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Global Environmental Change and Human Security

GECHS

Science Plan

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On Global Environmental Change

GECHS
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and Human Security

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SCIENCE PLAN

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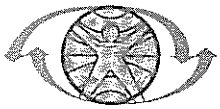

IHDP
INTERNATIONAL HUMAN DIMENSIONS PROGRAMME
ON GLOBAL ENVIRONMENTAL CHANGE

GLOBAL ENVIRONMENTAL CHANGE AND HUMAN SECURITY*

GECHS

SCIENCE PLAN

Dr. Steve Lonergan,
with collaboration from the GECHS Scientific Planning Committee

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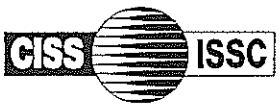
GECHS
GLOBAL ENVIRONMENTAL CHANGE
AND HUMAN SECURITY



Membership of the Global Environmental Change and Human Security (GECHS) Scientific Planning Committee

The GECHS Scientific Planning Committee collaborated with Dr. Steve Lonergan in the preparation of this Science Plan. A newly-formed Scientific Steering Committee will guide the implementation of this project.

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PREFACE

The project on Global Environmental Change and Human Security (GECHS) is important for at least three reasons: first, there is a need to better understand the relationship between global environmental change and human security; second, there is a need for an international project that facilitates liaisons between researchers, policy makers and NGOs involved in environment and human security work; and third, work on environment and security thus far suggests that there are significant gaps that must be filled in order to provide useful information to policy makers.

In the Spring of 1997 a group of researchers submitted a Scoping Report to the IHDP Scientific Committee (SC) proposing a core project on the theme of environment and security. As a result, the IHDP-SC authorised the establishment of a Scientific Planning Committee (SPC) under the leadership of Steve Lonergan. This SPC has guided the formulation of this Science Plan, which provides a summary of existing research on environment and security and identifies key research questions. However, it does not offer a recipe for how to conduct research. Instead, the Science Plan stands more as a menu of research. It also provides a research framework for new projects and ongoing activities by individual scientists and research teams.

The IHDP-SC would like to express its thanks to all those who have collaborated in the design, development, drafting and reviewing of this Science Plan. In particular we wish to acknowledge the energetic commitment of Steve Lonergan to the lengthy and sometimes frustrating process of producing a Science Plan. We would also like to thank the external reviewers and Anne Whyte, who served as the IHDP-SC liaison member for the GECHS project. Finally, we would like to express our appreciation for the essential financial support received from the Social Sciences and Humanities Research Council of Canada, the Canadian International Development Agency and the University of Victoria, the German Ministry for Science, Research and Technology (BMBF), the National Science Foundation of the United States, and contributions from other countries which have enabled the IHDP to support this process.

The completion of the Science Plan is the first major step in launching an international, interdisciplinary project on environment and security. The IHDP-SC approved the Science Plan in April 1999. The next step will be the nomination and approval of a Scientific Steering Committee, which will be responsible for the development, planning and implementation of the GECHS project.

The implementation of the project is an exciting and challenging phase. We hope that the Science Plan will contribute to a broader awareness of the manifold interactions between global environmental change and human security. We hope that it will attract the support of highly qualified researchers who may wish to develop new projects or who want to be integrated in ongoing or new projects under the GECHS umbrella. At the same time, the project has to involve policy-makers and NGOs as well. The IHDP-SC and Secretariat will support this process to ensure effective implementation of this plan and collaboration of the GECHS project with other projects in IHDP and related global environmental research programmes.

Professor Eckart Ehlers
Chair, IHDP-SC

Dr. Jill Jäger
Executive Director, IHDP

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In addition, many others made contributions to and comments on earlier drafts of this manuscript. In particular I would like to thank the members of the International Human Dimensions Programme's (IHDP) Scientific Committee; Larry Kohler from the IHDP; Geoffrey C. Dabelko from the Woodrow Wilson Center's Environmental Change and Security Project (the ECSP helped with the bibliography, and Geoff wrote sections of the report); Philippe LePrestre from the University of Quebec, Montreal; and all those who attended the two-day workshop that focused on the Science Plan, in Toronto in March 1997. I would also like to thank Andrea Blower, Kathleen Gabelmann, Denise Pritchard, and Amy Zidulka for their ideas and persistent efforts to produce a polished document, and the University of Victoria for its support of the GECHS project in general. And last, thanks to the four external reviewers who provided useful comments and criticisms of the penultimate draft.

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Steve Lonergan
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February, 1999

EXECUTIVE SUMMARY

Three key issues facing humankind as we prepare to enter the 21st century are environmental degradation, impoverishment, and the insecurity that can result from either of these two. Over the past decade, a considerable literature has arisen on the links between these three issues, and between environmental degradation and insecurity in particular. The Science Plan for the GECHS project focuses on developing a better understanding of these links, based on providing a new and different perspective than exists in previous research. In particular, we argue for a more interdisciplinary and integrative perspective on these issues.

Three key premises inform the development of this Science Plan. First, we recognise that human perceptions of the natural environment, and the way we use the environment, are socially constructed. Second, we accept that environmental problems must be addressed from a broader perspective that includes issues of impoverishment and issues of (in)equity. And third, we recognise that "space matters." In the context of our work, it is important to consider the various spatial levels at which both environment and security concerns can be addressed.

A review of environment and security work indicates that there is an ongoing need for conceptual and theoretical discussions on the nature of the relationship between environment and security. It is also important to build upon early empirical work that focused on environment and conflict and to provide additional empirical studies on environmental change and its relationship to a broader conception of security. At the same time expanded research networks and improved communication among researchers, policy makers, and NGOs are required in order to develop integrated research projects on environmental change and human security. It is believed that these needs can be best met through an international research programme that focuses both on guiding future research and assisting in policy development (at all levels).

Key Issues and the GECHS Project

Six key issues will form the backdrop for GECHS research activities.

1. **There needs to be continued theoretical and conceptual development of the links between environmental change, impoverishment, and insecurity.**

The GECHS project will focus on theoretical and conceptual development, using empirical studies to guide their development as well as for the validation of theory and conceptual frameworks. We recognise this needs to be integrated into all GECHS activities. Focus Area 1 of the GECHS Science Plan (see below) addresses this issue.

2. **There is a strong need for empirical studies focusing on the elements of environmental change that actually threaten <u>human</u> security, and on the role various processes (e.g., economic, social) play.**

GECHS research will concentrate on integrated regional studies about the relationship between environmental change and human security. This issue is represented in Focus Areas 2 and 3 of the Science Plan under the topics of "Environmental Change, Resource Use, and Human Security" and "Population, Environment, and Human Security."

3. **Researchers, NGOs, and policy makers must be encouraged to be actively involved in future environment and security activities of the GECHS project.**

The GECHS project will endeavour to actively engage NGOs and the policy community in all its activities. These activities include research, publications, education, and

workshops. In addition, joint projects will be initiated with other IHDP and IGBP core projects (in all cases, this has already begun).

4. **Research needs to focus on why some communities and organisations have been able to adapt to environmental change, while others appear to have been more vulnerable.**

GECHS research will examine the differential aspects of vulnerabilities and adaptations; for example, how the same set of circumstances – some aspect of global environmental change – might lead to war in one case, refugee movements in another case, famine in another, and adaptive responses in a fourth. This implies not only discerning between biophysical risk and social vulnerability, but also acknowledging the spatial variations in each.

5. **Issues of inequality and impoverishment must be incorporated into the analysis of environment and security links.**

Focus Area 2 of the GECHS Science Plan addresses the interrelationships between population, environment, and security. These include issues of environmental justice, unequal access to resources, and distributional aspects of resources and environmental services. Research may also include studies of the underlying social, political, and economic processes contributing to injustices and inequalities with respect to the environment and access to resources.

6. **There is a need to develop methods for the early warning of environmental change and its potential impacts, to identify regions of potential insecurity, and to determine why some groups or communities are more vulnerable than others, given the same level of biophysical risk.**

Researchers are already investigating issues of data and indicators of environmental change and human security. Focus Area 4 of the Science Plan, entitled "Indicators of Environmental Stress and Human Vulnerability," provides a framework to expand this work.

Research Questions

The overall research question addressed by the GECHS project is, "What is the relationship between global environmental change and human security?" From this general question, additional research questions have been identified. These questions can be placed into three categories: context, response options, and analysis.

Category	*Key Questions*
Context	What types of environmental change threaten human security? How does environmental change threaten human security? What is the present extent of insecurity? Which regions and groups are the most insecure? Why are some regions and groups more vulnerable to specific environmental changes than others? Can we predict future insecurities?
Response Options	What strategies are potentially available to cope with the insecurities caused by environmental change?
Analysis	Why are some strategies selected? Why are some effective? How can obstacles be overcome?

Project Objectives

The objectives of the GECHS project are, as follows.

Objective 1: Promote research;
Objective 2: Extend dialogue and collaboration among scholars internationally, including those in developing countries;
Objective 3: Link policy makers, researchers, and others.

Project Methodologies

To address the research questions posed above, the GECHS project will strive for an overall research programme that encompasses a range of research methodologies and techniques. Much of the research will focus on the local level, with significant involvement from local communities and non-governmental organisations. However, GECHS research will also involve computer modelling, the development of early warning systems, and the establishment of indicators of human insecurity. Two important contributions of the GECHS project to the global change community will be methodological advancement that integrates qualitative and quantitative assessments, and development of improved management techniques for better long-term analysis and planning.

Research Foci for GECHS

The five key research foci for the GECHS project, along with two activities that will be integrated throughout the project, are as follows:

FOCUS 1 Conceptual and Theoretical Issues in Environment and Human Security

Why some regions and societies are more vulnerable than others; the relationship between environment and conflict; how environmental change threatens human security.

FOCUS 2 Environmental Change, Resource Use, and Human Security

Water and human security; food security; energy security; atmospheric change and human security; land use change and human security (linkage project with LUCC); environment and conflict/cooperation.

FOCUS 3 Population, Environment, and Human Security

Environment, migration, and human security; urbanisation and human security; population, impoverishment, and human security; health, the environment, and human security; environmental change and indigenous people; women, environment, and human security.

FOCUS 4 Modelling Regions of Environmental Stress and Human Vulnerability

Developing indicators of environmental change and human security; modelling environmental stress and human vulnerability; critical zones (linkage project with the IGU).

FOCUS 5 Institutions and Policy Development in Environmental Security

The framework of global governance (linkage project with IDGEC); environment, conflict, and democracy; environmental change, adaptation, and human security; private vs. public investment and human security; technological innovation and transfer.

ACTIVITY 1 Data and Methodological Issues in Environment and Human Security

ACTIVITY 2 Communications, Education, and Training for GECHS

Justification for the Focus Areas

The Science Plan provides a detailed description of both the Focus Areas and the project outline. It is clear that the issue of environment and security must be dealt with holistically. Development plans must be conceived, designed, and implemented with a clear appreciation of the interconnectedness of poverty, environmental change, and insecurity from the individual to the global level. In addition, there are some general recommendations that form the basis for the identification of the focus areas listed above. These include the following:

The relationship between environment, security, and development is very much affected by the role of institutions. There must be a greater dialogue among and between environmental agencies, development assistance institutions, and the security and intelligence communities.

Increasingly, the focus of development must move away from the national level, and toward the community and local levels. Dialogue between the development, environment, and security communities must be encouraged.

The need to redirect our security focus away from the national level does not apply only to environmental issues. The world's poor have immediate needs that should be satisfied and very immediate forms of insecurity that must be addressed.

Development agencies must be aware that the rate of environmental, social, economic, and technical change is very rapid. The implications of accepting this are important.

It is vital to get away from traditional – and centralised – approaches to development planning. Viewing development problems from an environment and security framework provides a "new way of looking" at these issues (although not the only new way).

There must be a full range of analytical perspectives and methods applied to development problems. Newer qualitative research methods must be used to inform more quantitative assessments of problems, and vice versa. Analyses must move beyond traditional methods to include participatory and collaborative approaches.

Resources must be directed towards identifying vulnerable regions and vulnerable groups, and promoting adaptation and resilience, particularly in these vulnerable regions. Early warning systems can help in this regard, if they are informed by field information and focus on medium-term results (3-10 years).

The Focus Areas, which derive from these recommendations, provide a structure for the formative years of the GECHS. Specific projects and research activities will be a function of resource availability and assessment by scholars engaged in environment and security research.

CHAPTER I: RESEARCH BACKGROUND

1. Introduction

Three key issues facing humankind as we prepare to enter the 21st century are environmental degradation, impoverishment, and the insecurities caused by both of these factors. Environmental change at the local, national, regional, and global levels, largely the result of anthropogenic activity, is altering the balance that sustains life on the planet. The effects of such change include negative impacts on health, greater biophysical risk, threats to biodiversity, and a greater magnitude and frequency of extreme weather events. Coincidentally, our traditional conception of security, based on the military context of superpower competition since World War II, has evolved rapidly with the passing of the Cold War and the pressing realities of nonmilitary threats. Economic, demographic, environmental, and social issues are recognised increasingly as affecting security. In turn, North/South relations are now regarded as equally – if not more – important as East/West relations. These changes have occurred in the context of economic globalisation, population growth, environmental change, and continued economic and social disparities between people and countries. Historically, the concentration of wealth has resulted from the appropriation of natural and social capital by countries in the North, creating the distinction between countries in the North and in the South. Presently, some argue that economic globalisation is maintaining, if not increasing, disparities between people and between countries, and increasing the vulnerability of certain populations to environmental change.

Over the past decade, a considerable literature has arisen on the *links* between environment, impoverishment, and security, and between environment and security in particular. In an effort to accommodate the changing nature of security, there have been numerous attempts to "redefine" security. These discussions have stimulated research examining the specific relationship between environment and security.

There are two arguments commonly presented in favour of rethinking security. The first asserts that there are threats to state security other than conventional military ones (Conca, 1994; Finger, 1991, 1994; Krause & Williams, 1996; Levy, 1995a; Rothschild, 1995). Nonconventional threats include resource scarcity, human rights abuses, outbreaks of infectious disease and other deleterious health problems, population growth, and environmental degradation caused by toxic contamination, ozone depletion, global warming, water pollution, soil degradation, and loss of biodiversity (cf., Mathews, 1989; Renner, 1989; Ullman, 1983; Westing, 1989). The second argument professes that (state) security in itself is a problematic concept that needs to be radically altered (Dalby, 1996; Deudney, 1990, 1991; Mathews, 1989, 1991; Westing, 1989). This implies that the so-called nonconventional threats also act at levels other than the state.

Integral to the Science Plan is the recognition that the GECHS project is based on providing a new and different perspective than exists in previous work on the relationship between environmental change and security. We argue for a more *interdisciplinary* and *integrative* perspective on this issue. There are three key premises that inform the conceptualisation of this Science Plan. First, we recognise that human perceptions of the natural environment, and the way we use the environment, are socially constructed. Second, we accept that environmental problems must be addressed from a broader perspective that includes issues

of impoverishment and issues of (in)equity. And third, we recognise that "space matters". In the context of our work, it is important to consider the various spatial levels at which both environmental and security concerns can be addressed. In many cases, the appropriate spatial level for analysis will be determined by institutional constraints and knowledge availability. This may imply local or community-based research. In other cases, the international level – or the bioregional level – may be more relevant. Our analyses may also include cultural and social perceptions of space. Adopting these three premises provides a way of looking at the human dimensions of global environmental change that is relevant and meaningful to researchers, policymakers, *and* individuals and communities experiencing insecurities.

These three premises are revisited in Chapter II, and again in Chapter III, where they influence the discussion in general and the research foci in particular. We believe linking environment and security is a useful endeavour, despite the conceptual baggage and vagueness that sometimes accompany the term security. As this document attests, we also believe that less attention should be given to research on how environmental degradation contributes to *violent conflict*, and more attention devoted to understanding the relationships between *global environmental change* and *human security*.

The remainder of this chapter is devoted to a brief overview of the evolution of environment and security research, and offers some critical perspectives on environmental security. We hope that providing the research background will help contribute to a better understanding of the conceptual and theoretical context for the Global Environmental Change and Human Security project (GECHS).

2. The Evolution of Environment and Security Research

The main purpose of this section is to present a brief review of the literature on redefining security and of the empirical research that followed. This section also acknowledges that environment and security research did not evolve independent of policy directives. Research and policy in this area are closely linked, and there is a range of government agencies throughout the world involved in discussions on the links between environment and security.

2.1 The First Phase: Redefining Security

Although discussions on the issues of environmental change and security began as early as the 1950s, the two concepts were not explicitly linked (cf., Brown, 1954; Osborn, 1953). During the 1960s and early 1970s, the U.S. military's use of defoliants in the Vietnam War focused international attention on both the intentional and unintentional environmental damage caused by war.[1]

In the early 1980s, various institutions and writers began addressing security issues, beyond strict military concerns, that affect the state. The UN Commission on Disarmament

[1] The Additional Protocol I to the 1949 Geneva Convention on the Protection of Victims of International Armed Conflicts (1977) was the first of two treaties with major environmental importance that stemmed from international concern over excessive environmental degradation in Vietnam (Diederich, 1992). To date, this primarily humanitarian agreement has not been ratified by a number of major powers including the United States, France, and the United Kingdom, although most objections do not center on the environmental issues contained in the agreement. Efforts to develop more stringent definitions for the prohibition of "widespread, long-term and severe damage to the natural environment" continued with the 1977 Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques (the ENMOD Convention), the second of the post-Vietnam treaties.

and Security issues, chaired by Olaf Palme of Sweden, made a distinction between collective security and common security: the former implies the more traditional interstate military security issues, while the latter reflects the growing array of nonmilitary threats, including economic pressures, resource scarcity, population growth, and environmental degradation. This was followed by the New Political Thinking of Soviet leader Mikhail Gorbachev, promoting the concept of comprehensive security as a cornerstone of international politics. In 1989, Westing expanded the concept of comprehensive security, noting it was comprised of two intertwined components: political security, with its military, economic, and humanitarian subcomponents, and *environmental* security, which included protecting and utilising the environment (Westing, 1989). Thus, according to Westing, comprehensive security meant freedom from various threats, including nuclear war, poverty, and global environmental issues. How, then, could it be determined whether or not something constituted a threat to security? Richard Ullman (1983) had earlier offered the following definition of threats to security:

> A threat to national security is an action or sequence of events that 1) threatens drastically and over a relatively brief span of time to degrade the quality of life for the inhabitants of a state, or 2) threatens significantly to narrow the range of policy choices available to the government of a state or to private, non-governmental entities (person, groups, corporations) within the state. (p. 133)

While still circumscribing security within state boundaries, Ullman sought to expand the range of threats to security.

The suggestion to broaden the definition of threats to security to include environmental change, whether it is referred to as common, comprehensive, or sustainable livelihood security, came from a variety of sources. Although the report of the World Commission on Environment and Development (WCED), *Our Common Future*, is best known for its definition of "sustainable development," the Commission also called for recognition that security was partly a function of environmental sustainability. The Commission highlighted the causal role environmental stress can play in contributing to conflict while also stating that "a comprehensive approach to international and national security must transcend the traditional emphasis on military power and armed competition" (WCED, 1987, p. 90). Another source of redefinition was the 1986 nuclear meltdown at Chernobyl. The resulting impacts on neighbouring human populations and ecosystems placed health considerations squarely within a security framework for many people. The next year, Gorbachev proposed "ecological security" as a top priority for international confidence building.

In addition to the call for expanding our conception of what factors threatened security was a recognition that a strict focus on *national* security was too narrow. Security needed to be understood at levels of political analysis above (regional or global) and below (at the community or ecoregion levels) the state as the "traditional prerogatives of national states are poorly matched with the needs for regional cooperation and global decision making" (Mathews, 1989, p. 162). There was increasing acceptance that the state was no longer privileged as the only meaningful "object" to be secured (Buzan, 1991).

The initial phase of environment and security research concluded at almost the same time as the end of the Cold War. Authors such as Mathews (1989) and Myers (1989) provoked much of the debate on broadening conceptions of security. Largely conceptual and theoretical in nature, this led to a reassessment of *how* to define security and the *threats* that affect security. Writers, critical of "state security," argued that a new definition must include a recognition of both conventional *and* nonconventional threats. As well, some authors stressed

the need for empirical studies demonstrating the links between environment and security (Conca, 1994; Gleditsch, 1997; Lonergan, 1996).

2.2 The Second Phase: Empirical Research on Environment and Security

It was apparent that there needed to be significant empirical research on the relationship between environment and security to provide some validation – or at least a context – for the earlier conceptual and theoretical arguments. There existed a number of plausible hypotheses, but rigorous studies were lacking. The second phase of environment and security research addressed this need, although it did so by limiting its focus to studying the links between environmental degradation and *violent conflict*.

Assessing the nature of linkages between environment and security has proven elusive. The complexity of multiple interactions and feedbacks poses a tremendous empirical and methodological hurdle. The ambiguous and contested nature of the term security also complicates research and policy in the area of environment and security (Deudney & Matthew, 1999; Dokken & Graeger, 1995; Lipschutz, 1995). As noted previously, the meanings attached to the term security range from a narrow state-based definition of safety from armed conflict, to a much broader conception of security as synonymous with human well-being. A number of researchers tried to circumvent this discussion by ignoring the term "security" and concentrating specifically on the role of environmental change and resource depletion as potential *causes of violent conflict* (Homer-Dixon, 1991, 1994; Libiszewski, 1992). Such conflict, in turn, could pose a serious threat to the security of individuals, regions, and nation-states.

Box 1

SECURITY AND CONFLICT

It is important to distinguish between the concept of "freedom from conflict" and that of security. Conflict, and specifically violent conflict, is an empirical and observable phenomenon. Security, on the other hand, is a subjective and socially constructed perception that evolves and depends largely on the perspective of the entity (the individual, group, state, or international or transnational body) being secured and/or providing security. Conflict is a condition commonly considered a threat to security. Hence, conflict and security are often treated together but security and "freedom from conflict" should not be considered synonymous.

Work at, among others, the Peace and Conflicts Studies Programme at the University of Toronto (Homer-Dixon, 1991, 1994; Homer-Dixon et al., 1993), the Environment and Conflicts Project (ENCOP) in Zurich and Bern (e.g., Libiszewski, 1992; Spillman & Bächler, 1995), and the International Peace Research Institute in Oslo (e.g., Dokken & Græger, 1995; Gleditsch, 1992, 1998; Græger & Smith, 1994; Hauge & Ellingsen, 1998; Lodgaard & Hjort af Ornäs, 1992; Molvær, 1991) has contributed towards understanding the role of environmental change and resource depletion as potential causes of violent conflict (see also, Durham, 1979; Gleick, 1989, 1991; Lonergan & Kavanagh, 1991; National Academy of Sciences, 1991; Westing, 1986). These empirical studies have been crucial in advancing the scholarly discussions of the links between environmental change and violent conflict. The studies have also been instrumental in publicising the potential role environmental degradation may play as a contributor to violent conflict. However, this research focused largely on a very limited set of

cases dealing with inter- and intrastate violent conflicts and state security. Researchers at the University of Toronto and the Swiss Peace Institute (ENCOP) undertook two of the more notable sets of studies. Of course, the work of both the Toronto group and of ENCOP must be situated within the context of the significant contributions made by many other researchers, yet due to the scope of these two particular studies and the amount of discussion and debate that each generated, we feel a more detailed overview of them is warranted here.

2.2.1 The Toronto Project on Environment and Acute Conflict

At the University of Toronto, Thomas Homer-Dixon led a research team that examined the prospect of environmental stress causing acute conflict both within and among a select group of states. The conceptual and theoretical bases of the work were presented in two articles published in the journal *International Security* (Homer-Dixon, 1991, 1994). The work focuses on three types of environmentally induced conflict: 1) interstate conflict originating in part from resource scarcity; 2) subnational or intrastate conflict originating from what Homer-Dixon terms environmental scarcity driving population movements; and 3) subnational or intrastate conflict (civil strife and insurgency) originating from environmental stress that exacerbates economic deprivation and disrupts key social institutions.

In their empirical research, Homer-Dixon and his colleagues focus explicitly on developing countries where they suspect the linkage between environmental stress and acute conflict is the strongest. Many less developed states of the South tend to have weak institutional capacity for adapting to environmental stress, high levels of biophysical risk, and often exhibit high rates of population growth. The particular method of case selection used by Homer-Dixon stresses the question of how environmentally induced conflicts occur, not the question of where (Homer-Dixon, 1991, p. 116).

Homer-Dixon identifies three conditions of scarcity. These include 1) decreased quality and quantity of renewable resources (supply-induced scarcity); 2) increased population growth or per capita consumption (demand-induced scarcity); and 3) unequal resource access (structural scarcity). These sources can act singly or in combination to create a general condition of environmental scarcity. The interaction of these conditions produces two particularly common phenomena that Homer-Dixon calls resource capture and ecological marginalisation. Resource capture occurs when a decrease in the quantity or quality of renewable resources coincides with population growth, thus encouraging "powerful groups within a society to shift resource distribution in their favour. This can produce dire environmental scarcity for poorer and weaker groups whose claims to resources are opposed by these powerful elites" (Homer-Dixon, 1994, p. 10). Ecological marginalisation occurs when population growth and unequal resource access combine

> to cause migrations to regions that are ecologically fragile, such as steep upland slopes, areas at risk of desertification, and tropical rain forests. High population densities in these areas, combined with a lack of knowledge and capital to protect local resources, cause severe environmental damage and chronic poverty. (Homer-Dixon, 1994, pp. 10-11)

Any and all of these conditions in turn can produce social effects that are linked to violent conflict. Homer-Dixon believes that adaptation is more difficult in developing countries because they commonly lack the social institutions, resources, and technical expertise necessary for addressing the scarcities. He also identifies four social effects that are particularly relevant to the study of violent conflict: 1) decreased agricultural production; 2) decreased economic productivity; 3) population displacement; and 4) disrupted institutions and social relations (Homer-Dixon, 1991).

Although the studies of Homer-Dixon and his colleagues have not been universally accepted by the academic community, they provide an excellent – and broad-ranging – base for further empirical studies on environment and security. The deterministic perspective of his cause and effect relationships, the varying quality of the case studies, and a lack of control cases are among the criticisms levelled at the work. Nevertheless, the research stands as one of the few empirical attempts to better understand the linkage between environment and conflict.

2.2.2 The Environment and Conflicts Project (ENCOP)

The Environment and Conflicts Project (ENCOP) was cosponsored by the Centre for Security Studies and Conflict Research of the Swiss Federal Institute of Technology and the Swiss Peace Foundation. ENCOP utilised a broad definition of environmentally induced conflict that highlighted environmental degradation and resource depletion as contributing causal factors to different levels of conflict. Their working definition of an environmental conflict was as follows:

> Environmental conflicts manifest themselves as political, social, economic, ethnic, religious or territorial conflicts, or conflicts over resources or national interests, or any other type of conflict. They are traditional conflicts *induced by environmental degradation*. Environmental conflicts are characterised by the principal importance of degradation in one or more of the following fields: overuse of renewable resources, overstrain of the environment's sink capacity (pollution) or impoverishment of the space of living. (Libiszewski, 1992, p. 13)

Deterioration in environmental quality or resource scarcities can exacerbate other socioeconomic or political factors that are themselves the proximate causes of violent conflict. The environmental change is often neither necessary nor sufficient to cause some unique form of environmental conflict. Therefore, while the ENCOP group uses the term environmental conflict or environmentally induced conflict, it still considers these conflicts to be social and political events, not inevitable or determined outcomes of certain environmental conditions.

When trying to understand the role of the environment in conflict, the ENCOP research highlighted development and equity in the form of mal-development and environmental discrimination. Social and political mal-development, due in part to a degradation of natural resources, has become an international peace and security challenge. Environmental discrimination was also a critical factor in the analysis:

> Environmental discrimination occurs when distinct actors – based on their international position and/or their social, ethnic, linguistic, religious or regional identity – experience inequality through systematically restricted access to natural capital (productive renewable resources) relative to other actors. (Bächler, 1998)

Crisis areas most susceptible to environmentally induced conflict include

- arid and semi-arid plains (drylands),
- mountain areas with highland-lowland interactions,
- arenas with river basins subdivided by state boundaries,
- zones degraded by mining and dams,
- tropical forest belts, and
- poverty clusters of sprawling metropoles.

Based on these crisis areas and the various case studies, ENCOP was able to divide the types of environmentally induced conflicts among three primary levels:

- when the environment plays a role between groups within a country,
- when internal conflicts become internationalised, often through population displacement, and
- when interstate conflict arises from the degradation of regional environments or the global commons (for example, state to state conflict over shared river basins).

The distinctions among these groups proved to be fluid, making it hard to identify conflicts as being in strictly one category. In an attempt to make useful categorisations, the ENCOP investigators broke down each of these three groups by the types of actors involved in the conflicts, presenting seven ideal types of environmental conflict. Within all of these categories, ENCOP leaders Bächler and Spillmann (1996) stressed that social, political, and economic factors also played key causal roles and that the environment is usually not sufficient cause for conflict. For example, environmental and ethnic discrimination come together in *ethno-political conflicts* either when ethnic groups share a degraded and less productive ecological zone or when a less environmentally advantaged ethnic group moves into the ecological zone of a more environmentally advantaged ethnic group. *Centre-periphery conflicts* stem from different levels of access and control of environmental services between powerful centre populations and the marginalised periphery. Activities such as large cash crop farming projects, mining, and dams further undercut the marginal groups that are highly dependent on natural resources for survival.

The ENCOP investigators view their evidence as confirming the Toronto Project hypothesis on links between environmental scarcity and subnational or internal violent conflict. ENCOP conclusions stress the need for distinguishing between the different contributing roles – background reason, trigger, target, channel, and catalyst – that environmental transformation and environmental discrimination can play in conflict. Given that ENCOP situates environmental conflict within social, economic, and political causes of conflict, the individual case studies and the synthesis of the research pay particular attention to the institutional structures that often make the difference between the existence or absence of conflict in the presence of environmental transformation or discrimination (Bächler, 1998; Bächler & Spillman, 1996). Considered in conjunction with the seven pathways to environmentally induced conflict, this focus on institutions, state capacity, and civil society is intended to facilitate conflict management and early warning of environmental conflicts.

2.2.3 Related Research

The work described above, along with other studies, suggest that several types of environmental threats *may* have the capacity to produce certain types of conflict. Choucri (1991) discusses resource constraints as one of these threats. At first glance, the availability of water in the Middle East, the depletion of fish stocks off the east and west coasts of Canada, and deforestation in Brazil, the Philippines, Thailand and elsewhere have been, or have the potential to be, the source of conflict. Further, the U.S. National Academy of Sciences (1991) and Myers (1993) suggest that atmospheric change, from both global warming and ozone depletion, has the potential to cause significant societal disruption. In addition, land degradation – or land-use change in general – may directly affect society's ability to provide food resources for a growing population, or may indirectly affect other changes, such as global warming (see Box 4, p. 41).

Subsequent work by Bächler and Spillman (1996) demonstrates that environmental degradation and resource depletion may play a number of different, and sometimes subtle,

roles in affecting security and contributing to conflict. These include environmental change as background to the tensions, as a channel leading to tension, as a trigger, as a catalyst, or as a target. The work of Bächler and Spillman notwithstanding, some scholars criticise this perspective on environment and conflict as being deterministic (e.g., Conca, 1994; Dalby, 1992; Deudney, 1991; Levy, 1995a, 1995b). Despite the range of case studies undertaken, the evidence for a direct causal link between environmental degradation and violent conflict remains speculative. The conclusion of Homer-Dixon (1994) that environmental scarcity causes violent conflict seems intuitively reasonable; however, Lipschutz, (1995) and others (cf., Gurr, 1993, 1995; Libiszewski, 1992) argue that it overstates the importance of resources and the environment as contributors to conflict. The environment-conflict debate continues, but at the same time there is increasing acceptance that environmental degradation is at least a *contributor* to conflict and insecurity. The environment-conflict nexus is but one example of how various factors or relations of inequality and impoverishment structure threats.

The above research projects conclude what others intuitively accept: environmental change (and other nonconventional threats) is related to insecurity through conditions of inequality, institutional weakening, and impoverishment. The second phase of environment and security work has reinforced the deficiencies in the research programme that were identified in the first phase. However, there is a continued need for further conceptual and theoretical discussions on the nature of the relationship between environment and security. There is also a need to build upon the early empirical work that focused on environment and conflict and to provide additional empirical studies on environmental change and its relationship to a broader conception of security.

2.3 Integrating Research and Policy on Environment and Security

Discussion of the links between environment and security has extended far beyond an academic debate. Warren Christopher, during his tenure as U.S. Secretary of State, spoke about linking the two, noting that "natural resource issues [are] frequently critical to achieving political and economic stability." The Norwegian Defence Minister at the time, Johan Jorgen Holst, was even more explicit: "environmental degradation may be viewed as a *contribution* to armed conflict in the sense of exacerbating conflicts or adding new dimensions" (Holst, 1989, p. 123).

However, discussions in both academic and public policy circles have evidenced a considerable amount of confusion over how environment and security are linked. Furthermore, as Dabelko and Simmons (1997) note, the diversity of conceptual perspectives persists not only within disciplines, but also within government departments.

Part of the confusion over identifying the links between environment and security is the result of different interpretations of the two terms. The links have become even more difficult due to the diversity of participants in these discussions. Furthermore, the introduction of new terms, such as "environmental scarcity" or "environmental refugees" often frustrates researchers and policy makers for whom similar terms have specific, important, and, sometimes legal, meanings. Added to these problems is the conceptual baggage that accompanies the term security; most notions of security are affected by the state-centric views of the past (Dalby, 1997).

Individuals from environmental studies, geography, sociology, and other fields are also undertaking environment and security research. These researchers often interpret "security" differently than do members of the international relations community or the defence establishment. As well, the notion of security is being approached from different theoretical and methodological perspectives. Researchers are addressing issues of

sustainability, vulnerability, impoverishment (e.g., Leonard, 1989; Kasperson et al., 1996), eco- and social justice (e.g., Boyce, 1995; Cuomo, 1993), and globalisation (Saurin, 1995). There has also been much research and writing by nonacademic researchers who have adopted the term environmental security. This increases the visibility of the area, but frustrates policy analysts and researchers alike. In addition, although the discussion of environment and security began from a strictly "Northern" perspective, recent work has been from diverse sources and diverse perspectives. These researchers – many of whom are from the South – form their own definitions, responses, and adaptations to environmental security issues. Some of the researchers (re)politicise security, subverting the whole logic of the state as the provider of security (Dalby, 1994). They ask questions such as: "Who and what is being secured?" "Security for whom?" "Who is securing whom?" The issue then becomes not state security, but human security.

Box 2

Quality of Human Life and Land Degradation in Costa Rica: A Contradiction in Terms

In Costa Rica, like the rest of the world, land use practices have led to the degradation of areas that, if no concrete action is taken soon, will become completely unusable in the very short term. One of these areas, perhaps Costa Rica's highest priority, is Puriscal, located in the southern zone of the province of San Jose, on the slopes of the Central Pacific.

By the turn of the century, coffee plantations in the Central Valley of Costa Rica displaced small owners who based their living on a variety of crops. Former land-owners moved to other regions, and converted forested land to agricultural use and colonisation. As they moved south, steeper land was encountered. However, they were able to establish small villages and towns. By the early 1900s, this area was prosperous. They provided grains (rice, beans, and maize) to people living in the Central Valley, as well as wood for houses and buildings. Land in this area was kept under agricultural use until the 1950s, when other regions of the country started providing supplies to the city. At that time, landowners shifted to cattle ranching, eventually converting the highlands into a primary livestock zone. The overuse of forestland with agriculture and later extensive cattle ranching, produced a reduction in soil fertility and productivity levels. This situation is further aggravated by five months of yearly drought, and is especially pronounced on the heavily eroded, wind-exposed Northern slopes of the watershed.

At the present time, due to soil degradation, seismic activity, and local frustration over production means, Puriscal is one of the few counties of Costa Rica that has experienced negative population growth. Reclamation and the population security of the Picagres highlands hinge upon effective terrestrial ecosystem rehabilitation and long-range planning. Current research strategies focus on generating more productive pastures, natural forests, and tree plantations. With the regeneration of productivity and the implementation of sustainable land use practices, the quality of life of the Puriscal citizens should be guaranteed for generations to come.

Edgar Guttierez-Espeleta, GECHS Scientific Planning Committee

The result of the strong relationship between environment and security research and policy development is a somewhat jumbled array of research, popular writing, reports, and presentations, all attempting to influence the policy agenda. While such activities are consistent with the development of a new area of research, it is clear that there is a strong need for a programme that can assist in unscrambling the existing problems and guiding future research and policy development.

3. Critical Perspectives on Environmental Security

Throughout the environment and security debate, many writers have been critical of linking the two terms. These critics are from both traditional security institutions and from environmental studies backgrounds.

Researchers and analysts who take a traditional security perspective tend to discount the role environmental degradation or resource depletion play in precipitating violent conflict. They argue that broadening the definition of security to include a laundry list of modifiers (environmental, ecological, economic, food, human, comprehensive, common) undercuts the term's utility by making it mean something different to multiple constituencies. Military critics of tying environment and security together claim that performing environmental missions takes time and resources away from preparations for the traditional war fighting mission and therefore undermines preparedness and effectiveness in battle.

Environmental critics also claim that there is little evidence to support the argument that environmental degradation or resource depletion has a significant role in causing violent conflict, and especially interstate conflict. Furthermore, the methodological shortcomings of the previous research undermine the findings that do support a case for linking environment and violent conflict. Critics also fear that appropriating the term environmental security would lead to the militarisation of security rather than the greening of security. Military institutions, instead of undergoing fundamental change to reflect new security priorities, would more likely co-opt and weaken the nonstatist, nonthreat based, cooperative ethic of environmental rescue. This criticism is reinforced by the perception that security institutions are searching for new missions to justify their high Cold War funding levels. Environmental critics also decry the conception of environmental security that has developed as a uniquely Northern and Western term; it is viewed as unacceptable to the South as a paradigm or road map for facing environmental problems.

These criticisms of environmental security can be divided between those focused on the redefinition of security and those focused on the relationship between environmental stress and violent conflict.

3.1 Criticisms of Redefining Security in Environmental Terms

Critics commonly point out that, in light of Northern security institutions' post-Cold War search for new missions, the likelihood of the "securitisation" of the environment is greater that that of the "greening of security."[2] With environmental security being used as a political slogan to gain attention for the environment, the risk is that the historically powerful military institutions will co-opt the green rhetoric rather than willingly giving up resources to more effectively address the new threats to environmental security. Some observers suspect

[2] The term "greening of security" as it is used in this context is Wæver's (1995). Others share the concern expressed by the term with their own distinct critiques (Conca, 1994; Dalby, 1992, 1994; Deudney, 1990, 1991; Finger, 1991, 1994; Gleditsch, 1997; Lipschutz, 1995).

that the redefinition of security to include environmental considerations would take place only at a rhetorical level (i.e., in national security strategies) but would fail to produce a simultaneous reorientation or dismantling of security institutions and mindsets (Conca, 1994; Finger, 1994; Kakonen, 1994).

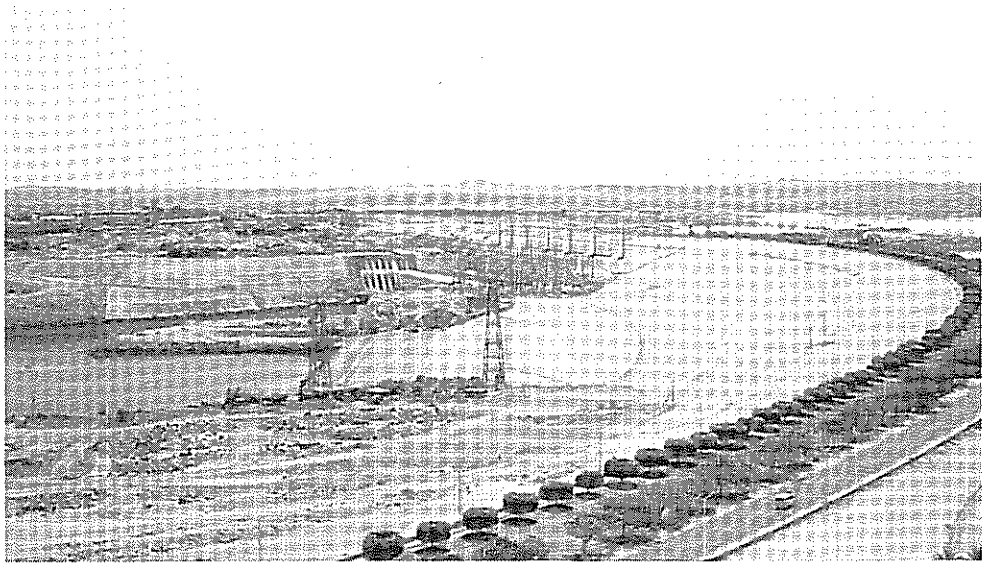
The traditional tool of security – that of force – is perceived to be mismatched with the interdependent environmental problems that, by their very nature, require cooperation for effective redress. The zero sum game associated with military security runs counter to the positive sum, cooperative approach required to effectively address environmental challenges. Environmental threats are rarely characterised by intentionality; in contrast, premeditation is associated with armed attack and characterises traditional security threats (Buzan, 1992; Deudney, 1991). The very notion of conceptualising environmental problems as threats to environmental security encourages an "us versus them" mentality (both humans versus nature and humans versus humans) that is perceived to undermine beneficial solutions (Wæver, 1995). By conceptualising environmental problems as security problems, the state is explicitly privileged as the most appropriate political unit to address environmental challenges (Moss, 1992). This state-based approach ignores the perceived necessity to attend to environmental problems with both transboundary cooperation and efforts to achieve local sustainability at the subnational level.

More broadly, some critics charge that environmental security encompasses too many problems and threats (for example, problems associated with infectious disease, global warming, environmental damage during war, deforestation, water scarcity, and nuclear waste are sometimes all discussed under the banner of environmental security). With such diverse problems included as the focus of environmental security, the term loses meaning and utility as an analytical tool because there is no delineation of what is included and what is not (Deudney, 1991; Dokken & Græger, 1995; Wæver, 1995). Linking environment and security is perceived to represent merely a normative slogan that conveys the urgency of addressing global problems in determining the priority of political battles (Levy, 1995a, 1995b).[3] Critics subject the term environmental security to a test of analytical rigor that results in failure for the normative proposition of a "redefined security."

This criticism illustrates how environmental security is held to different standards for different purposes. Those in academia criticising environmental security as a normative political slogan are asking that the term perform as a sharpened theoretical tool. They discount the early calls for redefining security, as undeveloped, a conceptual "trick" or minimally useful (Gleditsch, 1997; Levy, 1995a). From a policy perspective, the rhetorical use of the term is less troubling than the failure by its adherents to suggest specific policy priorities and interventions that would accompany any redefinition.

The above criticisms arise from authors who assign a high priority to the importance of coming to grips with global problems. However, others continue to find considerable utility in the purely statist and militaristic security assumptions and therefore oppose widening the purview of security to new and different threats (Walt, 1991). They argue that, while the Cold War has ended and the dangers of a bilateral standoff have abated, emerging military threats demand a traditional definition of security with continued priority support for the military. The proliferation of nuclear, chemical, and biological weapons; terrorism; and ethnic conflict remain reasons enough to not dilute the definition of security with peripheral, nonmilitary concerns.

[3] An interesting question arises concerning the utility of linking environment and security issues as a political strategy to raise priority and resources for global issues. The strategy has clear and successful precedents in the United States for other issues traditionally considered outside the purview of security (education and transportation infrastructure). But how applicable is this strategy and the accompanying critique to contexts other than the United States? Appeals to security may not carry the same weight in other contexts.



A symbol of the environment and development debate – the High Dam at Aswan, Egypt.
(Photo by: S. Lonergan)

There are also criticisms of environmental security that are based on the perspective of the South. Egyptian diplomat Somaya Saad, for example, argues that invoking the term environmental security represents a new Northern justification for continuing the inequitable power relationship between North and South (1991).[4] She worries that wealthy countries of the North can afford to care about the environment and will undermine the international legal principle of sovereignty in the name of a higher goal called environmental security. The principle of sovereignty, from the perspective of the South, provides some defence against exploitation by recognising each state, no matter how weak in capabilities, as the legitimate authority for control over the resources within its borders.

According to such critics, Northern states may be tempted, in the name of environmental security, to try to dictate the patterns of natural resource usage, development priorities, and population policies to developing countries in the South. The stability and welfare of some states rest on sets of social power relationships surrounding the utilisation of natural resources (large, politically empowered landowners in Brazil, for example). Elite groups in certain countries may therefore find an alteration of past social bargains, for the sake of environmental conservation, to be a larger threat to state security than the environmental destruction itself (Conca, 1994). Such perspectives raise barriers to obtaining the cooperation of the South with respect to addressing global environmental problems under the guise of environmental security. This argument implicitly recognises the importance of national or regional perspectives in defining or operationalising environmental security. The content and meaning of environmental security varies across nations and regions. These differences present difficulties when trying to mobilise action on a global scale under the label of environmental security.

The prominent focus on environmental stress and violent conflict in the environmental security literature also presents an additional cause for Southern suspicion of the term. Saad notes that:

[4] For additional elements of the "Southern critique", see Conca, 1994; Dalby, 1998; and Shiva, 1994.

> Twenty years ago, the emphasis was on ending the pollution that the industrialised North had been inflicting on the nations of the South. The goals were clean air and water and arable land – the requisites of a decent life; and the modality was international cooperation. Today, however, the North has seized hold of environmental issues by using them to cloak its own security concerns. (Saad, 1995, p. 273)

The North's concern with environmentally induced conflict can easily be viewed as a convenient means to distract attention from Northern environmental problems. High rates of consumption in the North or the historical depletion of resources do not figure prominently in causal models, yet they are integral elements in the larger environmental picture. Global issues such as climate change and stratospheric ozone depletion are not often recognised as salient issues in environmentally induced conflict because their long time-lines guarantee marginal relationships to violent conflict (Bächler, 1998; Homer-Dixon, 1994). The sources for these global problems tend to emanate disproportionately from the North. Furthermore, Northern interest in environment and conflict linkages often extends only to a concern for regime stability and international security implications. The operationalisation of environmental security within the traditional security institutions may stop short of fundamental interest in Southern problems of resource degradation and depletion, poverty, and the inequitable distribution of wealth.

3.2 Criticisms of the Environment and Conflict Literature

Empirical research on environmental degradation/resource depletion and violent conflict has also been criticised. The critiques often figure prominently in discussions of redefining security or environmental security but the critiques of the empirical research will be separated for the purposes of this review.[5] The lively academic and policy discussion on environment and violent conflict reflects the central role this discussion plays in the broader environmental security debates (Deudney & Matthew, 1999; Gleditsch, 1997; Kahl, 1997; Levy, 1995a).

Daniel Deudney, in an early and influential critique of the linking of environment and national security issues, cites limited empirical evidence of violent *international* conflict stemming from renewable resource scarcity (1990, 1991).[6] Little evidence was found to support the hypothesis regarding simple scarcity conflict between states, with the possible exception being conflict linked to river water.[7] This criticism is perhaps less relevant to questions of the environment's role in subnational or civil violent conflict. An opposite and contradictory critique says that the environmentally induced conflict phenomenon is nothing new, pointing to a long history of resource wars.

Deudney also expresses confidence in the adaptability of states through the use of markets to make up for any resource scarcities that could lead to conflict, making environmental conflict less likely (Deudney, 1990, 1991).[8] Others point to a supposed ease with which technological substitutes are developed for depleted natural resources, thereby delaying or removing the possibility of scarcities that might contribute to conflict.

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[5] See Buzan, 1991, 1992; Conca, 1994; Dalby, 1992; Deudney, 1990, 1991; Finger, 1991, 1994; Gleditsch, 1997; Kahl, 1997; Levy, 1995a, 1995b; Lipschutz, 1995, 1997; Lonergan, 1996; Matthew, 1995.

[6] See Dabelko and Dabelko, 1995 for a detailed discussion of Deudney's entire critique.

[7] The other exceptions were the "Soccer War" between Honduras and El Salvador in 1969 and the Anglo-Icelandic Cod War of 1972-73. See Durham, 1979 and Westing, 1986.

[8] For an increased focus on the mediating effects of intervening political institutions, see also Gurr, 1995; Kahl, 1997; and Lipschutz, 1997.

Still others claim that complexity and multicausality are ignored in environmentally induced conflict research. These critics claim that environmental variables are not sufficient to cause violent conflict, nor are they a necessary precondition to it and therefore do not lead to unique environmental conflicts. Because environmental degradation is simply one contributor among many, it is, therefore, *de facto* less interesting and an inseparable research topic from more general inquiries on violent conflict. While none of the prominent research efforts make unicausal claims, critics still find that environmental variables are privileged in the causal models despite researchers' inability to assign weight to environmental degradation or resource depletion relative to other causal factors.

In terms of the *significance* – as opposed to validity – of the causal links, some policy analysts from the North conclude that environmentally induced conflict is of less concern, because only the poorest countries are likely to experience it, thereby posing little threat to international security. While international spillover from developing country instability ("fragmentation" or "hardening") may occur, and, undoubtedly "trouble travel," environmental threats to international security are deemed minimal, and hence, should not be given serious consideration (Homer-Dixon, 1994).

Reservations also stem from the limited number of case studies in this area drawn almost exclusively from the developing world (Conca, 1994; Gleditsch, 1997). This developing country sample, as admitted by the investigators, represents cases selected as those *most likely* to exhibit environmentally induced conflict. This hypothesised predisposition springs from the cases having large but relatively impoverished populations, fragile natural environments, less participatory forms of government, and fewer private or public resources. Therefore, the patterns and conclusions drawn from the work of the Toronto Group and ENCOP (described in Section 2.2 of this chapter) provide significant evidence regarding the specific cases but are not generalisable to other cases.[9]

Another puzzling feature in trying to link environment and security is the number of cases where cooperation, not conflict, was the outcome of a dispute or an environmental change. What factor(s) account for the lack of conflict? The current state of the environment and conflict literature is faulted for not examining the "dogs that don't bark" cases where conflict did not occur despite environmental conditions that would suggest it might (Conca, 1994; Gleditsch, 1997; Levy, 1995a, 1995b). Indeed, comparative studies where conflict did and did not break out in the face of similar environmental scarcities may provide a more complete understanding of what role environmental variables play. Without such case study comparisons and large quantitative studies of environment and conflict, critics maintain policy makers can draw few lessons for preventing or mitigating conflict. These directions in scholarship form the foundations of calls for a "third wave" or third phase of environment and security scholarship (Gleditsch, 1997; Levy, 1995a, 1995b).[10]

It is clear that research on environment and security has not produced a consensual definition or a common policy agenda. While this is not unusual in early phases of any research programme and/or policy dialogue, it does present a certain amount of frustration when attempting to develop a coherent set of guidelines on how to proceed. This highlights the need for expanded research networks and improved communication among researchers, policy makers, and NGOs. There is now a need to bring these communities of scholars together – along with other researchers and policy makers – to develop integrated research projects on environmental change and human security.

[9] Homer-Dixon (1995) addresses methodological questions regarding "strategies for studying causation in complex ecological political systems" in a paper of the same name.

[10] Levy's "third wave" critique includes significantly more than these few points and has provoked a number of responses (Goldstone, 1996; Homer-Dixon, 1996; Levy, 1995b; Gleditsch, 1997; Hauge & Ellingsen, 1998).

CHAPTER II: GLOBAL ENVIRONMENTAL CHANGE AND HUMAN SECURITY: AN INTEGRATED RESEARCH PROGRAMME

1. Introduction

As is apparent from the discussion in Chapter I, there is a continued challenge to provide conceptual clarity and a strong theoretical base to the terms and the research on environmental change and human security. Further, there is a recognised need to expand the empirical research beyond environment and conflict, to include the broader array of security issues noted in the first phase of environment and security research. This must be accompanied by a recognition that the state is not, necessarily, the main object to be secured. Last, there is a crucial need to expand the dialogue, not only among environmental specialists, security specialists, development scholars, and policy makers, but also beyond these groups to the individuals and communities directly (and indirectly) affected by environmental changes. Together, these elements make a strong case for the development of an integrated research programme that can facilitate research and dialogue, involve a range of scholars and policy makers, and help coordinate the international work on environment and human security. We feel this can be accomplished best by linking the many aspects of global environmental change to a broader conception of security, often termed *human security*. In this chapter we define this and other terms, revisit the three key premises that help inform the conceptualisation of the GECHS project and shape the methodological framework for research on the links between environment and human security, discuss key issues for the GECHS project, and outline its research questions. Chapter II illustrates the new and different perspective that we argue must underlie the GECHS project, a perspective that is more *interdisciplinary* and *integrative*.

2. Conceptual Framework

The primary research question of the GECHS project is: *"What are the relationships between global environmental change and human security?"* In order to discuss this question it is important to clarify the meanings of and relationships between the key concepts: environment, global environmental change, and human security. GECHS takes the approach that these categories are not natural, nor are they universal; rather, they are historically and spatially unique, and they are constructed according to sets of social, economic, and political relations. These concepts, in and of themselves, possess no value or meaning; human interaction endows them with value and meaning (Saurin, 1995, p. 83). The use of terms such as environment, global environmental change, and human security, and related terms such as sustainable development, mobilises certain, often competing, assumptions about, for example, what is desirable (or not), what needs to be done (or not done), who decides (and who does not), and so on. This is not to say that these categories are "false" and need to be abandoned (although this may be true of some categories), but that these categories need to be questioned and problematised; they are complex and often ambiguous (Jackson & Penrose, 1993). Thus, understanding these concepts as social constructs recognises that they can be (and are) contested. In turn, this requires understanding how they are caught up in power

relations (WGSG, 1997). The acceptance of the socially constructed nature of certain terms – such as human security – implies that one of the fundamental challenges of any research programme is that it continually reexamines and reassesses the nature of terms and how they are used. By carefully examining these terms we can look at human security as a concept that not only describes a desirable "state" or end-result for individuals and communities, but as an active concept that challenges the inequitable structures that contribute to their insecurities. For these reasons, the key concepts – environment, global environmental change, and human security – are explored further below.

Environment

Our understanding of the term environment attempts to widen its definition and illustrate its contested nature. GECHS hopes to move away from exclusively technical assessments of environment, and environmental change or degradation (although these are necessary), and move towards incorporating assessments that take into account people's experiences in their environments, as well as matters of distribution, access, and entitlement. The environment is inclusive of both the physical and human, as well as the natural and the built. Accordingly, our partial definition of environment is a dynamic one, and is not synonymous with physical resources and processes. Observing that too often the environment translates nature into the static backdrop of human activities, the Scientific Planning Committee of GECHS wants to destabilise this dominant view of the environment. Through problematising the meaning of environment, and accepting that environment has multiple meanings, we can ask questions that would otherwise not fit into the "accepted terms of reference."

Global Environmental Change

The same is true of the term global environmental change. Global environmental change is generally considered as consisting of large-scale natural and human-induced perturbations to the Earth's environment, affecting land use and land cover, biodiversity, atmospheric composition, and climate (IGBP, 1997). Human induced perturbations are constituted by social, cultural, economic, demographic and political forces. In studying these "human dimensions" of global environmental change, we need to understand not only the role these drivers play in affecting the Earth's environment (in the IGBP sense), but also the way they are *influenced* by that environment. It is also crucial to understand the way in which individuals and societies both *mitigate* and *adapt to* stresses that result from changes to that environment. In this sense, global environmental change takes on a social, as well as a physical, dimension.

Human Security

Initially, human security was interpreted as meaning threats to the physical security of the person. The Universal Declaration of Human Rights adopted by the UN in 1948 states that "everyone has the right to life, liberty and the security of person." Now the concept is understood to include economic, health, and environmental concerns as well. It is, as the United Nations Development Programme (UNDP, 1994) notes, an "integrative" as opposed to merely a "defensive" concept. It is also a term with a complex significance. It stands as both a theoretical concept and a practical challenge, and implies specific approaches to research, allowing for unique time and space circumstances.

Early in its history, the UN identified two components of human security: freedom from fear and freedom from want. The UNDP (1994) attempted a more precise definition by

noting that human security implied safety from chronic threats such as hunger, disease, and oppression, and protection from the sudden and hurtful disruptions in the patterns of everyday life. The UNDP also noted that human security should not be equated with human development: "Human development is a broader concept, defined as a process of widening the range of people's choices. Human security means that people can exercise these choices safely and freely" (UNDP, 1994, p. 23).

What is human security? We emphasise that the meaning of human security offered here is to be viewed as a working definition; it is partial, requires continual reassessment, and, since it is our construction, it is positional. Caveats aside, we suggest a meaning for human security that connects the theoretical with the practical. Human security is achieved when and where individuals and communities

- have the options necessary to end, mitigate, or adapt to threats to their human, environmental, and social rights;
- have the capacity and freedom to exercise these options; and
- actively participate in attaining these options.

Moreover, human security will be achieved through challenging the structures and processes that contribute to insecurities.

2.1 Environment and Human Security

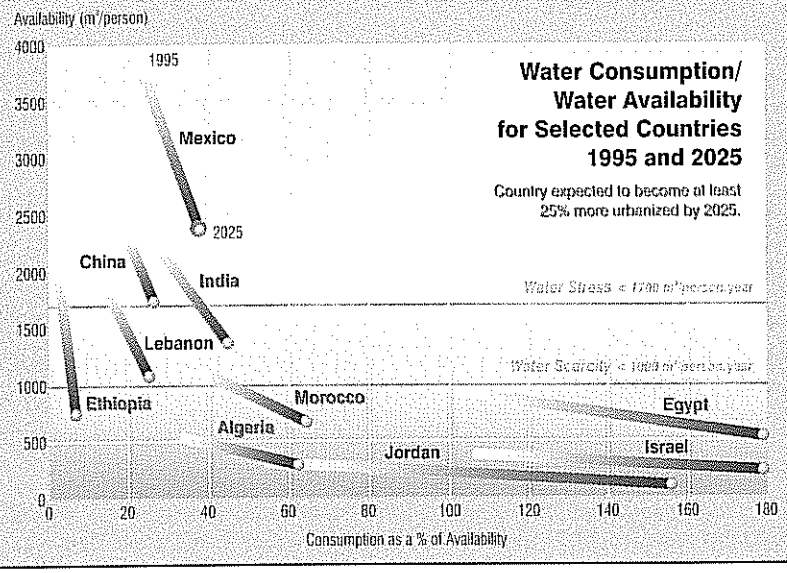
How, then, is environmental degradation related to human security? We refer back to the three premises presented in the introduction to Chapter I. We must first recognise that human perceptions of environments, and the way we use environments, are socially, economically, and politically constructed. Second, environmental problems must be addressed from a broader perspective that encompasses both world poverty and issues of (in)equity, as recommended by the WCED (1987). And third, the appropriate spatial level in which to deal with both environmental and security concerns is not necessarily the nation-state, but the level at which the knowledge base is the greatest (often the local level). This way of looking at the human dimensions of global environmental change generally locates insecurity in issues of equity.

Resource scarcity and environmental degradation create inequities (or the perception of inequities) in resource distribution that often contributes to insecurity.[11] This link may appear in a variety of contexts. The most obvious one today is the process of globalisation – economically, technologically and culturally – and its implications for the environment and for human security. A further example of the types of linkages that the GECHS project will study may provide insight into its intention. In China, water shortages that have caused a national decline in grain output, along with other factors such as an increase in population, are expected to result in a growing demand for grain. Figure 1 presents a summary of water consumption and water availability for selected countries. China is one country that is expected to be in a condition of "water stress" early in the 21st century.

[11] Inequalities in resource distribution under conditions of resource abundance, may also contribute to insecurity.

FIGURE 1

WATER CONSUMPTION/WATER AVAILABILITY FOR SELECTED COUNTRIES 1995 AND 2025



Data Sources: World Resources Institute, 1996; UNDP, 1994

The increased demand for water for both domestic and agricultural purposes will eventually result in a need to import grain. As China's economy grows, grain imports are expected to increase, significantly increasing the world demand for grain. Assuming the supply of grain remains static – a questionable assumption – the price of grain will be driven up and smaller and poorer countries that rely on grain imports will experience significant impacts. Therefore, it is reasonable to expect that water shortages in China may result in insecurities elsewhere in the world, moderated through links to agriculture, globalisation, and economic dependency.

2.2 *What Types of Environmental Change Affect Human Security?*

There are many environmental forces that have been presented as contributing to insecurity. Environmental calamities such as earthquakes, volcanic eruptions, floods, and drought have always presented a threat to human existence and their impact on humans has increased in scale considerably as people have moved into disaster-prone areas. The pace of other, human-induced forms of environmental degradation and resource depletion (e.g., deforestation, desertification, land degradation, erosion, salinisation, siltation, and climate change), while often more gradual, has increased in many regions due to a combination of increasing demand for agricultural products, improving technological means of exploitation, and the lagging pace of conservation and control. Meanwhile, the ability and perhaps also the inclination of people *to adapt* to environmental stress is increasingly challenged, particularly where resources and environment provide the principal basis of their livelihood, as is the case in much of the South.

Types of environmental degradation that may affect security are listed below. Some of these are acute, such as natural disasters and industrial accidents, while others are chronic (such as loss of biodiversity). A distinction can also be made between natural variability and

human-induced change (although the difference is not always clear). Last, there is an important spatial dimension in terms of the environmental stress and its social, economic, and environmental effects.

Natural Disasters

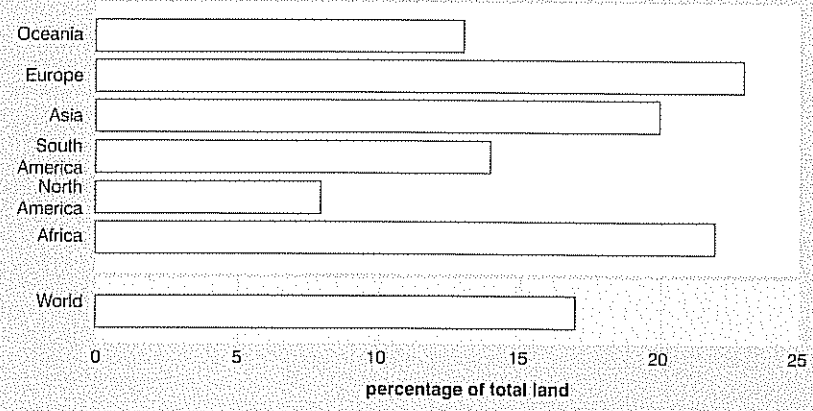
Natural disasters include floods, drought, volcanic eruptions, and earthquakes. They are usually characterised by a rapid onset, and their impact (destructiveness) is a function of the number of vulnerable people in the region rather than the severity of the disaster, per se. Poor people everywhere are the most affected because their socioeconomic circumstances place them in the most vulnerable living situations. (Droughts, despite a slower onset, are also included in this category.) Recent earthquakes in Pakistan, hurricanes in Honduras, and flooding in many regions of the world indicate not only the destructiveness of disasters, but also their ability to affect large numbers of people.

Cumulative Changes or "Slow-Onset Changes"

Cumulative changes are generally natural processes, occurring at a slower rate, which interact with – and are advanced by – human activities. The activities and processes include deforestation, land degradation, erosion, salinity, siltation, waterlogging, desertification, and climate warming. Human-induced soil degradation is one factor that directly affects economic sufficiency in rural areas (see Figure 2).[12] Water availability is another factor that may affect human security, and Table 1 notes countries that are experiencing, or will soon experience, conditions of water scarcity, where water scarcity is generally considered to be less than 1000 cubic metres per capita per year. This is a rough estimate only; many countries are able to supplement their water supply through expensive alternatives such as desalination (e.g., Kuwait) or imports of water (e.g., Singapore).

Figure 2

Human Induced Soil Degradation



Source: World Resource Institute, 1996

[12] There is no assumption here about the reliability of the data reported by the World Resources Institute (e.g., Figure 2). Data accuracy and reliability are problematic in all aspects of GECHS research, and pose significant problems to researchers. Specific issues of data and methodology will be an important component of GECHS research, and are covered in a later section of this document.

TABLE 1

COUNTRIES WITH PER-CAPITA WATER AVAILABILITY BELOW 1,700 CU.M. PER YEAR (1995).

Country	Per-capita water availability (cu.m. per year)
Kuwait	10
Malta	46
United Arab Emirates	94
Libya	132
Qatar	143
Saudi Arabia	170
Jordan	219
Singapore	221
Bahrain	223
Yemen Dem. Rep.	350
Israel	467
Tunisia	504
Algeria	573
Oman	657
Burundi	658
Djibouti	732
Cape Verde	811
Rwanda	870
Morocco	1197
Kenya	1257
Belgium	1269
Cyprus	1286
South Africa	1417
Poland	1463
Korea Rep.	1542
Egypt	1656
Haiti	1690

Sources: Gleick, 1998; World Resouces Institute, 1996.

The links between water scarcity and human-induced soil degradation on one hand and human security on the other tend to be indirect, with one or more of the following conditions present: rapid population growth, economic decline, inequitable distribution of resources, lack of institutional support, and political oppression. These factors are not preconditions of one another and do not apply exclusively to those countries that are generally considered vulnerable to insecurity; lack of institutional support or inequitable resource distribution can occur in advanced democracies that exhibit these conditions, causing insecurity for certain segments of the population.

Accidental Disruptions or Industrial Accidents

This category includes chemical manufacture and transport and nuclear reactor accidents. The two best-known examples are the nuclear accident at Chernobyl, in the former USSR in 1986, and the Union Carbide accident in Bhopal, India, in 1987. Between 1986 and 1992, there were over 75 major chemical accidents, which killed almost 4,000 persons worldwide, injured another 62,000, and displaced over 2 million. Most of these displacements, however, were temporary.

Development Projects

Development projects – generally dams and irrigation projects – often involve forced resettlement and affect many aspects of human security. In India, for example, it has been estimated that over 20 million persons have been uprooted by development projects in the past three decades. The Three Gorges Dam project in China – expected to displace over 1 million persons – and the Sardar Sarovar Dam project in India are the most notable present examples. Rapid urbanisation in some regions of the world is also forcing people from their land; conversion of agricultural land to urban uses has long been a phenomenon in the North, and has become increasingly prevalent in the South as well.

Conflict and Warfare

Environmental degradation is considered by many to be both a possible cause and effect of armed conflict. Although the evidence of wars being fought over the environment is weak (the exception being over land), there is an increasing use of the environment as a "weapon" of war or, as Gleick (1990) notes, as a "strategic tool." One obvious example in this category is the threat by then President Ozal of Turkey to restrict the flow of the Euphrates to Syria and Iraq in order to pressure Syria to discontinue its support of Kurdish separatists in Turkey. Other examples include the purposeful discharge of oil into the Persian Gulf during the Gulf War and the destruction of irrigation systems during conflicts in Somalia. Such activities have similar – and, indeed, more immediate – consequences to the slow-onset changes noted above. But in these cases, it seems clear that the "environment" is merely a symptom of a larger conflict, and the root cause of any insecurity is the conflict itself, and the reasons behind it.

3. Key Issues and the GECHS Project

Previous discussions and research on environment and security have provided considerable direction to identifying various issues that should be addressed by the GECHS project. A two-day workshop held in Toronto in the spring of 1997 distilled these into six key issues that will form the backdrop for GECHS research activities. These six are identified below, along with the ways in which the GECHS project will respond to them. The identification of the research foci for GECHS (see Chapter III) was based on these key issues.

The first issue relates to the need for continued conceptual and theoretical refinement of the terms used and the nature of the links themselves.

Issue 1: *There needs to be continued theoretical and conceptual development of the links among environmental change, impoverishment and security.*

Response: *The GECHS project will focus some of its activities on further theoretical and conceptual refinement, using empirical studies both as a guide to development and for the validation of theory and conceptual frameworks. It is recognised that this needs to be integrated into all activities. Focus Area 1 of the GECHS Science Plan (see below) addresses this issue.*

The second issue focuses on the dire need for further empirical research that considers the broader issues of environmental change and human security, including impoverishment, equity, and environmental justice. The empirical research that characterised phase two (see Chapter 1, Section 2.2) of environment and security research made major strides towards a better understanding of environment and security linkages. However, it was narrowly focused on the role environmental degradation and resource depletion play in contributing to violent conflict. There is also a need to understand the extent of an increasing global hegemony over resource control through international agreements and funding arrangements associated with their implementation. In such cases, it may not be enough to identify the links between factors such as resource depletion and insecurity; ultimately, the most important questions may relate to the interactions (that is, how factors are linked) rather than the factors themselves. How might international agreements affect security, particularly in the South?

Issue 2: *There is a strong need for empirical studies that are focused on which elements of environmental change actually threaten human security, and what role intervening variables (e.g., social processes) play.*

Response: *The GECHS project will concentrate its research activities on integrated regional studies of the relationship between environmental change and human security. This issue is represented in Focus Areas 2 and 3 of the Science Plan under the topics of "Environmental Change, Resource Use and Human Security" and "Population, Environment and Human Security."*

The third issue addresses the need to involve policy makers from the beginning of the discussions. It is crucial that this involvement not be superficial, but that policy makers and NGOs work with the academic community in all aspects of environment and security activities. This should also be an important goal of human dimensions research in general.

Issue 3: *There must be active involvement from researchers, NGOs, and policy makers in future environment and security activities.*

Response: *The GECHS project will endeavour to actively engage NGOs and the policy community in all its activities. These activities include research, publications, education, and workshops. In addition, joint projects will be initiated with other IHDP and IGBP core projects (in both cases, this has already begun).*

The fourth issue focuses on the important question of *why some communities and regions are more vulnerable to certain types of environmental threats than others.* Much of the research on the link between environment and human security has focused on countries in the South. These countries will be most adversely affected by environmental change, and it is here that insecurity will be the greatest. Nevertheless, environmental change and human security appear to be closely linked in many developed countries and post-Communist transition countries as well. For example, the importance of the Arctic North to Canada's defence system implies that climatic change, which could result in the melting of permafrost

(or even a change in the temperature of the permafrost), will affect Canada's ability to conduct security operations.

The issues of differential vulnerabilities, thresholds, and adaptation are central to the GECHS project.

Issue 4: *Research needs to focus on why some communities and organisations have been able to adapt to environmental change, while others appear to have been more vulnerable.*

Response: *GECHS research will examine these differential vulnerabilities. For example, how the same set of circumstances – various aspects of global environmental change – might produce war in one case, refugee movements in another case, famine in another, and adaptive responses in a fourth. This implies not only discerning between biophysical risk and social vulnerability, but also acknowledging the spatial variations in each.*

Box 3

Water and Security in the Middle East

A recent workshop organised by the Consortium for the International Earth Science Information Network (CIESIN) identified 17 critical environmental flashpoints that could lead to regional instability in the world over the next two decades. Six of these flashpoints focused on water supply, and three of these were in the Middle East. The Jordan River basin has often been presented as one of the key examples of where environment and security issues overlap. Central to the tensions that exist between Israel and the Palestinians is the availability of adequate fresh water supplies. In addition to the obvious water scarcity problem, the existence of refugees – Palestinian, Ethiopian, Russian and others – is stressing political, social and environmental systems. There are also significant constraints on the level of economic achievement of certain sectors of national or regional economies due to a lack of resources and increased mining and deterioration of the groundwater supply. The situation has become so extreme that King Hussein of Jordan singled out water as the only issue that would lead him to go to war with Israel. Despite the recent advances made in the peace discussions, the water issue remains a major stumbling block to a lasting peace in the region.

Virtually all of Israel's fresh water comes from two sources: surface water supplied by the Jordan River, or ground water fed by recharge from the West Bank to one of three major aquifers. There is a long legacy of controversy over fresh water in the region, dating back thousands of years. In recent times, there was a proposed comprehensive plan for cooperative use of the Jordan River (the Johnston Plan) as early as the 1950s, but this was derailed by mistrust among the four riparian states (Israel, Jordan, Lebanon, and Syria). Each nation has tended to follow its own water policies since the failure of that agreement, often to the detriment of other nations.

Water has long been considered a security issue in the region, and on numerous occasions, Israel and its neighbouring Arab states have feuded over access to Jordan River waters. At the time of the 1967 war, Israel was consuming almost 100 percent of its available fresh water supplies. Occupation of the three territories (the West Bank, the Golan Heights, and the Gaza Strip) after the war changed this situation in two ways. First, it increased the fresh water available to Israel by almost 50%. Second, it gave the country almost total control over the headwaters of the Jordan River and its tributaries,

as well as control over the major recharge region for its underground aquifers. Control of water resources in the West Bank and the Golan Heights is now integrated into Israel's economy and, accordingly, is essential to its future.

Presently, Israel draws over 40 percent of its fresh water supplies from the West Bank alone, and the country would face immediate water shortages and a significant curtailment of its agricultural and industrial development if it lost control of these supplies. Former Israeli agricultural minister Rafael Eitan stated in November of 1990 that Israel must never relinquish the West Bank because a loss of its water supplies would "threaten the Jewish state." The growing number of settlements in the region poses an additional problem. The water in the West Bank is now used in a ratio of 4.5% by Palestinians and 95.5% by Israelis (while the population is over 90 percent Palestinian). The UN Committee on Palestinian Rights concluded in 1980 that Israel had given priority to its own water needs at the expense of the Palestinian people.

To ensure security of the water supply from the West Bank aquifers, Israel has put in place quite restrictive policies regarding Palestinian use of water. Israel's application of restrictions on Palestinian development and use of water not only improves its access to West Bank water, but also extends its control throughout the territory. It is this inequitable situation with respect to water allocations that increases resentment and adds to tensions in the region.

Steve Lonergan, GECHS Scientific Planning Committee

There has been much rhetoric on the need to incorporate issues of impoverishment and equity into the broader context of environment and security research. This concern is well-founded, and finding ways to respond to this concern is a cornerstone of the GECHS project. This represents a key challenge to human dimensions research, but it is one that GECHS feels is nonetheless extremely important to address.

Issue 5: *Issues of inequality and impoverishment must be incorporated into the analysis of environment and security links.*

Response: *Focus Area 2 of the GECHS Science Plan addresses the interrelationships among population, environment, and security. This includes issues of environmental justice; inequalities in access to resources; and distributional aspects of resources and environmental services. Research may also include studies of the underlying social, political, and economic processes that contribute to injustices and inequalities with respect to the environment and access to resources.*

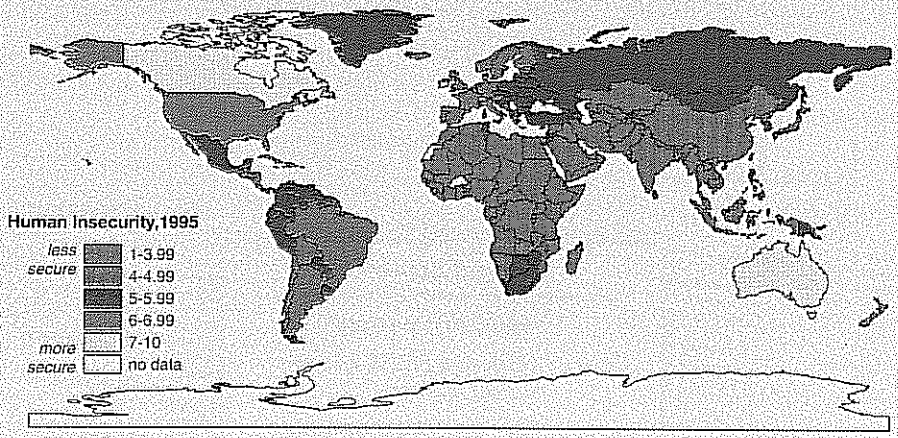
Issues of data and methodology are central to all global change research, and the GECHS project is no exception. The GECHS project has adopted a simple dictum for its approach to research: multiple researchers and multiple methods. One approach to addressing issues of data and methodology is to focus on identifying indicators of environmental degradation and human insecurity and then to use these indicators for early warning purposes. Indeed a major stimulus for further research on environment and security was the demand by policy makers to identify future "hot spots" throughout the world by putting in place early warning systems that could help detect and diffuse potential conflicts. Past attempts at mapping vulnerable spaces or developing early warning systems have met with limited success, due primarily to problems of data and definition. While acknowledging the difficulties, the GECHS project has been working towards developing an Index of Human Insecurity (IHI) that will assist in meeting a range of needs. Work on the IHI aims to

- assist in providing a clear conceptual definition and working framework for the measurement of vulnerability and insecurity;
- assess the quality and reliability of data that is used to depict vulnerability; and
- provide a visual mechanism with which to discuss the key issues relating to environment and human security.

At the international level, much of the conceptual and theoretical work on developing indices that link environment, economy, and society has been undertaken within the context of sustainable development, revealing primarily two competing paradigms: 1) driving force-state-response, and 2) the maintenance of capital. These two approaches have been adopted by the United Nations and the World Bank, respectively, and are closely related to the development of an IHI (Lonergan et al., 1999; see also Figure 3).

FIGURE 3

INDEX OF HUMAN INSECURITY



Source: Lonergan, et al., 1999

Work on data and indicators is important for the following reasons. First, there is a need for computer-based information to assist with medium- and long-term development planning efforts. The intention is not to produce an early warning index per se, but to develop a better understanding of the forces that produce human insecurity and some sense of where the most insecure regions may be now and in the future. Second, it was deemed important to consider the potential impact of global change on human security. Such change includes population growth and distribution as well as global warming and ozone depletion. This implies the need for determining how insecurity may change over time. And last, there is a pressing need to produce visual presentations and explanations of the forces that are influencing security. This need is crucial if decision makers are to be convinced to redirect public funds towards regions with the greatest need.

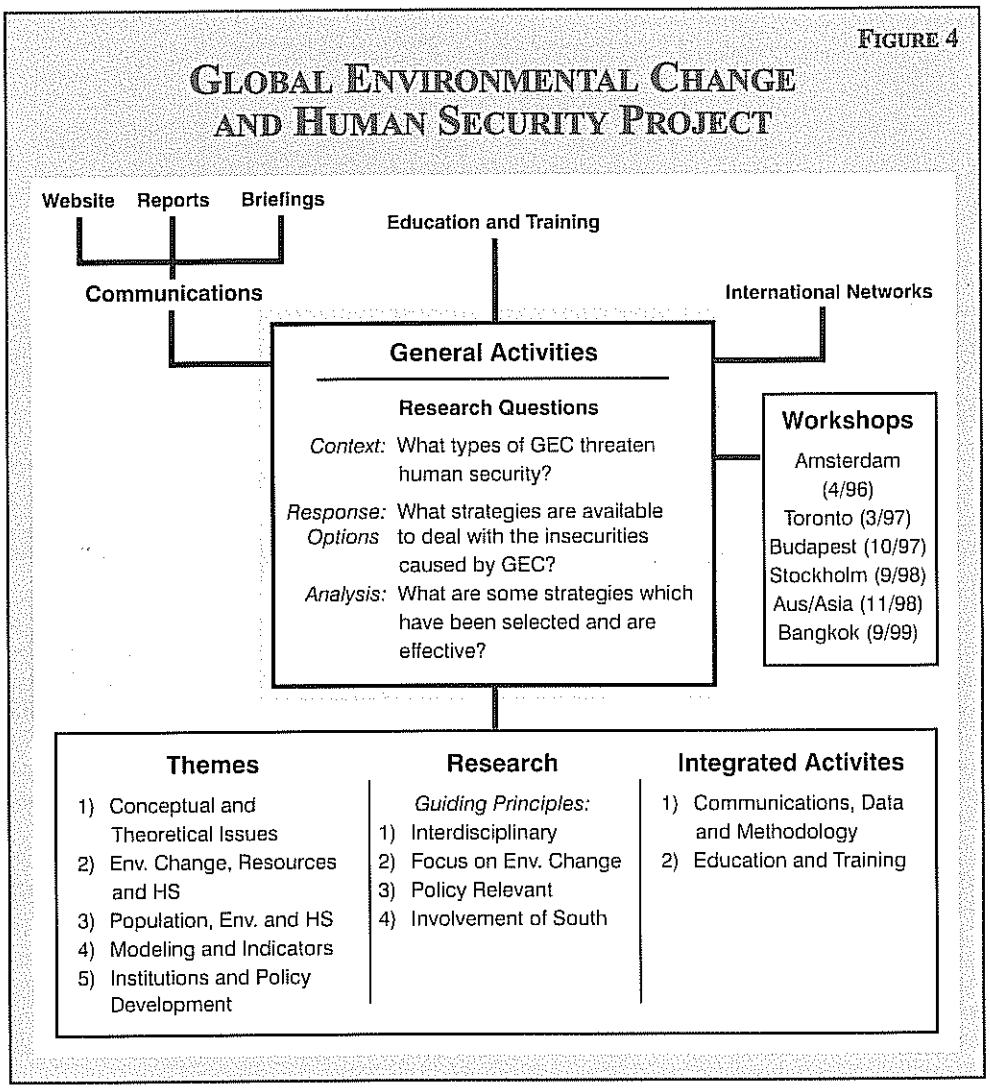
Data quality and reliability are major issues in using indicators for any purpose. Data may be out of date, incommensurable, inaccurate, and incomplete. The problems with data quality and reliability are so great that they directly influence the use of indicators for policy development. Similar to other indicator systems, the data used in the GECHS project present challenges to both developer and user.

This is also an area of research that overlaps considerably with other IHDP projects (and IGBP projects as well). GECHS researchers have already made a commitment to further research on indicators, and this area will be an important focus for the project.

Issue 6: *There is a need to develop methods for the early warning of environmental change and its potential impacts, to identify "hot spots" or regions of potential insecurity, and determine why some groups or communities are more vulnerable than others, given the same level of biophysical risk.*

Response: *GECHS researchers have already begun detailed research on issues of data and on indicators of environmental change and human security. Focus Area 4 of the Science Plan provides a framework to expand this work, and is entitled "Indicators of Environmental Stress and Human Vulnerability."*

FIGURE 4



4. Research Questions

4.1 Guiding Principles

Figure 4 provides a visual overview of the GECHS project. There are four guiding principles underlying the research proposed by GECHS. First, research will be *integrated* and *interdisciplinary*. This implies more than involving scholars from different disciplines; it recognises that the complexity of issues surrounding environment and human security mandates that different perspectives are brought to bear on any research question. Second, the focus of the research will be on *global environmental change*. This implies recognition not only that our *responses* to global changes are social constructs, but also that human-induced *global change itself* is the result of a constellation of social, economic, and political processes, as well as past strategies of adaptation. That is, embodied in environmental change is a crucial social component. Therefore, appropriate questions include, "What shapes our perceptions of environmental change?" and "How do these perceptions correlate with the responses?" Third, *it is incumbent upon the GECHS project to ensure that research includes the active participation of researchers from countries considered transitional economies and countries in the South, including the voices of those previously marginalised and disenfranchised.* Since environmental degradation and human insecurity are not equally distributed over space, it is imperative that researchers outside the North are directly involved in GECHS research projects, by not only contributing to, but also helping direct, all phases of the research. It is also important the GECHS project facilitates this process and assists in the research.

This is not to deny individuals and communities in the North may feel insecure in the face of environmental change. However, regions that are *most vulnerable* – in terms of both threats and, most importantly, the ability to respond to those threats (level of social vulnerability) – are primarily located outside the North. Furthermore, it is important to accept that since countries of the North *cause* many aspects of environmental change, we must promote dialogue among researchers from the North, the transition economies, and the South. The importance of this role for GECHS – promoting dialogue among researchers – cannot be understated. This implies that meetings and workshops should be held in countries in transition and in the South, and that the dissemination of results and general information focuses on the potential users of that information (i.e., decision makers and organisations in those countries). The last guiding principle in the research is that it be *policy relevant*. This implies that policy makers should be involved in the research design and should have some influence as to how research results are disseminated. In this case, "policy makers" is considered in the broadest sense to include supranational, national, and subnational government agencies.

4.2 Research Questions

The overall research question addressed by the GECHS project is, "What is the relationship between global environmental change and human security?" However, this simple question belies the complexity of the processes involved. Issues of perception, adaptation, vulnerability, interaction, response, and thresholds play a prominent role in identifying this relationship. From this general question, additional research questions have been identified in past workshops and discussions. These questions can be placed into three categories: context, response options, and analysis (see Table 2). These questions form the basis for the research foci presented in the next chapter.

5. Conclusions

This brief overview of the literature on environment and security presents a conceptual and theoretical context for the GECHS project and identifies three reasons why it is an appropriate science project for the IHDP. The reasons are, as follows: First, there is a need to better understand the relationship between global environmental change and human security. The GECHS project provides a framework with which to assess key issues relating to environmental change and development. Second, there is need for an international project which facilitates networking among researchers, policy makers, and NGOs involved in environment and security work. And last, the interdisciplinary nature of GECHS provides an excellent opportunity for the global change community to link directly to policy makers and NGOs. In addition, there are important links between GECHS and other IGBP and IHDP science projects. Not only is the GECHS project an important research endeavour for the IHDP, but it also offers necessary links to researchers from countries in transition and from the South. The GECHS project already has demonstrated its viability by acquiring support for workshops, publications, and research projects. The structure of the GECHS management plan for the next five years is presented in the following chapter. This structure is based on a number of key findings and recommendations that have resulted from GECHS-sponsored workshops, discussions of the Scientific Planning Committee and comments and suggestions received from researchers who have read earlier drafts of this Science Plan.

TABLE 2

KEY RESEARCH QUESTIONS FOR THE GECHS PROJECT

CATEGORY	*KEY QUESTIONS*
CONTEXT	What types of environmental change threaten human security? How does environmental change threaten human security? What is the present extent of insecurity? Which regions and groups are the most insecure? Why are some regions and groups more vulnerable to specific environmental changes than others? Can we predict future insecurities?
RESPONSE OPTIONS	What strategies are potentially available to cope with the insecurities caused by environmental change?
ANALYSIS	Why are some strategies selected? Why are some effective? How can obstacles be overcome?

Box 4

GLOBAL WARMING AND HUMAN SECURITY

Conflicts and tensions resulting from water resource disputes are direct and apparent. More difficult to determine, and possibly more devastating, are the long term and somewhat diffuse impacts that may result from what many feel is the overriding ecological concern of the 1990s – global warming.

Global warming may have significant implications for resource availability, agricultural productivity, and economic output; it may lead to coastal flooding and the creation of "environmental refugees." Reduced economic output, coupled with greater disparities in levels of economic achievement – both of which could be exacerbated by global warming – was one of the three types of environmentally induced conflict outlined in the theoretical discussion above. In many cases, with adequate prior knowledge, human systems will be able to adapt to a slowly changing climate. Despite the fact that some countries may be "winners" within the narrow perspective of how climate warming may affect agricultural productivity, it is apparent that regions more resilient to fluctuations in climate will be at an advantage as climate warms and precipitation patterns change. Sea-level rise, now projected to be between 0.2 and 0.6 metres under a scenario of doubling carbon dioxide levels, will have significant impacts on low-lying regions and countries such as Egypt and Thailand, which have a large percentage of their productive capacity lying less than one metre above sea level. More disruptive to political stability, however, will be the expected increasing magnitude and frequency of extreme events – events that are difficult and costly to prepare for, and events that may cause major social disruption. Most concerned will be those regions that are most vulnerable to climate disruptions, particularly areas subject to floods and droughts.

Only a limited amount of work has been done to date in terms of projecting the increased magnitude of extreme events under climate change. However, even using past climate variability to estimate temperature and precipitation extremes under a doubling of CO_2 (see, for example, Lonergan et al., 1993) presents sobering evidence of the levels temperature and precipitation could reach. Coastal flooding, a constant problem in much of Southeast Asia, would increase both in terms of flood frequency and the size or level of floods. This could cause population displacement and the related problems of environmental refugees. Periodic droughts in arid and semi-arid regions, already a cause of population displacement and conflict, could become more frequent and more long lasting.

The greatest impact of global warming and the associated extreme events would be on those groups in society that are most vulnerable to external stresses – the disenfranchised and impoverished who exist in all countries. The UNDP recently estimated that over one billion people live in absolute poverty in the developing world, with 64% of those people living in Asia. One of the key issues that needs to be addressed in this context is the relationship between impoverishment and environmental degradation. Since many of those people also live in ecologically fragile areas, environmental changes, such as global warming, could be devastating to such groups. The impacts of climate change – biophysical, socioeconomic, and political – as well as the present discussions on response strategies, must be considered against the background of the poverty and environment relationship.

Steve Lonergan, GECHS Scientific Planning Committee

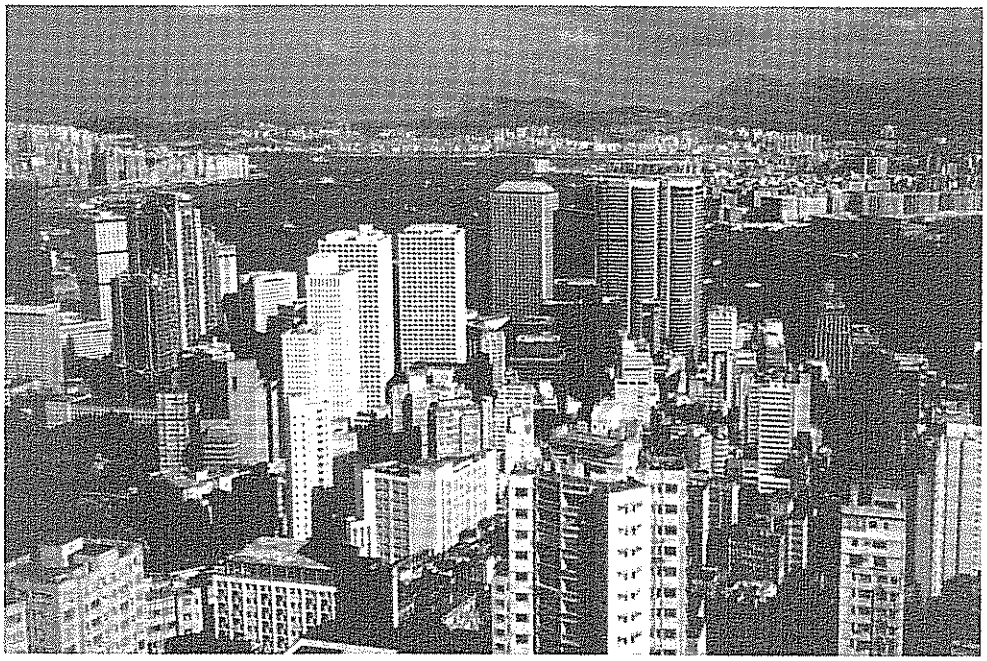
Box 5

Islands in the Midst: Vulnerability and Security in the South Pacific

The South Pacific is popularly represented and perceived as a relatively unspoiled paradise. However, such images obscure widespread resource degradation, toxic contamination, and the very serious threats posed by global environmental change. The vulnerability of the people of the Pacific is defined both by characteristics of the natural and physical environment (*biophysical vulnerability*), as well as by the social, political, and economic processes that impose upon the nations of the region and which define the capacity to cope in the face of change (*social vulnerability*). In terms of biophysical factors, many of the islands' environments are relatively fragile in the face of human use. The islands are small and have limited carrying capacity, and the region is geographically remote. At the same time, the islands generally have narrow and small economic bases and are highly exposed to fluctuations in international financial markets. Pressures to achieve improved economic performance have contributed to widespread resource harvesting, often by other countries, with an associated degradation of natural environments. Geographic remoteness has made the region appealing to other nations, particularly the U.S., France, and the U.K., as a site for toxic waste dumping and long-running programmes of nuclear weapons testing. Social vulnerability has also been affected by the region's colonial past. Colonisation led to the introduction of diseases, the commodification of resources and the environment, and fundamental social and cultural transformations. What looms as perhaps the greatest threat to human and environmental security in the region, though, is climate change. There is the spectre of an associated rise in sea level, and while the extent of this is under debate, it is widely accepted that, as a consequence of climate change, the islands of the Pacific will face increased threats from storm activity, coastal erosion, and changes in precipitation. As is the case with other threats, the vulnerability to climate change is a function of both biophysical characteristics (e.g., many islands are low-lying) and social factors, which in this case include a limited capacity to influence the international politics of climate change.

A focus on the Pacific reveals how threats to security are both cumulative and globalised in character. They are cumulative in the sense that environmental change is the product of many different processes. These processes may lead to resource depletion, environmental contamination, and climate change, all of which, in turn, may affect security. They are globalised because the processes operating on this unique region emanate not only from within, but also as a result of the agendas being pursued by agents outside the region. Vulnerability is defined also by the region's history (e.g., its recent colonial past) and by its geography.

Chris Cocklin, GECHS Scientific Planning Committee



Environmental change, urbanization, and coastal ecosystems – Hong Kong.
(Photo by: C-y. Lai)

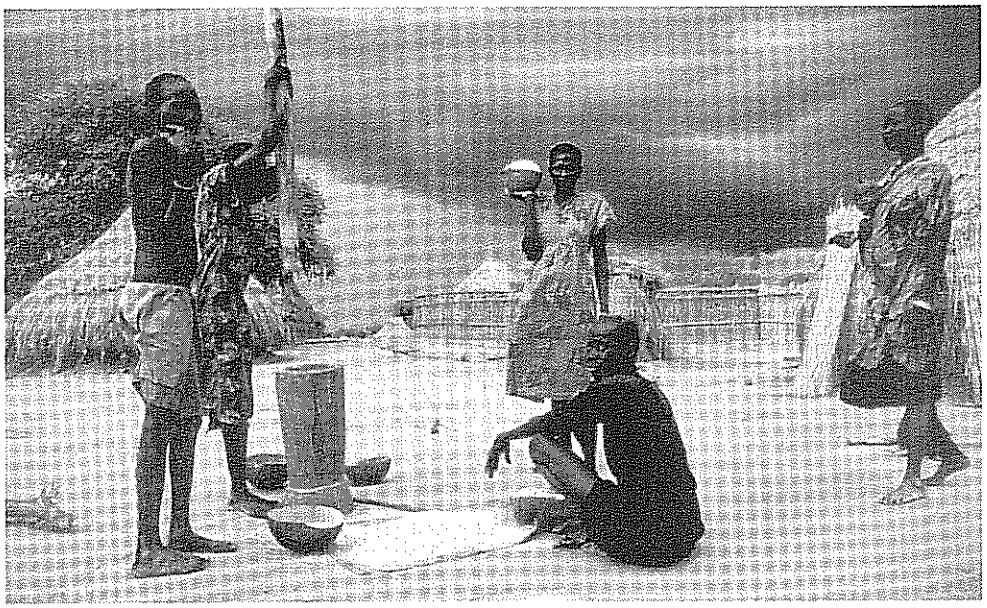
Environmental change and pastoralism – Druze villager in the northern Golan Heights.
(Photo by: S. Lonergan)

CHAPTER III:
RESEARCH FOCI AND ACTIVITIES

1. Rationale for the GECHS Project

The previous chapters provide a background to the evolving field of environment and security research and argue for a more interdisciplinary and integrative perspective in environment and security research, based on three key premises. The first is the recognition that human perceptions of the natural environment, and the way we use the environment, are socially, economically, and politically constructed. This recognition implies not only that our *responses* to global changes are social constructs, but that the process of *global change itself* is the result of a series of social, economic, and political processes. The second premise is the acceptance that environmental problems must always be addressed from a broader perspective that encompasses both world poverty and issues of equity. And third, there must be a realisation that "space matters." Associated with these issues is the recognition that traditional approaches to national security may not, in turn, ensure the security of individuals and communities. This extends from global efforts aimed at curbing global warming and ozone depletion to local anticrime initiatives. Again, this realisation calls for a broader notion of security, one that focuses on the "human" element, despite the ambiguities and difficulties this may cause.

What is the relationship between global environmental change and human security? The discussions surrounding this question have been extensive and wide ranging. One of the



Sustainable livelihoods: a key component of human security – Duar, Sudan.
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goals of the GECHS project is to provide a scientific perspective to the anecdotal descriptions linking environment and security currently pervading much of the literature. In this chapter we outline a general strategy for meeting this goal by providing an overall structure for GECHS through the identification of specific research foci and activities.

A note of explanation is necessary with regard to the research foci and activities outlined below. The GECHS project is in its early stages of development. Through a significant amount of ongoing research and discussions at workshops and conferences it has become clear there is a need for a research programme that will facilitate research and the circulation of information in the environment and security area. However, this programme needs to both complement ongoing research activities and to maintain a clear focus as it evolves. This presents a dilemma in proposing a science plan for GECHS. While there is a need for long-term planning and the wide circulation of information, there is an equally crucial need to provide an immediate focus for the project that utilises available resources and produces high-quality products. Therefore, this section of the Science Plan addresses two issues: first, the need for a long-term (five to seven years) general *framework* for the project, consistent with the overall research area (as outlined in the previous chapter); and second, the concomitant need for a small set of focused activities that demonstrate both the quality of research undertaken by the project as well as the benefit of developing strong linkages to policy makers, NGOs, and communities throughout the project. While the themes and activities outlined in the first section of this chapter present a broad structure for the GECHS project, this does not imply that extensive research will be undertaken on *all* of the subthemes in the early years of the project. Specific activities will evolve from this structure; these activities will depend on the research community, the needs of participants from countries in transition and the South, funding opportunities, and other available resources. On the other hand, general activities – such as theory development, communications, methodological development, and the like may include most or all of the subthemes. Specific research projects that are undertaken as part of GECHS will be based on the following criteria:

- Is there significant value added for GECHS to invest in a specific subtheme?
- Is there a core group of researchers willing to lead the research?
- Is there funding available to support the research?
- Will the research results be useful to both the research and the policy communities?
- Does the research involve significant input from grassroots organisations?

These criteria help define the specific activities for GECHS in the short term, as indicated later in this chapter. Given funding levels and the need to produce high quality, short-term results, we feel a two-phased approach – general information dissemination on GECHS and its subthemes and a small number of specific research projects – is, at this time, the most realistic design for the GECHS project. Additionally, a considerable amount of work has already been undertaken leading up to this Science Plan.

2. Project Goals

OBJECTIVE 1: PROMOTE RESEARCH

It is the primary purpose of GECHS to promote research on various topics related to environmental change and security. The research foci that have been identified for the GECHS project are depicted in Table 2 (p. 40). The focus of GECHS will be on research promotion and facilitation; each year, two or three research subthemes will be identified by the Scientific Steering Committee (SSC) – in consultation with researchers and policy makers

– as priority areas for GECHS. For each topic, the SSC will choose principal investigators (by invitation and from requests for proposals) to undertake the following activities:

- Write a research report that includes a survey of the key literature, an assessment of the policy relevance of the topic, and a list of researchers and institutes involved in the topic.
- Develop a small international working group to carry out research on the topic.
- Write a detailed research proposal to funding agencies for more in-depth research on the topic.

The purpose is not to simply reproduce existing research activities, but to extend present research, provide continuing support for ongoing research projects, and bring together scholars from disparate disciplines to work on specific issues.

OBJECTIVE 2: EXTEND DIALOGUE AND COLLABORATION AMONG SCHOLARS INTERNATIONALLY, INCLUDING THOSE IN DEVELOPING COUNTRIES

In addition to the research teams that are part of the above activity, there will be involvement in, or sponsorship of, various workshops that will report on research activities. The aim is to organise workshops in transition economies and the South, and to involve researchers and policy makers in the region in which the workshop is held. In addition, information on the GECHS project will be disseminated via electronic media, an annual newsletter, research reports, and various international conferences and workshops.

OBJECTIVE 3: LINK POLICY MAKERS AND RESEARCHERS

This objective will be achieved through the workshops noted above, the wide dissemination of research reports, the publication of policy briefing documents, and periodic briefings given to the policy community. The attempt will be to respond to the needs of the policy community as well as to better inform user groups on our research activities.

3. Project Methodologies

To address the research questions posed above, the GECHS project will incorporate a range of research methodologies and techniques in its research projects. Much of the research will be focused on the local level, with significant involvement from local communities and nongovernmental organisations. However, as will be evidenced below, GECHS research will also involve computer modeling, the development of early warning systems, and the establishment of indicators of human security. One of the important contributions of the GECHS project to the global change community will be methodological advancement, integrating qualitative and quantitative assessment, and management techniques for better long-term analysis and planning. Accordingly, no attempt will be made to either dictate the methodologies used, or limit the types of techniques applied. Nevertheless, the importance of a structural analysis and the need for research at the local level do point to a set of methodological guidelines that, most likely, will be incorporated into most GECHS research. They include

- comparative analysis,
- action oriented research,
- policy oriented research,
- participatory research,
- emphasis on data and scale issues, and
- threshold analysis.

Food security, trade and globalization – Robsart, Saskatchewan.
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Some of the key methodological issues, in addition to those noted above, include addressing elements of differential vulnerabilities between communities and institutions, assessing variations in societal response mechanisms, and identifying the importance of spatial scale in assessing the relationships between global change and human security.

What methodological approaches are appropriate for GECHS research? As noted in the forward to this document, the Science Plan stands more as a *menu* of research than as a recipe for how to do research. Accordingly, we expect methodological approaches will range from those rooted in positivist and post-positivist traditions (for example, indicator modelling), to those informed by feminist, critical, and postmodern theories. Within this flexible framework, multiple methods will be encouraged. However, given the guidelines and research questions noted previously, it is expected that qualitative methods of analysis – participatory methods, case studies, phenomenological studies, and ethnographies – will be used most frequently.

3.1 Research Foci for GECHS

The five key research foci for the GECHS project, along with two activities that will be integrated throughout the project, are outlined in Table 3. The specific activities that will be central to GECHS activities in the first few years are outlined in detail in the following section.

FOCUS 1: CONCEPTUAL AND THEORETICAL ISSUES IN ENVIRONMENT AND HUMAN SECURITY

Past work on environment and security has focused on expanding the definition of security to include nonconventional threats, and determining what role environment plays in contributing to insecurity and conflict. However, the links between environmental change and insecurity remain complex, indeterminate, and ill defined. Throughout the project there will be a focus on strengthening the theoretical and conceptual foundations of the research area.

TABLE 3

GECHS RESEARCH FOCI AND ACTIVITIES

FOCUS AREA	*TITLE*
FOCUS 1	Conceptual and Theoretical Issues in Environment and Human Security Why some regions and societies are more vulnerable than others The relationship between environment and conflict How environmental change threatens human security
FOCUS 2	Environmental Change, Resource Use, and Human Security Water and human security Food security Energy security Atmospheric change and human security Land use change and human security (linkage project with LUCC) Environment and conflict/cooperation
FOCUS 3	Population, Environment, and Human Security Environment, migration, and human security Urbanisation and human security Population, impoverishment, and human security Health, the environment, and human security Environmental change and indigenous people Women, environment, and human security
FOCUS 4	Modelling Regions of Environmental Stress and Human Vulnerability Developing indicators of environmental change and human security Modelling environmental stress and human vulnerability Critical zones (linkage project with the IGU)
FOCUS 5	Institutions and Policy Development in Environmental Security The framework of global governance (linkage project with IDGEC) Environment, conflict, and democracy Environmental change, adaptation, and human security Private vs. public investment and human security Technological innovation and transfer
ACTIVITY 1	Data and Methodological Issues in Environment and Human Security
ACTIVITY 2	Communications, Education, and Training for GECHS

The role environmental degradation or resource depletion plays in contributing to insecurity and conflict is often discounted by researchers and analysts who come from a traditional security perspective. These researchers and analysts argue that broadening the definition of security to include modifiers such as environmental, ecological, economic, food, human, comprehensive, and common undercuts the term's utility by making it mean something different to multiple constituencies. Military critiques of the linking of environment and security claim that performing environmental missions takes time and resources away from preparations for the traditional war-fighting mission and therefore undermines preparedness and effectiveness in battle. Proponents of research on environment and human security – including the national HDP committees of The Netherlands and Canada – feel that it is the most appropriate framework within which to address issues of world safety and global conflicts, differential vulnerabilities, environment, impoverishment and society, and distributional issues related to global change.

Despite the growing theoretical literature on the link between environment and security, there is a need to address the theoretical and conceptual development of intervening variables, differential vulnerabilities, and social processes as they relate to global environmental change and human security. Key questions to be addressed in this focus area include:

- What is meant by the links between environmental change and security?
- Does expanding the concept of security diminish its utility?
- How is the concept of human security related to cognate concepts such as sustainability and environmental justice?
- What are the relationships among common security, comprehensive security, sustainable livelihood security, and human security?

FOCUS 2: ENVIRONMENTAL CHANGE, RESOURCE USE, AND HUMAN SECURITY

What are the international impacts associated with an absolute or relative scarcity of resources? Where are these most urgent in their actual or potential impact on human security? What policies can be implemented to deal with these dilemmas?

Resource dilemmas are the result of scarcity of resources, related particularly to fresh water, energy, food, and land, where environmental factors play an important role. Scarcity can be absolute or relative. In both cases, the distribution (the allocation of resources) over societal groups and economic sectors is a crucial issue, within and between communities, states, or groups of states. Scarcity or inadequate distribution may give rise to institutional instability, conflict, or threats to human security. Perceptions about the extent of insecurity can vary between the different actors involved.

How does environmental change affect resource availability and, in turn, human security? Key factors relate to the degradation of resource quality and quantity, population growth and distribution, and unequal access to resources. In turn, dilemmas result from conflicting demands for resources or from the negative effects of overuse. The demand for domestic water, for example, has to be balanced with the demand for water for industrial and agricultural purposes (such as irrigation, power production, production of consumer goods).

This focus area will address dilemmas that are international in nature, either because they occur in more countries or, more importantly, because they spill over national borders. Precisely these kinds of problems raise crucial questions as to the kind of international

responses, policies, and institutions required and the actors involved. To deal with them in an appropriate way, the extent and causes of scarcity, the relationship between resources, and the nature of existing arrangements need to be understood first.

FOCUS 3: POPULATION, ENVIRONMENT, AND HUMAN SECURITY

How does population growth and movement affect the environment and human security? Does environmental change cause differential impacts on women and children (directly or indirectly)? How does environmental change affect the outbreak of disease?

The problems of impoverishment, population growth, environmental degradation, and natural resource depletion have been discussed and researched for many years, but it is only in the last decade that the extent and importance of the linkages among them have become recognised. The World Commission on Environment and Development generated much of the recent interest. It concluded,

> Poverty is a major cause and effect of global environmental problems. It is therefore futile to attempt to deal with environmental problems without a broader perspective that encompasses the factors underlying world poverty and international equality. (WCED, 1987)

This statement, however, belies the complex nature of the linkages among population growth, impoverishment, and environmental degradation. The relationship is complex, multidimensional, conditional, and, at least to date, indeterminate. It is *complex*, in that linkages are not always apparent, fundamental causes are often spatially and temporally unique, and the connections exist well beyond the first order. It is *multidimensional* as there are space, time, political religious, cultural, and other dimensions that must be considered and relationships between them that must be understood. It is *conditional* in that the state of a social system and the relationships that describe that system at any time are unique in time and space; poverty and environmental degradation are historically, socially, and politically constructed – only after assessing the significance of these forces can one understand the society and the relationships within. And last, these connections are, at present, indeterminate; as there has been a paucity of empirical work on the subject, the complexity and controversy surrounding the linkages can be oppressive, and the relationships themselves are somewhat ambiguous.

This focus area will address the key linkages among population, environment, and human security through research on the role of environment as a contributor to migratory movements of people, as a factor in affecting community health, and as a key component of overall human security.

FOCUS 4: MODELLING REGIONS OF ENVIRONMENTAL STRESS AND HUMAN SECURITY

What regions are the most vulnerable to environmental change? Why are some regions more vulnerable to specific environmental changes than others?

These are two of the key questions posed by policy makers when considering issues of environment and security. Early warning systems can help in this regard, as long as they are focused on medium-term results (3-10 years), and are informed by information from the field. The Famine Early Warning System (FEWS) for Sub-Saharan Africa and the Humanitarian Early Warning System (HEWS) being developed by the UN are two examples of such systems. But are computer-based early warning systems useful in the short-term prediction of

potential famine regions or regions where humanitarian crises may develop? Can such systems provide more information than that being provided by agencies in the field? And will governments respond to early warnings?

The answer to all of these questions is an unqualified, "it depends." Computer-based systems can serve as useful supplements – but not substitutes – to information from the field. Data on rainfall patterns, soil erosion, and other biophysical variables can usefully be combined with information from the field to provide a more accurate picture of the potential for famine in a region. However, for short-term predictions, socioeconomic data are inherently unreliable (and, in some cases, useless). In predicting regions of civil unrest, for example, quantitative information may actually be a hindrance if it overshadows the importance of qualitative information provided by observers in the region. Also, it is doubtful that a computer-based system will affect the *providers* of such information, since these countries (Canada, the U.S., or Germany, for example) generally have no vital or important national interest at stake in the regions under stress. Therefore, any early warning system that relies more heavily on computer-based models than on information from observers in the field is likely to be of minimal use. It would be much more useful to have warning systems designed for the medium term and long term, to provide assistance to governments for development assistance planning (rather than immediate response).

Models that reflect the full scope of human security and its determining factors – including environmental change – are not yet available. A major challenge in this area is to incorporate qualitative knowledge and uncertainties into formal models and into the development of indicators of insecurity. It is imperative that research be undertaken related to indicators of environmental change and human security that reflects the dynamics of the relationship between the two. This research needs to be based on a combination of computer modelling and case studies.

FOCUS 5: INSTITUTIONS AND POLICY DEVELOPMENT

> *How effective are regional and global organizations at identifying problems, establishing norms, building consensus, developing satisfactory regulatory responses, strengthening and revising these as required, and monitoring and enforcing compliance? How could these be improved? What forms of environmental change and human security are best addressed through global forms of governance? What is the impact of private investment flows on environmental change and human security?*

At the political level, two opposing views exist. The first argues that political institutions are not likely to develop satisfactory environmental policies because

- scientific uncertainty encourages wait-and-see attitudes,
- long-time horizons are unattractive to policy makers who prefer policies that provide immediate and tangible gains,
- deeply entrenched mixed interests within and among societies make consensus building difficult, and
- leadership on environmental issues is weak.

Many suggest that political institutions are so poorly suited to address environmental problems that attention should be shifted to technological innovation guided by market forces. A second group doubts that market forces can be mobilised without significant political involvement, or that problems could be resolved because private

sector organisations are fundamentally governed by profit motives that encourage the externalisation of costs.

This latter group is divided, however, on how politics can address environmental problems most effectively. Some argue for decentralisation – empowering individuals and local communities. Others argue for stronger multilateral cooperation and the granting of higher levels of authority and power to global organisations such as the UN. Still others believe that states are likely to remain the principal power holders in world politics and must therefore be called upon to address environmental problems. Most likely, different levels of governance will best address different forms of environmental change and human insecurity.

Since the 1960s, various components of the complex, interactive system of political institutions that govern humankind have been called upon to address environmental problems and promote human security. Some environmental problems are regarded as transnational; causes and effects that cross state borders cannot be managed through domestic legislation and therefore require multilateral cooperation. This, however, raises the historical problem of trade-offs between global governance and national sovereignty. While many international institutions and regimes have been created to address environmental challenges, states' attempts to preserve their sovereignty are often seen as weakening the impact of global forms of governance. In some areas, nonstate actors have stepped into the political realm by providing education, allocation, monitoring, and even enforcement services. There is much controversy over how successful global forms of governance are, whether they need to be improved and, if so, how this might be achieved.

4. Justification for the Focus Areas

In a recent report on the current state of environment and security research undertaken for the IUCN and the OECD, Dabelko, Lonergan, and Matthew (1999) noted eight key conclusions and recommendations. These form the basis for some of the activities of the GECHS project and are repeated below:

- The issue of environment and security must be dealt with holistically. Development must be conceived, designed, and implemented with a clear appreciation of the interconnectedness of poverty, environmental change, and insecurity from the individual to the global level. What this means is that efforts to promote economic development of a local community, for example, need to be assessed in terms of how they will affect the environment and security at the local and other levels.
- The relationship between environment, security, and development is very much affected by the role of organisations. There must be a greater dialogue among environmental agencies, development assistance organisations, and the security and intelligence communities. One role for the OECD would be to facilitate such a dialogue through workshops, training activities, and research projects.
- Increasingly, the focus of development must move away from the national level, and toward the community and local levels. Dialogue among the development, environment, and security communities must be encouraged (the GECHS project is a partner in a project promoting such dialogue among institutions in the South). Regular meetings at various levels should be set up immediately so that practitioners and researchers have the opportunity to discuss what they are doing and learn about what others are doing.

- This need to redirect our security focus away from the national level does not apply only to environmental issues. The world's poor have immediate needs that should be satisfied and very immediate forms of insecurity that must be addressed. At the individual level, nothing is more important than fair and reasonable access to potable water, adequate food, basic shelter, energy, education, health care, and opportunity. Thus, much emphasis should be placed on those forms of environmental problems that are most immediately threatening: problems linked to water and air quality, land use, and food availability.
- Development agencies must be aware that the rate of environmental, social, economic, and technical change is very rapid. Although this seems intuitively obvious, the implications of accepting this are important. We should not be diverted from attending to serious long-term threats by the endless immediate demands on scarce resources. Development must be balanced – satisfying immediate needs as well as possible while laying the foundations for long-term benefits. This form of thinking applies equally well to environmental and security issues.
- It is vital to get away from traditional – and centralised – approaches to development planning. As Rayner and Malone (1998) note, we have a dilemma of knowledge and control. Governments may have control over technology, but often have little knowledge of what the impacts of this technology might be when applied in different social and cultural contexts. We continue to provide rhetoric about the importance of considering gender, aboriginal peoples, and the environment in our development decisions, but in practice the values of marginalised and disenfranchised peoples are ignored. Viewing development problems from an environment and security framework provides a "new way of looking" at these issues (although not the only new way).
- Along with the approaches suggested in the previous point, there must be a full range of analytical perspectives and methods applied to development problems. Newer qualitative research methods must be used to inform more quantitative assessments of problems, and vice versa. Analyses must move beyond traditional methods to include participatory and collaborative approaches.
- Resources must be directed towards identifying vulnerable regions and vulnerable groups and promoting adaptation and resilience, particularly in these most vulnerable regions. Early warning systems can help in this regard, as long as they are focused on medium-term results (3-10 years), and are informed by information from the field. One option, an index of human insecurity, was discussed previously.

5. Specific Research Activities in the Short Term

As noted above, the research foci provide a general framework for the GECHS project, and outline a range of topics that might be included under a mature research programme. Specific research activities will be selected based on the criteria listed above. Still, one might ask two simple questions. *"Where will the GECHS project be in five or ten years?"* and *"Where is the value added for having the GECHS project at all"?* In addition to eventually exhibiting the characteristics of a mature research programme – certainly a goal of all IHDP projects – the GECHS project has proposed a supplemental

set of goals. The first of these is to affect policy relating to environmental change and human security. This will mandate involving researchers, policy makers, NGOs and those being researched in all aspects of GECHS activities. Second, GECHS will promote the use of qualitative methods in most of its research. This goal can only be achieved through participatory research, case studies, ethnographies, and the like. Third, GECHS will improve the dialogue among researchers, and among the groups listed above. The success of the GECHS project – and the value added it brings to global change research – lies in meeting these three goals. This presents a significant challenge to the GECHS project, and one that will require a considerable amount of time, effort, and funds.

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LIST OF ACRONYMS

BMBF	German Ministry for Education, Science, Research and Technology
ECSP	Environmental Change and Security Project (Woodrow Wilson Center)
ENCOP	Environment and Conflicts Project (Swiss Centre for Security Studies and Conflict Research/Swiss Peace Foundation)
ENMOD Convention	Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques
FEWS	The Famine Early Warning System
GEC	Global Environmental Change
GECHS	Global Environmental Change and Human Security (IHDP)
HEWS	The Humanitarian Early Warning System
HS	Human Security
IDGEC	Institutional Dimensions of Global Environmental Change (IHDP)
IGBP	International Geosphere-Biosphere Programme
IGU	International Geographical Union
IHDP	International Human Dimensions Programme on Global Environmental Change
IHI	Index of Human Insecurity
IUCN	World Conservation Union
LUCC	Land Use and Land Cover Change (IGBP/IHDP)
NGO	Non-Governmental Organisations
NSF	National Science Foundation of the United States
OECD	Organisation for Economic Co-operation and Development
SC	Scientific Committee
SPC	Scientific Planning Committee
SSC	Scientific Steering Committee
UNDP	United Nations Development Programme
WCED	World Commission on Environment and Development

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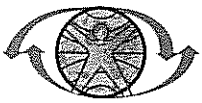

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