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.

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Mock NSC Briefing

Environment and U.S. National Security Interests: Newly Independent States and Central and Eastern Europe

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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.

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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 policymaking 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.

Geoffrey D. Dabelko is a doctoral candidate in the Department of Government and Politics at the University of Maryland, College Park and Associate Director of the Wilson Center's Environmental Change and Security Project.

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.

A. Environment and Security: General Debate and Definitions

Allenby, Branden R. "Implementing Industrial Ecology: Integrating Environment and National Security." Presented at the Workshop on Environmental Threats and National Security: An International Challenge to Science and Technology, Monterey, California, 10-12 December 1996.

Barnett, Jonathon. "Environmental Security as a Paradigm for Peace." Paper presented at the 16th General Conference of the International Peace Research Association, Brisbane, Australia, 8-12 July 1996.

Brock, Lothar. "Environmental Degradation as a Security Issue: Conceptual Pitfalls and Empirical Challenges." Paper presented at the 16th General Conference of the International Peace Research Association, Brisbane, Australia, 8-12 July 1996.

_____. "The Environment and Security: Conceptual and Theoretical Issues." Paper presented at the NATO Advanced Research Workshop, Bolkesjo, Norway, 12-16 June 1996.

Bröms, Peter. *Environmental Security Regimes: A Critical Approach*. Research Report presented to the Department of Political Science, Umeą University, 1995.

Cherry, W. A. Bill. "Environmental Security and Human Rights: Forging the Links." Paper presented at the 16th General Conference of the International Peace Research Association, Brisbane, Australia, 8-12 July 1996.

Corell, Robert W. "Understanding Global Environmental Threats." Paper presented at the Workshop on Environmental Threats and National Security: An International Challenge to Science and Technology, Monterey, California, 10-12 December 1996.

Dalby, Simon. "Environmental Security: Geopolitics, Ecology, and the New World Order," In *Environmental Policy with Political and Economic Degradation: The European Union and the United States*, eds. John B. Braden, Henk Folmer, and Thomas S. Ulen. Vermont: Edward Elger Publishing Company, 1996.

_____. "The Environment as a Geopolitical Threat: Reading Robert Kaplan's 'Coming Anarchy'." *Ecumene*, 3:4 (1996): 472-496.

Dabelko, Geoffrey D., and David D. Dabelko. "Environmental Security: Issues of Conflict and Redefinitions," In *Environment and Security*, eds. Simon Dalby and Paul Painchaud, (1): 23-49. Québec: Meridien Publishing, 1996.

Dabelko, Geoffrey D. and P.J. Simmons. "Environment and Security: Core Ideas and U.S. Government Initiatives" In *SAIS Review* 17 (Winter/Spring 1997): 127-146.

Dyer, Hugh C. "Environmental Security as a Universal Value: Implications for International Theory," In *The Environment and International Relations*, eds. John Vogler and Mark F. Imber, New York: Routledge, 1996.

Ellis, Jaye. "Environmental Security and Chapter 7: Can Cooperation be Bred of Conflict?" Paper delivered at the International Studies Association West 1996 Regional Conference, Eugene, Oregon, 10-12 October 1996.

Hill, Antonio. "Towards a Definition of 'Environmental Conflict': Theorizing the Role of Value." Paper presented at the NATO Advanced Research Workshop, Bolkesjo, Norway, 12-16 June 1996.

Homer-Dixon, Thomas F, and Jeffrey Boutwell. "Environmental Change, Global Security, and U.S. Policy," In *American Defense Annual* , ed. Joe Kruzel. Lexington: 1994.

_____. "Environmental Change and Human Security." *Behind the Headlines* 48:3 (Spring 1991): 1-17.

Kauffman, Joanne M. and David Marks. "A Step Beyond: MIT's Strategy and Experience in Building International Environmental Alliances." Paper presented at the Workshop on Environmental Threats and National Security: An International Challenge to Science and Technology, Monterey, California, 10-12 December 1996.

Keller, Kenneth. "Unpackaging the Environment." *World Policy Journal*. (Fall 1996): 11-23.

Kennedy, Donald. "Regional Dimensions of Environ-

mental Security." Paper presented at the Workshop on Environmental Threats and National Security: An International Challenge to Science and Technology, Monterey, California, 10-12 December 1996.

Kirk, Elizabeth J. "The Greening of Security: Environmental Dimensions of National, International, and Global Security After the Cold War," In *Science and International Security: New Perspectives for a Changing World Order,* ed. Eric H. Arnett. Washington: American Association for the Advancement of Science, 1991.

Lehman II, Ronald F. "Insights into Environmental Security: Learning from the Arms Control Experience." Paper presented at the Workshop on Environmental Threats and National Security: An International Challenge to Science and Technology, Monterey, California, 10-12 December 1996.

Lipschultz, Ronnie D. "Environmental Security and Environmental Determinism: The Relative Importance of Social and Natural Factors." Paper presented at the NATO Advanced Research Workshop, Bolkesjo, Norway, 12-16 June 1996.

Mackarinskiy, Oleg N. "The Probabilico-Statistical Approach to the Environmental Security Problems." Paper presented at the NATO Advanced Research Workshop, Bolkesjo, Norway, 12-16 June 1996.

MacNeil, Jim. "Environmental Change as a Source of Conflict: More Work Needed," In *Environment and Security*, eds. Simon Dalby and Paul Painchaud, (1):10-13. Québec: Meridien Publishing, 1996.

Matthew, Richard "The Future of Environmental Security." Paper presented at the NATO Advanced Research Workshop, Bolkesjo, Norway, 12-16 June 1996.
_____. "The Greening of U.S. Foreign Policy." *Issues in Science and Technology* (Fall 1996): 39-47.

Rogers, Katrina. "Pre-empting Violent Conflict: Learning from Environmental Cooperation." Paper presented at the NATO Advanced Research Workshop, Bolkesjo, Norway, 12-16 June 1996.

Simmons, P.J. and Geoffrey D. Dabelko. "Environment and Security: Core Ideas and U.S. Government Activities." Paper presented at the Workshop on Environmental Threats and National Security: An International Challenge to Science and Technology, Monterey, California, 10-12 December 1996.

Sprinz, Detlef. "Regulating the International Environment: A Conceptual Model of Environmental Security and Instrument Choice." Paper presented at the NATO Advanced Research Workshop, Norway, June 1996.

Stranks, Robert. "China: Environmental Stress and National Security." Paper presented at the NATO Advanced Research Workshop, Bolkesjo, Norway, 12-16 June 1996.

Thomas, Gerald B. "U.S. Environmental Security Policy: Broad Concern or Narrow Interests." Paper delivered at the International Studies Association West 1996 Regional Conference, Eugene, Oregon, 10-12 October 1996.

Weiss, Edith Brown. "International Law and Environmental Security." Paper presented at the Workshop on Environmental Threats and National Security: An International Challenge to Science and Technology, Monterey, California, 10-12 December 1996.

de Wilde, Jaap. "Ecological Security at the Local Level from an International Relations Perspective." Paper presented at the 16th General Conference of the International Peace Research Association, Brisbane, Australia, 8-12 July 1996.

B. Redefining Security: Articles Mentioning the Environment

Alison, Graham, and Gregory F. Treverton. "National Security Portfolio Review," In *Rethinking Security: Beyond Cold War to New World Order,* eds. Alison and Treverton, New York: W. W. Norton and Company, 1992.

Baldwin, David A. "Security Studies and the End of the Cold War." *World Politics* 48(1): 117-41.

Brown, L. *Human Needs and the Security of Nations.* Headline Series 238. New York: Foreign Policy Association, 1978.

Dessler, David. "Theory, Method and Inference in Security Studies." Paper presented at the NATO Advanced Research Workshop, Bolkesjo, Norway, 12-16 June 1996.

Edwards, Michael J. "Definitions, Threats, and Pyramids: The Changing Faces of Security," In *Environment and Security*, eds. Simon Dalby and Paul Painchaud, (1):96-123. Québec: Meridien Publishing, 1996.

Eisenberger, Peter, Michael M. Crow, and Lewis E. Gilbert. "Earth Stewardship: Developing the Systems Knowledge, Engineering, and Social Tools for the Difficult Choices in the 21st Century." Paper presented at the Workshop on Environmental Threats and National Security: An International Challenge to Science and Technology, Monterey, California, 10-12 December 1996.

Florini, Ann and P.J. Simmons. "The New Security Thinking: A Review of the North American Litterature." Paper presented at the Workshop on Redefining Security, the Brookings Institution, Washington, D.C., 9 March 1997.

Gaddis, John Lewis. "Chaos, Complexity, and Contemporary History." *Think Peace Series* No. 30, Contemporary History Institute: Ohio University, 1994.

Gleditsch, Nils Peter, and Bjorn Otto Sverdrup. "Democracy and Environmentalism." Paper presented at the NATO Advanced Research Workshop, Bolkesjo, Norway, 12-16 June 1996.

Graubaurd, Stephen. "The Quest to World Order." *1 DAEDALUS: Journal of the American Academy of Arts and Sciences* 24(3): V-XX, 1995.

Jablonsky, David. *Time's Cycle and National Military Strategy: The Case for Continuity in a Time of Change.* Carlisle: U.S. Army War College, 1995.

Kaplan, Robert D. "History Moving North." *The Atlantic Monthly* (February 1997): 21-31.

Klare, Michael T. "Redefining Security: The New Global Schisms." *Current History* 95:604 (1996): 353-358.

Kolodziej, Ed. "Renaissance in Security Studies?" *International Studies Quarterly* 36(4) (1992) : 421-438.

Krause, Keith and Michael C. Williams. "Broadening the Agenda of Security Studies: Politics and Methods." *Mershon International Studies Review* 40 (1996): 229-254.

Mathews, Jessica. "A New Security Agenda." *The Washington Post,* 1 October 1992.
_____. "The New Security Puzzles." *The Washington Post*, 24 July 1994.
_____."Power Shift: The Rise of Global Civil Society." *Foreign Affairs* 76(1): 50-66, January 1997.

Peterson, Peter G., and James K. Sebenius. "The Primacy of the Domestic Agenda," In *Rethinking Security: Beyond Cold War to New World Order,* eds. Alison and Treverton. New York: W. W. Norton and Company, 1992.

Renner, Michael. *Fighting for Survival: Environmental Decline, Social Conflict, and the New Age of Insecurity.* New York: W.W. Norton and Company, 1996.

Rothschild, Emma. "What is Security?" *DAEDALUS: Journal of the American Academy of Arts and Sciences* 124:3 (1995): 53-91.

Schipper, Lee. "CO2: The Easy Problem to Forget Today, The Hardest Problem to Fix Tomorrow." Paper presented at the Workshop on Environmental Threats and National Security: A Challenge to Science and Technology, Monterey, California, 10-12 December 1996.

Schultz, Richard. "Introduction to International Security," In *Security Studies for the 1990s,* eds. Richard Schultz, Roy Godson, and Ted Greenwood. Washington: Brassey's (U.S.), 1997.

Snider, Don M. *The National Security Strategy: Documenting Strategic Vision,* 2nd ed. Carlisle: U.S. Army War College, 1995.

Steen, Peter. "A New Triad in Security: Military, Ecological, and Economic Securities in the Third World." Paper delivered at the International Studies Association West 1996 Regional Conference, Eugene, Oregon, 10-12 October 1996.

United Nations Development Program. "Redefining Security: the Human Dimension." *Human Development Report 1994*, 229-236.

C. Environment as a Security Threat to a Nation's Health, Economy, or Quality of Life

Burros, William, ed. "Global Security Beyond 2000: Global Population Growth, Environmental Degradation, Migration, and Transnational Organized Crime." *Conference Report*. Pittsburgh, Pennsylvania, 2-3 November 1995.

Feshbach, Murray. "Environmental and Health Problems in the Former Soviet Union: Do They Matter to the United Sates?" Paper presented at the Workshop on Environmental Threats and National Security: An International Challenge to Science and Technology, Monterey, California, 10-12 December 1996.

"Global HIV / AIDS: A Strategy for U.S. Leadership." A Consensus Report of the CSIS Working Group on Global HIV / AIDS." Washington: The Center for Strategic and International Studies, 1994.

Hayes, Peter, Natalie Kraft, David von Hippel, and Lyuba Zarsky. " Energy Dimensions of Environmental Security in Northeast Asia." Paper presented at the Workshop on Environmental Threats and National Security: An International Challenge to Science and Technology, Monterey, California, 10-12 December 1996.

Kane, Hal. "Food Security and International Security." Paper presented at the Workshop on Environmental Threats and National Security: An International Challenge to Science and Technology, Monterey, California,

10-12 December 1996.

Murphy, Fredrick A. "Emerging Infectious Diseases, Public Health, and National Security." Paper presented at the Workshop on Environmental Threats and National Security: An International Challenge to Science and Technology, Monterey, California, 10-12 December 1996.

Obi, Cyril. "Oil, Environmental Conflict and National Security in Nigeria: Ramifications of the Ecology-Security Nexus for Sub-Regional Peace."ACDIS Occasional Paper, University of Illinois at Urbana, January 1996.

Platt, Anne. "The Resurgence of Infectious Diseases." *World Watch* (July / August 1995): 26-32.

Regis, Ed. *Virus Ground Zero: Stalking the Killer Viruses with the Centers for Disease Control.* New York: Simon & Schuster, 199x.

Ribeiro, Mauricio Andres. "Water, Drought, and Conflict: The Case of Brazil's San Francisco River." Paper presented at the 16th General Conference of the International Peace Research Association, Brisbane, Australia, 8-12 July 1996.

Ryan, Frank. *Virus X: Tracking the New Killer Plagues Out of the Present and into the Future.* New York: Little, Brown, 199x.

D. Environment as a Contributing Factor to Political Instability and/or Violent Conflict

Bailey, Jennifer. "States, Stocks, and Sovereignty: High Seas Fishing and the Expansion of State Sovereignty." Paper presented at the NATO Advanced Research Workshop, Bolkesjo, Norway, 12-16 June 1996.

Beaumont, Peter. "Conflict over Water in the Middle East: Fantasy or Reality?" Paper presented at the NATO Advanced Research Workshop, Bolkesjo, Norway, 12-16 June 1996.

Correia, Francisco Nanes, and Joaquin Evarista de Silva. "Transboundary Issues in Water Resources." Paper presented at the NATO Advanced Research Workshop, Bolkesjo, Norway, 12-16 June 1996.

Gleditsch, Nils Peter. "The Environment, Politics and Armed Conflict: A Critique and Research Proposal." Paper presented at the NATO Advanced Research Workshop, Bolkesjo, Norway, 12-16 June 1996.

Gleick, Peter E. "Water and International Security in the 21st Century." Paper presented at the Workshop on Environmental Threats and National Security: An International Challenge to Science and Technology, Monterey, California, 10-12 December 1996.

_____. "Moving Towards Peace in the Middle East: Sharing the Waters." *Pacific Institute Report* (Spring 1995): 6.

Hammarstrom, Mats. "Scarcity of Minerals and Military Conflict." Paper presented at the NATO Advanced Research Workshop, Bolkesjo, Norway, 12-16 June 1996.

Hange, Wenche and Tanja Ellingsen. "Environmental Change and Civil War: A Multivariate Approach." Paper presented at the NATO Advanced Research Workshop, Bolkesjo, Norway, 12-16 June 1996.

Homer-Dixon, Thomas F. "Environmental Scarcity, Mass Violence, and the Limits to Ingenuity."*Current History* 95:604 (November 1996): 359-365.

_____."The Myth of Water Wars." *Toronto Globe and Mail* 5 November 1996.

_____."Is Anarchy Coming? A Response to the Optimists." *Toronto Globe and Mail*. 10 May 1994.

_____."Environmental Change, Economic Decline, and Civil Strife in Developing Countries." *International Studies Notes* Spring 1991.

_____. "Environmental Scarcity and Mass Violence." Paper presented at the NATO Advanced Research Workshop, Bolkesjo, Norway, 12-16 June 1996.

Klotzli, Stefan. "The Aral Sea Syndrome and Regional Cooperation in Central Asia: Opportunity or Obstacle?" Paper presented at the NATO Advanced Research Workshop, Bolkesjo, Norway, 12-16 June 1996.

Llamas, M. Ramon. "Transboundary Relations in an Area with Limited Water Resources." Paper presented at the NATO Advanced Research Workshop, Bolkesjo, Norway, 12-16 June 1996.

Loksha, Victor. "The Tumen River Economic Development Area: Environmental Challenge for Northeast Asia," In *Environment and Security*, eds. Simon Dalby and Paul Painchaud, (1): 124-155. Québec: Meridien Publishing, 1996.

Lonergan, Steve. "Water Resources and Conflict: Examples from the Middle East." Paper presented at the NATO Advanced Research Workshop, Bolkesjo, Norway, 12-16 June 1996.

Mohammed, Nadir A.L. "Environmental Conflicts in Africa." Paper presented at the NATO Advanced Research Workshop, Bolkesjo, Norway, 12-16 June 1996.

Payne, Rodger A. "The GEF, Environmental Conflict, and Transnational Environmentalism." Paper pre-

sented at the NATO Advanced Research Workshop, Bolkesjo, Norway, 12-16 June 1996.

Percival, Val and Thomas Homer-Dixon. "Environmental Scarcity and Violent Conflict." *Journal of Environment and Development* 5:3 (September 1996): 270-291.

Smil, Vaclav. "China's Environmental Security: Non-Catastrophic Perspectives." Paper presented at the Workshop on Environmental Threats and National Security: An International Challenge to Science and Technology, Monterey, California, 10-12 December 1996.

Smith, Zachary. "Managing International Resource Conflicts: The Water Resources Experience." Paper presented at the 16th General Conference of the International Peace Research Association, Brisbane, Australia, 8-12 July 1996.

Soroos, Marvin S. "The Canadian-Spanish Turbot War of 1995: A Case Study in the Resolution of International Fishery Disputes." Paper presented at the NATO Advanced Research Workshop, Bolkesjo, Norway, 12-16 June 1996.

Swain Ashok. "Water Scarcity: A Threat to Global Security," In *Environment and Security*, eds. Simon Dalby and Paul Painchaud, (1):156-172. Québec: Meridien Publishing, 1996.

Swain, Ashok, and Peter Wallensteen. "Conflict and Cooperation over International Rivers: What Rules of Which Games?" Paper presented at the NATO Advanced Research Workshop, Bolkesjo, Norway, 12-16 June 1996.

"Umweltzerstorung, eine Kriegsursache. Synthese." (Environmental Degradation, a Cause of War. Synthesis.) In *Kriegsursache Umweltzerstorung. Okologische Konflikte in der Dritten Welt und Wege ihrer friedlichen Bearbeitung.* (Ecological Conflicts in the Third World and Ways for their Resolution.) eds. Gunther Bachler, Volker Boge, Stefan Klotzli, Stephan Libiszewski and Kurt R. Spillmann, Vol. I, Zurich: Ruegger Verlag, 1996.

Varshavsky, Alexander, and Leonid Varshavsky. "Conflicts at Global and Local Levels and Environmental Change: Economics and Mathematical Methods and Models of Research." Paper presented at the NATO Advanced Research Workshop, Bolkesjo, Norway, 12-16 June 1996.

E. The Intelligence Community and the Environment

David, Ruth A. "The Environment, National Security, and the Intelligence Community." Paper presented at the Workshop on Environmental Threats and National Security: An International Challenge to Science and Technology, Monterey, California, 10-12 December 1996.

Gore, Al. "An Arctic Breakthrough: Heralding a New Era of Cooperation, the United Sates and Russia are Making Data from their Cold War Intelligence Archives Available to Science." *National Geographic* 191: 2 (February 1997): 36-57.

Harris, Robert "Global Observing Systems for Environmental Security." Paper presented at the Workshop on Environmental Threats and National Security: An International Challenge to Science and Technology, Monterey, California, 10-12 December 1996.

F. Environmental Effects of War and Preparations for War

Nilsen, Thomas and Nils Bohmer. *Sources to Radioactive Contamination in Murmansk and Arkhangel'sk Counties.* Bellona Report Volume 1. Oslo: The Bellona Foundation, 1994.

Nilsen, Thomas, Igor Kudrik, and Alexandr Nikitin. *The Russian Northern Fleet: Sources of Radioactive Contamination.* Bellona Report No. 1 Oslo: The Belona Foundation, 1996.

Sajo, Andras. "Environmental Damage Caused by Troops Stationed Abroad: The Red Army in Hungary." Paper presented at the NATO Advanced Research Workshop, Bolkesjo, Norway, 12-16 June 1996.

Schafer, Jon Kenneth. "Nuclear Materials: A Perspective on Environmental Threats and National Security." Paper presented at the Workshop on Environmental Threats and National Security: An International Challenge to Science and Technology, Monterey, California, 10-12 December 1996.

Scherbak, Yuri M. "Ten Years of the Chornobyl Era." *Scientific American* (April 1996): 44-49.

Westing, Arthur H. "Environmental Protection from Wartime Damage: The Role of International Law." Paper presented at the NATO Advanced Research Workshop, Bolkesjo, Norway, 12-16 June 1996.

G. Official Statements Relating Environment to Security Issues or Security Institutions

Bowling, Curtis. "Department of Defense Perspective on Environment and Security." Paper presented at the Workshop on Environmental Threats and National Security: An International Challenge to Science and Technology, Monterey, California, 10-12 December 1996.

Christopher, Warren. "The Environment in U.S. Foreign Policy." Remarks delivered at the Woodrow Wilson International Center for Scholars, Washington, D.C., 14 January 1997.

_____."Council of the Americas: Supporting Economic Growth and Democracy." Remarks delivered at the Council of the Americas, Washington, D.C., 6 May 1996.

Claussen, Eileen B. Remarks delivered at the Chatham House Workshop on Multinational Corporations and Global Environmental Change, London, England, 27 June 1996.

Clinton, William J. Remarks delivered at the International Coral Reef Initiative Event, Port Douglas, Australia, 22 November 1996.

Deutch, John. "The Environment on the Intelligence Agenda." Remarks delivered at the World Affairs Council, Los Angeles, California, 25 July 1996.

"Environmental Diplomacy: the Environment and U.S. Foreign Policy." Department of State: Washington, DC: April 1997.

Gibbons, John. Remarks delivered at the conference on Climate Change, Evolving Technologies, U.S. Businesses and the World Economy in the 21st Century, U.S. Department of State, Washington, D.C., 18 June 1996.

Hambley, Mark. "The Environment and Diplomacy: New Challenges for American Foreign Policy." Paper presented at the Workshop on International Environment and Security Issues at the National Defense University, Washington, D.C., 8 August 1996.

Goodman, Sherri W. "The Environment and National Security." Remarks delivered at the National Defense University, Washington, D.C., 8 August 1996.

Haspel, Abraham E. "Department of Energy Perspective on Environment and Security." Paper presented at the Workshop on Environmental Threats and National Security: An International Challenge to Science and Technology, Monterey, California, 10-12 December 1996.

Perry, William J. Remarks delivered to the Society of American Engineers, Washington, D.C., 20 November 1996.

Talbott, Strobe. Remarks delivered at the Environmental Issues in American Foreign Policy Seminar, National Foreign Affairs Training Center, Arlington, VA, 10 September 1996.

Wirth, Timothy E. "Population Pressure and the Crisis in the Great Lakes Region of Africa." Paper presented at the Center for Foreign Policy, Washington, D.C., 18 December 1996.

H. Population, Environment and Security

Ashford, Lori S. "New Perspectives on Population: Lessons from Cairo." Population Bulletin 50, no. 1, Population Reference Bureau, Inc., Washington, D.C., March 1995.

Brown, Janet Welsh. "Population, Consumption, and the Path to Sustainability." *Current History* 95:604 (November 1996): 366-371.

Cassen, Robert, ed. *Population and Development: Old Debates, New Conclusions.* Washington D.C.: Overseas Development Council, 1994.

Chiras, Daniel D. *Voices of the Earth: Vital Ideas from America's Best Environmental Books.* Boulder, CO: Johnson Books, 1995.

Cohen, Joel E. "How Many People can the Earth Support?" *Population Today* 24:1, 1996.

Diehl, Paul F. and Jaroslav Tir. "Population Pressures and International Conflict: Linking Population Growth and Density to Disputes and Wars." Paper presented at the NATO Advanced Research Workshop, Bolkesjo, Norway, 12-16 June 1996.

Ehrlich, Anne H. "Implications of Population Pressure on Agriculture and Ecosystems." *Advances in Botanical Research* 21 (1995): 80-104.

_____. "Toward a Sustainable Global Population," In *Building Sustainable Societies*, ed. Dennis C. Pirages, New York: M.E. Sharpe, 1996, 151-165.

Homer-Dixon, Thomas F. "Population and Conflict." Distinguished Lecture sponsored by the International Union for the Scientific Study of Population, Non-Government Forum, United Nations Conference on Population and Development, Cairo, 8 September 1994.

Lutz, Wolfgang. "The Future of World Population." *Population Bulletin* 49, no. 1, Population Reference Bureau, Inc., Washington, D.C., June 1994.

Ness, Gayl. "Handbooks Linking Population and Environmental Issues," In *IUCN Guide to Sustainability Strategies.* Geneva: IUCN, 1994.

"Population/Environment Equations: Implications for Future Security." Final Report of the Third Conference of the International Consortium for the Study of Environmental Security, Tufts University, May- June, 1994.

Preeg, Ernest H. *The Haitian Dilemma: A Case Study in Demographics, Development, and U.S. Foreign Policy.* Washington, DC: The Center for Strategic and International Studies, 1996.

Suhrke, Astri. "Environmental Degradation and Population Flows." *Journal of Environmental Affairs* 47(2) (1994): 473-496.

Tietelbaum, Michael, and Jay Winter. "The Population-Environment Debate in Historical Perspective," In *Population-Environment Dynamics: Ideas and Observations,* ed. Gayl D. Ness. Ann Arbor: The University of Michigan Press, 1993.

United Nations. *Report of the International Conference on Population and Development-Cairo,* 5-13 September, 1994, A/CONF/71/13, 18 October, 1994.

United Nations. *Summary of the Programme of Action of the International Conference on Population and Development,* New York, 1995.

Westing, Arthur H. "Population, Desertification, and Migration." *Environmental Conservation* 21(2) (June 1994): 110-114.

I. **Environmental Security and Migration**

Dowty, Alan and Gil Loescher. "Refugee Flows as Grounds for International Action." *International Security* 21:1 (1996): 43-71.

Kirschten, Dick. "No Refuge ." *National Journal* (10 September 1994): 2068-2073.

Larrabee, F. Stephen. "Down and Out in Warsaw and Budapest: Eastern Europe and East-West Migration." *International Security* 16:4(1992): 219-247.

Lee, Shin Wha. "In Limbo: Environmental Refugees in the Third World." Paper presented at NATO Advanced Research Workshop, Bolkesjo, Norway, 12-16 June 1996.

Leiderman, Stuart. "Environmental Refugees and Ecological Restoration: Learning how to Reserve the Remainder Earth Scenario and Avoid Environmental Conflict." Paper presented at the NATO Advanced Research Workshop, Bolkesjo, Norway, 12-16 June 1996.

Leopold, Mark. "Adapting to a New World: Refugees and Forced Migration." *Development* (1994): 4.

Suhrke, Astri. "Environmental Change, Migration, Conflict: A Lethal Feedback Dynamic?" Paper presented at the NATO Advanced Research Workshop, Bolkesjo, Norway, 12-16 June 1996.

Vlachos, Evan. "Environmental Threats and Mass Migrations: The Growing Challenge of Environmental Refugees." Paper presented at the NATO Advanced Research Workshop, Bolkesjo, Norway, 12-16 June 1996.

Weiner, Myron. "Bad Neighbors: An Inquiry into the Causes of Refugee Flows." *International Security* 21:1(1996): 5-42.