agencies before making firm commitments.

The Next Steps

Representatives of institutions from several countries could not attend the meeting in Ankara but have expressed interest in contributing to the Pilot Study. To facilitate their integration and to further the progress of the Pilot Study, Evidence Based Research will draft a questionnaire to be sent to all interested NATO Member States and Partnership for Peace Countries. It will cover the following subjects:

- Information on serious conflicts that are analyzed by research institutions or are of special interest in the respective countries,

- Participation in sub-groups and possible contribution to one or more of the working group subjects agreed upon,

- Areas of interest and relevant current or future research projects.

The first Working group session of Area 1 took place in Washington, D.C. on January 21 and 22, 1997, where an outline for the analysis of indicators of environment and security issues is to be discussed as well as conceptual issues regarding modeling. The next Pilot Study meeting is to take place at the Center for Strategic Leadership (United States Army War College) in Carlisle Barracks, Pennsylvania, from May 20 to 22, 1997. The Pilot Study is to be finalized during the second half of 1998.

Workshop Report

Environmental Threats and National Security: An International Challenge to Science and Technology

Monterey, California
10-12 December 1996

by Paul L. Chrzanowski, Braden R. Allenby, Thomas J. Gilmartin, and Ronald F. Lehman II

The Workshop "Environmental Threats and National Security: An International Challenge to Science and Technology" at Monterey, California, in December, 1996, provided an opportunity for technologists, environmental experts, and policy specialists to exchange information and develop approaches for responding to environmental challenges as we enter the 21st century. The expert presentations and multidisciplinary discussions during the three days of sessions identified significant environmental threats to international security. They also highlighted ongoing activities to address these threats, science and technology efforts that merit additional emphasis, and barriers to mounting more effective responses to environmental challenges. Tables 1 and 2 list the sponsors, host institutions, and formal presentations at the Workshop.

Six principal points were raised at the Workshop:

- *The Importance of Environmental Issues*. At the end of the 20th century, we project that the world will double in population by the year 2050. Much of the increase will be in developing countries striving to attain a higher standard of living for their people. The stress on the limited common resources of the planet—air, water systems, fossil fuels, and land for agricultural use—will be enormous and unevenly distributed. The linkages among these factors and their resultant impact on regional well-being and the global environment need to be much better understood. Consequences of environmental mismanagement are very evident, for example, in areas of the former Soviet Union, where life expectancy has sharply declined over the last decade. We need to begin to take steps to limit the increase in global and regional environmental stresses and to hedge against anticipated adverse consequences.

- *The Security Dimension to Environmental Threats.* Secretary of State Warren Christopher stated in April 1996: "As we move to the 21st century, the nexus between security and the environment will become even more apparent." Not all environmental issues are security issues, but scarcity and environmental deterioration can fuel old hatreds based on religious, ethnic, or class differences and lead to conflict. Emergent diseases, which can arise and spread from unsanitary, overpopulated regions, are also a security concern. Various regions and environmental stresses leading to or setting the stage for conflict have been the focus of many academic studies of "Environmental Security" over the past decade.

The subject of Environmental Security has other facets as well. For example, within the Department of Defense, Environmental Security is an aspect of preventative defense, intended to create conditions for peace in a region. It entails engaging foreign militaries in environmental collaborations associated with defense activities, acquiring new weapon systems whose day-to-day operations have reduced environmental impact, and working with regional parties to identify sound solutions to regionally-troublesome environmental problems. In cases where there is a certain and proximate relationship between the environmental concern and the potential for conflict, the U.S. national security apparatus is much more likely to become engaged.

Environmental Security—whether it be broadly or narrowly defined—can be a helpful explanatory framework and analytical tool for decisionmakers, scholars, and the public. It can assist in the conceptualization of problems, the setting of priorities, and the organization of responses to environmental and demographic changes. Over time, it might evolve to become an established discipline in international security, like arms control. There

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are many parallels between environmental security and arms control, both of which focus on the downsides of technical progress. Yet, in the two cases there remain differences in the proximity and immediacy of issues and the clarity of theory and policy strategies.

• *The Complexity of Environmental Security Issues.* Environment and security issues are multifaceted and complex. In a fundamental way, environment must be viewed as strategic factor to be weighed in with many other variables affecting a regional situation. It cannot be considered in isolation as if it were overhead, and it must be worked with full participation of regional entities. Furthermore, global environmental issues must be considered in an international context that has changed significantly in the recent past. In addition to independent states, there are now transnational elites and networks, thousands of intergovernmental organizations, and tens of thousands of non-governmental organizations that have interest and equity in the international system. These factors raise a broad spectrum of issues related to international agreements, such as accountability, capability overload and congestion, and compliance.

It is clear that any analysis of the Earth system requires a multidisciplinary approach. Modeling must include human, biological, and physical factors. Overall, it is going to be difficult recognizing, defining, and attributing global climate changes to human actions. Linkages are very significant and very complex. The modeler is challenged to identify what factors are most important and to reduce uncertainties in those areas first. This task is made more difficult by the nonlinearity of the overall system. It is possible a small perturbation due to human actions or random factors can result in a very large effect (e.g., an abrupt change in ocean current that significantly changes global temperatures). In the historic past, a 6° C average temperature drop occurred in Northern Europe over a decade.

In the final analysis, the human factors may be the most difficult to model (and to deal with). An example is provided in the transportation sector. There are many problems associated with transportation, one of which is CO_2 emissions. It is an easy problem to ignore, and we cannot deal with it effectively until we understand underlying sociological factors, such as the coupling between income and mobility. Moreover, within the U.S., there presently is no feedback mechanism (social, technical, or economic, such as a gas tax) to stabilize CO_2 emissions. Furthermore, there is no consensus whether or how to approach the issue.

• *The U.S. Role in Environmental Security*. The U.S. has the capability to measure, understand, and predict environmental consequences through the application of science and technology. We must influence actions taken in the U.S. and other industrialized nations that affect the global environment. We must also influence the actions of states with rapidly growing economies, such as China, India, and Indonesia, which will be among the largest economies in the world in the 21st century. China, for example, is a case of rapid economic growth, limited natural resources (both oil and land for agriculture), and a degraded environment that is of international concern. Acid rain from coal burning is a problem for China and for its neighbors. However, there is some good news in this case. China is starting to act to improve its environment at an earlier stage in its economic development than other countries have. With proper management, China may be able to avoid food shortages and major health problems from air pollution in the coming decades.

In general, the United States has three broad roles to play in the environmental security area. First, we solve problems and share the developed technological capabilities with other countries. An example, currently being worked within the Department of Energy, is a nuclear materials stewardship program. In this effort, technically sound, integrated approaches to managing radioactive materials are being sought, which may engender international cooperation on concepts such as regional storage facilities. Second, we work other countries to build capacity to prevent environmental stresses. The goal is long-lasting solutions achieved through partnership with host countries. There are academic examples of these activities—humorously portrayed at the Workshop as being analogous, at times, to "herding cats." In addition, there are U.S. Government activities, such as the Arctic Military Environmental Cooperation effort, where we are engaged with Norway and Russia on spent fuel disposition and radioactive waste handling issues. Finally, the U.S. provides direction to international efforts through leadership and example.

• *Science and Technology in Response to Environmental Threats.* The application and advance of science and technology is crucial to the formulation and execution of responses to environmental threats. Both research universities and national laboratories contribute to the effort, working in conjunction with private industry and laboratories. Their responsibilities are to develop objective knowledge and technologies. Efforts include analysis, research and testing, and model development for applications ranging from site characterization to global circulation.

Universities have special responsibilities for the education of the next generation of decisionmakers, analysts, and scientists; while the Department of Energy laboratories have special responsibilities in the areas of radioactive waste remediation, nuclear safety, and nuclear material handling. In addition, other research institutions (including universities) advance agricultural technologies. These advances will be relied

upon to feed a more populous planet in the future. However, grainland under cultivation, per capita water use for irrigation, the size of the fish catch, grazing land, per capita grain yield, and fertilizer use have all leveled off or fallen from peak values during the 1990s. And, agricultural research organizations are not receiving adequate financial support. More support is also needed for many aspects of disease control. Since there is no way to predict when or where the next important new pathogen will emerge, investments are necessary for the various elements of a "discovery-to-control" continuum of activities. Proposals exist to expand activities: a global disease surveillance system, a global diagnostics system, a global emergency response system.

In the area of sensors and global monitoring, the use of intelligence assets and, in the future, high-resolution civilian satellites will provide an ability to understand and respond to humanitarian crises and to monitor flashpoints. Environmental intelligence is now a significant responsibility of the U.S. intelligence community. A Measurements of Earth Data for Environmental Analysis (MEDEA) team, consisting of about 70 scientists, advises the intelligence community on the use of its resources for the study of the environment. MEDEA is also responsible for making data available pertaining to deforestation, change in the temperature of oceans, wetlands management, and radioactive contamination. The intelligence community also works with various agencies on disaster response and monitoring. For the future, NASA has plans for Earth-monitoring satellite systems that will have high spatial and spectral resolution and rapid revisit times.

Remote sensing offers the prospect of supporting a wide range of detailed studies, ranging from issues related to urban areas to aspects of sustainable agriculture. Activities were discussed at the Workshop that involved the fusion of various data bases to study the regional consequences of environmental factors which are, in cases, global in origin. The overall objective is to develop multifactoral maps of environmental stress, which can be compared to the regional distribution of various human factors. It might be possible to develop predictive measures for environmentally-related security problems. Data is the driver. There is a need for better organization of existing data and the data expected from future sensor systems. The data must be workable, transparent, and accessible. This will facilitate regional cooperation, strengthen policy and regulatory analysis, and foster sustainable use of resources.

- *The Future of Environmental Security.* The April 1996 statement by Christopher Warren is evidence of high-level Clinton administration interest in Environmental Security. Significant pronouncements have also been made by John Deutch (as Director of Central Intelligence) and Secretary of Defense William Perry. In addition, Memoranda of Understanding exist among various departments and agencies fostering cooperation on environmental security issues. This high level interest provides a basis for work projects at various levels within DoD, DoE, the State Department, and the Environmental Protection Agency.

Yet, there are two related sources of concern. As expressed by one Workshop participant, "If everyone owns the problem, no one owns the problem." If there are shared interests in Environmental Security, it is important that responsibilities are carefully delineated and that vital aspects of the research, development, and execution responsibilities do not fall through the crack. Alternatively, responsibility could be delegated to one central entity, but there are problems with that approach also. Secondly, a combination of federal budget pressures, a lack of immediacy, and an absence of sharp focus to Environmental Security activities can lead to systemic under investment. We will soon see what momentum Environmental Security has in the second Clinton Administration.

In a much broader sense, it may take several administrations after the end of the Cold War to readjust priorities and realign the direction of the national security apparatus in the U.S. government. Environmental Security may take time to mature into a well-funded thrust area. Alternatively, the evolving new relationship between humans and the natural environment might broaden to become a principle of basic quality of life worldwide—a theme much broader than Environmental Security. What are our overall responsibilities to all the citizens of Earth and to future generations?

Internet Sites and Resources

The following is a list of internet sites and forums to facilitate research and policy efforts. This list of sites is not comprehensive and reflects different categories of environment and security issues.

Government Institutions

California Environmental Protection Agency
http://www.calepa.cahwnet.gov
This California EPA home page provides numerous listings of its policies, programs, initiatives and publications. In particular, the page features information on decommissioning and cleaning up military bases.

National Climatic Data Center (NCDC)
http://www.ncdc.noaa.gov
This NCDC home page offers access to the latest publications, conferences and programs on global climate change. A link is provided to on-line data and its climate research programs.

North Atlantic Treaty Organization (NATO), Environmental Clearinghouse System
http://echs.ida.org
The NATO Environmental Clearinghouse System (ECHS) web site serves as a link to environmental data, reports, and studies. The site serves as a tool for the multiple CCMS pilot studies and participating nations to acquire, organize, retrieve, and disseminate environmental information of common interest.

North Atlantic Treaty Organization (NATO), Scientific and Environmental Affairs
http://www.nato.int/science/home02.htm
The page for NATO's Scientific and Environmental Affairs program features newsletters, press releases, meetings and information on its latest activities. In particular, this page highlights the work of the NATO Science Committee and the environmental projects of the NATO Committee on the Challenges of Modern Society.

Pacific Northwest National Laboratory, Center for Environmental Security
http://www.pnl.gov:2080/science.html
This site outlines the Pacific Northwest National Laboratory science and technology program. It places specific focus on its current research and development programs relating to environmental restoration and change, energy, and national security.

United States Department of State
Bureau of Oceans and International Environmental and Scientific Affairs
http://www.state.gov/global/oes
This site is the main source for information about the State Department's foreign policy development and implementation in global environment, science, and technology issues. It also features the State Department's April 1997 "Environmental Diplomacy" report.

United States Bureau of the Census/International Programs Center
http://www.census.gov/ipc/www
The International Programs Center's work in the area of population and security can be accessed through its International Database (IDB) at this site.

United States Central Intelligence Agency (CIA)
http://www.odci.gov/cia
The CIA home page provides links to Agency publications, press releases, demographic maps, official statements, and other intelligence community Web sites.

United States Department of Defense, Environmental Network and Information Exchange
http://denix.cecer.army.mil./denix/denix.html
The Defense Environmental Network & Information Exchange provides DoD personnel and contractors work-

ing on environmental security issues with legislative updates, departmental bulletins and links to other environmental security resources. DENIX is a project of the DoD's Defense Environmental Security Corporate Information Management Program Office (DESCIM).

United States Department of Defense, Environmental Security
http://www.acq.osd.mil/ens
The Office of the Deputy Under Secretary of Defense for Environmental Security page includes links to government officials, projects, and divisions within DoD.

United States Department of Energy
http://apollo.osti.gov/html
This DoE home page contains links to departmental programs, personnel and informational services.

United States Global Change Research Program (USGCRP)
http://www.usgcrp.gov
The home page for USGCRP provides access to research and information offices and services, and to different research programs and seminars.

United States Government Printing Office (GPO)
http://www.access.gpo.gov/index.html
The home page for the GPO provides links to current government reports from all branches, including a link to the United States General Accounting Office page which can search for all reports and testimonies.

United States Government Printing Office/Superintendent of Documents
http://www.access.gpo.gov/su_docs
The U.S. Government Printing Office's Superintendent of Documents page provides access to the *Federal Register*, the *Congressional Record* and additional government documents.

United States Information Agency
http://www.usia.gov/topical/global/environ/content.htm
This site provides access to documents, articles, other internet sites and resources on environmental issues.

White House Office of Science and Technology Policy (OSTP)
http://www2.whitehouse.gov/WH/EOP/OSTP/html/OSTP_Home-plain.html
This home page provides links to White House publications, recent activities and other government agencies.

Scholarly and Non-Governmental Organizations

The Bellona Foundation
http://www.grida.no/ngo/bellona
This web page features this Norwegian environmental group's factsheets and the latest news on the state of the environment in Eastern Europe and Russia.

Cambridge University/Global Security Programme
http://www.gsp.cam.ac.uk
The Global Security Programme page provides information on the publications, staff, and activities of this institute. This site attempts to bring together traditional environment, development, and international relations studies to better understand the post-Cold War period.

Consortium for International Earth Science Information Network (CIESIN)
http://www.ciesin.org
The CIESIN home page provides links to interactive applications, metadata resources, data resources, information systems and resources, education sites, services, programs and related sites. It is also a link to the CIESIN World Data Center A (WDC-A) for Human Interactions in the Environment.

Center for Security Studies and Conflict Research
http://www.fsk.ethz.ch
This home page provides an overview of the Environment and Conflicts Project (ENCOP) and includes a complete listing of the Project's papers and links to other projects and sources on the topic of security.

International Relations and Security Network/Center for Security Studies
http://www.isn.ethz.ch
The International Security Network page, maintained by ENCOP, links to numerous security related Web pages, including major institutional sources of information on environmental security and environmentally linked conflicts. It also provides keyword searches and resources organized by subject, region, institution and event.

Consortium for International Earth Science Information Network (CIESIN)/Socioeconomic Data and Applications Center (SEDAC)
http://sedac.ciesin.org/ozone
CIESIN and SEDAC created the Stratospheric Ozone and Human Health Web site as an on-line service that integrates NASA remote-sensoring and atmospheric data on strataspheric ozone depletion and ultraviolet radiation with health-related data and information.

Cornell University/Center for the Environment (CfE)
http://www.cfe.cornell.edu
The CfE home page provides an overview of its program which is designed to foster cooperation among private and public institutions as a means to resolve environmental conflicts. The page includes links to its publications and related web sites.

Demographic, Environmental, and Security Issues Project (DESIP)
http://www.igc.apc.org/desip
This database lists on-going conflicts, and focuses on the environmental and population aspects of those conflicts. It attempts to show users connections between environmental scarcity and political conflict.

EcoNet
http://www.lcr.org/score100/econet_info.html
Econet is an online computer network that links people and environmental organizations. The home page provides links to a directory of environmental resources and the EcoNet Gopher.

EnviroLink
http://www.envirolink.org
The EnviroLink home page provides access to an extensive environmental resource database.

Global Environmental Facility (GEF)
http://www.worldbank.org/html/gef/geftext.htm
The GEF home page provides multi-lingual links to its publications and bulletins.

The Global Network of Environmental Technology (GNET)
http://www.gnet.org
GNET is a communications and information delivery system that facilitates the rapid commercialization and diffusion of environmental technologies through public and private collaboration in the global marketplace. The GNET home page provides access to its latest database and news regarding the environment.

The Green Disk
http://www.igc.org/greendisk
The Green Disk is a bimonthly journal of contemporary environmental issues. The site provides the journal issues and allows visitors to submit their own environmental project descriptions, upcoming meetings, and website to be published in upcoming issues. Also, a link to eBase 6.0 provides users a link to a database of

environmental issues, campaigns and organizations.

International Human Dimensions Program (IHDP)/Global Environmental Change and Human Security
http://geography.geog.uvic.ca/hdp/htmls/index.html
This home page gives a project description and outline of IDHP activities. It provides access to reports by IDHP and other key research organizations, an online bibliography and global change hyperlinks.

International Institute for Sustainable Development (IISD)
http://iisd1.iisd.ca
The IISD home page provides links to the Institute's many projects on sustainable development. It also links to a list of selected book and article resources for environment and security.

Intergovernmental Panel on Climate Change (IPCC)
http://www.unep.ch/ipcc/ipcc-0.html
The IPCC was established by the UN to assess scientific information about climate change relevant to international and national policy. The IPCC home page provides links to current and past reports, working groups and meeting schedules.

Institute for Global Communications (IGC)
http://www.igc.org/igc/members/index.html
The IGC home page provides an extensive list of environmental organizations conducting work relevant to environmental change and security issues, as well as links to relevant reports and handbooks.

International Studies Association (ISA)
http://www.isanet.org
This site provides access to the panel and paper listings for academia's largest professional association focused explicitly on international affairs. This site also provides links to ISAs Environmental Studies Section and relevant ISA regional conferences.

The Nautilus Institute
http://www.nautilus.org
The home page for Nautilus provides extensive information on its Asia Pacific Regional Environmental Network (APRENet) and its project on Energy, Security and Environment in Northeast Asia. The site has links to its other projects and related Internet resources.

Ozone Secretariat
http://www.unep.ch/ozone
The Ozone Secretariat is the Secretariat for the Vienna Convention and the Montreal Protocol. The home page provides information, documents, original statements and publications on the Ozone.

Pacific Institute for Studies in Development, Environment, and Security
http://www.pacinst.org/pacinst
The Pacific Institute provides research and policy analysis in the areas of environment, sustainable development, and international security. Their page allows access to its programs and publications.

Panos Institute
http://www.oneworld.org/panos/index.html
This page links users to Panos' recent publications as well as to research on environmental and social development issues.

Population Reference Bureau (PRB)
http://www.prb.org/prb
The PRB provides information on population trends for policymakers, educators, the media and the public. Their home page supplies links to their latest statistics and publications.

Royal Institute of Technology, Stockholm, Sweden
http://www.lib.kth.se/~lg/envsite.htm
This page, entitled Environmental Sites on the Internet, provides a large environmental subject index with links to other home pages and gopher menus.

Scientific Study of International Processes Section of ISA's Home Page
http://csf.colorado.edu/isa/ssip
This home page provides users with access to academic programs and research resources which focus on international studies.

Sierra Club
http://www.sierraclub.org/policy/521.html
The Sierra Club web page highlights its adopted policy position on Environmental Security. The policy statement begins, "Investments in environmental security should begin to replace new military expenditures..."

Stockholm International Peace Research Institute (SIPRI)
http://www.sipri.se/
This site provides listings of projects, conferences, publications, and links to environmental security web sites. The Institute's research commonly considers environmental factors in discussions of security and disarmament.

Trade and Environment Database (TED)
http://gurukul.ucc.american.edu/ted/ted.htm
The Trade and Environment Database webpage provides links to information about the TED projects, its cases, and other relevant websites. Over 350 cases relating trade and the environment can be sorted by legal, geographic, trade and environment attributes. Other TED research papers relating trade and the environment to economics, conflict and culture are also posted on this website.

United Nations Environment Program (UNEP)
http://www.unep.ch
The home page for UNEP provides links to publications, convention reports and access to the UNEP database.

The United Nations International Conference on Population and Development (ICPD)
http://www.iisd.ca/linkages/cairo.html
This conference brought together world leaders, representatives of non-governmental organizations and United Nations agencies to agree on a program of action. This web site lists the historical background, recommendations and publications of the conference.

University of California/Institute of Global Conflict and Cooperation (IGCC)
http://www-igcc.ucsd.edu/IGCC/igccmenu.html
The IGCC page includes information on the Institute, IGCC fellowships, grants and ongoing research and campus programs. The page also provides the full text of all IGCC publications.

University of Toronto/Peace and Conflict Studies
http://utl1.library.utoronto.ca/WWW/pcs/pcs.htm
The University of Toronto's Peace and Conflict Study Program's home page describes its programs and purpose. The page also contains links to its Project on Environment, Population and Security, and its Project on Environmental Scarcities, State Capacity and Civil Violence.

University of Toronto/Environmental Security Library & Database
http://www.library.utoronto.ca/www/pcs/catalogue/libintro.htm
This site provides access to the Environmental Security Library & Database which contains extensive information on topics related to environmental stress and violent conflict in developing countries.

Bibliographic Guide to the Literature

The Environmental Change and Security Project (ECSP) compiled the following list, supplementing the bibliographic entries from Issues I and II. The Guide includes a wide range of publications, organized by theme, which relate to the various known conceptions about environment and security. The ECSP will continue to publish additions to this bibliography; we welcome suggestions regarding the organization and content of the bibliography. Entries are formatted according to Kate L. Turabian's Manual for Writers of Term Papers, Theses and Dissertations.

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