

Special Reports

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

NATO/CCMS¹ Pilot Study: Environment and Security in an International Context

State of the Art and Perspectives
Interim Report
October 1996

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1. INTRODUCTION AND OVERVIEW

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

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

2. ENVIRONMENT AND SECURITY: CONCEPTUAL ISSUES

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

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

2.1 RELATIONSHIP BETWEEN ENVIRONMENT AND SECURITY

The relationship between environment and security can be subsumed under two fundamental environment-security linkages. These refer to problems of environmental degradation (including natural catastrophes) and resource depletion or scarcity as a consequence of military activity in times of peace and war⁵ on the one hand and a direct or indirect source of conflict on the other.

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

2.2 THE ENVIRONMENT AS A CAUSE OF VIOLENT CONFLICT

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

Figure 1 shows three levels to be distinguished regarding the relationship between environment and security. At the most basic level, there are certain framework conditions or societal capacities, most importantly: (1) the characteristics of the political system; (2) the existing knowledge about an issue; (3) the economic and technological options available; and, (4) the cultural and ethnic characteristics of the society or societies involved. Under the heading of framework conditions situational factors (e.g. a change of government, current diplomatic tensions, sudden increases/decreases of commodity prices, etc.) should also be considered. These framework conditions influence all other elements and relationships depicted in Figure 1. They build the foundation on which environmental

degradation and resource scarcities are generated and perceived. Resource scarcities might lead either directly to potentially violent conflict or to secondary social problems with the potential for causing violent conflict. Environmental degradation, including natural disasters, might result in secondary problems by means of which they become indirect causal factors of violent conflicts. Whether or not resource scarcities and/or environmental degradation will lead to the outbreak of violent conflict in a particular instance, however, is dependent on the framework conditions.

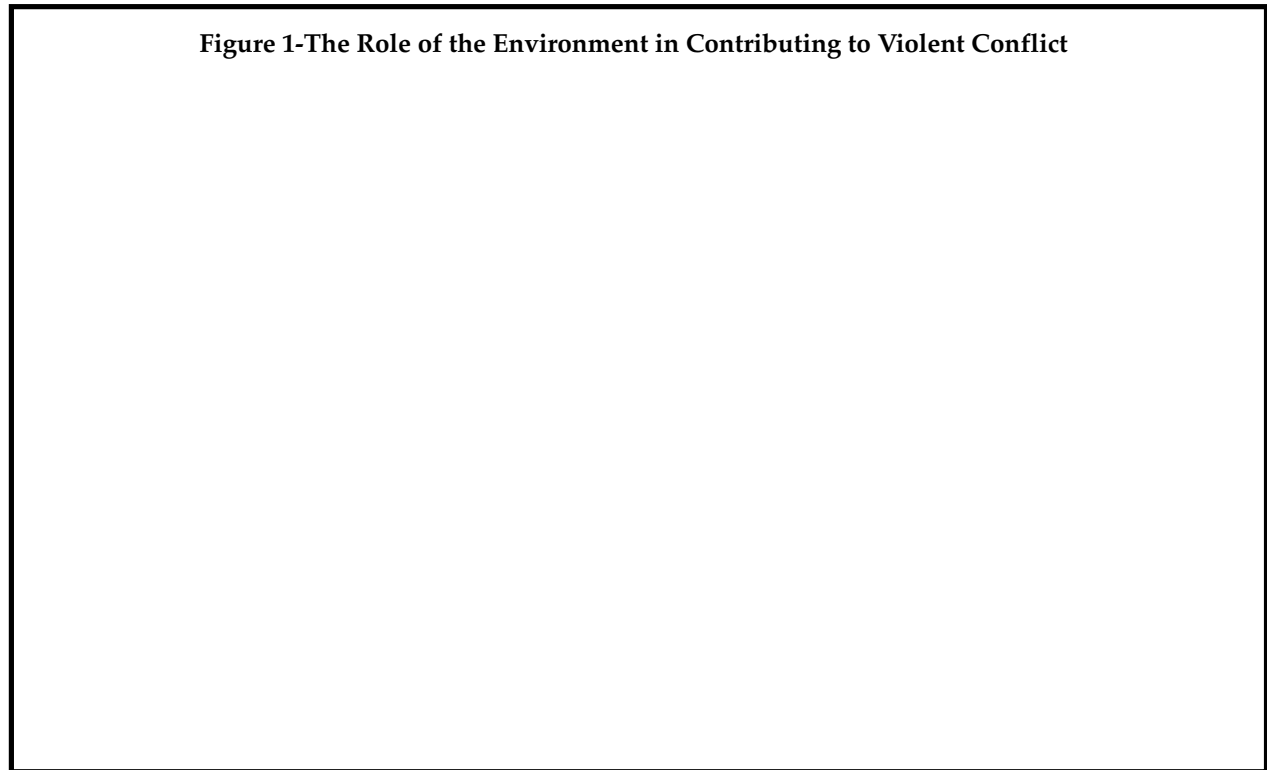
The influence pathways shown in Figure 1 are not always one-way relationships. At the most basic level, the underlying framework conditions might themselves be influenced by environmental problems, secondary social problems, or any resulting violent conflict. Furthermore, secondary social problems might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

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

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

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

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



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

Although the sustainable development agenda should not be duplicated by the investigation of environment-security linkages, both issues are certainly closely related. In considering the role of environmental problems as threats to security, those items on the sustainable development agenda requiring specific attention because of their security relevance need to be highlighted. A list of the environmental issues which are most prone to becoming security threats remains to be determined. Tackling those environmental threats to security as a matter of priority might serve environmental as well as security purposes. Furthermore, achieving security in the military sense is a major precondition for the success of any strategy aimed at reaching sustainability. This is because violent conflict and

the destruction resulting from it necessarily counteract efforts to realize sustainable development. Thus, mitigating environmental problems that might cause or contribute to violent conflicts is itself a contribution to sustainable development. By the same token, sustainable development can be seen as a major precondition of security, and its realization will alleviate any environmental threats to security.

3. DATA IN THE FIELD OF ENVIRONMENT AND SECURITY

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

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

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

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

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

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

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

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

Data sets specifically covering environment and security are at an early stage of development. Furthermore, there appears to be a lack of universally agreed upon indicators and indexes on environment and security. In conclusion, the current data sources on environment and security are likely to be insufficient for *systematically* assessing the crucial link between envi-

ronmental pressures, state of ecosystems, related social problems, and governmental response, as well as the occurrence of violence. Therefore, more structured efforts have to be undertaken to substantiate findings in support of better informed public policy on environment and security.

4. MAJOR PROBLEMS AND PROBLEM REGIONS

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

4.1 MAJOR PROBLEMS

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

(1) *Secondary social problems*

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

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

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

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

(2) Environmental degradation

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

Today, however, *local and regional environmental deg-*

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

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

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

(3) Resource scarcities

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

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

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

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

4.2 MAJOR PROBLEM REGIONS

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

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

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

5. POLICY RESPONSES TO ENVIRONMENTAL THREATS TO SECURITY

There are certainly countless policy options for responding to environmental challenges at every level, be it local, national, regional or international. In the

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

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

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

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

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

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

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

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

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

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

Since the Earth Summit in Rio de Janeiro in 1992, there has been some institutional reform to enhance the role and increase the weight of environmental considerations in international policy-making. The UN

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

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

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

(2) *Capacity building.*

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

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

6. RECOMMENDATIONS FOR STRUCTURING THE FUTURE DISCUSSION

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

This report identifies several gaps in existing knowledge that should be addressed in the Pilot Study on Environment and Security in an International Context. The questions to be addressed can be put into two distinct clusters. Cluster 1 would be science-oriented and would address methodological and concep-

tual problems as well as issues of data collection and availability, and the construction of appropriate indicators. Cluster 2 would build on the results of Cluster 1 by addressing policy-oriented questions of comparative threat assessments of different environmental issues as well as evaluating possible policy responses, particularly regarding international institutions. . . .

Cluster 1: Indicators and Data Collection

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

The analysis has to draw on the work done in Cluster 1 and expand it. Relevant environmental problems might include climate change, depletion of the ozone layer, loss of biodiversity, desertification, deforestation, lack of water availability, and "classical" air pollution (SO₂, NO_x). It will have to take into account the current knowledge about the effects of the environmental problems under investigation as well as the structure and development of framework conditions in relevant regions.

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

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

Developing a decision support system.

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

Evaluation of selected policy responses to environmental threats to security.

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

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

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

ENDNOTES

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

² <http://ech.s.ida.org/s05/biblio.html>

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

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

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

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

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

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