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State-of-the-Art Review on Environment, Security and Development Co-operation

For the Working Party on Development Co-operation and Environment
OECD Development Assistance Committee

Note to the Reader

The following report is a state-of-the-art survey on Environment, Security and Development Co-operation. It seeks to trace the development of interest in and understanding of the link between environmental degradation, social tension and conflict, and to identify the significance for development assistance. It is a desk study, conducted with the assistance of professionals fully familiar with the field.

What neither the mandate, time frame nor budget permitted was a comprehensive consultation with developing country experts, nor the gathering and analysis of date or case material from developing countries, with the exception of those cited in the report. A full appreciation of the implications of Environment and Security for development co-operation would require a more complete and systematic attempt to examine these issues in a developing country context and from a developing country perspective.

This is one of the firm recommendations for future work.

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Foreword

The relationship between environment and security feels right. It seems intuitively correct to assume a direct correlation between environmental degradation on the one hand and social disruption and conflict on the other.

We have all heard the sad story of deforestation in the Ethiopian highlands, the mind-boggling statistics on loss of topsoil, the sobering figures of population growth. So when we see television reports of massive movements of people out of the highlands in search of a better life, it seems clear. There is a direct link between environmental degradation and human tragedy. These people would not have left the environment of their ancestors had resource mismanagement not obliged them to do so.

Examples abound. Rwanda - before the genocide and even after - is a singularly crowded place. With population growing and resources shrinking, surely there is a time when the magic lines cross and the whole system breaks down. Add traditional conflicts between Hutu cultivators and Tutsi pastoralists, and there is the recipe for tragedy. The Soccer War between Honduras and El Salvador is often explained by the inability of campesinos to eke out a living on their land, leading to an increase in environmental refugees, a growing strain on social institutions and, inevitably, the flashpoint, the conflict.

Some scholars suggest that Israel's determination to hold onto large parts of the West Bank has more to do with control of water resources than fears of a hostile Palestinian neighbour. Many analysts are concerned that growing environmental pressures may also soon create insecurities and possible conflict in pivotal states such as China, India and Brazil. Through countless examples, the link between environmental degradation and security risk emerges as an underlying explanation, the factor that allows all sorts of disparate and apparently inexplicable elements to fall into place. It is a long sought-for organising principle, the credible cause behind so many symptoms.

It follows, then, that the development assistance community must take environment and security seriously. Not only is it pointless treating the multiple manifestations of tension, conflict and the breakdown of social institutions if the cause remains untreated, development assistance budgets are already straining under the burden of a seemingly endless set of humanitarian crises and disasters, many of them with apparent environmental causes. Following the precautionary principle, is it not better to invest in disaster prevention or disaster avoidance than to invest vastly greater amounts in dealing with the consequences of disaster? Is it not cheaper, and in every way more favourable, to plant trees in Ethiopia, enhance soil fertility in Rwanda, or terrace slopes in Honduras, rather than funding the emergency relief that seems inevitably to be required?

But there is more. The ending of the Cold War has led to a rethinking of the role of the military. No longer needed to such an extent to guarantee the inviolability of threatened national frontiers, can they not be recycled into a force ensuring the eradication of the causes of conflict? Is there not, now, a massive peace dividend to be cashed in and can it not be reinvested in sustainable development?

This report aims to examine what is known about the link between environmental care on the one hand, and the creation of a more secure society on the other. It is deliberately cast as an introduction to the subject for the serious if unschooled reader, and especially for the development assistance professional. It looks at how the link between environment and security was first articulated, how thinking on the subject has developed, what has resulted

from attempts to develop empirical tools for the examination of the link. It traces the emergence and development of different schools of thought on the topic, some of which feel that this perspective offers new and important insights into both environment and security, others of which feel that the perspective offers little more than a new way of looking at familiar old ground - old wine in new bottles. It sets out the views of the critics, who feel that the militarisation of the environment, and the increasing involvement of the defence community in issues once beyond their mandate, carries dangers.

The report gives a sense of the present debate concerning environment and security, and outlines the principal current lines of investigation. More important, the report tries to look at the topic not only from the perspective of the Northern countries, where it has been most actively studied, but also from those developing country perspectives that are known. It seeks to identify the principal questions from the standpoint of the aid practitioner and offers at least tentative answers to these.

The report does not seek to reach a firm conclusion, either about the links between environment and security, or in prescriptions for development assistance. It simply sets out the current thinking on the topic, offers an insight into the genesis of this thinking, and singles out some considerations for debate and further work for the aid community.

We very much hope that the report, in addition to offering important insight into a timely and topical subject, will lay the foundation for a full and informed debate within the OECD-DAC Working Party on Development Co-operation and Environment, and clarify where the aid community should place its attentions and efforts in the coming years.

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Executive Summary

Introduction

This report was commissioned by OECD's Development Assistance Committee to provide an overview of recent research and policy initiatives linking environmental change, conflict and security, and to review strategic and operational responses by development co-operation agencies to this work.

It was designed as a preliminary initiative that would provide a basis for answering three questions: Is this approach useful for understanding problems and identifying priorities in developing countries and countries in transition? Is it relevant to the activities of the DAC and OECD? What would be an appropriate next step?

The report does not attempt to provide environment and security guidelines for development co-operation agencies. It does not rest on close consultation with experts in developing or transitioning economies, but instead reflects a critical review of the extensive literature that has been produced in the past decade. On these terms, the findings of this study complement or reinforce a number of concerns and objectives noted in recent OECD and DAC policy papers and reports, including:

-*Shaping the 21st Century: The Contribution of Development Co-operation* (May 1996)

-*DAC Guidelines on Conflict, Peace and Development Co-operation* (1997)

-*Military Expenditure in Developing Countries: Security and Development* (March 1997)

-*Guiding the Transition to Sustainable Development: A Critical Role for the OECD* (November 1997)

-*OECD Work on Sustainable Development: a discussion paper on work to be undertaken over the period 1998-2001* (July 1998)

In these various documents, the OECD offers a new paradigm for development that integrates economic well being, social stability and environmental sustainability, and expresses a special interest in applying its skills and resources to conflict analysis and management as essential components of the development process.

The relationships among environmental change, conflict and security have received considerable attention in the 1990s, and the conclusions of various research projects provide strong support for many of the policy positions enunciated by the OECD.

In this context several points deserve to be highlighted.

- *The concept of security is expanding.*

In the 1990s, many security researchers in the developed countries are moving away from narrowly militaristic understandings of threat, vulnerability and response mechanisms. This is due to (a) awareness that the interactive processes of technological innovation, economic globalisation and environmental degradation pose new challenges to human welfare and security that resist military solutions and require co-operative responses; (b) an apparent decline in the incidence and probability of interstate war in much of the world owing to

economic interdependence, democratisation, international regimes and the deterrent effect of weapons of mass destruction; and (c) the end of the Cold War, which simultaneously has led to a reduction in military budgets and provided an opportunity to rethink security.

- *Security is being linked to environmental change.*

There is growing consensus that environmental degradation can and does trigger, amplify or cause conflict and instability, and a growing concern that environmentally induced conflict might increase. Today, security institutions are being called upon to protect access to environmental goods in other countries as well as in the global commons, and to provide support for humanitarian operations, many of which have significant environmental roots. In the future, force may be used in response to transboundary pollution, or to enforce international environmental law. But security specialists recognise that conflict can be a constructive force, signalling the need for institutional change or capacity building. The pressures placed on institutions by environmental degradation and resource scarcity might be just such a signal. And, in an era of highly destructive weaponry, most would prefer that force be used as a last resort, and that all possible efforts be made to bolster and adapt institutions so that they are able to manage conflict effectively, before it escalates to widespread violence and war. In many cases, reducing poverty, strengthening the state and civil society, and promoting human rights will do more to enhance security and help countries adapt to changing environmental conditions than applying force will achieve. These are objectives clearly enunciated in *DAC Guidelines on Conflict, Peace and Development Co-operation* and shared by a growing number of security specialists.

- *Security assets are being used for environmental ends.*

In a number of countries military and intelligence assets are being used to collect environmental data and assist in the implementation of environmental initiatives such as reforestation. Military establishments throughout the world have met to discuss the threats posed by environmental degradation, share information and technology, co-operate in clean-up activities, and develop collaborative response mechanisms to environmental crises and conflicts. Often the defence community possesses skills and resources that may be the best available, at least in the short-term, for various environmental tasks. The value of this type of activity is noted in the paper, *Military Expenditure in Developing Countries: Security and Development*.

- *The holistic concept of human security is gaining attention.*

As research has progressed, the concept of human security has gained credibility, and policies of preventive defence – which involve supporting democratisation processes, building institutional capacity, strengthening regional security organisations, transferring technology, and promoting human rights – have begun to take shape. These are similar to objectives identified in the *DAC Guidelines* document. Thus while security institutions still prepare for warfare and see themselves as existing primarily to protect territorial integrity and political independence, scholars and policy specialists are moving towards a world view that overlaps in significant ways with what had previously been the domain of the development community. And, in some countries, security institutions are feeling a pressure to acknowledge the validity of this shift in security thinking; some have initiated programmes to

explore and even experiment with new conceptions of security. Thus the conditions are ripe for a mutually rewarding dialogue between elements of the two communities.

- *Development affects both the environment and security.*

As the development community moves away from measuring progress primarily in terms of economic growth and towards a more holistic concept, it is also becoming aware of the various ways in which its activities – which often lead to some redistribution of power – can both affect ecosystems and promote or undermine local, national and regional security mechanisms (a point noted in *Military Expenditure in Developing Countries*). Awareness of linkages among environment, conflict and security may help development agencies provide assistance that supports other policy objectives or, at least, has fewer negative spillover effects.

- *Exploring this linkage may be politically useful.*

If development assistance can be designed in ways that reduce conflict and enhance security, then it acquires a further justification that resonates positively with groups that have been critical of this type of assistance. The language of security is rhetorically powerful—this alone is a good reason for considering its analytical utility.

In this context, environmental degradation and human security are critical components of a fragile but important bridge between the development and security communities. Both sides now have an opportunity to promote economic well being, social stability and environmental sustainability by strengthening that bridge. While extensive institutional co-operation seems unlikely today, researchers and policy makers on both sides can learn from the expertise and experience of the other.

This report adds substance to that bridge by providing an overview of the literature on the linkages among environmental change, conflict and security; describing the various environmental initiatives underway in security communities throughout the world; and suggesting ways in which the development community might benefit from this research.

To meet the various objectives intimated above, this report is organised into eight chapters, briefly described below.

CHAPTER I: INTRODUCTION describes recent innovative thinking and policy in the areas of security, development and environmental rescue. It is in this unique context that it becomes clear why the development community might be interested in—and benefit from—the new ideas and initiatives that have come to define the field of environmental security.

CHAPTER II: EARLY LITERATURE provides a brief background to the intense and extensive research, dialogue and policy activity that have been witnessed in the 1990s.

CHAPTER III: ENVIRONMENT AND CONFLICT critically reviews various arguments suggesting a causal relationship between environmental change and acute conflict

and violence.

CHAPTER IV: THE ROLE OF TRADITIONAL SECURITY INSTITUTIONS considers in some detail how military and intelligence agencies, especially in North America and parts of Europe, are responding to real and potential linkages between environmental change and security.

CHAPTER V: CRITICAL PERSPECTIVES ON ENVIRONMENTAL SECURITY presents the main lines of criticism directed at proponents of environmental security.

CHAPTER VI: ENVIRONMENT, HUMAN SECURITY AND SUSTAINABLE DEVELOPMENT surveys work that has begun the difficult task of knitting together concerns about environmental security and concerns about environmentally sustainable social development.

CHAPTER VII: CONCLUSIONS reiterates the main findings of this study: this is a useful approach to understanding and addressing some urgent contemporary problems; it is relevant to the activities of the DAC and OECD; and further work ought to be undertaken—drawing upon expertise in developing and transition countries—with the objective of producing environment and security guidelines for development co-operation assistance.

Chapter I: Introduction

As the twentieth century draws to a close, many of the world's security, development and environmental organisations are working to define new paradigms for security to assist international agencies in their efforts to enhance the security, welfare and opportunities of all people. Through vigorous and innovative research, dialogue and policymaking activities, these organisations are gradually changing perceptions of how to promote progress in its many forms – material, ethical and political. And they are refining our understanding of the variety of forces that can and do impede progress.

Perhaps the most important factor underlying these efforts is the dramatic impact of technological innovation, which is the driving force behind economic globalisation, new modes of interdependence, and extremely high levels of human-generated environmental change. Goods, services, capital, knowledge and information are expanding rapidly, and move with increasing freedom and speed throughout the world, creating and amplifying threats and opportunities in ways that no one fully understands. Coupled with these changes is the continued growth of the global population, and – in direct opposition to the movement of capital - the increasing barriers that are being established to *prevent* the movement of people. Coincidentally, the end of the Cold War has provided many individuals and groups with the opportunity and motivation to assess the technologically driven changes that are taking place on our planet.

Since 1945, especially in the developed countries, the desire to prevent a third world war has remained a primary concern. Guided in large measure by the United States, a broad program took shape to achieve this objective. It involved transforming colonies into sovereign states, increasing economic openness, and creating an array of robust regional and international organisations. However, the Cold War emerged in 1947 and quickly dominated the global agenda. International organisations were constrained by superpower rivalry; economic openness was limited by military concerns; and the new states founded in the 1950s and 1960s became an arena for superpower competition. In this context, security was conceived of primarily in terms of neutralising military threats to the territorial integrity and political independence of the state. Accordingly, huge defence expenditures were authorised in an effort to deter the other side from aggressive and hostile behaviour. New countries, searching for models of successful statehood, could not fail to see the emphasis placed on their military assets by developed states.

The process of rethinking security began in the 1970s and 1980s, becoming prevalent in the 1990s. Above all, this process is a recognition that throughout the world military establishments are not the only significant threat to individuals, peoples and states, nor can they be fully relied upon to address all forms of insecurity. In simple terms, security means freedom from danger. Now it is widely acknowledged that what needs to be secured and what constitutes danger vary from one situation to another, and require a rich repertoire of tools and policies. Moreover, there is a broad perception that the net impact of the proliferation of weapons of mass destruction, the expansion of democracy, the rise in world trade, and the evolution of regimes and other multilateral forms of governance has been to reduce the incidence and probability of interstate war. This is especially true in certain parts of the world, such as Europe and the Americas. Consequently, there is a decreased likelihood of world war, and the greatest threats to security for many people in the world today are domestic (especially poverty, inequity, civil war and state-sponsored violence) or transnational (including transnational crime, terrorism, disease and environmental degradation). In view of this, enhancing security now requires expanding our focus from the

threat of external aggression to include the threats posed by internal and transnational forces.

This is not to suggest that military threats have disappeared or that the importance of the military has diminished. Efforts to deny nuclear weapons to countries such as Iraq, and concerns about a destabilising arms race triggered by the nuclear weapons tests of India and Pakistan, are recent cases that demonstrate the continuing salience of conventional military thinking. But in many parts of the world, insecurity is now most closely related to internal and transnational threats. Addressing these threats requires skills and resources ordinarily not found in conventional defence establishments. Identifying new threats and vulnerabilities, and providing the skills and resources to analyse and address them, has become the central objective of efforts to rethink security.

The changes that occurred in military and security thinking have influenced other areas of international relations as well. Overseas development assistance has undergone major structural changes during the past half century. In the decades following World War II, at least two forces shaped the development community – both of which have diminished in recent years. On the one hand, the privileged position of national security on the foreign policy agendas of most donor countries meant that military concerns had a strong influence on the character of official development assistance. On the other hand, the authority granted to modernisation theories of the 1950s and 1960s profoundly affected efforts to erase poverty and promote economic growth. But, as Dylan Hendrickson argues, "dramatic changes [have been] underway since the 1980s in the way international development assistance is provided" (Hendrickson, 1997:4). In particular, official aid to states has declined, the role of NGOs has increased, short-term relief spending on humanitarian crises has grown, and there has been a shift away from large-scale infrastructure projects towards community-based programs designed to reduce poverty and empower women. Perhaps most important, economic growth is viewed now as only one part of the development process.

The Organisation for Economic Co-operation and Development (OECD) is playing a leading role in redefining development, manifest in a series of policy statements and other official documents released in the past several years. According to *Shaping the 21st Century*, for example:

> Our understanding of development and development co-operation has undergone fundamental change.... We now see a much broader range of aims for a more people-centred, participatory and sustainable development process (OECD, 1996:13).

This process has three clear components: economic well being, social development, and environmental sustainability and regeneration (OECD, 1996). At the risk of simplifying a highly detailed framework for redefining development, it is clear that the OECD seeks to promote a holistic vision of development. This vision goes beyond the reduction of poverty and the promotion of economic growth and encompasses the "strengthening of human and institutional capacities" (OECD, 1997:13). Accordingly, institutions will be better equipped to contribute to solving global problems, to take advantage of the opportunities afforded by globalisation, and to adapt to new exigencies as they arise.

One of the themes linking these initiatives to redefine security and development is a shared concern for the implications of environmental change. The environmental movement, which in its contemporary formulation emerged in the 1960s, is a third global discourse focused on identifying a new paradigm for the international community. In the 1960s,

writings by individuals such as Rachel Carson brought the problem of human-generated environmental degradation to the attention of the world. The 1970s witnessed an energetic response to this problem: the Stockholm Conference placed the issue on the global agenda and created the United Nations Environment Programme; NGOs such as Greenpeace and Friends of the Earth were founded; national environmental protection agencies were set up; and numerous multilateral environmental agreements were negotiated. In the 1980s, the World Commission on Environment and Development (WCED) was established. Chaired by Gro Harlem Brundtland of Norway, the WCED popularised the concept of sustainable development and set in motion the process that culminated, in the 1990s, with the articulation of a comprehensive programme for environmental rescue – the UN Conference on Environment and Development's Agenda 21.

The environmental movement has succeeded in providing the world with a new lens to look through as it seeks to define the requirements for security and development in the next century. The objective of this report is to present a comprehensive overview of recent research, debate and policy activity in the area of environmental security that may be of interest to development specialists. In this regard, two things stand out.

First, there is considerable overlap between the concerns of those in the environmental security community and the concerns of those in the development community. Both are cognisant of the local, regional and global forces that shape the human condition. Both are concerned about the welfare and dignity of the individual, and seek to promote these in ways that are environmentally sustainable. Both are aware of the difficulties that the state is experiencing in addressing the challenges of the late twentieth century, and hence of the need to enlist the assistance of NGOs and international organisations.

This overlap is a new phenomenon. During the Cold War era, the security community tended to regard the development community as a marginal player in international relations. At best, it could be used as an instrument for purchasing or strengthening allies, especially in areas where superpower rivalry was strategically important. At worst, it diverted funds into projects that were rarely successful or threatened to strengthen future enemies. Today, there is a growing recognition that development programs might enhance security in many ways. Thus, there is the emergence of an opportunity for constructive dialogue, information sharing and the pooling of resources.

Second, the environmental security literature offers insights into world affairs to the development community which might better assist it in achieving its goals more fully. According to a policy statement released by the OECD's Development Assistance Committee (DAC) in May 1997 entitled *Conflict, Peace and Development: Co-operation on the Threshold of the 21st Century*:

> We know that prolonged economic decline can be a source of conflict. On the other hand, economic growth alone does not prevent or resolve violent conflict, and can sometimes even intensify tensions in a society.... Development assistance will have the most impact in conflict prevention when it is designed and timed to address the root causes of violent conflicts, as well as the precipitating factors, in ways that are relevant to local circumstances (OECD, 1997:2).

Much of the environmental security literature focuses precisely on this problem. Both poverty and economic growth can cause environmental degradation, creating a vicious cycle that is self-reinforcing. This situation, in turn, is closely connected to conflict and insecurity,

especially when located in the context of weak or corrupt political institutions, high levels of militarisation, and ethnic or urban-rural tensions. The problems can be particularly acute for small states and local communities that find themselves buffeted by external forces over which they have little control. To make matters worse, in their efforts to consolidate power, developing states sometimes weaken local institutions before they are competent to manage local conflicts themselves.

There is no simple strategy for reducing violence and enhancing security under these conditions. What is almost certain, however, is that to be successful, any initiative will have to address both the contextual and structural aspects of the problem. This will almost always involve mobilising and strengthening local, state, regional and global resources and institutions. It will frequently entail a two-phase strategy of providing immediate relief and building capacity for long-term success. It will require addressing the difficult task of simultaneously strengthening civil society, the state and regional organisations to ensure that one does not fall prey to the other. It will also have to be sensitive to complex equity issues as equity is often integral to the success of co-operative efforts.

Today there is a growing need to understand better the human sources of environmental change, and the ways in which environmental factors combine with economic, social and political forces to trigger, amplify or cause violence and insecurity. The development community already has demonstrated its awareness of the importance of these linkages, and expressed its commitment to finding effective ways of managing them. Environmental security specialists can contribute to this analysis as well as to the actions that it generates.

It would be misleading and counterproductive, however, to suggest that environmental security is simply a code word for sustainable development, although in practice the concerns of both communities may often intersect. Development implies a gradual improvement in human welfare and the expansion of the opportunities individuals have to live safe, healthy, and dignified lives. Security suggests freedom from danger. At times, this may mean freedom from the things that threaten the process of development or the fruits of development. But security also has a conservative aspect: the development process can become a threat to security insofar as it inadvertently -- or intentionally -- subverts traditional security mechanisms by redistributing power in a society or region.

In this sense, the OECD report entitled *Military Expenditure in Developing Countries: Security and Development* is accurate in claiming, first, that "security is necessary for development" and, second, that "the root causes of insecurity are often developmental." (OECD, 1997: 3,8). It is difficult to promote development under conditions of violence and insecurity. Today, for example, private capital flows into developing countries are five times as great as overseas development assistance, and they have thus become crucial to the development process. But private capital tends to shy away from regions of instability. At the same time, development can undermine traditional conflict management mechanisms and create new forms of insecurity.

In one sense, then, environmental security and sustainable development suggest a similar end, a condition in which:

- individuals and communities have fair and reasonable access to those things they require to exist and flourish;
- disputes are resolved fairly;

- and the environment is protected from destructive human behaviour.

But the terms also describe processes which, as they head toward their shared endpoint, can reinforce or undermine each other. Under these circumstances, it is crucial that the institutions that provide security are able to adapt to and accommodate change rather than impede it. And it is equally crucial that the process of development does not ride roughshod over security institutions and conflict management mechanisms, redistributing power in ways that are likely to generate intense conflict and violence. For while in the grand scheme of things, conflict and violence may be described as adaptation mechanisms, in a world of highly destructive technologies these adaptive strategies must be used with extreme caution.

To reconcile environmental security and sustainable development, and move toward the endpoint they share, will require the sensitivity and co-operation that come from mutual respect and permanent dialogue. For example, it would be a tragedy if development efforts that made perfect sense at the local level undermined carefully negotiated regional security arrangements or vice versa. Thus, if the recommendations of this report could be reduced to a single overarching principle, it might be this: in defining its development strategies, the DAC and the OECD should include an assessment of their multiple security implications. The baseline for this endeavour ought to be human security – the individual's freedom from those threats to his or her welfare and dignity that can be neutralised or mitigated. But individuals make up communities that are themselves nested in complex structures – both social and ecological – organised at sub-national, national, regional and global levels. Each of these defines security and development in certain ways that can be co-operative or based on conflict. Managing this complex state of affairs should be the shared endeavour of the security and development communities.

The foregoing presents an optimistic assessment of the relevance of environmental security to the development community. This is not meant to suggest, however, that military and intelligence communities have fully embraced the concept of environmental security. In fact, there is significant resistance throughout the world to integrating environmental concerns into defence institutions; militaries continue to be major polluters; there is much confusion about what security means and how it might be operationalised; and many analysts remain strong advocates of conventional security thinking and practice. Nonetheless, a number of promising initiatives have been undertaken, and the inroads environmentalism has made are not likely to be rolled back, as long as the problems of environmental degradation remain pervasive and urgent. Moreover, many security specialists are receptive to the need to rethink security, and among these, environmental issues are widely regarded as vitally important. In developing countries, where the military has played coercive roles internally, scepticism is often quite pronounced. But rather than retreat in the face of opposition, it might be wise to continue to apply pressure to these institutions, encouraging them to play a constructive role that truly enhances human security. Broadening the concept of security invites the participation of other actors, an outcome that could assist in shifting military expenditures to other areas.

In the Cold War era, the development community was often constrained by the imperatives of security specialists worried about any action that might upset a balance of power defined strictly in terms of military capacity, which they believed was the fundamental basis of security. Ironically, in the post Cold War era, there is a growing receptiveness to the possibility that development – as currently defined in OECD documents – might be an essential component of security at every level from local to global. Environmentalism has affected the worldviews of both groups, and offers an opportunity to link development and

security in a mutually beneficial manner.

To meet the various objectives listed above, this report is organised into eight chapters. The five chapters following the **Introduction** (**Chapter I**) respond to a specific question about the linkages between environment and security. **Chapter VII** provides some general conclusions. Finally, the appendices include a list of institutions engaged in research on environmental security and an extensive bibliography.

Chapter II: Early Literature – Linking Environment and Security

1. The Evolution of Environment and Security Research

National security has focused traditionally on protecting the territorial integrity and political sovereignty of the state from military aggression from other states. This generally has involved forming alliances and investing in military assets in order to deter potential adversaries and use force effectively when required. In recent years, there has been increased emphasis placed on expanding the traditional conception of security to include so-called non-conventional threats such as resource scarcity, human rights abuses, outbreaks of infectious disease, and environmental degradation caused by toxic contamination, ozone depletion, global warming, water pollution, soil degradation and the loss of biodiversity (*cf.* Ullman, 1983; Renner, 1989; Westing, 1989). These discussions, in turn, have stimulated research on examining the specific relationship between environment and security.

The academic literature on environment and security emerged in the 1970s. Even before this, as early as the 1950s, discussions on the issue of environmental change and security occurred without explicit use of the term environmental security (*cf.* Osborn, 1953; Brown, 1954; Sprout and Sprout, 1971; and Ophuls, 1976). Following from these discussions, in 1977, the U.S. Central Intelligence Agency established an environmental centre to assess the relationships between environment and security. The U.S. military's use of defoliants in Southeast Asia during the Vietnam War focused international attention on both the intentional and unintentional environmental damage caused by war. 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). This primarily humanitarian agreement has to date not been ratified by a number of major powers, including the United States, France and the United Kingdom, although most objections do not centre 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.

By the early 1980s, various institutions and writers began addressing security issues beyond strictly military concerns that affect the state. The UN Commission on Disarmament and Security issues, chaired by Olaf Palme, made a distinction between collective security and common security. The former implied the more traditional interstate military security issues, while the latter reflected the growing array of non-military threats, including economic change, resource scarcity, population growth and environmental degradation. This was followed by the New Political Thinking of Russian President Mikhail Gorbachev that promoted the concept of comprehensive security as a cornerstone of international politics. Comprehensive security included various threats, including nuclear war, poverty, and global environmental issues.

Coincidentally, numerous writers addressed the issue of expanding the definition of security to include non-military threats. Richard Ullman, for example, 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 (Ullman, 1983: 133).

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

The suggestion to broaden the definition of security to include environmental threats was by no means limited to American sources. Although the report of the World Commission on Environment and Development, *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" (1987: 290). Westing (1989) elaborated on this statement by noting that comprehensive security has two intertwined components: *political* security, with its military, economic and humanitarian sub-components, and *environmental* security, including protecting and utilising the environment.

The 1986 nuclear meltdown at Chernobyl and its attendant devastation of neighbouring human populations and ecosystems placed health considerations squarely within a security framework for many people. The next year, President Gorbachev proposed ecological security as a top priority that de facto would serve as an impulse for international confidence building.

In addition to the call for expanding our conception of what factors were *threats* to 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 (community or eco-region) the state as the "traditional prerogatives of national states are poorly matched with the needs for regional co-operation and global decision-making" (Matthews, 1989: 162). It was increasingly accepted 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. Articles by Jessica Matthews (1989) and Norman Myers (1989) summarised much of the debate on broadening conceptions of security. Like earlier contributions, these efforts addressed two key issues. First, there was a need to redefine security to include a new range of threats. Such threats included population growth, resource scarcity, and environmental degradation. Second, there was an acceptance that the object of security was no longer simply the state, but ranged to levels above and below the level of the state. Myers (1993), for example, equated security with,

> Human wellbeing: not only protection from harm and injury but access to water, food, shelter, health, employment, and other basic requisites that are due of every person on Earth. It is the collectivity of these citizen needs – overall safety and quality of life – that should figure prominently in the nation's view of security (Myers, 1993: 20).

Similar to the arguments made by World Commission on Environment and Development, Myers argues for moving from security as a freedom from various threats to security as a freedom to access environmental services.

Today, critiques of this early literature often emphasise its ahistorical and alarmist character. Some historical analyses suggest that environmental change has been a key determinant of the rise and fall of civilisations—and, ultimately, of progress in many areas of endeavour. In short, there is nothing new about this relationship. Moreover, some critics argue, the claim that human activity is hastening a catastrophe becomes less influential as the years and decades pass. In spite of its flaws, however, the early literature initiated an important debate and laid the foundations for the more rigorous research programmes of the 1990s.

2. The Policy Dimensions of Environment and Security Research

The discussion of the links between environment and security has extended far beyond an academic debate. Warren Christopher, former U.S. Secretary of State, has explicitly linked the two terms, noting that "…natural resource issues (are) frequently critical to achieving political and economic stability…" Former Norwegian Defence Minister Johan Holst was even more explicit when he noted that, "environmental degradation may be viewed as a contribution to armed conflict in the sense of exacerbating conflicts or adding new dimensions."

Whether the discussions are among academics or in public policy circles, there is little doubt a considerable amount of confusion exists over how environment and security are related. As Simmons and Dabelko (1996) note, the diversity of conceptual perspectives persists not only within disciplines, but within government departments as well. Indeed, many researchers avoid using the term security altogether, preferring to focus on environmental change and social adaptation and/or armed conflict.

At least part of the confusion over identifying the links between environment and security is the result of different *institutional* interpretations of the terms environment and security. At present, these interpretations include the following:

- Security of the environment (or security of services provided by the natural environment. This has also been interpreted as non-diminishing natural capital). This includes military and defence intelligence institutions monitoring and enforcing international environmental agreements; gathering, analysing, and disseminating scientific data on the natural environment; responding to mitigate environmental crises and disasters; implementing environmental sustainability programs; guaranteeing access to natural resources; spinning off environmental cleanup technologies; and protecting natural parks and reserves.
- Environmental degradation or depletion stemming from military preparation for armed conflict; from the conduct of armed conflict; and from the disposal of military waste;
- Environmental degradation and resource depletion as potential causes of violent conflict;

- Institutional infringement on the principle of sovereignty to mitigate environmental degradation;
- Environmental degradation and resource depletion as threats to national welfare (and, therefore, national security); and
- A broad notion of environment embedded in a range of factors that affect human security.

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 the early phases of any scientific 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. It also makes it clear the differences that exist along a number of critical questions:

- ✓ What is being secured, or what is the object of security?
- ✓ Whom is the security for?
- ✓ What is being secured against?
- ✓ Who is trying to provide security?
- ✓ How are these actors providing security?
- ✓ What is meant by environmental degradation?

Chapter III: Environment and Conflict: General Claims

1. Introduction

Assessing the nature of linkages between environment and security has proven difficult. The complexity of multiple interactions and feedbacks poses tremendous empirical and methodological hurdles. The ambiguous and contested nature of the term security also complicates research and policy in the area of environment and security (Dokken and Graeger, 1995; Lipschutz, 1995; Deudney and Matthew, 1999). 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. In the 1990s a number of researchers have 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; Bächler, 1994). Such conflict, in turn, could pose a serious threat to the security of individuals, regions and nation-states. The general discussions on the nature of security and the role of environmental degradation as a contributor to insecurity and conflict are labelled by Levy (1995a) as the first wave of environment and conflict research. The empirical research that attempted to prove a link between environment and conflict has been labelled by Levy (1995b) as the second wave of environment and conflict studies.[1]

The state of environment and conflict research that defined this second wave is by no means complete, definitive or without critiques. Yet what emerged from the research was a set of causal claims which provide a basis for debating the potential role of environmental and demographic stress as contributors to conflict. These claims also allow for a further discussion of anticipatory policy formulation that incorporates the links between environment and conflict, and provide a basis for pursuing further investigation of the complex and still poorly understood linkages.

Work at the Peace and Conflicts Studies Program 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 and Bächler, 1995), and the International Peace Research Institute, Oslo (e.g., Molvær, 1991; Gleditsch, 1992; Lodgaard and Hjort af Ornäs 1992; Græger and Smith, 1994; Dokken and Græger, 1995; Hauge and Ellingsen, 1996), among others, all contributed towards this effort (see also, Durham, 1979; Westing, 1986; Gleick, 1989; 1991; National Academy of Science, 1991; Lonergan and Kavanagh, 1991). These empirical studies have been crucial, not only in terms of advancing the scholarly discussion of the links between environmental change and violent conflict, but also in publicising the potential role environmental degradation may play as a contributor to violent conflict. Although many studies focused on the somewhat muddled concept of environmental scarcity rather than on environmental degradation per se, the conclusion by Homer-Dixon *et al* (1993) was clear: "…scarcities of renewable resources are already contributing to violent conflicts in many parts of the developing world." Subsequent work by Bächler *et. al.* (1998) demonstrated 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 environment as background to the tensions, as a channel leading to tension, as a trigger, as a catalyst or as a target.

[1] The first wave of environment and conflict research was the attempt to redefine security (Levy, 1995a). However, since Levy focused primarily on environment and conflict, we have chosen not to use his terminology of first and second waves.

Some scholars have been critical of this deterministic perspective on environment and conflict (e.g., Deudney, 1991; Dalby, 1992; Conca, 1994; Levy, 1995a; 1995b). Despite the range of case studies that was undertaken, the evidence for a direct causal link between environmental degradation and violent conflict – implied by Homer-Dixon's statement above – remains speculative and anecdotal. It also should be noted that most of the researchers writing in the environment, conflict and security area are from the disciplines of international relations and political science, and deal primarily with issues of state and military security. Their emphasis generally has not been on the interrelationships between environmental change and various aspects of what is being termed human security (that is food security, economic security, political security, and community security, all of which affects both individuals and groups of people). Rather, their research has focused largely on a very limited set of cases dealing with inter- and intrastate violent conflicts and state security.

2. Environmental Change and Conflict

BOX 1: SECURITY AND CONFLICT

It is important to distinguish between the terms conflict and 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 (individual, group, state, international, or transnational) being secured and/or providing security. Conflict is a condition commonly considered a threat to security. Hence the terms are often treated together but should not be considered synonymous.

It appears that several types of environmental threats *may* have the capacity to contribute to insecurity and to produce conflict as well. Constraints on resources are a crucial factor that is often discussed in the literature (Choucri, 1991). Rapid industrialisation and population growth in many regions have resulted in an increased demand for both renewable and non-renewable natural resources, and as Ullman (1983) and others have noted, competition for resources has historically been a major cause of conflict. This simple statement seems intuitively reasonable; however, there are some who feel it overstates the importance of resources and the environment as contributors to conflict (Lipschutz, 1995). At first glance, the availability of water in the Middle East; the depletion of fish stocks off the east coast of Canada; deforestation in Brazil, Thailand and elsewhere have all been, or have the potential to be, the source of conflict. It has further been suggested that atmospheric change - both global warming and ozone depletion - has the potential to cause significant societal disruption, according to the U.S. National Academy of Science (1991) and Myers (1993). 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). Homer-Dixon (1994) provides some evidence of these relationships and concludes that environmental scarcity (which includes environmental change, population growth, and an unequal distribution of resources) *causes* violent conflict. While this contention remains open to debate, it is increasingly accepted that environmental degradation is at least a *contributor* to conflict and insecurity.

Several other authors have attempted to clarify the possible relationships between the environment and conflict or security as well. Wallensteen (1992), for example, proposes a

seven point classification of the connection between environmental destruction and conflict and/or security. Although he offers no examples to support the typology, his classification system is as follows:

- environmental destruction leading to reduced resources available to society and thus resulting in more contention in society at large;
- environmental destruction leading to a shift in power between already existing parties;
- environmental destruction leading to the formation of new parties, as part of a reaction to environmental destruction;
- environmental destruction leading to environmental issues becoming important for established parties;
- environmental destruction leading to environmental issues becoming more central in political affairs than other issues in society;
- environmental destruction leading to conflict behaviour involving environmentally-based groups; and
- environmental destruction leading to environmentally-based conflict behaviour involving environmentally-based groups.

While these linkages provide us with conceptual insights into the types of conflicts which one may expect as a result of environmental change, they offer little evidence from specific cases of environment as a contributor to conflict or insecurity. Without having specific empirical evidence, how can we determine whether a direct link between environment and security exists? **Nevertheless, the above research and general statements lead us to an inescapable conclusion: environmental change (and other non-conventional threats) is related to insecurity through conditions of inequality and impoverishment.** The environment-security nexus is but one example of how various factors or threats are coupled with the structural features of inequality and impoverishment.

The efforts that attempted to identify the linkages between environmental degradation/resource depletion and violent conflict differed in terms of method, definition and goal. However, a number of shared elements allow for some generalisation when characterising the literature. The environmental variable is perceived to play a number of different roles in its links to violent conflict. This is reflected in Dokken and Græger's definition of environmental conflict "as a conflict that involves environmental stress or degradation, whether as cause, consequence or intervening variable – perhaps in combination with social, ethnical or political elements" (1995: 38). Libiszewski provides an operative definition of an environmental conflict for the Swiss-based Environment and Conflicts Project (ENCOP) team with the following characterisation:

> 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 (1992:13).

The types of environmental issues examined as potential contributors to conflict are highly varied in terms of; 1) where they occur geographically, 2) at what level they occur (local, national, regional, global), 3) the speed with which they occur, and 4) the sources for their occurrence. The types of social, political and economic problems produced or exacerbated by environmental scarcity are equally diverse.

A number of researchers prefer the term environmentally-induced conflict to environmental conflict to describe the environment's causal roles. Environmentally-induced conflict leaves more latitude for incorporating the multiple causes that are characteristic to all conflicts. Initial evidence points to the environment as an underlying, distant, or background variable that influences or intensifies the conflict (Dokken and Græger, 1995). Homer-Dixon (1994) characterises the role of environmental scarcity in violent conflict as underlying, sub-national and diffuse. Homer-Dixon uses the term environmental scarcity as a catch-all phrase to denote a range of factors which affect the availability of natural resources and the quality of the services provided by the natural environment. The term environmentally-induced conflict also assists in the necessary distinction between the *causes* of conflict and the *issues* that are being fought over. Unlike conflicts over non-renewable resources or resource wars where the resources themselves are the alleged object of contention, environmentally-induced conflicts often are not viewed as a unique kind of conflict. Instead environmental variables contribute to social effects that are the more traditional grievances precipitating conflict (ethnic differences, relative deprivation) (Homer-Dixon, 1994; Gurr, 1970; Gurr, 1993). **The environmental variables do not directly cause the conflict per se but instead make more salient the variables that can precipitate conflict** (Libiszewski, 1992).

Many researchers do expect environmentally-induced conflict from renewable resource scarcity to become increasingly frequent. Unlike non-renewable resources, technological innovation and the market have only achieved limited success in developing substitutes for renewable resources (clean air, fertile top soil) according to this line of argument. Therefore, history may not be a good indicator of future potential for conflict. Increasing environmental degradation and resource depletion – the result of increased population, higher use of natural resources per capita, and a constant or decreasing supply of environmental amenities – are pushing ecosystems into a highly uncertain and complex ecological future. This expectation of increasing environmental scarcity encourages many observers to predict an accompanying increase in environmentally-induced conflict (Homer-Dixon, 1994; Winnefeld and Morris, 1994; Bächler and Spillmann, 1996; Kahl, 1997; Bächler, 1998).

Research efforts aimed at drawing a link between environment and conflict certainly existed prior to this more recent work. Choucri and North (1975) developed the theory of lateral pressure in the mid 1970s to help explain state motivations for crossing borders in search of resources, thereby precipitating conflict. States, through population growth and increased resource use, stressed their own finite resources. Pressure mounted to move across political borders and acquire new resources. These movements of populations and/or armies helped precipitate conflict with neighbouring states according to their theory. This cross boundary theory, therefore, focused on population and resource as fundamental to much interstate conflict.[2]

Peace research institutes throughout Northern Europe, often in co-operation with the United Nations Environment Program (UNEP), also conducted additional early work,

[2]See Lipschutz, 1989 for criticisms of theories of resource wars.

focusing both on inter- and intrastate conflict (Westing, 1986, 1988, 1989). As noted in the previous chapter, reports such as the World Commission on Environment and Development's *Our Common Future* also highlighted coming environmental conflicts in the context of a new security agenda (WCED, 1987).

Currently, investigations into environmental links with violent conflict are in a transition stage. Two major academic projects have recently been completed, and their collected findings are emerging in book form. These efforts have adopted a case study approach and have received considerable attention in both academic and policy circles. Drs. Thomas Homer-Dixon and Jeffrey Boutwell of the University of Toronto and the American Association for the Advancement of Science directed both the Environmental Change and Acute Conflict Project and the Project on Environment, Conflict and Security. Drs. Günther Bächler and Kurt Spillmann of the Swiss Peace Foundation and the Centre for Security Studies and Conflict Research directed the Environment and Conflicts Project (ENCOP). These research projects have conducted numerous case studies since 1989.

The conclusions of these prominent research efforts have drawn considerable academic and policy attention through their publications and, perhaps more importantly, through the retelling of their findings in more popular media (Kaplan, 1994; Dalby, 1995).[3] These efforts also produced a large set of theoretical and methodological criticisms that are extensively discussed in the Chapter V. But this second wave of a developing environment and conflict literature is now being succeeded by a more varied third wave of research that attempts to build upon prior efforts (Kahl, 1997; Lipschutz, 1997; Lonergan, 1996; Esty et. al, 1995; Gleditsch, 1997).

One of the most recent trends in environment and conflict research is a concerted effort to apply quantitative analysis in addition to the established qualitative methodological approach. Significant efforts are currently underway at the International Peace Research Institute, Oslo (PRIO) and at various agencies within the U.S. government including the Department of Defense and Central Intelligence Agency. At the request of U.S. Vice President Al Gore, the intelligence community assembled a Task Force on State Failure that has amassed social, political, economic, demographic and environmental data sets to analyse the breakdown of state structures and mechanisms. The Task Force used multiple regression and neural network models to assess the causes of state failures since 1955.[4] The first phase of these efforts produced few reliable conclusions regarding potential environmental conditions given the poor quality and limited quantity of environmental data. Attempts are ongoing to collect additional data and further develop theoretical environmental models for assessing the environment's role in state failure.

Initial quantitative research conducted at the International Peace Research Institute of Oslo in Norway has produced preliminary quantitative evidence supporting at least a weak link between environmental stress and civil war (Hauge and Ellingsen, 1996). Although their results are tentative – since data problems invariably cause difficulties – researchers found a correlation between soil degradation and civil conflict. The research has also shown that economic and political variables were judged to be more significant contributors to civil conflict than environmental variables. This is also a general conclusion of most of the environment and conflict studies (see below).

[3]See Simmons and Dabelko, 1996; Matthew, 1996; and the Environmental Change and Security Project Reports Issues 1-3 for accounts of environment and conflict research in U.S. policy circles.

[4]See Esty et al., 1995 for the broad definition of state failure. See also ECSP, 1997: 212 for a summary of the Task Force's findings.

2.1. The Toronto Project on Environment and Acute Conflict

The work of the Toronto Group and ENCOP (see 2.2 below) must be situated within the context of the significant contributions made by many other researchers. Given their scope and the amount of discussion and debate generated by these two efforts, a more detailed overview of each is offered.

Thomas Homer-Dixon of the University of Toronto recently 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* (1991, 1994). The work focused on three aspects of environmentally-induced conflict: 1) interstate conflict originating in part from resource scarcity; 2) sub-national or intrastate conflict originating in some part from what he termed environmental scarcity driving population movements; and 3) sub-national or intrastate conflict (civil strife and insurgency) originating in some part from environmental stress exacerbating economic deprivation and disrupting key social institutions.

In their empirical research, Homer-Dixon and his colleagues focused explicitly on developing countries where they suspected the linkage between environmental stress and acute conflict was 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 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: 116).

The Toronto group examined seven major environmental problems in an attempt to understand better their roles as potential contributors to conflict: global warming, stratospheric ozone depletion, acid deposition, deforestation, degradation of agricultural land, overuse and pollution of water supplies, and depletion of fish stocks. Similar to other researchers of environmentally-induced conflicts, Homer-Dixon focused on renewable resources rather than non-renewable ones. Renewable resources in this context include renewable goods such as fisheries and timber as well as renewable services such as a sustaining and benign climate and agricultural soil. The project included case studies in countries such as Bangladesh, Pakistan, India, the Philippines, Haiti, Lesotho, South Africa, Senegal, Mauritania, Ethiopia, Egypt, Jordan, Syria, Israel, Turkey, Iraq, China, Mexico, Pakistan, Rwanda, Nicaragua, and Peru. It also looked at a range of issues, such as population, social adaptation, and urban growth.

Homer-Dixon identified three ways humans cause environmental scarcity of renewable resources (often these are found in combination with one another). These include: 1) decreased quality and quantity of renewable resources at higher rates than they are naturally renewed (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 the general condition of environmental scarcity. The interaction of these sources 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 "to encourage 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: 10). Ecological marginalisation occurs when population growth and unequal resource access combines

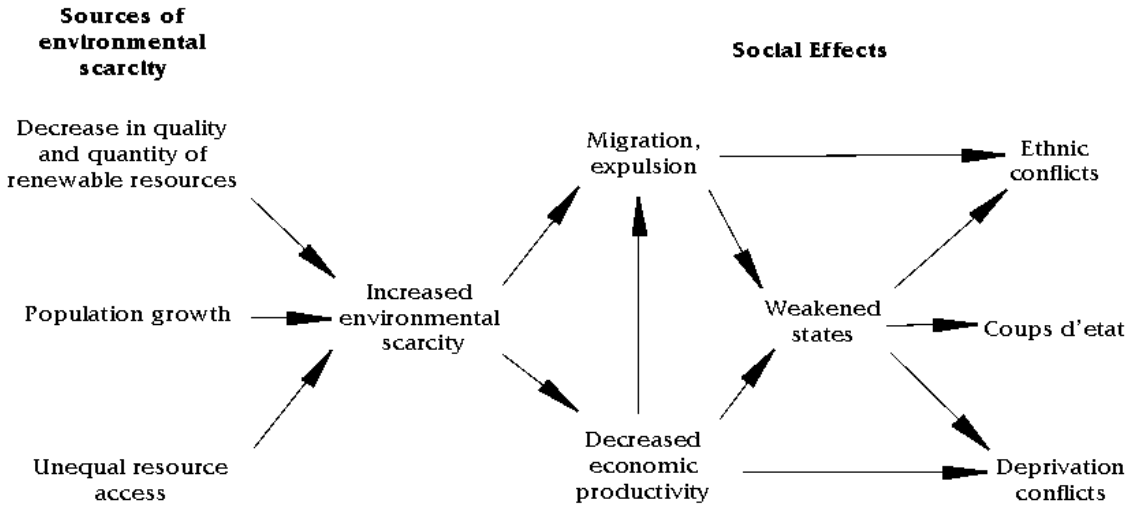
> to cause migrations to regions that are ecologically fragile, such as steep upland slopes, areas at risk of desertification, and tropical rain forests. High population densities in these areas, combined with a lack of knowledge and capital to protect local resources, causes severe environmental damage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

These sources of environmental scarcity in turn can produce social effects that are linked to violent conflict if countries are unable to adapt to the environmental scarcities. Homer-Dixon believes that adaptation is more difficult in developing countries due to their common shortage of social institutions, resources and technical expertise for addressing the scarcities. He then identifies four social effects that are particularly relevant for studying violent conflict: 1) decreased agricultural production; 2) decreased economic productivity; 3) population displacement; and 4) disrupted institutions and social relations (1991). These social effects are themselves often intertwined. Emanating from environmental scarcity, they can undermine the capacity and legitimacy of a state that increasingly cannot meet the rising demands of the population with its declining resources. This gap between expectations and the state's capability to meet the rising demands may also lead to increased competition among elites according to the Homer-Dixon findings.

The movement of people (social effect number 3), for example, poses an internal threat in developing countries exhibiting low levels of state capacity, where most mass migration is occurring. Beyond presenting an additional burden on the social welfare functions of the state, migrant populations can challenge the dominant group for both economic and political control of the state (Chinese in Malaysia and Palestinians in Jordan). It is useful to distinguish between the type and condition of peoples who move voluntarily from those who are forced to flee life-threatening conditions. The distinction between voluntary and forced migration does help determine the likely degree of threat posed to the regime (Zohlberg et al., 1989). Voluntary migrants are typically equipped with financial and/or educational capabilities that allow them to make more forceful demands of the state. Forced migrants, while placing additional social welfare burdens on the state, are typically more disadvantaged and disorganised and therefore more easily repressed or absorbed by the country (Suhrke, 1993; Sandberg and Smith, 1994).

At the beginning of their project, Homer-Dixon and his associates hypothesised that these four social effects, based on environmental scarcity, would likely contribute to three types of environmentally-induced conflict surrounding renewable resources. The three conflict types, as they were listed at the beginning of the section, are 1) simple scarcity conflict between or among states; 2) group-identity conflict within or among states; and 3) relative deprivation conflict within or among states. Figure 1 outlines the hypothesised types of scarcities, social effects and conflicts likely to occur.

Figure 1. Some Sources and Consequences of Environmental Scarcity



The evidence and analysis coming from the project suggests to its investigators that environmentally-induced conflict is sub-national, diffuse and persistent in character (Homer-Dixon, 1994). Little evidence supports the first hypothesis regarding simple scarcity conflict between states, with the possible exception of water.[5] Again, the focus on renewable resources distinguishes the research from non-renewable resource wars. However, hypotheses two and three did find more support in the in-depth case studies. Some cases supported the hypothesis that intrastate group identity and deprivation conflicts (and perhaps coups d'état) could be caused by population movements, economic decline and weakened states. Evidence suggested that global problems such as climate change and stratospheric ozone depletion were *less likely* to cause environmentally-induced conflict while fish stocks, forests, water and agricultural land issues were *most likely* of the renewable resources to induce conflict.

Three causal scenarios illustrate how the three sources of environmental scarcity, singly or in combination, may cause a series of social effects that in turn leads to one of the conflict ideal types. These scenarios are drawn from the project's case studies and their reporting in Homer-Dixon (1993).

> Population growth can result in less agricultural land being available. This may then induce human migrations that, in turn, may lead to violent conflict. The conflict spurred by Bangladeshi migrations into India can in part be explained by these dynamics (in addition to religion and politics) (Hazarika, 1993).
>
> Unequal access to resources can combine with high rates of population growth to produce environmental degradation. This degradation can then contribute to "economic deprivation that spurs insurgency and rebellion" (Homer-Dixon, 1993: 42). Examples include the Philippines, the Himalayas, the Sahel, Indonesia, Brazil and Costa Rica.

[5]River water is considered by Homer-Dixon and others to be the renewable resource most likely to precipitate interstate conflict (Gleick, 1993; Lowi, 1993; Homer-Dixon, 1994).

> Population growth and a decline in quantity and quality of renewable resources may lead to changes in access to resources (development project, change in property rights). These changes may, in turn, cause violence among those denied or given reduced access to the resources. The Senegal River Valley between Senegal and Mauritania presents one example. Issues of class and race played a part in the conflict that broke out, but environmental scarcity is still viewed as an underlying cause of the violent conflict.

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 that have been levelled at the work. Nevertheless, the research stands as one of the few empirical attempts to understand the linkage between environment and conflict better.

2.2. The Environment and Conflicts Project (ENCOP)

The Environment and Conflicts Project (ENCOP) is co-sponsored by the Centre for Security Studies and Conflict Research of the Swiss Federal Institute of Technology and the Swiss Peace Foundation. ENCOP has tried to develop a typology of conflict by investigating what kinds of environmental degradation cause what kinds of conflict (Böge, 1992; Bächler and Spillmann, 1996 (vols.1-3); Bächler, 1998). Like the Toronto Project, the ENCOP investigation focused on developing countries with a series of in-depth case studies.

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, 1992:13).

Deterioration in environmental quality or resource scarcities can exacerbate other socio-economic 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 from certain environmental conditions.

The ENCOP research highlighted development and equity in the form of maldevelopment and environmental discrimination when trying to understand the role of the

environment in conflict. Social and political maldevelopment, due in part to a degradation of natural resources, has become an international peace and security challenge (Bächler, forthcoming: 2). 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: 4).

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 sub-divided by state boundaries;
- zones degraded by mining and dams;
- tropical forest belts; and
- poverty clusters of sprawling metropoles.

These crisis areas were found in the case studies in Africa, Latin American, Central and Southeast Asia and Oceania. 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:

1. When the environment plays a role between groups within a country;
2. When internal conflicts become internationalised, often through population displacement; and
3. 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 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 stressed that social, political and economic factors also played key causal roles where the environment is not sufficient to cause conflict.

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. Catalysts such as large cash crop farming projects, mining and dams further undercut the marginal groups that are highly dependent on natural resources for survival.

According to the ENCOP classification, *internal migration conflicts* can occur when 1) populations are both pushed and pulled into new areas because of drought, floods, or desertification, or when 2) populations are forcibly displaced by large dam, agricultural, industrial or mining projects.

Environmental discrimination can contribute to international migrations that intensify economic or political conflicts in what ENCOP terms *cross-border migration conflicts*. While population movements can be sudden and involuntary following an environmental catastrophe, more often these movements occur gradually for a variety of environmentally-related reasons.

Population pressures, especially in less productive ecological regions, can cause migrations to new areas where conflict can then occur. ENCOP classified these phenomena as *demographically-caused migration conflicts*. Three types of demographic change are identified as critical in terms of these migration conflicts: "population scale in relation to resources available (density), population growth rate, and resource redistribution through migration and displacement" (Bächler, 1998: 15).

Asymmetric dependence of upper and lower riparians could lead to *international water conflicts* as another category of environmentally-induced conflict. Conflict in this context remained in the form of political tensions and military threats and not organised state violence. Among the cases examined, no war had been fought explicitly over shared water resources.

Last, *Global environmental conflicts* might evolve around climate change or ozone depletion, but the ENCOP framework did not permit definitive exploration of these medium and long range challenges. The investigators suggested, however, that potential conflicts were likely to centre around local manifestations of the global problems rather than broader North-South conflict on a global scale.

The ENCOP investigators view their evidence as confirming the Toronto Project hypothesis on links between environmental scarcity and sub-national or internal violent conflict. ENCOP conclusions stress the need to distinguish among different contributing roles environmental transformation and environmental discrimination can play in conflict: background reason, trigger, target, channel and catalyst. 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 and Spillmann, 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.

3. What Types of Threats Affect Security?

Recent empirical work on environment and conflict has concluded that the direct effect of environmental degradation and resource scarcity on the probability of violent conflict is quite weak (see above). This conclusion, however, is less true once we adopt an expanded definition of security (both in terms of non-conventional threats as well as different spatial levels of analysis). It is also accepted that any new perspective on security must be an integrated one; that is, there is an array of factors that together threaten security. Rather than look at these in isolation, it is important to view them *holistically*. Nevertheless, for this initial discussion, it is worth identifying the various factors that have been found to contribute to violent conflict, and to note the strength of this relationship. In turn, these factors will also be important in affecting human security. In many of these cases, environment may be a contributing factor as well, thereby influencing security indirectly through these other routes

or mechanisms. Table 1 lists some of the key factors contributing to conflict, along with their link to intrastate and interstate conflict, and the strength of these relationships. The table is based on work done by Esty et al., (1995), Homer-Dixon (1995) and Bächler (1998). As is obvious from the table, violent conflicts are more likely to occur in states where there are significant population movements, a lack of economic resources, and unstable political regimes. In addition, ethnic fragmentation, high population density, and relative power status also affect security, at least at the national level.

TABLE 1. Factors contributing to violent conflict.

Contributing Factor	Link to Intrastate Violent Conflict	Link to Interstate Violent Conflict	Strength of Relationship
Political System	Prob. of violence varies inversely with the degree of democratisation.	Stable democracies are unlikely to experience violent conflict with one another.	*Strong*
Geographical Contiguity		Neighbouring states are more likely to experience conflict than non-neighbouring states.	*Weak*
Ethnic Fragmentation	Prob. of violence increases with the degree of ethnic fragmentation.	Ethnic linkages across borders increases the probability of conflict diffusion.	*Strong*
Population Density	Prob. of violence increases with population density.		*Strong*
Power Status		If there is a substantial difference in power status, the probability of violence increases.	*Medium*
Previous Conflict	Violent conflict in the previous two years increases the prob. of violence.	Violent conflict in the previous two years increases the prob. of violence.	*Strong*
Level of Economic or Human Development	Prob. of violence varies inversely with the level of development.		*Strong*
Resource Scarcity	Probability of violence increases with increased levels of resource scarcity.	Probability of violence increases with increased levels of resource scarcity.	*Weak*
Vulnerability to Natural Disasters	Unknown.		*?*

4. 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 human impact has increased considerably in scale 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, climate change), while often more gradual, has been growing rapidly in recent decades owing to a combination of increasing demand, 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 developing world.

Types of environmental change/degradation which may affect security include the following:

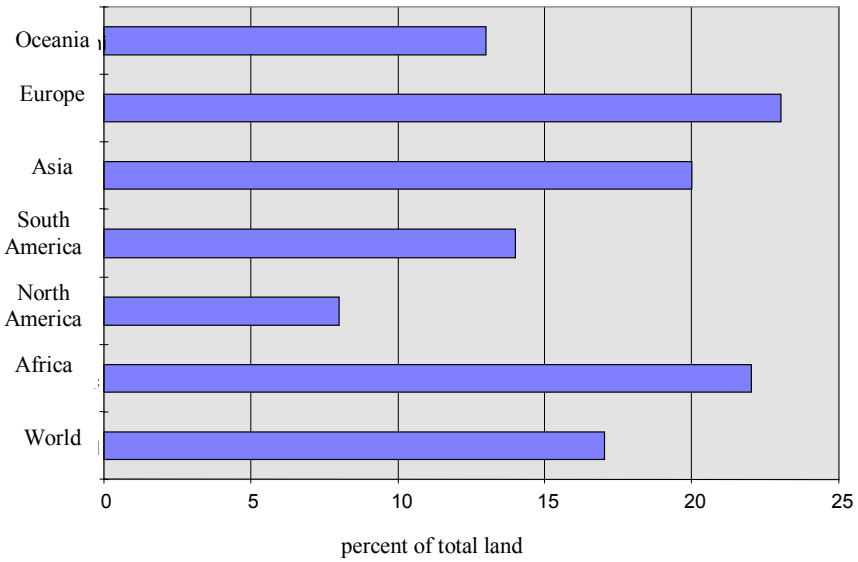
4.1. Natural disasters

Natural disasters include floods, volcanoes 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 in developing countries are the most affected because they are the most vulnerable. (Droughts, despite a slower onset, are also included in this category.) Recent earthquakes in Pakistan, 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.

4.2. Cumulative changes or slow-onset changes

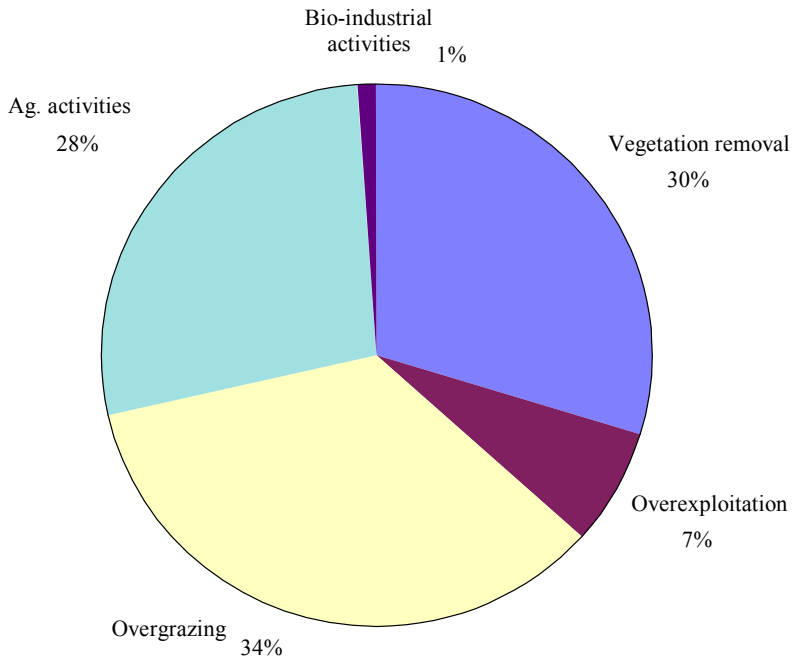
Cumulative changes are generally natural processes occurring at a slower rate which interact with – and are advanced by – human activities. The processes include deforestation, land degradation, erosion, salinity, siltation, water-logging, desertification and climate warming. Human-induced soil degradation is one factor that directly affects economic sufficiency in rural areas (Figures 2 and 3). Water availability is another factor that may affect human security, and Figure 4 notes countries which are experiencing – or will soon experience – conditions of water scarcity, where water scarcity is generally considered to be less than 1000 cubic meters 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)). Do factors such as water scarcity and human-induced soil degradation in and of themselves affect human security? The linkage is much more indirect; in most cases, one or more of the following conditions are also present: rapid population growth, economic decline, inequitable distribution of resources, lack of institutional support and political repression.

Figure 2. Human Induced Soil Degradation , 1980 - 1990



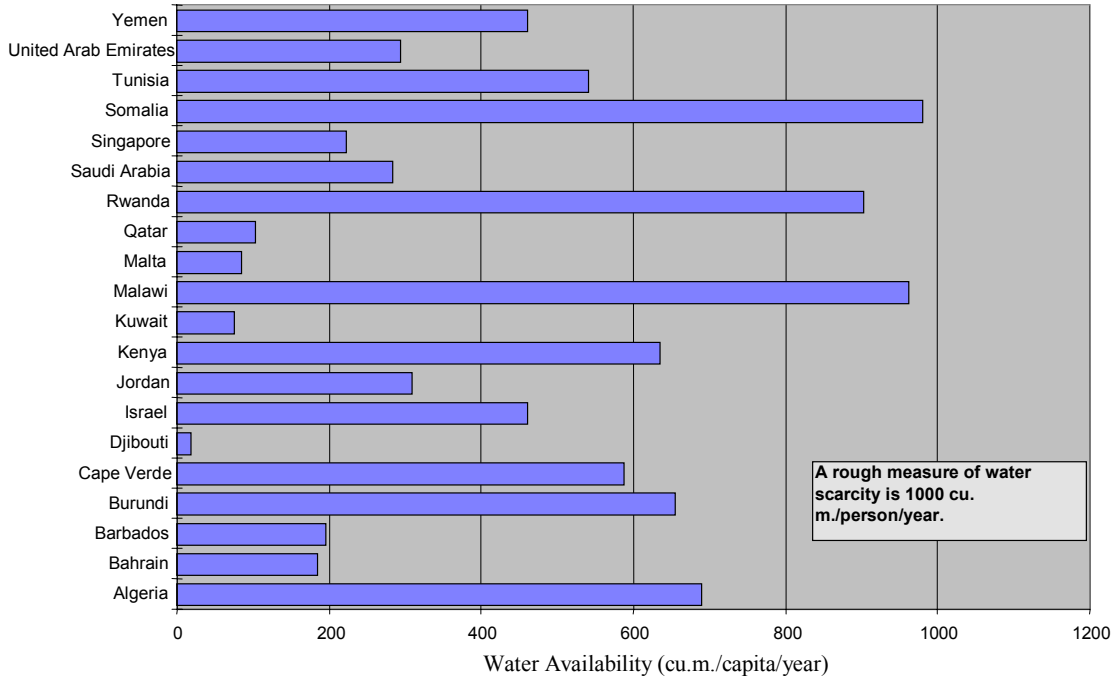
Source: World Resources Institute, 1996.

Figure 3. Causes of Human Induced Soil Degradation



Source: World Resources Institute, 1996.

Figure 4. Countries Experiencing Water Scarcity, 1990.



Source: World Resources Institute, 1996

4.3. Accidental disruptions or industrial accidents

This category includes chemical manufacture and transport and nuclear reactor accidents. The two most obvious 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 4000 persons world-wide, injured another 62,000, and displaced over 2 million.

Most of these displacements, however, were temporary.

4.4. Development projects

Development projects such as dams and irrigation systems 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 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 increasingly this is the case in the South as well.

4.5 Conflict and warfare

Environmental degradation is considered by many to be both a cause and effect of armed conflict. Although the evidence of wars being fought over the environment is weak (except, of course, over land), there is an increasing use of the environment as a weapon of war or, as Gleick (1990) notes, as a strategic tool. 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.

Much of the research on the linkage between environment and human security has focused on countries in the South. There is a perception at least that these countries will be most adversely affected by environmental change (and hence where insecurity will be the greatest). While this hypothesis is highly plausible, environmental change and human security appear to be closely linked in many developed countries and post-Communist transition countries as well. 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 cross-sectoral environmental crises in Eastern Europe and the republics of the former Soviet Union provide numerous opportunities for investigating environment and human security linkages.

Arbman et al., have put together a useful table to characterise different environmental threats to security (Table 2). Although the assessments are completely subjective, it helps to identify possible threats and to speculate on their impacts.

TABLE 2. Characteristics and Impacts of Different Environmental Threats

ENVIRONMENTAL THREATS	RATE OF CHANGE	NATIONAL (N) REGIONAL (R) GLOBAL (G)	SOCIAL IMPACTS	ECONOMIC IMPACTS	POLITICAL IMPACTS
NON-RENEWABLE RESOURCE SCARCITY					
FOSSIL FUELS	*LOW*	*N/R/G*	*MEDIUM*	*STRONG*	*STRONG*
MINERALS	*LOW*	*N/R/G*	*WEAK*	*MEDIUM*	*MEDIUM*
RENEWABLE RESOURCE SCARCITY					
FORESTS	*MEDIUM*	*N/R*	*MEDIUM*	*MEDIUM*	*MEDIUM*
FOOD	*MEDIUM*	*N/R*	*STRONG*	*MEDIUM*	*STRONG*
FRESH WATER	*MEDIUM*	*N/R*	*STRONG*	*MEDIUM*	*STRONG*
FRESH AIR	*MEDIUM*	*N/R*	*WEAK*	*WEAK*	*WEAK*
ENVIRONMENTAL DEGRADATION					
GLOBAL WARMING	*LOW*	*G*	*STRONG*	*STRONG*	*STRONG*
ACIDIFICATION	*LOW*	*N/R*	*WEAK*	*MEDIUM*	*MEDIUM*
OZONE DEPLETION	*LOW*	*G*	*MEDIUM*	*MEDIUM*	*STRONG*
EUTROPHICATION	*LOW*	*N/R*	*WEAK*	*MEDIUM*	*MEDIUM*
HEAVY METALS	*LOW*	*N/R*	*MEDIUM*	*WEAK*	*STRONG*
ORGANIC POLLUTANTS	*LOW*	*N/R*	*MEDIUM*	*WEAK*	*STRONG*
RADIATION	*LOW*	*N/R*	*WEAK*	*WEAK*	*STRONG*
MAJOR ACCCIDENTS	*HIGH*	*N/R*	*STRONG*	*STRONG*	*STRONG*

Source: *Adapted from Arbman,* et al.*, 1998*.

BOX 2 WATER AND SECURITY IN THE MIDDLE EAST

A recent workshop sponsored by the DCI Environmental Center in the U.S. 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 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/conflicts 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 identified 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 co-operative 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. A number of authors have argued that a major contributing factor in the tensions leading to the 1967 war was the water issue. At the time, Israel was consuming almost 100% 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 are now integrated into Israel's economy and, accordingly, essential to its future.

Presently, Israel draws over forty 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% 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 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 which increases resentment and adds to tensions in the region.

Chapter IV: The Role of Traditional Security Institutions

1. Introduction

The early expressions of contemporary environmentalism that emerged in Europe and North America in the 1960s and 1970s often were influenced by critiques of the modern state and advanced industrial society. Writers such as Murray Bookchin, Barry Commoner, Aldo Leopold, Arne Naess and Lynn White linked their concerns about the environment to broader concerns about consumer society, the Western emphasis on economic growth as an indicator of progress, and the impersonal and instrumental rationality of the state. This was an era characterised by anti-war demonstrations, student protest, anxiety about the prospect of nuclear Armageddon, the suppression of dissent in the former Soviet Union, anti-apartheid movements, and women's rights advocacy. In this context, many environmentalists joined other critics-at-large in regarding the state with suspicion, and numerous environmental NGOs were established as vehicles to promote social change outside the formal domain of politics. The term military-industrial complex conveys well a widely shared sentiment about the real character of the state.

Contemporary environmentalism has not entirely abandoned its concerns about the capacity of the state to address environmental problems, or about its commitment to an environmental agenda. It is thus not surprising that discussions and policies linking the environment to traditional security institutions have been controversial.

In a very general sense, the state provides security by enacting and enforcing laws, redistributing wealth, providing public goods, maintaining military and intelligence services, and entering strategic alliances. On the basis of this conception of the state, two sorts of questions have emerged in the environmental security literature. The first, which has received attention primarily in the United States and some European countries, is: Should environmental concerns be integrated into military and intelligence institutions, and, if so, how? The second question, which often focuses on the alleged weaknesses of states in developing countries, asks: How can and should state capacity be built so that environmental security issues can be addressed effectively?

2. The Role of Military and Intelligence Institutions

There are two general ways in which environmental factors and military and intelligence institutions have been linked. The first concerns the ways in which environmental change might threaten national interests and hence become relevant to the conventional mandates of these institutions. The second concerns the ways in which the activities of these institutions affect the environment, and also the ways in which their skills and resources might be used to implement and support environmental policy

2. 1. Environmental threats to national interests

(a) Monitoring and addressing tension, instability and conflict caused, amplified or triggered by environmental factors.

An obvious area for the involvement of the security community is in tracking environmental change that might trigger or exacerbate regional instability and civil or interstate violence. UNEP's first *Global Environmental Outlook* report, released in 1997, makes clear that environmental degradation and scarcity are worsening world-wide, especially

in parts of Asia-Pacific, West Asia, Africa and Latin America. According to researchers such as Thomas Homer-Dixon, the potential for environmentally-escalated institutional failure, ethnic conflict, urban violence and mass migration is high and likely to increase. In these cases the military may be called upon to respond. Understanding the sources of conflict, developing early warning systems, and having appropriate response strategies in hand, could be essential to successful conflict resolution efforts. At the very least, the military may be required to create and maintain peace until satisfactory institutional arrangements are in place. To this end, both the U.S. Department of Defense (DOD) and the CIA are developing early warning systems. Further, numerous conferences have been hosted by the US or under the auspices of NATO to discuss these issues

(b) Protecting access to environmental goods abroad.

One popular interpretation of the Gulf War is that advanced industrial states acted to protect their access to oil in the Middle East. Clearly there were other objectives and rationales shaping the decision to use force, but protecting access to environmental goods outside of one's borders has long been, and is likely to remain, an important aspect of world politics. In many cases technology can be used to develop substitutes for scarce resources; in other cases trade will be a more economical approach. But substitution and trade will not always succeed. In recent years numerous conflicts have taken place over access to fisheries, and some observers believe that competition over access to scarce fresh water resources may increase in the years ahead. Moreover, it is conceivable that states will consider using force to protect goods such as rain forests – which regulate climate, serve as important carbon banks and contain high levels of biodiversity – if diplomatic solutions prove unsuccessful. While historically these areas have been regarded as under the jurisdiction of the states in which they lie, attempts to underscore their importance to the world community have increased in the past decade.

2. 2. Using security assets to advance environmental goals

(a) Greening the military.

Clearly, some of the objectives associated with environmentalism can be advanced by greening military training, testing and war-fighting activities. There is no doubt that in the past the military – especially in the US and former USSR – has been a major polluter. But in the past few years, the US Department of Defense has decreased toxic waste by fifty percent. In co-operation with Sweden, it has developed guidelines for environmental standards. It has worked with Russia and other Arctic nations to reduce radioactive contamination of the Arctic region. The Australia-Canada-U.S. trilateral arrangement is another example of an attempt to address environmental problems co-operatively. Base clean-up has been somewhat less successful, and anecdotal evidence suggests that throughout the world, the military continue to treat the environment in a reckless manner. But there is no doubt that the military in NATO countries have claimed to be cleaning up their activities. The actual gains, however, are difficult to assess, and may be the result of cuts in military budgets rather than changes in military practice.

(b) Using military and intelligence assets to support environmental initiatives.

Especially in NATO countries, intelligence and defence institutions possess highly sophisticated resources that can assist in environmental assessment and monitoring, and in developing green technologies. This issue has received considerable attention in the US in the 1990s. Under the aegis of Vice President Gore, the CIA permitted civilian scientists to examine archive material that might be useful in assessing environmental degradation. The so-called Medea Group concluded that archived satellite imagery was of great scientific value. The National Intelligence Council is exploring ways to make the CIA's data-gathering and analysis capabilities available to environmental consumers, including foreign and non-governmental organisations. The technology is so sophisticated that satellite imagery can be used to diagnose the health of forests as well as monitor deforestation. It can penetrate water well enough to assist in evaluating the condition of fisheries. It already has been used to track and help fight forest fires.

Some observers are highly sceptical of this initiative, on the grounds that the CIA's penchant for secrecy and other responsibilities might taint its public offerings. They advocate the development of commercial satellite systems. But the technological sophistication of intelligence assets may not be achievable in the private sector for some time. Thus the ongoing efforts to build bridges between the CIA and a new generation of consumers remain important.

Similarly, many military establishments possess extensive resources that might be applied to environmental policy initiatives, including technology-driving, environmental restoration, treaty monitoring and, possibly, enforcement. Experiments with recycling technologies and ecosystem restoration by the US military may serve as models for future endeavours. Discussions on using the US military, or NATO, or UN forces to monitor compliance with international environmental law are at a preliminary stage and face a fair amount of opposition.

In developing countries, military organisations often possess more skills and resources than other departments of state. In these cases it would be foolish not to at least consider their potential to assist in supporting environmental policy

(c) Promoting dialogue, building confidence and transferring technology.

Another approach to linking environment and defence establishments is through creating opportunities for dialogue and fostering military-to-military partnerships. Imperfect information is an important source of misunderstanding, sub-optimal policy and tension – dialogue can build trust and help identify shared interests. Unfortunately, many international fora are constrained by the perception that advanced industrial states are seeking to control the international environmental agenda, maintain the status quo, and shift the burden of environmental rescue onto the developing world. Conferences on environmental security may be able to provide a new context for dialogue, perhaps surmounting some of the obstacles evident in other venues. These may have collateral benefits insofar as they create greater awareness of the concerns, incentives and beliefs of other countries.

In the past five years, NATO has hosted four Advanced Research Workshops on environmental themes, bringing together military and civilian specialists from NATO countries, Eastern and Central Europe, and Russia. It has also funded a pilot study on environmental security in an international context through its Committee on the Challenges to

Modern Society. Similarly, the Asia Pacific Centre for Security Studies organised a workshop on environmental security in June 1997 that brought together senior environmental and military officials from 13 countries in the region.

(d) Providing disaster and humanitarian assistance.

While all states are vulnerable to the adverse effects of environmental change, the capacity to respond varies enormously. In particular, states with weak or corrupt governments, economic problems, and/or ethnic tensions may be unable to respond effectively. In these cases, severe environmental change can generate large-scale humanitarian crises. Already, under the auspices of the United Nations, the international community has been called upon to provide emergency relief in many parts of the world. Often, these operations require military assistance, and there are sound reasons for predicting more rather than fewer of these demands in the future. But, as the case of Somalia amply illustrated, various logistical and resourcing problems need to be resolved for this mechanism to become wholly effective.

It is important to note that, in many developing countries, the military is a vital resource that will be called upon to assist in managing disasters and other crises. Because these will often have an important environmental component, environmental awareness may be crucial to success.

It is also important to note that in many countries of the world, military and intelligence institutions have played active roles in domestic affairs that are remembered with a fair amount of hostility. Moreover, many individuals within defence communities are themselves hostile to the idea of using them for non-conventional roles, arguing that this is likely to weaken their war-fighting capability. Finally, these institutions tend to be secretive, resistant to change and expensive. Thus turning to them for assistance will not always be a wise strategy.

3. Strengthening State Capacity

The provision of security – however it is conceived – is widely regarded as a primary responsibility of the state. In fulfilling this role, the state maintains military and intelligence services, and security studies have tended to focus on these institutions because security has often been defined as protecting the state's territorial integrity and political independence from direct, external threats. But as the concept of security is broadened, other aspects of the state require consideration.

Of course, the state always has been mandated to provide security within its borders, where threats include things like crime, corruption, ethnic rivalry and urban-rural tensions. As the work of Homer-Dixon and others suggests, environmental change is frequently related to diffuse civil strife – a problem likely to intensify in the years ahead. To deal with civil strife, the state relies on fair laws and effective law enforcement, its ability to redistribute resources and provide public goods, and a host of conflict management mechanisms. It must also be robust enough to adapt to new challenges. A number of states formed in the latter half of the twentieth century have been hard pressed to provide internal security. They may lack legitimacy or resources, or be plagued by corruption. In situations where environmental degradation is severe, poverty is widespread, corruption is rampant and the state is relatively new and thus lacks legitimacy and expertise, civil violence and conflict are likely to arise.

Clearly there is a need to build state capacity. When states are unable to provide security, they may turn to the international community (or it may elect to intervene), but outsiders will rarely have the motivation, resources and authority to manage internal conflict. Since the end of the Cold War, the UN has undertaken a number of humanitarian missions, a trend that is likely to continue, but the results have been poor. This is largely because entering a situation in which a state has failed or a civil war is raging poses numerous, complex problems. Finding ways to build state capacity so that it can manage internal conflict, adapt to changing circumstances, participate in multilateral initiatives, and contribute to strong regional organisations is therefore highly desirable.

There is, however, very little agreement on what building state capacity entails and how it can best be achieved. Limited resources need to be targeted to those sectors in which they will have the greatest therapeutic effect – but what are they? There is no tried and proven formula to guide the activities of the international community.

In the context of environmental security, training, information sharing, building data bases and providing access to green technologies are clearly important. Finding ways to reduce poverty, improve health care and education, and empower women are also essential. Moreover, it is crucial that all forms of assistance be designed with the full participation of the recipients, to ensure that local exigencies, customs and values are incorporated into solution sets. Beyond these general principles, three areas deserve special attention.

First, building state capacity so that it can manage conflict and provide security must be led from within. There is no single model of a successful state that can be used to guide behaviour. Context is crucial – variables ranging from resource endowments and climate to traditional customs and mores will affect the particular character of the state. External actors can, however, stress the importance of participatory politics, the rule of law, equity and respect for human rights. These are common elements of successful states that are widely acknowledged.

Second, the state apparatus is an important source of prestige, wealth and power – much internal conflict is in fact the result of an attempt to capture the state. Once the state has been captured, its officials are able to use the military, intelligence and police to maintain their privileged position. To avoid this, it is important to build the capacity of civil society as well as that of the state. Citizens must be aware of their rights, able to express their concerns, and free to participate in the formulation of the policies and laws that will affect them.

Finally, while under international law states have sovereign authority within their territories, it is nonetheless the case that they are affected by a multitude of transnational and international forces that they cannot hope to control on their own. Thus, encouraging participation in regional and global organisations, which in large measure exist to manage these forces, is also an important component of effective state building.

4. Conclusion

Within the framework of environmental security, there are a number of roles for military and intelligence organisations. Some of these fit squarely within the conventional mandates of these institutions, while others push them into new areas. In the US and some other NATO countries, efforts have been made to integrate environmental issues into these highly specialised security institutions. This is partly motivated by the desire to protect defence budgets from cuts in the post Cold War era and reform the negative image these

institutions have in the environmental community. But it is also a response to a growing awareness that the requirements of security are changing as technology knits the world together and humankind faces serious transnational, environmental challenges. These efforts ought to be encouraged and promoted in developing countries, but their limitations must also be recognised. There is resistance within defence establishments and many valid concerns about their competence and utility.

As the concept of security broadens, we are reminded that the fundamental guarantor of security in our world is the state. Although non-state actors play important roles that must be recognised and encouraged, building state capacity remains vitally important. How this can best be achieved is a hotly disputed question. In large measure, successful states must be constructed from within. But the international community can help by underscoring the importance of the rule of law, participatory politics, and respect for human rights. It can act to ensure that power is also made available in civil society. And it can stress the importance of regional and global organisations in designing co-operative solutions to common problems and constructing regimes of shared expectations and information that enable trade and other mutually-beneficial forms of interaction.

Chapter V: Critical Perspectives on Environmental Security

1. Introduction

Throughout the environment and security debate, many writers have been critical of linking the two terms. These critics come from both traditional security institutions and from environmental studies backgrounds. In some cases, the arguments against linking environment and security are similar; in other cases, they are quite different.

Researchers and analysts from a traditional security perspective tend to discount the role that environmental degradation or resource depletion play in precipitating violent conflict. They further 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 each of many constituencies. Military critics of tying environment and security together also 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 much of the research undermine the findings that do support a case for linking environment and violent conflict. Critics also fear that propagating the term environmental security could lead to the militarisation of the environment rather than the greening of security. Military institutions, instead of undergoing fundamental change to reflect new security priorities, are more likely to co-opt and weaken the non-statist, non-threat based, co-operative 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 an uniquely Northern and Western term; it is viewed as unacceptable to the South as a paradigm for environmental problems.

For the purposes of this review, criticisms of environmental security will be divided into those focused on the redefinition of security and those focused on the relationship between environmental stress and violent conflict.

2. Criticisms of Redefining Security in Environmental Terms

Critics commonly point out the greater likelihood of the militarisation of the environment than the greening of security as Northern security institutions search for new missions in the post Cold War period.[6] 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 address the new threats to environmental security more effectively. Some observers suspect that security may be redefined to include environmental considerations merely at a rhetorical level (*i.e.* national security strategies) but would fail to produce a simultaneous reorientation or

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

dismantling of security institutions and mindsets (Conca, 1994; Käkönen, 1994; Finger, 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 co-operation for effective redress. The zero sum game or, at the very least, competitive *modus operandi,* associated with military security runs counter to the positive sum, co-operative approach required to effectively address environmental challenges. Environmental threats are rarely characterised by intentionality, whereas premeditation associated with armed attack characterises traditional security threats (Deudney, 1991; Buzan, 1992). The very notion of conceptualising environmental problems as threats to environmental security encourages an us versus them mentality perceived to undermine beneficial solutions (both humans versus nature and humans versus humans) (Deudney, 1990; 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 co-operation and efforts to achieve local sustainability at the sub-national 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; Bruyninckx, 1993; Dokken and Græger, 1995; Wæver, 1995). Instead, linking environment and security merely represents a normative slogan conveying the urgency of addressing global problems in determining the priority of political battles (Levy, 1995a; 1995b).[7] These 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, sometimes termed the first wave of environmental security literature, as undeveloped, a conceptual trick or minimally useful (Levy, 1995; Gleditsch, 1997). 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 which 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 stand-off have abated, emerging military threats demand a traditional definition of security with continued priority support for the military. Nuclear, chemical and biological weapons proliferation, terrorism, and ethnic

[7]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.

conflict remain reasons enough to not dilute the definition of security with peripheral, non-military concerns.

There are also criticisms of environmental security which 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).[8] 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.

By this reasoning, 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 (politically-empowered large landowners in Brazil, for example). Elites 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, 1995). Such perspectives raise barriers to obtaining the co-operation 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.

> 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 co-operation. Today, however, the North has seized hold of environmental issues by using them to cloak its own security concerns. (*S. Saad, 1995: 273.)*

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. 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 (Homer-Dixon, 1994; Bächler, forthcoming 1998). The sources for these global problems tend to emanate disproportionately from the North. Furthermore, as illustrated in the policy section, 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

[8]See Shiva, 1994; Conca, 1994; and Dalby, 1998; for additional elements of the Southern critique.

degradation and depletion, poverty, and the inequitable distribution of wealth.

3. Criticisms of the Environment and Conflict Literature

A prominent subset of environmental security, 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 can be separated for the purposes of this review.[9] Some points of critique have been addressed by the researchers of environmentally-induced conflict, some points are true of less precise causal claims that are detailed here, and some points suggest directions for a constructive research agenda. The lively academic and policy debates surrounding an environmental pathway to conflict in the broader environmental security debates reflects its central role in the broader environmental security debates (Levy, 1995a; ECSP, 1996; Gleditsch, 1997; Kahl, 1997; Deudney and Matthew, 1999).

Daniel Deudney, in an early and influential critique of linking environment and national security issues, cited limited empirical evidence of violent *international* conflict stemming from renewable resource scarcity (1990; 1991).[10] Little evidence was found to support the hypothesis regarding simple scarcity conflict between states with the possible exception of river water.[11] This criticism is perhaps less relevant to questions of the environment's role in sub-national 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. As discussed earlier, the focus in the research has been on renewable, and not non-renewable, resources. There is little dispute that wars have been fought over non-renewable resources such as oil.

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 (1990; 1991).[12] Deudney and others point to a supposed ease with which technological substitutes are developed for depleted natural resources, thereby pushing off scarcities that might contribute to conflict.

Still others claim that complexity and multi-causality are ignored in environmentally-induced conflict research. These critics claim that environmental variables are neither sufficient nor necessary in causing violent conflict and therefore do not represent unique environmental conflicts. Because the type of conflict is not uniquely environmental, it is *de facto* less interesting and an inseparable research topic from more general inquiries on violent conflict. While none of the prominent research efforts make uni-causal claims, critics still find that environmental variables are over-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* of the causal links rather than their validity, some policy analysts from the North conclude that environmentally-induced conflict is of less concern,

[9]See Deudney 1990; 1991; Buzan, 1991; 1992; Finger, 1991; 1994; Dalby, 1992; Conca, 1994; Matthew, 1995; Lonergan, 1996; Lipschutz, 1995; 1997; Levy, 1995a; 1995b; Gleditsch, 1997; Kahl, 1997.
[10]See Dabelko and Dabelko, 1995 for a detailed discussion of Deudney's entire critique.
[11]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.
[12]See also Kahl, 1997; Lipschutz, 1997 and Esty et al., 1995 for an increased focus on the mediating effects of intervening political institutions.

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 travels, 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 provide significant evidence regarding the specific cases but necessarily provide limited external validity for other cases.[13]

Another puzzling factor in trying to link environment and security is the number of cases where co-operation, not conflict, was the outcome of a dispute or and 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; Levy, 1995a; 1995b; Gleditsch, 1997). It is suggested that 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 of environment and security scholarship (Levy, 1995a, 1995b; Gleditsch, 1997).[14]

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

[14] Levy's third wave critique includes significantly more than these few points and has provoked a number of responses. See *International Security* 20:3, 1995/1996, and *Environmental Change and Security Project Report #2*, Spring 1996.

Chapter VI: Environment, Human Security and Sustainable Development

1. Introduction

During the past decade, much research has focused on environmental change as a cause or amplifier of social conflict, and much attention has been given to integrating environmental concerns into conventional security policy. The concerns of this approach are easily specified and include:

- How does the state protect access to environmental goods beyond its borders?
- How does it protect itself from negative externalities--such as transboundary air pollution or sudden population flows?
- Does environmental change generate social instability, conflict and violence? If so, how can state officials predict where and when environmental change will create a situation in which they may have to use force?
- Do national military establishments contribute to environmental change, and if so, can they be "greened"?
- Can security assets, such as spy satellites, be used to address environmental problems?

The strengths and weaknesses of thinking about the linkages between environment and security in these precise, state-centered terms have been discussed in an earlier chapter.

During this same period, a very different perspective—the ecological world view—has also gained clarity and become influential in many parts of the world. It contends that humans are recklessly transforming and destroying nature on a grand scale. Its frontline objective is to secure the environment from the unprecedented threats posed by uncontrolled human activity. By "following nature," that is, by adapting ourselves to natural patterns, rhythms and thresholds, many of its proponents suggest, we will not only cease those activities that are destroying our life support system, but we may also recover some of the rich purpose of life that has been lost in our consumer societies--spirituality, beauty, truth and simplicity

The concept of deep ecology--which undergirds the ecological view--has inspired diverse thought and behaviour. One of its most eloquent and influential proponents, Fritjof Capra, a theoretical physicist, argues that the ecological view represents a new paradigm for scientific and social science, and ultimately for policy making:

> The paradigm that is now receding... consists of a number of entrenched ideas and values, among them the view of the universe as a mechanical system..., the view of the human body as a machine, the view of life in society as a competitive struggle for existence, the belief in unlimited material progress....

The new paradigm may be called a holistic worldview, seeing the world as an integrated whole rather than a dissociated collection of parts. (1996: 6)

According to this perspective, the whole is greater than its parts, and must be at the centre of analytical and normative thinking and policy making. This is in many ways an attractive image—we exist as part of a great web of life, and only an integrative, holistic, non-linear mindset can appreciate this. Using social constructions such as the state system, which

exists within the web of life, as the basis for analysis and action, is highly problematic insofar as such perspectives are incomplete and can thus be misleading.

These familiar conceptions are not, however, without a certain political utility. Centering human needs, aspirations and fears in the state enables the reduction of the rest of the web of life to the status of inputs and mechanical processes. Regarding everything in terms of its utility to the state creates a rationale for the transformation, exploitation and domination of other aspects of the web that are scarcely acknowledged let alone understood. And these, deep ecologists contend, are the real characteristics of human history, especially in recent centuries. They are manifest in our relations with river basins, wolf populations, and forest ecosystems. They are evident in cultural depictions of women, linked to nature, presented as inferior, caricatured as reproductive units. They are seen in the relations between the rich countries of the North and the poorer countries of the South. They are, at bottom, dangerous traits based on false notions and they have propelled us into an age of crisis in which everything from spirituality to ecosystem integrity has been severely damaged.

Of course not everyone agrees that human-generated environmental change is pervasive and serious, and that responding to it requires a fundamental transformation in our world view. People disagree on the extent and significance of human generated environmental change, the sorts of challenges it poses, the trajectory it is on, and the response that is desirable and sufficient. However, insofar as the relationships between environment and security are concerned, one need not limit one's focus to the particular interests of sovereign states or extend it to encompass the welfare of the planet's whole complex web of life. **The concept of "human security" offers a third perspective that allows us to move beyond conventional security thinking, appreciate both the local and global dimensions of the many insecurities experienced by real individuals and groups, and identify useful ways of linking security and development policies.**

2. Environmental Change and Human Security

It is a great irony that many of the challenges we face today are the unintended consequences of our efforts to enhance the security and welfare of humankind. Unfortunately, our efforts have involved:

(a) extracting resources (such as fish, fresh water and timber) faster than they can be replenished;

(b) loading toxic and other waste materials into our land, water and air faster than they can be broken down and neutralised; and

(c) drastically modifying large ecosystems (from rain forests to coral reefs) such that they can no longer support many species or effectively provide important environmental services such as climate control.

As a result, throughout the world humankind is experiencing scarcity (especially of food and water), microbial invasion, loss of option values, and excessive exposure to toxic substances and particulates. It is not, however, experiencing these things in a uniform manner. The careful manipulation of economic, political and cultural systems allows some individuals and groups to direct many of the adverse consequences of environmental change toward weaker entities or future generations.

The concept of human security helps understand the complex interactions that

determine the relative distribution of security and insecurity. Specifically, at the level of individuals and groups (from small communities to humankind), security and insecurity are largely a function of five interactive systems as follows:

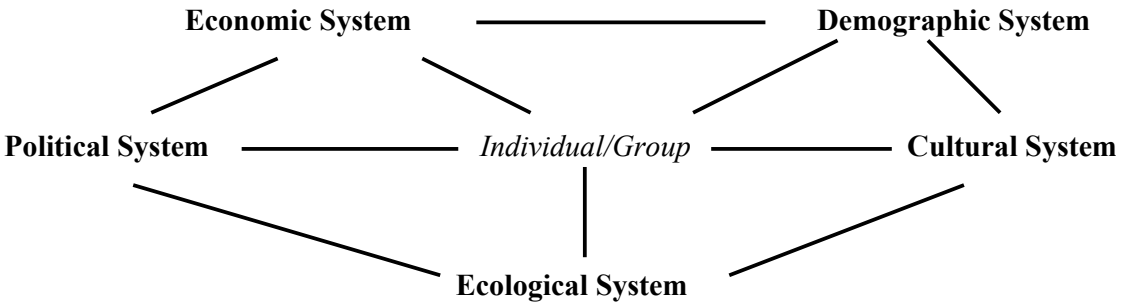
Table 3. Elements of Human Security

System	Security-Promoting Mechanisms	Insecurity-Promoting Mechanisms
Economic	Wealth Welfare Policies	Poverty Inequity
Political	Law Legitimate Force	Corruption Unlawful use of Force
Cultural	Social Identity Justice	Discrimination Injustice
Demographic	Low Birth rate Urbanisation	High Birth Rate Rapid Population Flows
Ecological	Life Support Raw Materials	Scarcity Disease

Thus, rather than consider security primarily in terms of military balances and the costs and benefits of using force to further national interests, the human security approach situates force in a comprehensive framework of tools, processes and systems. Under certain conditions, such as war, the distribution and composition of force may be the most important determinant of security and insecurity. But in many other situations, security and insecurity will be most closely related to poverty or resource scarcity or social discrimination. In these cases, traditional security institutions may have only a minor contribution to make, or none at all.

A second vital feature of the human security perspective is that it calls attention to the dynamic and interactive character of the five security-relevant systems. They are dynamic in large measure due to the human propensity for technological and ideational innovation. However, the natural--and imperfectly understood--dynamism of ecological systems is also of great importance in shaping outcomes. In all cases, the dynamic nature of these systems means that they can be security-promoting at one point or in one context, and insecurity-promoting in another. Moreover, the five systems are interactive in numerous complex ways. Indeed, the interactions between these systems have given rise to entire fields of enquiry such as political economy, cultural politics and political ecology, and the importance of this interactivity is noted in the increasing prominence of interdisciplinary studies (see, for example, Wilson 1998). Finally, micro-level decisions of individuals and groups affect the character of these systems even as they are being shaped and constrained by them (see *Figure*). Thus, for example, recent economic crises throughout Asia Pacific have been related to the decisions of individual investors themselves responding to the incentives and disincentives of the global economy. This is precisely the type of complex process--and adverse outcome--that human security thinking seeks to analyse and, ultimately, alleviate or prevent.

Figure 5. Human Security Network



From a human security perspective, then, environmental change is important in two ways. First, it can itself be a source of insecurity. Even if the state does not register a given form of environmental change as a threat to its core values or national interests, fragments of its citizenry may feel otherwise. On the other hand, if the state does appreciate the security relevance of environmental change, it may still be constrained in terms of its response insofar as the problem has diacritical transnational dimensions. Second, modes of environmental change can exacerbate other real or potential forms of insecurity such as poverty or discrimination or terrorism (for example, see Homer-Dixon 1996).

Insofar as these two general claims are valid, it is crucial that analysts and policy makers consider security/insecurity from the comprehensive vantage provided by the analytical framework of human security. This will foster a better understanding of causal relationships, which are almost always network-based. Better understanding will in turn help reduce the likelihood of recommending or implementing bad policies. For example, an attempt to reduce insecurity by alleviating poverty may fail if it involves increasing environmental degradation or scarcity, creating a situation in which short-term gains are almost certain to be undermined by medium or long-term losses. There is indeed much truth to the environmentalist dictum, "everything is connected to everything."

The human security perspective can also help in clarifying the points in a network of complex relationships at which the application of scarce resources might have the greatest impact. For example, distributing scarce resources to reduce insecurity by funding both efficiency programs and clean up activities may spread resources too thinly to be optimally effective. Concentrating on one or the other might generate more desirable outcomes. Or perhaps investment in another sector altogether, such as education, would be a better strategy. To make these sort of policy investment decisions requires a clear sense of the "big picture" of the sources of human security/insecurity.

Fortunately, while grappling with complicated issues and processes, the concept of human security is itself quite simple. In today's world individuals and groups are rendered more or less insecure by the impact upon them of five interactive and dynamic systems. Contemporary technologies have deepened considerably the transnational character of these systems. Previous theories of world politics, which explored the problem of security in the

context of two settings--domestic and international, or internal and external--and which sought to reduce insecurity primarily by enhancements to state authority and capacity (and especially by building military capability), remain important but fail to capture significant aspects of current threats to security. One of these aspects has to do with the complex, interactive and transnational nature of imperilled ecosystems. This source of insecurity may be especially relevant to parts of the developing world where population growth, economic development, regional tensions, and weak enforcement of environmental law have placed enormous stress on ecosystems, creating a situation that could generate high levels of insecurity in the years ahead.

3. Human Security and Sustainable Development

The concept of "human security" offers a comprehensive, integrative framework for analysing the various insecurities faced by people throughout the world. It shows how interactive systems can either generate insecurities, neutralise each other, or enhance security. It is not surprising that from a human security perspective, economic development that reduces poverty will tend to be regarded as a highly desirable strategy because poverty clearly interacts with other systems—such as ecological systems—to render people highly insecure. But, as noted in the Introduction to this study, it would be misleading to see human security and sustainable development as synonymous, although in practice the concerns of both concepts may often intersect. Development implies a gradual improvement in human welfare and the expansion of the opportunities individuals have to live safe, healthy, and dignified lives. Security suggests freedom from danger. At times, this may mean freedom from the things that threaten the process of development or the fruits of development. But security also has a conservative aspect: the development process can become a threat to security insofar as it inadvertently—or intentionally--subverts existing security mechanisms by redistributing power in a society or region.

In this sense, the OECD report entitled *Military Expenditure in Developing Countries: Security and Development* is accurate in claiming, first, that "security is necessary for development" and, second, that "the root causes of insecurity are often developmental." (1997:3, 8) It is difficult to promote development under conditions of violence and insecurity. Today, for example, private capital flows into developing countries are five times as great as ODA, and they have thus become crucial to the development process. But private capital tends to shy away from regions of instability. At the same time, development can undermine traditional conflict management mechanisms and create new forms of insecurity.

In one sense, then, human security and sustainable development suggest a similar end: a condition in which individuals and communities have fair and reasonable access to those things they require to exist and flourish; in which disputes are resolved fairly; and in which the environment is protected from destructive human behaviour. But the terms also describe processes which, as they head toward their shared endpoint, can reinforce or undermine each other. Under these circumstances, it is crucial that the institutions that provide security are able to adapt to and accommodate change rather than impede it. And it is equally crucial that the process of development does not ride roughshod over security institutions and conflict management mechanisms, redistributing power in ways that are likely to generate intense conflict and violence. For while, in the grand scheme of things, conflict and violence may be described as adaptation mechanisms, in a world of highly destructive technologies these adaptive strategies must be used with extreme caution.

To co-ordinate human security and sustainable development, and move toward the endpoint they share, will require the sensitivity and co-operation that come from mutual respect and permanent dialogue. For example, it would be a tragedy if development efforts that made perfect sense at the local level undermined carefully negotiated regional security arrangements or vice versa. Thus, if the recommendations of this report could be reduced to a single overarching principle, it might be this: in defining its development strategies, DAC and the OECD should include an assessment of their multiple security implications. The baseline for this endeavour ought to be human security – the individual's freedom from those threats to his or her welfare and dignity that can be neutralised or mitigated. But individuals exist in communities that are themselves nested in complex structures – both social and ecological – organised at sub-national, national, regional and global levels. Each of these defines security and development in certain ways that can be co-operative or conflictual. Managing this complex state of affairs should be the shared endeavour of the security and development communities.

This way of thinking is consistent with the current position of the UNDP which, in a 1994 report, described security as an "integrative" rather than merely a "defensive" concept. The UNDP definition of human security includes seven categories of threats:

1) Economic security (assured basic income)
2) Food security (physical and economic access to food)
3) Health security
4) Environmental security (access to sanitary water supply, clean air and a non-degraded land system)
5) Personal security (security from physical violence and threats)
6) Community security (security from ethnic cleansing)
7) Political security (protection of basic human rights and freedoms)

The UNDP agrees 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."

The appeal of the term "human security" is that it recognises the inter-linkages of environment and society, while acknowledging that our perceptions of the environment, and the way we use the environment, are historically, socially and politically constructed. It makes sense, then, that such a concept should be incorporated into the current dialogue on the nature of development, and into existing development policies and programs. How can this be achieved? This report is one step in that direction. A complementary strategy currently being developed attempts to construct an index of human insecurity , or an index of vulnerability, that will assist in identifying countries that are "insecure" and provide an early warning of whether a country or region is becoming less secure.[15]

Perhaps the most important point to emphasise is that human security offers an unprecedented opportunity to link security policy and development policy because it has a broad, receptive and evolving understanding of the sources of insecurity, the nature of

[15] This is expanded upon in Appendix V.

contemporary threat and vulnerability, and the ways in which these can best be mitigated. Sustainable development will not always be the preferred strategy of security specialists, but it will always make sense as an integral part of the repertoire of strategies employed to maximise security at the individual and group level over the long-term. For this to succeed, however, the development community must become receptive to the language of human security and more conscious of its concerns and the extent to which they are shared.

It is clear that the OECD is interested in the ways in which ODA can contribute to enhancing human security. In various documents[16] produced over the past two years, the OECD has articulated a new paradigm for development that integrates economic well-being, social stability and environmental sustainability, and it has expressed a special interest in applying its skills and resources to conflict analysis and management as essential components of the development process. But as the following chapter suggests, while ODA agencies are not opposed to linking development and human security through the environment, little effort has been made to think this project through.

[16] These include:

-*Shaping the 21st Century: The Contribution of Development Co-operation* (May 1996)

-*DAC Guidelines on Conflict, Peace and Development Co-operation* (1997)

-*Military Expenditure in Developing Countries: Security and Development* (March 1997)

-*Guiding the Transition to Sustainable Development: A Critical Role for the OECD* (November 1997)

-*OECD Work on Sustainable Development: a discussion paper on work to be undertaken over the period 1998-2001* (July 1998)

BOX 3. CLIMATE CHANGE 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 – climate change.

Climate change may have significant implications for resource availability, agricultural productivity, the creation of environmental refugees, coastal flooding, and economic output. Reduced economic output, coupled with greater disparities in levels of economic achievement – both of which could be exacerbated by climate change – was one of the types of environmentally induced conflict outlined previously in this report.

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 change 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 which may cause major social disruption. Most concerned will be those regions which 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, but 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 related problems of environmental refugees referred to above. 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 climate change 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 which 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 climate change, could be devastating to such groups. The impacts of climate change – biophysical, socio-economic, and political – as well as the response strategies that are now being discussed, must be considered against the background of the poverty/environment relationship.

BOX 4 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 that 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 they 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, which led to the introduction of diseases, 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. Like 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, leading to resource depletion, environmental contamination, and the threats posed by climate change. 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 – a tyranny of size and location.

Chapter VII: Conclusions

It is worth noting some general conclusions, based on the literature reviewed and on discussions with researchers and policy makers.

1. The causes of conflict and insecurity are multiple, complex, and well integrated. Therefore, it is extremely difficult to isolate the role of environmental degradation and resource depletion as contributors to, or causes of, conflict and insecurity. Evidence suggests that the environment plays a relatively minor role as a *direct* cause of violent conflict. However, some evidence also indicates that environmental variables may make an indirect, *underlying* contribution to conflict through their negative impact on other factors that may more directly cause violent conflict. It is increasingly apparent that environmental degradation and resource depletion play an important role in creating or exacerbating human insecurities. This environmental contribution appears especially relevant as the terms of reference shift from the national level down to the community level or up to the international level.
2. Undertaking research on the role that environmental degradation plays in contributing to insecurity also assists in clarifying what other factors may be important contributors to insecurity and conflict. For example, research on environment and security often strengthens the conclusion that poverty is a key factor in causing tension, unrest and, eventually, conflict.
3. The most severe challenges for individual well-being in many parts of the world may well not be external (to the country of residence), but internal, although internal problems are likely to be affected in some way by external forces.
4. Environmental degradation and resource depletion provide opportunities for co-operation. For example, the transboundary nature of these issues forces states to co-operate to resolve environmental problems, and may act as a deterrent against violent conflict.
5. The research on environment and security, while limited, has brought attention to the growing salience of non-conventional security threats. It has also stimulated discussion on issues of environment and *human* security. It appears that this latter discussion may provide a useful framework within which to address development issues, particularly since it recognises that environmental problems must be analysed from a broad perspective that encompasses economic, political, cultural and demographic systems. It thus emphasises the extent to which understanding context is crucial to successful development and security strategies. General models can help orient thinking, but carefully researched case studies prepared by or in collaboration with local stakeholders are of vital importance.
6. In short, linking environmental change to a broad concept of security is a useful and insightful approach to many contemporary problems. It is an approach relevant to the activities of the DAC and OECD, and further work aimed at identifying environment and security guidelines for development assistance agencies would likely be productive for many reasons. In particular, awareness of this linkage could be instrumental in designing development assistance that contributes to security at different levels of social organisation, or that, at least, does not contribute to violent conflict and instability. Development assistance that

simultaneously helped to alleviate poverty, enhance the quality of life, and reduce insecurity could be defended to a much broader community than is currently the case.

7. Finally, further work on this approach and its utility for the community of development assistance agencies ought to be undertaken in close collaboration with experts from developing and transition economies. To date, the lion's share of research and policy activity has been undertaken in the developed world; the insights, sensibilities and knowledge of those outside this region are critical for fully appreciating this set of linkages and integrating this understanding into strategic and operational activities.

Appendix I:
Terms of Reference

Appendix II:
Non-Governmental Activities in Environment and Security

Cambridge University, The Cambridge Global Security Programme

Botolph House, 17 Botolph Lane, Cambridge, CB2 3RE, United Kingdom

Phone: +41 (1223) 33-45-09 Fax: +41 (1223) 33-50-65

The Global Security Program integrates the disciplines of international relations, development studies and environmental studies in activities relating to teaching, research, and policy development, and includes under its auspices an independent project entitled the Global Security Communications Initiative.

Contact: Gwyn Prins, Director

The Canadian Global Change Program

225 Metcalfe Street, Suite 308, Ottawa, ON, K2P 1P9, Canada

Phone: +1 (613) 991-5640 Fax: +1 (613) 991-6996 email: cgp@rsc.ca

The CGCP Research Panel on Environment and Security has evaluated (1) the current state of knowledge in the research area, (2) the current state of, and future plans for, Canadian research, and has also made recommendations for further Canadian research.

Contact: Jeffrey Watson, Executive Director

Web address: http://www.cgcp.rsc.ca

The Center For Security Policy

Suite 350-1250 24th Street, NW, Washington, DC 20037, USA

Phone: +1 (202) 466-0515 Fax: +1 (202) 466-0518

The Center for Security Policy disseminates analyses and policy recommendations to the national and international debates on security policy, with emphasis on the strategic and environmental implications of energy.

Centre for Security Studies and Conflict Research, Swiss Federal Institute of Technology

Swiss Federal Institute of Technology, ETH Zentrum SEI, 8092 Zurich, Switzerland

Tel.: +41 (1) 632 40 25 Fax: +41 (1) 632 19 41 email: postmaster@sipo.reok.ethz.ch

Ongoing research projects on environmental degradation and military conflicts, with case studies in south Asia, Africa and the Middle East. Just completing a major project entitled Environment and Conflicts Project (ENCOP).

Contact: Prof. Kurt Spillmann, Director

Web address: http://www.fsk.ethz.ch/

The Climate Institute

333 ½ Pennsylvania Ave. SE, Washington, DC 20002, USA

Phone: +1 (202) 547-0104 Fax: +1 (202) 547-0111 email: climateinst@igc.apc.org

The Climate Institute has an ongoing Environmental Refugees Program to assess and respond to displacement caused by land degradation, drought, desertification, deforestation and other environmental problems, and will in future work toward national and international consensus on response strategies.

Contact: Christopher Dabi

Web address: http://www.climate.org

Consortium For International Earth Science Information Network

CIESIN User Services, 2250 Pierce Road, University Center, Michigan 48710, USA

Phone: +1 (517) 797-2727 Fax: +1 (517) 797-2622 email: info@ceisin.org

A consortium of universities and research institutes focusing on human dimensions of global change and sustainable development.

Contact: Thomas Parris, CIESIN, 1747 Pennsylvania Ave. NW, Suite 200, Washington D.C., 20006, USA

Web address: http://www.ceisin.org

Ecologic – Centre For International And European Environmental Research

Haus der Demokratie, Friedrichstrasse 165, 10117 Berlin, Germany

Phone: +49 (30) 2265-1135 Fax: +49 (30) 2265-1136 email: office@ecologic.de

Ecologic is engaged in applied research and policy consultancy, with the goal of analysing and advancing environmental policy in Europe.

Contact: R. Andreas Kraemer, Director (Kraemer@Ecologic.de) or Alexander Carius, Director (Carius@Ecologic.de)

Web address: http://www.snafu.de/~rak/

Environment and Conflicts Project, Center for Security Policy and Conflict Research at the Swiss Federal Institute of Technology and the Swiss Peace Foundation

Center for Security Policy and Conflict Research: ETH-Zentrum SEI, 8092 Zurich, Switzerland

Phone: +41 (1) 632 40 25 or 40 20 Fax: +41 (1) 632 19 41 email: encop@sipo.reok.ethz.ch

Swiss Peace Foundation: Wasserwerkgasse 7, P.O. Box 3011 Bern, Switzerland

Phone: +41 (31) 311 55 82 Fax: +41 (31) 311 55 83

Completed in 1996, the Environment and Conflicts Project investigated the causal relationships between human-made environmental transformation and actual or possible violent conflicts. A follow-up project - Environmental change, Consensus Building and

Resource Management - aims to investigate practical approaches to the prevention and resolution of conflicts arising from environmental degradation.

Contacts:

1) Kurt R. Spillman, Director, Center for Security Policy and Conflict Resolution

2) Günther Bächler, Executive Director, Swiss Peace Foundation (chfried@dial.eunet.ch)

Web address: http://www.fsk.ethz.ch/encop/

Environmental Change and Security Project

Woodrow Wilson International Center For Scholars, 1 Woodrow Wilson Plaza, 1300 Pennsylvania Ave. NW, Washington D.C., 20004-3027, USA

Phone: +1 (202) 691-4130 Fax: +1 (202) 691-4184 email: ecsp@erols.com

Since its inception in 1994, the Project has served as an information clearinghouse on the views, activities and policy initiatives falling under the rubric of "environment, population and security." The ECSP acts as a neutral, non-partisan forum for researchers, practitioners and interested individuals to meet, exchange ideas and concerns, and develop cross-disciplinary dialogue.

Contact: Geoffrey D. Dabelko, Director (gdabelko@erols.com)

Web address: http://ecsp.si.edu/default.htm

Environmental Policy and Society (EPOS)

EPOS, The Tema Institute, Linköping University, 581 83 Linköping, Sweden

Phone: +46 13 28 2510 Fax: +46 13 28 4415 email: tiigr@tema.liu.se

One program in EPOS focuses on environmental security, particularly in Angola and Namibia.

Contact: Prof. Anders Hjort af Ornäs, Programme Director

Web address: http://www.tema.liu.se/epos/

The Fridtjof Nansen Institute

Fridtjof Nansens vei 17, Postboks 236, N-1324, Lysaker, Norway

Phone: +41 67 11 1900 Fax: +47 67 11 1910 email: sentralbord@fni.no

The Fridtjof Nansen Institute conducts applied social science research on international issues of energy, resource management, and the environment.

Contact: Kaare Willoch, Director (kaare.willoch@fni.no)

Web address: http://www.fni.no

The Global Environmental Change and Human Security Project

Department of Geography, University of Victoria, P.O. Box 3050, Victoria, British Columbia, V8W 3P5, Canada

Phone: +1 (250) 472-4337 Fax: +1 (250) 472-4830 email: info@gechs.org

The objectives of the Global Environmental Change And Human Security Project are (1) to promote research activities in the area of global environmental change and human security, (2) to encourage the collaboration of scholars internationally, and (3) to facilitate improved communication and co-operation between the policy community/user groups and the research community.

Contact: Steve Lonergan, Chair (lonergan@uvic.ca)

Web address: http://www.gehcs.org

Global Green USA Legacy Program

1025 Vermont Ave. NW, Suite 300, Washington D.C., 20005-6303, USA

Phone: +1 (202) 879-3181/3184 Fax: +1 (202) 879-3182 email: ggusa@globalgreen.org

The Legacy Project facilitates co-operation among the military, environment, citizens, business, and scientific and government communities in order to "accelerate the clean-up of the environmental legacy of the Cold War".

Contact: Paul Walker, Legacy Program Director

Web address: http://www.globalgreen.org

Groupe de recherche et d'information sur la paix et la sécurité (GRIP)

33, rue Van Hoorde, B-1030 Brussels, Belgium

Phone: +32 (2) 241 84 20 Fax: +32 (2) 245 19 33 email: admi@grip.org

GRIP has a major research project on environment and security, with three goals: (1) to clarify the links between global ecological change and past, present and future conflict situations; (2) to explain the negative impact of military activities on the environment; and (3) to propose remedies and strategies for the future.

Contact: Bernard Adam, Director (bernard.adam@grip.org)

Web address: http://www.grip.org

Harvard Center for Population and Development Studies

9 Bow Street, Cambridge, MA 02138, USA

Phone: +1 (617) 495-3002 Fax: +1 (617) 495-5418 email: cpds@hsph.harvard.edu

Through various programs, the centre promotes discussion about the nature of security, and human dimensions of security. Research initiatives include ethics and international policy, human survival crises during complex humanitarian emergencies, and population and security.

Contact: Winifred M. Fitzgerald, Executive Director

Web address: http://www.hsph.harvard.edu/hcpds

Institute of War and Peace Studies, Columbia University, Environment and Security Project

13th Floor, International Affairs Building, 420 West 118th Street, New York, NY 10027, USA

Phone: +1 (212) 854-4616 Fax: +1 (212) 864-1686

The Institute Of War And Peace Studies studies military and non-military aspects of international relations, in particular the relationship between environmental degradation, resource scarcity and violent conflict in the developing world.

Contact: Professor Richard K. Betts, Director

Web address: http://www.columbia.edu/cu/iwps/

Instituto Venezolano de Estudios Sociales y Políticos (INVESP)

INVESP, Av. Gil Fortoul, Qta. Marielvi, Santa Mónica, Apartado Postal 80948, zona 1080, Caracas, Venezuela

Phone: +58 2 662-1655 Fax: +58 2 661-5195 email: invesp@compuserve.com

INVESP has a multidisciplinary research project entitled: "Caribbean Environment: Threats and Regional Co-operation." The project involves a number of other Caribbean countries and focuses on the issue of environmental security in the region.

Contact: Francine Jacome, Director or Andrés Serbin, President

International Clearinghouse On the Military and the Environment

P.O. Box 150753, Brooklyn, NY 11215, USA

Phone: +1 (718) 788-6071

Collects and disseminates data on the relationship between the military and the environment, and the effects of war on the environment.

Contact: John M. Miller, Co-ordinator

International Consortium for the Study of Environmental Security (ICSE) and the Groupe d'Études et de Recherches sur les Politiques Environmentales (GERPE), Université Laval

Jean-Durand Building, Université Laval, Québec, Québec, G1K 7P4, Canada

Phone: +1 (418) 656-2316 Fax: +1 (418) 656-7908

The ICSE is a network of academic and non-academic institutions involved in studying the concept of environmental security. Their activities include an annual general conference, local workshops and publication of a newsletter.

The International Institute for Environmental Strategies and Security, Université Laval

Faculty of the Social Sciences, Edifice Jean-Durand, Université Laval, Québec, Québec, G1K 7P4, Canada

Phone: +1 (418) 656-2316 Fax: +1 (418) 656-7908

Examines the interplay between culture, economy, society and the environment in terms of environmental insecurity and human perceptions of insecurity, and initiates research in environment and security.

Contact: Dr. Paul Painchaud, IIESS, International Secretariat of the GERPE (paul.painchaud@pol.ulaval.ca)

International Institute for Sustainable Development

6th Floor, 161 Portage Avenue East, Winnipeg, Manitoba, R3B 0Y4, Canada

Phone: +1 (204) 958-7700 Fax: +1 (204) 958-7710 email: info@iisd.ca

Seeks to integrate sustainable development into Canadian and international policy decision-making, following themes of environment and development integration and security.

Web address: http:// iisd.ca

International Peace Research Institute

Fuglehauggata 11, 0260 Oslo, Norway

Phone: +47 22 54 77 00 Fax: +47 22 54 77 01 email: info@prio.no

PRIO has a major emphasis on environmental security and has sponsored a number of workshops in this area. PRIO has made significant theoretical contributions to the concept of security, in addition to investigating the specific linkages between environment, poverty, conflict and migration. Also very active in publishing reports on environmental security and environment and conflict.

Contact: Nils Petter Gleditsch, Editor, *Journal of Peace Research* (npg@prio.no)

Web address: http://www.prio.no

IUCN: The World Conservation Union

28 rue Mauverney, 1196 Gland, Switzerland

Phone: +41 22 999 00 01 Fax: +41 22 999 00 02 email: info@iucn.org

Promotes effective global governance and the equitable and ecologically sustainable use of natural resources, through contributions to multilateral agreements such as CITES and the Biodiversity Convention. The IUCN World Conservation Congress held in Montreal in 1996 included meetings which focussed on water scarcity, population and environment, and environment and security.

Contact: Maritta Koch-Weser, Director General

Web address: http://iucn.org

Natural Resources Defense Council

40 West 20th St., New York, NY 10011, USA

Phone: +1 (212) 727-2700 email: nrdcinfo@nrdc.org

Non-profit organisation with a membership composed of attorneys, scientists and specialists. Has undertaken research, analysis and advocacy related to nuclear weapons production and dismantlement, nuclear materials and proliferation, and nuclear energy.

Web address: http://www.nrdc.org

The Nautilus Institute for Security and Sustainable Development

1801 2nd Street, Berkeley, CA 94710, USA

Phone: +1 (510) 204-9296 Fax: +1 (510) 204-9298 email: nautilus@nautilus.org

The Nautilus Institute promotes international co-operation for security and ecologically sustainable development, with a focus on the Asia-Pacific region.

Contact: Peter Hayes, Ph.D., Co-Executive Director; Director, Peace and Security Projects (phayes@nautilus.org)

Web address: www.nautilus.org

Pacific Institute for Studies in Development, Environment, and Security

654 13th Street, Preservation Park, Oakland, CA, 94612, USA

Phone: +1 (510) 251-1600 Fax: +1 (510) 251-2203 email: pistaff@pacinst.org

An independent, non-profit that conducts research and policy analysis in the areas of environmental degradation, sustainable development and international security, focusing on freshwater resources, forestry and resource management.

Contact: Peter H. Gleick, President (pgleick@pipeline.com)

Web address: http://www.pacinst.org

Pacific Northwest National Laboratory, The Center for Environmental Security

Suite 900-901 D Street, SW, Washington, DC 20024-2115, USA

Phone: +1 (202) 646-7782 Fax: +1 (202) 646-7821

Provides a venue to debate and evaluate environmental issues that impact national security in order to (1) address underlying motivations for weapons acquisition, and (2) develop methods of regional tension-reduction and confidence-building.

Contact:

1) Brian R. Shaw, Manager, Center for environmental Security, National Security Division, Pacific Northwest National Laboratory
2) James L. Fuller, Non-proliferation Programs, Pacific Northwest National Laboratory. Phone: +1 (509)376-4065 Fax: +1 (509) 373-0716

Population Reference Bureau

1875 Connecticut Ave. NW, Suite 520, Washington D.C., 20009-5728, USA

Phone: +1 (202) 483-1100 Fax: +1 (202) 328-3937 email: popref@prb.org

Provides information about U.S. and international population trends, and examines various relationships, such as that between population, environment and security.

Contact: Alene Gelbard, Director, International Programs

Web address: http://www.igc.org/prb/

Stanford University Global Environmental Forum, Institute for International Studies

Room 200, Encina Hall, Stanford, CA 94305-6055, USA

Phone: +1 (415) 725-9888 Fax: +1 (415) 725-2592

An integrated teaching and research program to aid in the discovery and dissemination of knowledge related to issues such as population growth, human health and nutrition, climate change, toxic wastes, and loss of biodiversity.

Contact: Donald Kennedy or Stephen Schneider, Co-Directors

Stockholm International Peace Research Institute

Signalistgatan 9, S-169 70 Solna, Sweden

Phone: +46 8 655 97 00 Fax: +46 8 655 97 33 email: sipri@sipri.se

Pursues research on various defence and disarmament issues, including the links between environment and security.

Web address: http://www.sipri.se

Tampere Peace Research Institute

TAPRI, University of Tampere, Åkerlundinkatu 3, 4th floor, P.O. Box 607, FIN-33101, Tampere, Finland

Phone: +358 (0)3 215 7696 Fax: +358 (0)3 223 6620

Contributed, via conferences and published research, theoretical as well as case studies on the environment and security nexus, with a focus on environment, security and conflict in Europe and the Mediterranean.

Contact: Tuomo Melasuo, Research Director (yttume@uta.fi)

http://www.uta.fi/laitokset/tapri/

University of Toronto, Peace and Conflict Studies Program

Peace and Conflict Studies, University College, University of Toronto, 15 King's College Circle, Toronto, Ontario, M5S 3H7, Canada

Phone: +1 (416) 978-8148 Fax: +1 (416) 978-8416 email: pcs.programme@utoronto.ca

An interdisciplinary teaching and research program at University College. The Program has been involved in two major studies with the American Academy of Arts and Sciences. The first focused on environmental change and acute conflict, and the second (ongoing) is entitled "Environmental Scarcities, State Capacity and Civil Violence." Co-directors of both of these projects are Thomas Homer-Dixon (U of T) and Jeffery Boutwell (at the American Academy).

Contact: Dr. Thomas Homer-Dixon, Program Director

Web address: http://www.library.utoronto.ca/pcs/pcs.htm

Uppsala University, Department of Peace and Conflict Research

Department of Peace and Conflict Research, Box 514, 751 20 Uppsala, Sweden

Phone: +46 (0)18 471 25 00 Fax: +46 (0)18 69 51 02 email: info@pcr.uu.se

Primary attention has been given to three issues: (1) natural resource management when interests conflict; (2) environmental co-operation for confidence building; (3) environmental securities globally.

Contact: Prof. Peter Wallentseen, Head of Department (Peter.Wallensteen@pcr.uu.se)

Web address: http://www.pcr.uu.se/index.html

Worldwatch Institute

1776 Massachusetts Ave. NW, Washington D.C., 20036-1904, USA

Phone: +1 (202) 452-1999 Fax: +1 (202) 296-7365 email: worldwatch@worldwatch.org

Has, and continues to, analyse and publish information on the effects of food scarcity on global and regional political stability, on security issues and the environment, and on redefining security in the context of global environmental and social issues.

Web address: http://www.worldwatch.org/index.html

York Centre for International and Security Studies.

3rd floor York Lanes, York University, 4700 Keele Street, North York, Ontario, M3J 1P3, Canada

Phone: +1 (416) 736-5156 Fax: +1 (416) 736-5752

Recently initiated a program on global change and environmental security. Focus is on broader security issues in the Asia-Pacific region.

Contact: Dr. David Dewitt, Director

Web address: http://www.yorku.ca/research/ciss/

Appendix III
Identifying an Index of Human Insecurity

Famine Early Warning System (FEWS)

FEWS is an information system sponsored by USAID and designed to help decision makers anticipate potential famine conditions in Sub-Saharan Africa. FEWS combines biophysical data on meteorological conditions, crop yield and soil quality to calculate an early warning indicator of potential famine regions. These indicators are then linked to socio-economic, demographic and health and nutrition data to identify vulnerable population groups requiring assistance. The focus of the system is on early warning of famine risks, and assisting in the formation of famine mitigation and prevention strategies. The strength of FEWS is in combining an extensive database with field experts and offices in 16 African countries. Its weaknesses are related to the spatial limitations of the system (which is understandable, given that FEWS focuses on the most famine-prone countries) and the emphasis on biophysical data. These weaknesses are not insignificant, and within the OECD concerns have been expressed that FEWS has not proven cost effective and relies on an outdated methodology.

Humanitarian Early Warning System (HEWS)

Similar in design to FEWS, the Humanitarian Early Warning System (HEWS; UNDHA, 1995) is a database of statistical and textual information that is used to provide an early warning of potential humanitarian crises. Developed by the UN Department of Humanitarian Affairs (now OCHA) in New York, HEWS attempts to provide descriptive and predictive information to decision makers involved in humanitarian assistance efforts. Although it has a broader regional focus than FEWS, HEWS is much more limited in scope, and is still in its formative stage. Statistical (quantitative) data are collected for 14 categories, including population, economic and environmental. Textual information provides more detailed information on potential problem spots and assists in identifying critical factors for each country (which are then weighted more heavily in the quantitative assessment). It is premature to provide a complete evaluation of the HEWS model, but the absence of field information and the categorisation of information as quantitative (and suitable for the model) or qualitative (and suitable only for the textual component) is troublesome. It also is not clear which indicators are key to the system, or why there is a need for such a large set of indicators.

A note on early warning systems

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, socio-economic data are inherently unreliable (and, in some cases, useless). In predicting regions of civil unrest, for example, quantitative information my 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- and long-term, to provide assistance to governments for development assistance planning (rather than immediate response).

Developing an index of human insecurity

As noted above, human security is multi-dimensional. Insecurities often arise from the complex interaction of numerous variables – a situation that is difficult to model. This poses problems when trying to identify a set of indicators that would provide an accurate index of human insecurity. The UNDP identified six such indicators – food insecurity; job insecurity; human rights violations; ethnic conflicts; inequity; and military spending. However, one glaring omission is the lack of environment and resource indicators, despite the purported link between environment and human security. Based on the pressure-state-response framework adopted by the Commission on Sustainable Development (1996), we have outlined one possible index of human insecurity which helps to conceptualise the meaning of the term, as well as identify countries and regions at exhibiting the highest levels of insecurity. This preliminary development of an index of human insecurity was undertaken for the following reasons. First, there is a need for computer-based information to assist with medium- and long-term development planning efforts. It was not the intention to produce an early warning index, 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. 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 persuaded to redirect public funds towards regions in greatest need.

In addition, four key conditions influenced and constrained the development of an index of human insecurity.

1. We must move away from long lists of indicators that may be overlapping and highly correlated with one another. Previous work by one of the co-authors (Gustavson, Lonergan and Ruitenbeek, 1998) has demonstrated that a small list of indicators is most appropriate and effective for the purposes noted above.
2. Since environment, economy and society are inter-linked, there must be some sense that changes to one factor will be mitigated by many other factors (at least until some threshold level is reached). Therefore, a standard set of indicators should be used for the base index; additional indicators can be added to deal with specific issues (e.g., food security or civil unrest).
3. Qualitative information is as important as quantitative information in identifying regions of human insecurity. Accordingly, efforts must be made to incorporate

both quantitative and qualitative data in the development of an index, and to supplement the index with adequate textual analysis and explanation.

4. The index should be developed within a Geographical Information System to promote both visual display and allow flexibility in future analysis.

The initial phase of the research focused on the selection of a small set of indicators that would be used to comprise the base index. Indicator selection followed a set of evaluation criteria (some elements of which are presented above; others can be found in Anderson, 1988). Twelve indicators comprised the initial base index (this has since been expanded to sixteen), and, at a minimum, each indicator had to be available for 100 of the 187 countries in the world. The problems with temporal consistency yielded to selecting the most recent year available for each indicator. Indicators were selected based partially on their contribution to violent conflict (see Table 1). This allowed us to use the theoretical and empirical work of previous authors noted in this report. Table X presents the initial 12 indicators assigned according to functional relationships and structural relationships.

Data for the component indicators was incorporated into ArcInfo, a standard GIS. A statistical procedure known as hierarchical cluster analysis was then performed on each indicator. The raw data for each indicator was then assigned to one of ten like-data clusters. The cluster analysis was performed to ensure that data were commensurate when being combined into an index, and to highlight extremes in the data. The indicators (now with scores of one to ten) were then summed and averaged over the number of indicators to calculate the index. In the first stage, all indicators were given the same weight.

TABLE X. Indicators of Human Insecurity.

	Functional Relationships (process flows)	**Structural Relationships (linkages, defining characteristics)**
Environmental	Water Scarcity Access to Safe Water	Food Import Dependency Ratio Energy Imports as a % of Consumption
Economic	Income per capita	Income distribution
Social	Physical Violence Population Density	Maternal Mortality
Institutional	Expenditures on Defence vs. Health and Education	Degree of Democratisation Indicator of Human Freedoms

Environmental Flashpoints

The maps presented in Maps 1 and 2 identify countries that are vulnerable, according to the index outlined above. This is just one of many such indices that could be developed; identifying a perfect index is unlikely given the complex nature of the problem. One other approach is to have regional specialists identify hot spots where environmental change and resource depletion may affect political stability either directly or indirectly. This was the

focus of the DCI Environmental Center's Environmental Flashpoints Conference held in November, 1997. 150 experts were divided into seven regional groups, and spent two days identifying what some of the key environmental issues were in their respective regions, and whether or not these issues would affect political stability. The results of the workshop are summarised in Table Y. Various other factors, such as contributing factors and data needs, are also included in the table.

Map 1

Map 2

TABLE Y: Regional environmental stress situations identified at the Flashpoints Workshop

Region	**Issue**	**Time Frame**
China and East Asia	Flood control: Three Gorges Dam	current and outyears
	Food security problem (decreased agricultural production)	10 years`
	Instability in North Korea	current and outyears
Southeast Asia	Water scarcity: Mekong dams	5 – 10 years +
	Logging, deforestation	current and outyears
	Regional air pollution	current and outyears
South Asia	India – Pakistan: accelerated nuclear energy production and waste disposal	current and outyears
	India: large-scale energy development projects	current and outyears
	India: food security	10 years
North Africa/Middle East	Nile water diversion	current and outyears
	Gaza water quality and quantity	1 – 2 years
	Tigris/Euphrates watershed	3 –5 years
Sub-Saharan Africa	Kenya: competition for arable land	current and outyears
	Okavango River basin: water diversion and withdrawal (Namibia)	1 –3 years
	Sudano-Sahelian and Horn of Africa regions: food security	current and outyears (drought years)
Europe	Nuclear plant accident (more than 60 Russian-designed plants in central and eastern Europe)	open
Former Soviet Union	Radioactive wastes	current and outyears
	Declining seas: Black, Caspian, Aral	current and outyears
Latin America/Caribbean	Cessation of methyl bromide fumigation (agricultural imports)	by 2001
	Completion of last 60 miles of Pan American Highway at Darien Gap	10 years
	Biodiversity loss	current and outyears

Appendix IV:
Bibliography

Abdel Rahim, N. *et al.* 1991. *Greenwar, Environment and Conflict*. London: Panos Institute.

Abrahamson, D. E. 1989. The Changing Atmosphere: Implications for Global Security. In: Dean Edwin Abrahamson, ed., *The Challenge of Global Warming*. Washington, D.C.: Island Press. pp. 50.

Adams, A., *et al.* 1995. Environmental Warfare: Implications for Policymakers and War Planners. A draft research paper presented to the Directorate of Research, U.S. Air Force, Air Command and Staff College, ACSC/DEC/014/95-05, May 1995.

Ahlstrom, C. 1991. *Casualties of Conflict*. Department of Peace and Conflict Research, Uppsala University, Uppsala, Sweden.

Albright, M. K., United States Permanent Representative to the United Nations. 1994. Keynote Address at the 1994 Symposium for the Environmental Defense Fund on the Global Environment: International Issues and Institutions, presentation at the United Nations, New York City, NY, 21 April 1994.

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

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

Almond, H. H., Jr. 1988. War, Weapons and the Environment. *The Georgetown International Environmental Law Review* 1:2: 167-197.

Amin, S. H. 1986. *Marine Pollution in International and Middle Eastern Law*. Glasgow: Royston Limited.

Anderson, E.W. 1988. Water: the next strategic resource. In: J.R. Starr and D.C. Stoll, eds., *The Politics of Scarcity: Water in the Middle East*. London: Westview Press. pp. 1 - 21.

ANU South Asian Studies Group. 1992. *Security and Environment in South Asia*. Australian National University.

Arbman et al. 1998. Paper presented to the workshop on Environment and Security in Scandinavia. Stockholm, Sweden, September 1998.

Archer, C. and D. Scrivener, eds. 1986. *Northern Waters: Security and Resource Issues*. London: Croom Helm for The Royal Institute of International Affairs.

Arkin, W. M., D. Durrant, and M. Cherni. 1991. *On Impact: Modern Warfare and the Environment, A Case Study of the Gulf War*. Washington, D.C.: Greenpeace.

Arne, W. D. 1992. Environmental Destruction in War. *Disarmament* XV:2.

Atwood, J. B. 1995. Toward a New Definition of National Security. Speech presented at Conference of Harrison Program on the Future Global Agenda, College Park, MD, 2 November 1995.

Bächler, G. 1994. Desertification and Conflict: The Marginalization of Poverty and of Environmental Conflicts. Seminar paper to the Almeria Symposium on Desertification and Migration, February 1994.

Bächler, G. 1998. Why environmental transformation causes violence. *Environmental Change and Security Project Report 4*. Washington, D.C.: Woodrow Wilson Center. pp. 24-44.

Bächler, Günther & Spillman, Kurt R., eds. 1996*. Environmental degradation as a cause of war – Kriegsursache Umweltzerstörun.*. 3 volumes, Zürich Chur, Switzerland: Rüegger Verlag.

Badolato, Colonel E. 1991. Pollution as Ammunition. *Proceedings of the U.S. Naval Institute* (October): 68-70.

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

Barber, C. 1989. Global Environmental Security and International Cooperation: Conceptual, Organizational and Legal Frameworks. Draft, World Resources Institute, October 1989.

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

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

Bedeski, R.E. 1991. Unconventional Security Threats: an Overview. Paper presented at the Workshop on Unconventional Security in the North Pacific Region, East West Centre, Honolulu, December, 1991.

Bennett, O., ed. 1991. *Greenwar: Environment and Conflict*. London: Panos Institute.

Berkowitz, B. D. 1993. The Use of Intelligence Resources for Environmental Monitoring. Unpublished. February 1993.

Beschorner, N. 1992. Water and Instability in the Middle East. International Institute for Strategic Studies, Adelphi Paper 273, London: Brassey's Ltd.

Beschorner, N. 1993. The Problem of Regional Rivalry. *Middle East Economic Digest* (29 January).

Binnendijk, H. and P. Clawson (eds). 1995. *Strategic Assessment 1995: U.S. Security Challenges in Transition*. Washington, D.C.: Institute for National Strategic Studies.

Bjerke, S. 1994. Security and Environment Issues in the North. *International Challenges* 14:1: 4-10.

Black, R. 1993. Geography and Refugees: Current Issues. In: Richard Black and Vaughan Robinson, eds., *Geography and Refugees: Patterns and Processes of Change*. London: Belhaven Press. pp. 3-14.

Blick, J.P. 1988. Genocidal warfare in tribal societies as a result of European-induced culture conflict. *Man* (n.s.) 23: 654-670.

Bloom, S., J. M. Miller, and P. Winkler. 1993. *Hidden Casualties II: Environmental, Health and Political Consequences of the Persian Gulf War*. San Francisco: North Atlantic Books.

Böge, V. 1992. Bougainville: A 'Classical' Environmental Conflict? Occasional Paper No. 3, Environment and Conflicts Project, Swiss Peace Foundation, Berne and Center for Security Studies and Conflict Research, Zurich.

Böge, V. 1992. Proposal for an Analytical Framework to Grasp 'Environmental Conflict'. Occasional Paper No. 1, Environment and Conflicts Project, Swiss Peace Foundation, Berne and Center for Security Studies and Conflict Research, Zurich, Switzerland.

Bosnjakovic, B. 1993. Environmental Issues and Political Conflicts in Central and Eastern Europe: A Two-Way Road. Paper presented at GeoPolitics of the Environment and the New World Order: Limits, Conflicts, Insecurity? SORISTEC, Chantilly, France, January 1993.

Bothe, M. 1992. Environmental Destruction as a Method of Warfare: Do We Need New Law? *Disarmament* XV:2: 101-112.

Boulding, E. 1991. States, Boundaries: Environmental Security in Global and Regional Conflicts. *Interdisciplinary Peace Research* 3:2: 78-91.

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

Broadus, J. M. 1989. Impacts of Future Sea-Level Rise. Paper presented at Forum on Global Change and Our Common Future, National Academy of Sciences, Washington, D.C., May 1989.

Broadus, J. M., and R.V. Vartanov. 1991. The Oceans and Environmental Security. *Oceanus* 34:2: 14-19.

Brock, L. 1991. Peace Through Parks: The Environment on the Peace Research Agenda. *Journal of Peace Research* 28: 407-23.

Brock, L. 1992. Security Through Defending the Environment: An Illusion? In: Boulding, E., ed., *New Agendas for Peace Research: Conflict and Security Re-examined*. Boulder: Lynne Reinner Publishers, Inc. pp. 79-102.

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

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

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

Brown, H. 1954. *The Challenge of Man's Future*. New York: Viking.

Brown, J. W. 1996. Population, Consumption, and the Path to Sustainability. *Current History* 95: 604: 366-371.

Brown, J. W., ed. 1990. *In the U.S. Interest: Resources, Growth, and Security in the Developing World*. Boulder, CO: Westview Press.

Brown, L. 1977. Redefining Security. Worldwatch Paper No. 14, Worldwatch Institute, Washington, D.C.

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

Brown, M. E., S. M. Lynn-Jones, and S. E. Miller, eds. 1995. *The Perils of Anarchy: Contemporary Realism and International Security*. Boston: MIT Press.

Brown, Malcolm W., Michio Kaku, James M. Fallows and Eric Fischer. 1991. War and the environment. *Audubon* 93(5): 88-99.

Brown, N. 1989. Climate, Ecology and International Security. *Survival* 31: 519-32.

Brundtland, G. H. 1993. The Environment, Security and Development. In: SIPRI Yearbook 1993: World Armaments and Disarmament, Oxford: Oxford University Press.

Bruyninckx, H. 1993. Environmental Security: An Analysis of the Conceptual Problems Defining the Relationship Between Environment and Security. Paper presented at the Annual Meeting of the International Studies Association, Acapulco, Mexico, March 1993.

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

Bush, K. 1990. Climate Change, Global Security, and International Governance: A Summary of Proceedings of a Conference on Climate Change and Global Security. Working Paper 23, Canadian Institute for International Peace and Security, Ottawa.

Butts, K. H. 1993. Environmental Security: What is DOD's Role? U.S. Army War College, Strategic Studies Institute, Carlisle, PA.

Butts, K. H. 1994. Environmental Security: A DOD Partnership for Peace. In: Strategic Studies Institute Special Report, U.S. Army War College, 42. U.S. Government Printing Office.

Butts, K. H. 1994. Why the Military is Good for the Environment. In: J. Käkönen, ed., Green Security or Militarized Environment, Brookfield: Dartmouth Publishing Co. pp 83-110.

Buzan, B. 1991. New Patterns of Global Security. *International Affairs* 67(3): 431-51.

Buzan, B. 1991. *People States and Fear (Second Edition)*. Boulder: Lynne Reinner Publishers, Inc.

Buzan, B. 1992. Environment As a Security Issue. In: Paul Painchaud. ed., *Geopolitical Perspectives on Environmental Security*. Québec, Université Laval: Cahier du GERPE, No. 92-05.

Byers, B. 1991. Ecoregions, State Sovereignty and Conflict. *Bulletin of Peace Proposals* 22:1: 65-76.

Byers, B. A. 1994. Armed Forces and the Conservation of Biological Diversity. In: Jyrki Käkönen, ed., *Green Security or Militarized Environment*. Brookfield: Dartmouth Publishing Co. pp 111-130.

Caccia, C. 1990. An Increasingly Urgent Need to Redefine Security. *International Perspectives* 19:2: 17-22.

Caldwell, L. K. 1985. U.S. Interests and the Global Environment. Occasional Paper No. 35, The Stanley Institute, Muscatine, Iowa.

Caldwell, L. K. 1990. *International Environmental Policy: Emergence and Dimensions (Second Edition)*. Durham: Duke University Press.

Calleigh, A.S. 1983. Middle East water: vital resource, conflict and cooperation. In: J.R. Starr (ed), *A Shared Destiny*. New York: Praeger Publishers. pp 121 - 135.

Capra, Fritjof. 1996. *The web of life : a new scientific understanding of living systems*. New York: Anchor Books.

Carter, F.W. and D. T., eds. 1993. *Environmental Problems in Eastern Europe.* London and New York: Routledge.

Cassen, R., ed. 1994. *Population and Development: Old Debates, New Conclusions.* Washington DC: Overseas Development Council (ODC).

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

Chivian, E., M. McCally, H. Hu, and A. Haines, eds. 1993. *Critical Condition: Human Health and the Environment*. A report by Physicians for Social Responsibility. Cambridge: MIT Press.

Choucri, N. (ed). 1984. *Multidisciplinary Perspectives on Population and Conflict.* Syracuse: University Press.

Choucri, N. 1991. Resource Constraints as Causes of Conflict. *Ecodecision* 2: 52-55.

Choucri, N. 1992. *Challenges to Security: Population and Political Economy in Egypt*. London: Harper Collins Academic.

Choucri, Nazli and Robert North. 1975. *Nations in Conflict.* San Francisco: W. H. Freeman.

Christopher, W. 1996. American Diplomacy and the Global Environmental Challenges of the 21st Century. Address at Stanford University, 9 April 1996.

CIA. 1974. *A study of climatological research as it pertains to intelligence problems*. Central Intelligence Agency, Langley, VA.

CIMI. 1987. Doctrine of national security threatens Brazil's Indians. *Cultural Survival Quarterly* 11 (2):53-65.

Clark, L. 1989. Internal refugees - the hidden half. In: U.S. Committee for Refugees, World Refugee Survey - 1988 in Review. Washington: American Council for Nationalities Service. pp 18 - 24.

Claussen, E., Special Assistant to the President and Senior Director for Global Environmental Affairs. 1994. U.S. National Security and the Challenge of Climate Change, keynote address at the International Conference on Climate Change, Washington, D.C., 27 July 1994.

Claussen, E., Special Assistant to the President and Senior Director for Global Environmental Affairs. 1994. Environment and Security: The Challenge of Integration, presentation at the Woodrow Wilson International Center for Scholars, Washington, D.C., 6 October 1994.

Cleveland, H., and S. G. Brown. 1976. The Limits of Obsession: Fencing in the 'National Security' Claim. *Administrative Law Review* 28: 327-46.

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

Commission on Global Governance. 1995. *Our Common Neighborhood*. Oxford: Oxford University Press.

Commoner, B. 1990. *Making Peace with the Planet*. New York: Pantheon Books.

Conca, K. 1993. Environmental Change and the Deep Structure of World Politics. In: Ronnie D. Lipschutz and Ken Conca , eds., *The State and Social Power in Global Environmental Politics*. New York: Columbia University Press. pp 306-26.

Conca, K. 1994. In the Name of Sustainability: Peace Studies and Environmental Discourse. *Peace and Change* 19: 91-113.

Conca, K. 1995. Global Environmental Governance: Causes, Components, and Consequences. Occasional Paper No. 6, Harrison Program on the Future Global Agenda, January 1995.

Conca, K., M. A., and G. D. Dabelko. 1995. From Ecological Conflict to Environmental Security? In: Conca, Alberty and Dabelko, eds., *Green Planet Blues: Environmental Politics from Stockholm to Rio*. Boulder, CO: Westview Press. pp 239-244.

Congressional Research Service Interdivisional Team, co-ordinated by Martin Lee. 1991. *Applying Defense Resources to Environmental Problems*. CRS Issue Brief 90127, Washington, D.C.

Conklin, Beth A. and Laura R. Graham. 1995. The shifting middle ground: Amazonian Indians and ecopolitics. *American Anthropologist* 97(4):695-710.

Connelly, M., and P. Kennedy. 1994. Must It Be the Rest Against the West? *The Atlantic Monthly* (December) : 61-84.

Constantine, G. T. 1993. Contingency Support Study, Environmental Defense Intelligence for National Disasters Relief Operation, Bangladesh. Defense Intelligence Agency, Washington, D.C.

Constantine, G. T. 1993. Environmental Defense Intelligence. Global Intelligence Issues. Defense Intelligence Agency, Washington, D.C.

Cooley, J. K. 1992. Middle East Water: Power for Peace. *Middle East Policy* 1:2.

Cooley, J.K. 1984. The war over water. *Foreign Policy* 54: 3 - 26.

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

Correia, F. N., and J. E. de Silva. 1996. Transboundary Issues in Water Resources. Paper presented at the NATO Advanced Research Workshop, Bolkesjo, Norway, 12-16 June 1996.

Critchley, W. H., and T. Terriff. 1993. Environment and Security. In: Richard Shultz, Roy Godson, and Ted Greenwood, eds., *Security Studies for the 1990s.* Washington: Brassey's. pp 327-52.

Crosby, Alfred. 1986. *Ecological Imperialism*. Cambridge University Press, New York.

D.C. Esty, J.A. Goldstone, T.R. Gurr, P.T. Surko, and A.N. Unger. *State failure task force report.* A working paper for the Central Intelligence Committee, (Washington DC) November 1995. McLean, VA: Science Applications International Corporation.

Dabelko, D. D., and G. D. Dabelko. 1993. The International Environment and The U.S. Intelligence Community. *International Journal of Intelligence and CounterIntelligence* 6: 21-41.

Dabelko, G.D. and D. Dabelko. 1995. Environmental Security: Issues of Conflict and Redefinition. Environmental Change and Security Project. Washington: The Woodrow Wilson Center. Issue 1.

Dabelko, G.D. 1991. Security Perils in the 1990s: Environment and Intelligence. *The Georgetown Compass* 2: 50-53.

Dabelko, G.D. 1995. Environmental Security: The Parameters of the U.S. Debate. Presented at ISA's International Security Studies Section and APSA's International Security and Arms Control Section Co-sponsored Annual Conference New Frontiers in International Security, Rosslyn, VA. October 13-14.

Dabelko, G.D. 1995. The Environment and Conflict in the Third World: Examining Linkage, Context and Policy. Paper presented at Causes of Conflicts in the Third World. Conference sponsored by the North/South Coalition in cooperation with the International Peace Research Institute, Oslo (PRIO), November 18-19.

Dabelko, G.D. 1996. Ideas and the Evolution of Environmental Security Conceptions. Paper presented at the International Studies Association Annual Meeting, San Diego, CA, April 1996.

Dabelko, G.D., & Simmons, P.J. 1997. Environment and security: Core ideas and U.S. government initiatives. *SAIS Review*, Winter-Spring, 127-146.

Dahl, A. W. 1992. Environmental Destruction in War. *Disarmament* XV:2: 113-127.

Dalby, S. 1991. A Climate of Conflict? Environment and Security in the Pacific. In: M.L. Goldie and D.A. Ross, eds., *Pacific Security 2010: Canadian Perspectives on Pacific Security into the 21st Century*. Aurora Papers 10, Canadian Centre for Arms Control and Disarmament, Ottawa, pp 51-64.

Dalby, S. 1992. Security, modernity, ecology: the dilemmas of post-cold war security discourse. *Alternatives* 17: 95-134.

Dalby, S. 1992. Ecopolitical Discourse: 'Environmental' Security and Political Geography. *Progress in Human Geography* 16: 503-522.

Dalby, S. 1994. Security, Intelligence, the National Interest and the Global Environment. Preliminary draft paper prepared for a conference on Intelligence Analysis and Assessment: The Producer/Policy Maker Relationship in a Changing World, Geography Department, Carleton University, Ottawa.

Dalby, S. 1994. The Politics of Environmental Security. In: Jyrki Käkönen, ed., *Green Security or Militarized Environment*. Brookfield: Dartmouth Publishing Co. pp 25-54.

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

Dalby, S. 1996. The Environment as a Geopolitical Threat: reading Robert Kaplan's 'Coming Anarchy'. *Ecumene*, 3: 4: 472-496.

Dalby, S. *Human security: Environmental dimensions of a contested concept*. Paper for a Government of Canada, Department of Foreign Affairs and International Trade workshop on "Taking Human Security Seriously," Québec, 24 July, 1998.

Darlington, C.D. 1969. *The Evolution of Man and Society*. Simon and Schuster, New York.

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

Davis, E. B., and S. M. Davis. 1994. The U.S. Military and Non-Traditional Roles. Paper prepared for the Annual Meeting of the International Studies Association, Washington, D.C., March-April, 1994.

de Sherbinin, A. 1995. World Population Growth and U.S. National Security. *The Environmental Change and Security Projec*t *Report* 1: 24-39.

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

DeBardeleben, J., and J. Hannigan, eds. 1994. *Environmental Security and Quality After Communism*. Boulder, CO: Westview Press.

Deibert, R.J. 1995. Out of Focus: U.S. Military Satellites to the Environmental Rescue. In: D. Deudney and R. Matthew, eds., *Contested Ground: Security and Conflict in the New Environmental Politics*. New York: SUNY Press.

Del Rosso, S.J., Jr. 1995. The Insecure State: Reflections on 'the State' and 'Security' in a Changing World. *Daedalus* 124: 2: 175-207.

Dessler, D. 1994. How to Sort Causes in the Study of Environmental Change and Violent Conflict. In: N. Graeger and D. Smith, eds., *Environment, Poverty, and Conflict*. Oslo: International Peace Research Institute. pp 91-102.

Deudney, D. 1990. The Case Against Linking Environmental Degradation and National Security. *Millennium: Journal of International Studies*, 19(3): 461-76.

Deudney, D. 1991. Environment and security: muddled thinking. *Bulletin of the Atomic Scientists* (April): 22-28.

Deudney, D. 1992. The Mirage of Eco-War: The Weak Relationship Among Global Environmental Change, National Security and Interstate Violence. In: I. Rowlands and M. Green, eds., *Global Environmental Change and International Relations*. Basingstoke: MacMillan.

Deudney, D. and R. Matthew, eds. 1995. *Contested Grounds: Security and Conflict in the New Environmental Politics*. New York: SUNY Publishers.

Deudney D. and R. Matthew, eds. 1999. *Contested Grounds : Security and Conflict in the New Environmental Politics.* New York: SUNY Press.

Diederich, M.D., Jr. 1992. 'Law of War' and Ecology-A Proposal for a Workable Approach to Protecting the Environment Through the Law of War. *Military Law Review* 136: 138-160.

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

Dietrich Fischer. 1993. *Non-military Aspects of Security*. Cambridge: Dartmouth.

Dokken, K. and N. Graeger. 1995. The Concept of Environmental Security - Political Slogan or Analytical Tool? International Peace Research Institute, Oslo (PRIO), Report 2.

Dowty, A. and G. Loescher. 1996. Refugee Flows as Grounds for International Action. *International Security* 21: 1: 43-71.

Dreyfuss, R. 1995. Spying on the Environment. *E Magazine* (Jan./Feb): 28-35.

Dunaway, R.L. 1995. Environmental Assistance as National Security Policy: Helping the Former Soviet Union Find Solutions to its Environmental Problems. INSS Occasional Paper No. 4, USAF Institute for National Security Studies, US Air Force Academy, Colorado.

Durham, W.H. 1979. *Scarcity and Survival in Central America: Ecological Origins of the Soccer War*. Stanford: Stanford University Press. Palo Alto, California.

Earthscan Briefing. 1984. *Environment and Conflict*. Earthscan Briefing, Document 40, Washington, D.C.

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

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

Ehrlich, A.H., and J.W. Birks, eds. 1990. *Hidden Dangers: Environmental Costs of Preparing for War*. San Francisco: Sierra Club Books.

Ehrlich, P.R. 1991. Population Growth and Environmental Security. *Georgia Review* 45: 2: 223-232.

Ehrlich, P.R. 1994. Human Population Growth and Global Change. In: *Ecological and Social Dimensions of Global Change.* Report from the Institute of International Studies. Berkeley, CA. pp 119-146.

Ehrlich, P.R., and A.H. Ehrlich. 1988. *The Environmental Dimensions of National Security*. Stanford, CA: Stanford Institute for Population and Resource Studies.

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

El-Hinnawi, E. 1985. *Environmental Refugees*. Nairobi: United Nations Environmental Program.

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

Ember, Carol R. and Melvin Ember. 1992. Resource unpredictability, mistrust, and war. *Journal of Conflict Resolution* 36(2): 242-262.

Environmental Conflict and Security Project. 1996. *Environmental Change and Security Project Report #2*. Washington D.C.: Woodrow Wilson International Center for Scholars, Spring 1996.

Environmental Conflict and Security Project. 1997. *Environmental Change and Security Project Report #3*. Washington D.C.: Woodrow Wilson International Center for Scholars, Spring 1997.

Environmental Policy and Law. 1992. Law Concerning the Protection of the Environment in Times of Armed Conflict. *Environmental Policy and Law* 22: 1: 63-64.

Evteev, S.E. 1989. Ecological security of sustainable development. *Development*, 2-3: 112-115.

Fairclough, A.J. 1991. Global Environmental and Natural Resource Problems-Their Economic, Political and Security Implications. *The Washington Quarterly*, winter 1991.

Falk, R.A. 1992. The Environmental Law of War. In: G. Plant, ed., *Environmental Protection and the Law of War*. New York: Belhaven Press. pp. 87-95.

Falkenmark, M. 1986a. Fresh water as a factor in strategic policy and action. In: A.H. Westing, ed., *Global Resources and International Conflict: Environmental Factors in Strategic Policy and Action*. New York: Oxford University Press. pp. 85 - 113.

Falkenmark, M. 1986b. Fresh water - time for a modified approach. *Ambio* 15(4): 192-200.

Falkenmark, M. 1989a. Middle East hydro-politics: water scarcity and conflicts in the Middle East. *Ambio* 18(6): 350-352.

Falkenmark, M. 1989b. The massive water scarcity now threatening Africa - why isn't it being addressed? *Ambio* 18(2): 112-118.

Fawcett, J. E. S., and A. Perry. 1981. *Law and International Resource Conflicts*. Oxford: Clarendon Press.

Feliciano, F.P. 1992. Marine Pollution and Spoilation of Natural Resources as War Measures: A Note on Some International Law Problems in the Gulf War. *Houston Journal of International Law* 14: 483-519.

Ferguson, R.B. 1990. Blood of the Leviathan: western contact and warfare in Amazonia. *American Ethnologist* 17: 237-257.

Feshbach, M. 1995. *Ecological Disaster: Cleaning Up the Hidden Legacy of the Soviet Regime*. New York: The Twentieth Century Fund Press.

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

Feshbach, M., and A. Friendly, Jr. 1992. *Ecocide in the USSR: Health and Nature Under Siege*. New York: Basic Books.

Feshbach, M., ed. 1995. *Environmental and Health Atlas of Russia*. Moscow: PAIMS Publishing House.

Fetter, S., and F. von Hippel. 1990. The Hazard from Plutonium Dispersal by Nuclear-Warhead Accidents. *Science & Global Security* 2:1: 21-41.

Finger, M. 1991. The military, the nation state and the environment. *The Ecologist* 21(5): 220-5.

Finger, M. 1994. Global Environmental Degradation and the Military. In: Jyrki Käkönen, ed., *Green Security or Militarized Environment*. Brookfield: Dartmouth Publishing Co. pp. 169-192.

Fischer, D. 1993. *Nonmilitary Aspects of Security: A Systems Approach*. Brookfield: Dartmouth Publishing Co.

Flannery, Tim. 1994. *The Future Eaters: An Ecological History of Australasian Lands and People.* George Braziller, New York.

Fleishman, R. 1995. Environmental Security: Concept and Practice. *National Security Studies Quarterly* 1: 2.

Foster, G.D. 1989. Global Demographic Trends to the Year 2010: Implications for National Security. *The Washington Quarterly* (Spring 1989).

Funke, O. 1994. Environmental Dimensions of National Security: The End of the Cold War. In: Jyrki Käkönen, ed., *Green Security or Militarized Environment*, Brookfield: Dartmouth Publishing Co. pp. 55-82.

Galtung, J. 1982. *Environment, Development and Military Activity*. New York: Columbia University Press.

Gardner, R.G. and K. Heider. 1969. *Gardens of War: Life and Death in the New Guinea Stone Age*. Random House, New York.

Geneva Convention. 1977. Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques. Geneva Convention, 18 May 1977.

Gizewski, P. 1995. Data Survey: Population, Environment and Acute Conflict. Occasional Paper, Project on Environment, Population, and Security, The Peace and Conflict Studies Program , University of Toronto and the American Association for the Advancement of Science.

Gizewski, P., and T.F. Homer-Dixon. 1995. Urban Growth and Violence: Will the Future Resemble the Past? Occasional Paper of the Project on Environment, Population, and Security. The Peace and Conflict Studies Program of the University of Toronto and the American Association for the Advancement of Science.

Glass, W.E. 1995. Cleaning Up Defense Installations: Issues and Options. Congressional Budget Office, Washington, D.C., January 1995.

Gleditsch, N.P. (ed.) 1997. *Conflict and the Environment*. NATO ASI Series Vol. 33. Kluwer Academic Publishers, Dordecht, The Netherlands.

Gleditsch, N.P. 1992. Conversion and the Environment. Proceedings of a Seminar in Perm, Russia, November 1991. PRIO Report No 2., International Peace Research Institute, Oslo (May 1992).

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

Gleditsch, N.P., and B.O. Sverdrup. 1996. Democracy and Environment. Paper Presented to the Fourth National Conference in Political Science, Geilo, January 8-9. International Peace Research Institute, Oslo (PRIO)

Gleditsch, N.P., and B.O. Sverdrup. 1996. Democracy and Environmentalism. Paper presented at the NATO Advanced Research Workshop, Bolkesjo, Norway, 12-16 June 1996.

Gleditsch, N.P., and T. Risse-Kappen (eds.). 1995. Democracy and Peace. *European Journal of International Relations* 1(4).

Gleick, P. 1989. Global climate changes and geopolitics: pressures on developing countries. In: A. Berger et al, eds., *Climate and Geosciences*. Kluwer Academic Publishers. pp. 603 - 621.

Gleick, P. 1989. The Implications of Global Climate Changes for International Security. *Climate Change* 15: 303-325.

Gleick, P. 1989a. Climate change and international politics: problems facing developing Countries. *Ambio* 18(6): 333 - 339.

Gleick, P. 1990. Environment, resources and international security and politics. In: E.H. Arnett, ed., *Science and International Security: Responding to a Changing World*. Washington, D.C.: American Association for the Advancement of Science. pp. 501-523.

Gleick, P. 1990. *Environment, Resources, and Security: Arenas for Conflict, Areas for Cooperation*. Berkeley: Pacific Institute for Studies in Development, Environment and Security.

Gleick, P. 1990. Global Climatic Change and International Security. *Colorado Journal of International Environmental Law and Policy* 1: 41-56.

Gleick, P. 1991. Environment and security: the clear connections. *Bulletin of the Atomic Scientists* (April): 17-21.

Gleick, P. 1991. The Growing Links Among Environment, Resources and Security. Paper presented at the National Defense University Topical Symposium, Washington, D.C., November 1991.

Gleick, P. 1992. How Will Climatic Changes and Strategies for the Control of Greenhouse-Gas Emissions Influence International Peace and Global Security? In: G.I. Pearman, ed., *Limiting the Greenhouse Effect: Options for Controlling Atmospheric CO2 Accumulation*. New York: John Wiley & Sons Ltd. pp 561-572.

Gleick, P. 1992. Reducing the Risks of Conflict Over Fresh Water Resources in the Middle East. Proceedings of the First Israeli-Palestinian International Academic Conference on Water Resources, Zurich, Switzerland, 10-13 December 1992.

Gleick, P. 1993. Water and Conflict: Fresh Water Resources and International Security. *International Security* 18: 79-112.

Gleick, P. 1994. Water and Conflict in the Middle East. *Environment* 36: 6-15, 35- 42.

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

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

Goldblat, J. 1977. The Environmental Warfare Convention: How Meaningful Is It? *Ambio* 6: 216-221.

Goldblat, J. 1991. Legal Protection of the Environment Against the Effects of Military Activities. *Bulletin of Peace Proposals* 22:4: 1-8.

Goldblat, J. 1992. Legal Constraints on the Environmental Disruptions by War. ed. Paul Painchaud, Cahier du GERPE, No. 92-05 University of Laval, Quebec.

Goldstone, J. 1991. *Revolution and Rebellion in the Early Modern World*. University of Berkeley Press.

Goldstone, J. 1992. Imminent Political Conflicts Arising from China's Environmental Crises. Occasional Paper Series, Project on Environmental Change and Acute Conflict, University of Toronto and the American Academy of Arts and Sciences.

Goodland, R. 1994. Environmental Sustainability: Imperative for Peace. In: Nina Graeger and Dan Smith, eds., *Environment, Poverty, and Conflict*, Oslo: International Peace Research Institute. pp 19-47.

Graeger, N. 1995. The Concept of Environmental Security: Security Beyond State Sovereignty? Paper presented at the Thirteenth Nordic (and First Baltic) Peace Research Conference, Lohulsalu, Estonia, 29 June-2 July 1995.

Graeger, N. 1996. Review Essay: Environmental Security. *Journal of Peace Research* 33: 109-116.

Graeger, N. and D. Smith (eds.). 1994. Environment Poverty and Conflict. International Peace Research Institute, Oslo (PRIO), Report 2.

Granbom, P.O. 1994. Dumped Chemical Ammunition in the Baltic: A Rejoinder. *Security Dialogue* 25:1: 105-110.

Granzeier, M.S. 1995. The Debate Over Making Environmental Protection a National Security Issue. Paper presented at the Western Political Science Association Annual Meeting, Portland, Oregon, 16-18 March 1995.

Greenhouse, S. 1995. The Greening of U.S. Diplomacy: Focus on Ecology. *The New York Times*, 9 October 1995, A6.

Greenpeace International. 1992. *The Environmental Legacy of the Gulf War*. A Greenpeace Report, Greenpeace International, Amsterdam, Holland.

Greenwald, P.T. 1992. United States and Environmental Security: Deforestation and Conflict in Southeast Asia. Master's Thesis, Naval Post-Graduate School, Monterey, CA.

Griffiths, F. 1995. Environment and Security in Arctic Waters: A Canadian Perspective. Working Paper of the Scott Polar Research Institute, University of Cambridge.

Gurr, T. 1985. On the Political Consequences of Scarcity and Economic Decline. *International Studies Quarterly* 29(1): 51-75.

Gurr, Ted Robert. 1970. *Why Men Rebel*. Princeton: Princeton University Press.

Gurr, Ted Robert. 1993. *Minorities at risk : a global view of ethnopolitical conflicts.* Washington, D.C.: United States Institute of Peace Press.

Gurr, T.R. 1995. Minorities, nationalists, and ethnopolitical conflict. In C.A. Crocker, F.O. Hampson, with P. Aall (Eds.), *Managing Global Chaos: Sources of and Responses to International Conflict* (pp. 53-77). Washington, D.C.: United States Institute of Peace Press.

Gurtov, M. 1991. Open borders: a global-humanist approach to the refugee crisis. *World Development* 19(5): 485-496.

Gustavson, K., S.C. Lonergan and J. Ruitenbeek. 1998. "Modelling indicators of sustainability for the Fraser River Basin" *Ecological Economics* 12(4): 35-54.

Haas, J. and W. Creamer. 1993. *Stress and Warfare Among the Kayenta Anasazi of the 13th Century A.D.* Field Museum of Natural History, Chicago.

Hafiz, M.A., and N. Islam. 1993. Environmental Degradation and Intra/Interstate Conflicts in Bangladesh. Occasional Paper No. 6, Environment and Conflicts Project, Swiss Peace Foundation, Berne, and Center for Security Studies and Conflict Research, Zurich, Switzerland.

Hamilton, K. 1995. Making Sense of Population and Security. Paper prepared for the ISSS-ISAC Joint Meeting, Rosslyn, VA, 13-14 October 1995.

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

Handl, G. 1990. Environmental Security and Global Change: The Challenge to International Law. *Yearbook of International Law* 1.

Hansch, S. 1995. How Many People Die of Starvation in Humanitarian Emergencies? Working Paper of the Refugee Policy Group, Washington, D.C.

Hansen, L. 1995. Post-Sovereignty, Post-Security, Post-NATO: Nato's Redefinition of European Security After the Cold War. Paper presented at the Annual Convention of the International Studies Association, Chicago, IL, February, 1995.

Hardaway, R.M. 1994. *Population, Law, and the Environment.* Westport, CT: Praeger.

Harris, Marvin. 1974. *Cows, Pigs, Wars and Witches: The Riddles of Culture*. Random House, New York.

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

Harvey, H. 1988. Natural Security. *Nuclear Times* (March/April): 24-26.

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

Hassan, S. 1991. Environmental Issues and Security in South Asia. Adelphi Papers 262, International Institute for Strategic Studies, London.

Hassan, S. 1992. Environmental Sources of Conflict in the South Asian Subcontinent. *Disarmament* 15: 79-95.

Hauge, W. and T. Ellingsen. 1996. Environmental Change and Civil War: A Multivariate Approach. Paper presented at the NATO Advanced Research Workshop, Bolkesjo, Norway, 12-16 June 1996.

Hauge, W., & T. Ellingsen. 1998. Beyond environmental scarcity: Causal pathways to conflict. *Journal of Peace Research,* 35 (3), 299-317.

Hawley, T. M. 1992. *Against the Fires of Hell: The Environmental Disaster of the Gulf War*. New York: Harcourt Brace Jovanovich.

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

Hazarika, S. 1993. Bangladesh and Assam: Land Pressures, Migration and Ethnic Conflict. Occasional Paper No. 3, Project on Environmental Change and Acute Conflict, American Academy of Arts and Sciences, Cambridge, MA.

Heinien, L. 1994. The Military and the Environment: The Arctic Case. In: Jyrki Käkönen, ed., *Green Security or Militarized Environment*, Brookfield: Dartmouth Publishing Co. pp 155-168.

Heininen, L. 1990. Environmental Threats of Military Presence in Northern Waters and the Arctic. In: Lassi Heininen, ed., *Arctic Environmental Problems 2d ed*., Tampara, Finland: Tampere Peace Research Institute Research Report No. 41. pp 66-80.

Heininen, L. 1992. The Conflict of Interests Between the Environment and Military Strategy in Northern Waters and the Arctic. In: Jyrki Käkönen, ed., *Perspectives on Environmental Conflict and International Politics*, London: Pinter Publishers. pp 55-71.

Hendrickson, Dylan. 1997. *Supporting Local Capacities for Managing Conflicts over Natural Resources in the Sahel: a review of issues with an annotated bibliography.* London: IIED.

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

Hill, Jonathan D. 1994. Alienated targets: military discourse and the disempowerment of indigenous Amazonian peoples in Venezuela. *Identities* 1(1):7-34.

Hillel, D. 1994. *Rivers of Eden: The Struggle for Water and the Quest for Peace in the Middle East*. New York: Oxford University Press.

Hilterman, J.R. 1993. Diverting Water, Displacing Iraq's Marsh People. *Middle East Report* (March/April).

Hindly, A. 1990. Tension Flows from an Ebbing Nile. *Middle East Economic Digest* (25 May).

Hjort af Ornäs, A. and C. Krokfors. 1991. Environment and International Security. *Nytt frannordiska afrikainstitutet* 28.

Hjort af Ornäs, A. and S. Lodgaard. 1992. *The Environment and International Security*. International Peace Research Institute and the Research Programme on Environment and International Security. Department of Human Geography, Uppsala University.

Hjort af Ornäs, A., and M.A. Mohamed Salih. 1991. *Ecology and Politics: Environmental Stress and Security in Africa*. Uppsala, Sweden: Scandinavian Institute of African Studies.

Hjort af Ornäs, A., and S. Lodgaard. 1992. *The Environment and International Security*. Oslo: International Peace Research Institute.

Hoagland, S., and S. Conbere. 1991. *Environmental Stress and National Security*. College Park: Center for Global Change, University of Maryland.

Holst, J. 1989. Security & the environment: a preliminary exploration. *Bulletin of Peace Proposals* 20(2): 123-128.

Holst, Johan Jorgen. 1995. *Conflict and Environmental Degradation*. NUPI Notat 325, Norwegian Institute of International Affairs, Oslo, Norway.

Homer-Dixon, T. 1990. *Environmental Change and Violent Conflict*. Occasional Paper No. 4, American Academy of Arts and Sciences, Cambridge, MA.

Homer-Dixon, T. 1991. Environmental Change and Human Security. *Behind the Headlines* 48:3: 1-17.

Homer-Dixon, T. 1991. Environmental Change, Economic Decline, and Civil Strife in Developing Countries. *International Studies Notes* (Spring).

Homer-Dixon, T. 1991. On the threshold: environmental changes as causes of acute conflict. *International Security* 16(2): 76-116.

Homer-Dixon, T. 1994. Environmental scarcities and violent conflict: evidence from cases. *International Security* 19(1): 5-40.

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

Homer-Dixon, T. 1995. *Strategies for Studying Causation in Complex Ecological-Political Systems*. Occasional Paper, Project on Environment, Population, and Security, The Peace and Conflict Studies Program, University of Toronto, and the American Association for the Advancement of Science (March 1995).

Homer-Dixon, T. 1995. The Ingenuity Gap: Can Poor Countries Adapt to Resource Scarcity? *Population and Development Review* 21:3: 587-612.

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

Homer-Dixon, T. 1996. Environmental Scarcity, Mass Violence, and the Limits to Ingenuity. *Current History* 95:604: 359-365.

Homer-Dixon, T. and V. Percival. 1995. *Environmental Scarcity and Violent Conflict: Briefing Book*. Paper of the Project on Environment, Population and Security, The Peace and Conflict Studies Program, University of Toronto and the American Association for the Advancement of Science.

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

Homer-Dixon, T.F., J. Boutwell, and G.W. Rathjens. 1993. Environmental Change and Violent Conflict. *Scientific American* 268(2): 38-45.

Honey, P. 1991. Water Is Another Liquid Causing Mideast Tensions. *The Baltimore Sun*, 31 March 1991.

Howard, P. and T. Homer-Dixon. 1995. *Environmental Scarcity and Violent Conflict: The Case of Chiapas, Mexico*. Paper of the Project on Environment, Population and Security, The Peace and Conflict Studies Program, University of Toronto and the American Association for the Advancement of Science.

Hugo, G. 1987. Forgotten refugees: postwar forced migration within Southeast Asian countries. In: J.R. Rogge, ed., *Refugees: A Third World Dilemma*, New Jersey: Rowan and Littlefield.

Human Dimensions of Global Environmental Change Programme. 1994-1995. *Work Plan*. Occasional Paper Number 6 (Spring).

Huntington, S. 1991. America's Changing Strategic Interests. *Survival* 33: 3-17.

Huysmans, J. 1995. Migrants as a Security Problem: Dangers of 'Securitizing' Societal Issues. In: Robert Miles & Dietrich Thranhardt, eds., *Migration and European Integration: The Dynamics of Inclusion and Exclusion*, London: Pinter. pp 20.

Hveem, H. 1979. Militarization of Nature: Conflict and Control over Strategic Resources and Some Implications for Peace Policies. *Journal of Peace Research* 16:1: 1-26.

ICIHI (The Independent Commission on International Humanitarian Issues). 1986. *Refugees: The Dynamics of Displacement*. London: Zed Books.

Imber, M.F. 1994. *Environment, Security and UN Reform.* New York: St. Martin's Press.

International Consortium for the Study of Environmental Security. 1994. *Population/Environment Equations: Implications for Future Security*. Final Report of the Third Conference of the International Consortium for the Study of Environmental Security. Tufts University, 31 May-4 June, 1994.

International Institute for Environment and Development (IIED). 1984. *Environment and conflict, briefing document 40*. London.

International Peace Research Institute, Oslo and United Nations Environment Programme. 1989. *Environmental Security*. Report contributing to the concept of Comprehensive International Security, Oslo, Norway.

Intriligator, M.D. 1991. Defining 'Global Security'. *Disarmament* 24:4: 59-72.

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

Jacobsen, K. 1994. *The Impact of Refugees on the Environment*. Working paper of the Refugee Policy Group (June), Washington, D.C.

Jacobson, J. 1988. *Environmental Refugees: A Yardstick of Habitability.* Worldwatch Paper 86. Washington, D.C.: Worldwatch Institute

Jarrett, R., R. Reuter, J. Stratta, and R. Jain. 1992. *Environmental Trends--Policy Implications for the U.S. Army*. Army Environmental Policy Institute, Champaign, IL.

Kahl, Colin A. 1997. "States and Scarcity: A State-Centric Theory of Environmentally-Induced Violent Conflict."

Käkönen, J. (ed). 1992. *Perspectives on Environmental Conflict and International Politics*. London: Pinter Publishers.

Käkönen, J. (ed). 1994. *Green Security or Militarized Environment*. Tampere Peace Research Institute. Brookfield: Dartmouth Publishing Co.

Käkönen, J. 1988. *Natural Resources and Conflicts in the Changing International System: Three Studies on Imperialism*. Brookfield: Avebury.

Käkönen, J. 1992. The Concept of Security-From Limited to Comprehensive. In: Käkönen, J., ed., *Perspectives on Environmental Conflict and International Politics*, London: Pinter Publishers. pp 146-155.

Kane, H. 1995. *The Hour of Departure: Forces that Create Refugees and Migrants*. Worldwatch Paper No. 125, Worldwatch Institute, Washington, D.C.

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

Kaplan, R. 1994. The Coming Anarchy. *The Atlantic Monthly* (Feb): 45-76.

Kaplan, R. 1997. History Moving North. *The Atlantic Monthly.* (Feb): 21-31.

Karp, R.C. (ed). 1993. *Central and Eastern Europe: The Challenge of Transition.* Stockholm International Peace Research Institute: Oxford University Press.

Kavanagh, B. and S. Lonergan, 1992. *Environmental Degradation, Population Displacement and Global Security: An Overview of the Issues*. Report IR92-1, Canadian Global Change Program, Ottawa.

Keeley, Lawrence H. 1996. *War Before Civilisation*. Oxford University Press, New York.

Keller, K. 1996. Unpacking the Environment. *World Policy Journal.* (Fall): 11-23.

Kellman, B. 1995. The Chemical Weapons Convention: A Verification and Enforcement Model for International Environmental Treaties. Paper presented at the Annual Convention of the International Studies Association, Chicago, IL, February 1995.

Kelly, K. and T. Homer-Dixon. 1995. *Environmental Scarcity and Violent Conflict*. Paper of the Project on Environment, Population and Security, The Peace and Conflict Studies Program, University of Toronto and the American Association for the Advancement of Science.

Kemp, G. 1977. Scarcity and Strategy. *Foreign Affairs* 56: 396-414.

Kennedy, D. 1996. Regional Dimensions of Environmental Security. Paper presented at the Workshop on Environmental Threats and National Security: An International Challenge to Science and Technology, Monterey, California, 10-12 December 1996.

Kerr, R. 1994. The Defense Department Declassifies the Earth-Slowly. *Science* 263: 625-6.

Kimball, D., et al. 1993. *Covering the Map: A Survey of Military Pollution Sites in the United States.* Washington, D.C.: Physicians for Social Responsibility; Litchfield: Military Toxics Project.

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

Klare, M.T. 1993. War, Weapons, and Sustainability in the Post-Cold War Era. Paper presented at Footsteps to Sustainability Conference of the Harrison Program of the Future Global Agenda, Washington, D.C., 30 October 1993.

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

Kliot, N. 1994. *Water Resources and Conflict in the Middle East*. London: Routledge.

Klötzli, S. 1992. *Sustainable Development: a Disputed Concept*. Occasional Paper No. 2, Environment and Conflicts Project, Swiss Peace Foundation, Berne, and Center for Security Studies and Conflict Research, Zurich, Switzerland.

Klötzli, S. 1994. *The Water and Soil Crisis in Central Asia-A Source for Future Conflicts?* Occasional Paper No. 11, Environment and Conflicts Project, Swiss Peace Foundation, Berne, and Center for Security Studies and Conflict Research, Zurich, Switzerland.

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

Knauft, B. 1992. Warfare, western intrusion, and ecology in Melanesia. *Man* (n.s.) 27:399-401.

Kolars, J. 1990. The Course of Water in the Arab Middle East. *American-Arab Affairs* 33: 57-68.

Kolars, J. 1992. *Sustainable Development: A Disputed Concept*. Occasional Paper No. 2, Environment and Conflicts Project, Swiss Peace Foundation, Berne, and Center for Security Studies and Conflict Research, Zurich, Switzerland.

Kolars, J. 1992. Trickle of Hope: Negotiating Water Rights Is Critical to Peace in the Middle East. *The Sciences* (Nov./Dec.)

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

Koplow, D.A. 1994. *Some Disassembly Required: Eliminating Chemical Weapons While Protecting the Environment*. Lawyers Alliance for World Security, Committee for National Security, July 1994.

Krause, K. 1994. *Redefining International Peace and Security?: The Discourses and Practices of Multilateral Security Activity*. Working Paper No. 13, York University Centre for International and Strategic Studies, Toronto.

Krause, K. and M.C. Williams. 1996. Broadening the Agenda of Security Studies: Politics and Methods. *Mershon International Studies Review* 40: 229-254.

Krause, K., and M.C. Williams. 1995. From Strategy to Security: Foundations of Critical Security Studies. Paper presented at the Annual Convention of the International Studies Association, Chicago, IL, February 1995.

Kumar, C. 1993. *Beyond Earth Summit '92: Redefining the International Security Agenda*. ACDIS Occasional Paper, University of Illinois, Urbana, IL.

Kurth, J. 1993. The Decline and Fall of Almost Everything: Paul Kennedy Peers into the 21st Century. *Foreign Affairs* 72:2: 156-162.

Lang, C.I. 1995. *Environmental Degradation in Kenya as a Cause of Political Conflict, Social Stress, and Ethnic Tensions*. Occasional Paper No. 12, Environment and Conflicts Project, Swiss Peace Foundation Berne and Center for Security Studies and Conflict Research, Zurich.

LaRiviere, J.W.M. 1989. Threats to the World's Water. *Scientific American* 26:1: 80-94.

Latham, R. 1995. Thinking About Security after the Cold War. *International Studies Notes* 20: 9-16.

Lazaro, M.A., and H. Wang. 1992. Global Environmental Security: Research and Policy Studies for the 1990s. In: Hua Wang, Shen-Lin Chang, and Ho-Ching Lee, eds., *Energy, Environment, and Information Management*, Argonne: International Symposium on Energy, Environment, and Information Management.

Lazarus, D. 1990. New strangers at the door? *Refugees* 84: 11-12.

Le Prestre, P. 1992. The Notion of Environmental Security. In: Paul Painchaud, ed., *Geopolitical Perspectives on Environmental Security*, Université Laval, Québec: Cahier du GERPE, No. 92-05.

Le Prestre, P. 1993. Environmental Security and the Future of American Defense Policy. Paper presented at GeoPolitics of the Environment and the New World Order: Limits, Conflicts, Insecurity? SORISTEC, Chantilly, France, January 1993.

Lee, S.W. 1993. Environmental Refugees in the Third World: Offsprings of Natural and Human-induced Disasters. Paper presented at the Annual Meeting of the International Studies Association, Acapulco, Mexico, 23-27 March 1993.

Lee, S.W. 1994. A Deadly Triangle: The Environment, Refugees, and Conflict. Paper presented at the Annual Meeting of the American Political Science Association, New York, 1-4 September 1994.

Lee, S.W. 1995. An 'Official' Refugee? Environmentally Displaced Persons. Paper presented at the Annual Meeting of the International Studies Association, Chicago, IL, 22-26 February 1995.

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

Lee, S.W. 1996. Not a One-Time Event: Environmental Change, Ethnic Rivalry, and Violent Conflict in the Third World. Paper presented at the International Studies Association Annual Meeting, San Diego, CA, April 1996.

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

Lehtinen, A. 1992. Questions on Environment and Democracy within Northern Boreal Forestry: The Finnish Forest Conflict Becoming an International Issue. In: S. Lodgaard and A. Hjort af Ornäs, eds., *The Environment and International Security*, Oslo: International Peace Research Institute. pp 75-84.

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

Leopold, M. 1994. Adapting to a New World: Refugees and Forced Migration. *Development* : 4.

Levy, M.A. 1995b. Time for a Third Wave of Environment and Security Scholarship? *The Environmental Change and Security Project Report* 1: 44-46.

Levy, M.A.1995a. Is the Environment a National Security Issue? *International Security* 20(2): 35-62.

Libiszewski, S. 1992. *What is an Environmental Conflict?* Environment and Conflicts Project (ENCOP), Occasional Paper No. 6. Zurich: Center for Security Studies and Conflict Research.

Liebler, A. 1992. Deliberate Wartime Environmental Damage: New Challenges for International Law. *California Western International Law Journal* 23: 67-137.

Lim, T.G. and M.J. Valencia (eds). 1990. *Conflict Over Natural Resources in Southeast Asia and the Pacific*. London: Oxford University Press.

Lim, T.G. and M.J. Valencia. 1990. *Conflict Over Natural Resources in South-East Asia and the Pacific*. Singapore: United Nations University Press.

Lipschutz, R. 1995b. On Security. In: Ronnie Lipschutz, ed., *On Security*, New York: Columbia University Press. pp 1-23.

Lipschutz, R.D. 1989. *When Nations Clash: Raw Materials, Ideology, and Foreign Policy*. New York: Ballinger.

Lipschutz, R.D. 1992. What Resources Will Matter? Environmental Degradation as a Security Issue. Proceedings from an AAAS Annual Meeting Symposium, Environmental Dimensions of Security, February 1992.

Lipschutz, R.D. 1995a. Negotiating the Boundaries of Difference and Security at Millennium's End. In: Ronnie Lipschutz, ed., *On Security*, New York: Columbia University Press. pp 212-228.

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

Lipschutz, R.D. 1997. "From Place to Planet: Local Knowledge and Global Environmental Governance," *Global Governance 3, #1,* Jan.-Apr. 1997: 83-102.

Lipschutz, R.D. 1997. Environmental conflict and environmental determinism: The relative importance of social and natural factors. In N.P. Gleditsch (Ed.), *Conflict and the Environment*. NATO ASI Series Vol. 33. Dordecht: The Netherlands: Kluwer Academic Publishers.

Lipschutz, R.D. and J.P. Holdren. 1990. Crossing Borders: Resource Flows, the Global Environment, and International Security. *Bulletin of Peace Proposals* 21(2): 121-33.

Lipschutz, R.D. and K. Conca (eds). 1993. *The State and Social Power in Global Environmental Politics*. New York: Columbia University Press.

Lipschutz, R.D., and J.P. Holdren. 1990. Crossing Borders: Resources Flows, the Global Environment, and International Security. *Bulletin of Peace Proposals* 21: 121-133.

Liverman, D.M. 1991. *Environment and Security in Mexico*. University Park: Department of Geography, Pennsylvania State University.

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

Lodgaard, S. 1992. Environment, Confidence-Building and Security. In: S. Lodgaard and A. Hjort af Ornäs, eds., *The Environment and International Security*, Oslo: International Peace Research Institute. pp 19-30.

Lodgaard, S., and A. Hjort af Ornäs (eds). 1992. *The Environment and International Security*. International Peace Research Institute, Oslo (PRIO), Report 3.

Lodgaard, S., N. Gebremedhin, J.B. Opschoor and R.A. Perelet. 1989. *Environmental Security: A Report Contributing to the Concept of Comprehensive International Security*. PRIO/UNEP Programme on Military Activities and the Human Environment, Oslo.

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

Lonergan, S.C. 1991. *Climate warming, water resources and geopolitical conflict: a study of nations dependent on the Nile, Litani and Jordan River systems*. ORAE Extramural Paper No. 55, Department of National Defense, Ottawa.

Lonergan, S.C. 1993. Impoverishment, population and environmental degradation: the case for equity. *Environmental Conservation* 20(4): 328-334.

Lonergan, S.C. 1994. *Environmental Change and Regional Security in Southeast Asia*. Directorate of Strategic Analysis project report no. PR 659, Canada Department of National Defence, Ottawa.

Lonergan, S.C. and B. Kavanagh. 1991. Climate change, water resources and security in the Middle East. *Global Environmental Change* (September): 272-290.

Lonergan, S.C. and D. Brooks. 1994. *Watershed: The Role of Freshwater in the Israeli-Palestinian Conflict*. Ottawa: IDRC Press.

Lonergan, S.C. and T. Homer-Dixon. 1991. *The Environmental Security Panel of the Canadian Global Change Program: an update on activities*. Delta.

Lonergan, S.C., R. DiFrancesco and M-k. Woo. 1993. Climate change and transportation in northern Canada: an integrated impact assessment. *Climatic Change* 24: 331-351.

Lowi, M. 1992. *West Bank Water Resources and the Resolution of Conflict in the Middle East*. Occasional Paper No. 1, Project on Environmental Change and Acute Conflict, American Academy of Arts and Sciences, Cambridge, MA.

Lowi, M. 1993. Bridging the Divide: Transboundary Resource Disputes and the Case of West Bank Water. *International Security* 18:1: 113-138.

Lowi, M. 1995. Rivers of Conflict, Rivers of Peace. *Journal of International Affairs* 49:1: 123-144.

Lowi, M. 1995. *Water and Power: The Politics of a Scarce Resource in the Jordan River Basin*. Cambridge University Press.

Lowi, M. and J. Rothman. 1993. Arabs and Israelis: the Jordan River. In: G. O. Faure and J. Rubin, eds., *Culture and Negotiation: The Resolution of Water Disputes*, CA: Sage Publications.

Lunde, L. 1991. North/South and Global Warming-Conflict or Cooperation? *Bulletin of Peace Proposals* 22:2: 199-210.

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

Lynn-Jones, S.M., and S.E. Miller (eds). 1995. *Global Dangers: Changing Dimensions of International Security*. Boston: MIT Press.

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

MacNeill, J., P. Winsemius, and T. Yakushiji. 1991. Global Environmental and Geopolitical Change. In: *Beyond Interdependence: The Meshing of the World's Economy and the Earth's Economy*, New York: Oxford University Press. pp 52-73.

Maier, C. 1990. *Peace and Security Studies for the 1990s*. Paper for the MacArthur SSRC Fellowship Program.

Manser, R. 1993. *Failed Transitions: The Eastern European Economy and Environment since the Fall of Communism*. New York: The New Press.

Mathews, J.T. 1991. The Environment and International Security. In: M. Klare and D. Thomas., eds., *World Security: Trends and Challenges at Century's End*, New York: St Martin's Press.

Mathews, J.T. 1992. A New Security Agenda. *The Washington Post* 1 October 1992.

Mathews, J.T. 1992. Preserving the Global Environment: Implications for U.S. Policy. In: C.W. Kegley, Jr. and E.R. Wittkopf, eds., *The Future of American Foreign Policy*, New York: St. Martin's Press. pp 85-94.

Mathews, J.T. 1994. The New Security Puzzles. *The Washington Post*, 24 July 1994.

Mathews, J.T. 1996. Power Shift: The Rise of Global Civil Society. *Foreign Affairs* (December).

Matthew, R. 1995. Environmental Security: Demystifying the Concept, Clarifying the Stakes. *The Environmental Change and Security Project Report* 1: 14-23.

Matthew, R. 1996. The Future of Environmental Security. Paper presented at the NATO Advanced Research Workshop, Bolkesjo, Norway, 12-16 June 1996.

Matthew, R. 1996. The Greening of U.S. Foreign Policy. *Issues in Science and Technology* (Fall): 39-47.

Matthews, J.T. 1989. Redefining Security. *Foreign Affairs* 68: 162-177.

Matthews, J.T. 1990. How Green the Pentagon. *The Washington Post* 19 July 1990: 23.

Matthews, J.T. 1991. Nations and Nature: A New look at Global Security. Presentation at the Twenty-First J. Robert Oppenheimer Memorial Lecture, Los Alamos, New Mexico, August 1991.

Maull, H.W. 1989. Energy and Resources: the Strategic Dimensions. *Survival* 31:6: 500-518.

McCue, G.S. 1993. Environmental Refugees: Applying International Environmental Law to Involuntary Migration. *Georgetown International Environmental Law Review* 6:1: 151-190.

McNeely, Jeffrey A. *Armed Conflicts and Humanitarian Concerns: How Attention to Environmental Scarcity Can Prevent Human Tragedies.* Presented to ICRC Humanitarian Forum, Wolfsburg Centre, 8-10 June 1997.

McNeely, Jeffrey A. *War and Biodiversity: an Assessment of Impacts.* Presented to the First International Conference on Addressing Environmental Consequences of War: Legal, Economic and Scientific Perspectives, Washington D.C., USA, 10-12 June, 1998.

Melasuo, T. 1992. Development, Peasants and Environmental Issues in Wollo, Ethiopia. In: Jyrki Käkönen, ed., *Perspectives on Environmental Conflict and International Politics*, London: Pinter Publishers. pp136-145.

Midtvage, R. 1993. *Water, Resource Use and Conflict: The Case of the Senegal River*. Oslo, International Peace Research Institute.

Miller, J.M. 1992. Hidden Wars: The Militaries' War on the Environment. *Nonviolent Activist* (Nov./Dec.): 4.

Mirovitskaya, N. S., and J. C. Haney. 1992. Fisheries Exploitation as a Threat to Environmental Security: The North Pacific Ocean. *Marine Policy* 16: 243-258.

Mische, P.M. 1989. Ecological Security in an Inter-Dependent World. *Breakthrough* (Summer/Fall): 7-17.

Mische, P.M. 1992. Ecological Security and the Need to Reconceptualize Sovereignty. *Alternatives* 14: 389-427.

Mische, P.M. 1992. Security Through Defending the Environment: Citizens Say Yes! In: Elise Boulding, ed., *New Agendas for Peace Research: Conflict and Security Re-examined*, Boulder: Lynne Reinner Publishers Inc. pp 103-38.

Mische, P.M. 1994. Peace and Ecological Security. *Peace Review* 6: 275-284.

Mische, P.M. 1995. Ecological Security in a New World Order: Some Linkages between Ecology, Peace and Global Security. In: *Non-Military Aspects of International Security*, Paris: UNESCO.

Moffett, G. 1996. How 'Green' Issues Shape Policy. *The Christian Science Monitor*, 9 April 1996, 1 and 18.

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

Molvaer, R.K. 1990. Environmental Cooperation in the Horn of Africa: A UNEP Perspective. *Bulletin of Peace Proposals* 21:2: 135-142.

Molvaer, R.K. 1991. Environmentally Induced Conflicts?: A Discussion Based on Studies from the Horn of Africa. *Bulletin of Peace Proposals* 22: 175-188.

Molvaer, R.K. 1992. Points for the Agenda of Studies in Environmental Security. In: S. Lodgaard and A. Hjort af Ornäs, *The Environment and International Security*, Oslo: International Peace Research Institute. pp 63-74.

Moorehead, R. 1992. Land Tenure and Environmental Conflict: The Case of the Inland Niger Delta, Mali. In: Jyrki Käkönen, ed., *Perspectives on Environmental Conflict and International Politics*, London: Pinter Publishers. pp 96-115.

Moss, R.H. 1992. Environmental Security? The Illogic of Centralized State Responses to Environmental Threats. In: Paul Painchaud, ed., *Geopolitcal Perspectives on Environmental Security*, Université Laval, Québec: Cahier du GERPE, No. 92-05.

Mougeot, L. 1992. *Outmigration induced by environmental degradation*. Draft copy. Environment Department, World Bank, Washington, DC.

Myers, N. 1986. The environmental dimension to security issues. *The Environmentalist* 6(4): 251 - 257.

Myers, N. 1987. *Not Far Afield: U.S. Interests and the Global Environment*. Washington, D.C.: World Resources Institute.

Myers, N. 1989a. Environment and Security. *Foreign Policy* 74: 23-41.

Myers, N. 1989b. Environmental Security: The Case of South Africa. *International Environmental Affairs* 1:2: 138-54.

Myers, N. 1990. Environment and Security: The Emergent Linkages. National Forum: Phi Kappa Phi Journal (Winter).

Myers, N. 1993. *Ultimate Security*. New York: W.W. Norton.

Myers, N. 1993. Environmental Refugees in a Globally Warmed World. *BioScience* 43:11: 752-761.

Myers, N. 1993. *Ultimate Security: The Environmental Basis of Political Stability*. New York: W.W. Norton & Co.

Myers, N., and J. Kent. 1995. *Environmental Exodus: An Emergent Crisis in the Global Arena*. Washington: The Climate Institute.

Myers, N., and J. Simon. 1994. *Scarcity or Abundance? A Debate on the Environment*. New York: W.W. Norton, New York.

Naff, T. 1992. Water Scarcity, Resource Management, and Conflict in the Middle East. Proceedings from Environmental Dimensions of Security, an AAAS Annual Meeting Symposium, Washington, D.C., February 1992.

Naff, T. and R.C. Matson (eds). 1984. *Water in the Middle East: Conflict or Cooperation?* Boulder, Colorado: Westview Press Inc.

National Academy of Sciences (U.S.). 1991. *Policy Implications of Global Warming*. Washington, D.C.

National Governors' Association. 1990. From Crisis to Commitment: Environmental Cleanup and Compliance at Federal Facilities. National Governors' Association (NGA)-National Association of Attorneys General Task Force on Federal Facilities, Washington, D.C.

National Science and Technology Council. 1995. National Science and Technology Council's Committee for National Security. *National Security Science and Technology Strategy*.

National Toxic Campaign Fund. 1991. *The U.S. Military's Toxic Legacy: A Special Report on America's Worst Environmental Enemy*. National Toxic Campaign Fund (NTCF), Boston, MA.

NATO. 1992. Pilot Study on Promotion of Environmental Awareness in the Armed Forces, Final Report. NATO, Committee on the Challenges of Modern Society 10 June 1992.

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

Nnoli, O. 1990. Desertification, Refugees and Regional Conflict in West Africa. *Disasters* 14: 132-139.

Nordenfelt, J. 1992. Environmental Destruction as Method of Warfare. In: S. Lodgaard and A. Hjort af Ornäs, eds., *The Environment and International Security*, Oslo: International Peace Research Institute. pp 31-40.

North, R. C. 1977. Toward a Framework for the Analysis of Scarcity and Conflict. *International Studies Quarterly* 21: 569-591.

Obi, C. 1996. Oil, Environmental Conflict and National Security in Nigeria: Ramifications of the Ecology-Security Nexus for Sub-Regional Peace. Paper presented at the International Studies Association Annual Meeting, San Diego, CA, 1996.

Ohlsson, L. 1995. *Water and Security in Southern Africa*. Publication on Water Resources No 1, Swedish International Development Cooperation Agency, Department for Natural Resources and the Environment.

Ohlsson, L., ed. 1992. *Regional Case Studies of Water Conflicts.* Padrigu Papers, Department of Peace and Development Research, University of Göteborg, Sweden.

Ophuls, W. 1976. *Ecology and the Politics of Scarcity*. San Francisco: Freeman.

Ophuls, W. and A.S. Boyan, Jr. 1990. *Ecology and the Politics of Scarcity Revisited*. New York: W.H. Freeman and Co.

Opschoor, J.B. 1989. North-South Trade, Resource Degradation and Economic Security. *Bulletin of Peace Proposals* 20(2): 135-42.

Organisation for Economic Co-operation and Development. 1996. *Shaping the 21st Century: The Contribution of Development Co-operation*. Report adopted at the Thirty-fourth High Level Meeting of the Development Assistance Committee, held on 6-7 May 1996.

Organisation for Economic Co-operation and Development. 1997. *DAC Guidelines on Conflict, Peace and Development Co-operation*.

Organisation for Economic Co-operation and Development. 1997. *Military Expenditure in Developing Countries: Security and Development*. A report of the findings of the Ottawa Symposium on Military Expenditures in Developing Countries: Security and Development, co-sponsored by the Government of Canada, and the Development Assistance Committee of the OECD Paris, France, and held in Ottawa on 18-19 March 1997.

Organisation for Economic Co-operation and Development. 1997. *Guiding the Transition to Sustainable Development: A Critical Role for the OECD*. Report of the High-Level Advisory Group on the Environment, November 1997.

Organisation for Economic Co-operation and Development. 1998. *OECD Work on Sustainable Development: a discussion paper on work to be undertaken over the period 1998-2001*. July 1998.

Osborn, F. 1953. *Our Plundered Planet*. Boston: Little Brown.

Painchaud, P., ed. 1992. *Geopolitical Perspectives on Environmental Security*. Université Laval, Québec: Cahier du GERPE, No. 92-05.

Parry, M.L. 1986. Some implications of climatic change for human development. In: W.C. Clark and R.E. Munn, eds., *Sustainable Development of the Biosphere*. Cambridge: Cambridge Univ. Press.

Payne, R.A. 1996. The GEF, Environmental Conflict, and Transnational Environmentalism. Paper presented at the NATO Advanced Research Workshop, Bolkesjo, Norway, 12-16 June 1996.

Payne, R.J. 1980. Flags of Convenience and Oil Pollution: A Threat to National Security? *Houston Journal of International Law* 3:1: 67-99.

Peluso, N. 1993. Coercing Conservation. In: Ronnie D. Lipschutz and Ken Conca, eds., *The State and Social Power in Global Environmental Politics*, New York: Columbia University Press. pp 46-70.

Percival, V. and T. Homer-Dixon. 1995. Environmental Scarcity and Violent Conflict: The Case of South Africa. Paper of The Project on Environment, Population and Security, The Peace and Conflict Studies Program, University of Toronto and the American Association for the Advancement of Science.

Percival, V. and T. Homer-Dixon. 1996. Environmental Scarcity and Violent Conflict. *Journal of Environment and Development* 5:3: 270-291.

Percival, V., and T. Homer-Dixon. 1995. *Environmental Scarcity and Violent Conflict: The Rwandan Case*. Occasional Paper, Project on Environment, Population, and Security, The Peace and Conflict Studies Program, University of Toronto, and the American Association for the Advancement of Science, Washington, D.C.

Perelet, R. 1994. The Environment as a Security Issue. In: *The Environment: Towards a Sustainable Future*, Dutch Committee for Long-Term Environmental Policy. Boston: Kluwer Academic Publishers.

Peterson, S.B., and J.M. Teal. 1986. Ocean Fisheries as a Factor in Strategic Policy and Action. In: Arthur H. Westing, ed., *Global Resources and International Conflict: Environmental Factors in Strategic Policy and Action*, Oxford: Oxford University Press. pp 114-142.

Pirages, D. 1978. *Global Ecopolitics: A New Context for International Relations*. North Scituate: Duxbury Press.

Pirages, D. 1991a. Social Evolution and Ecological Security. *Bulletin of Peace Proposals* 22: 329-334.

Pirages, D. 1991b. The Greening of Peace Research. *Journal of Peace Research* 28:2: 129-133.

Pirages, D. 1996. Ecological Security: Micro-Threats to Human Well-Being. Paper presented at the International Studies Association Annual Meeting, San Diego, CA, April 1996.

Plant, G. 1992. *Environmental Protection and the Law of War: A 'Fifth Geneva' Convention on the Protection of the Environment in Time of Armed Conflict*. New York: Belhaven Press.

Ponting, Clive. 1992. *A Green History of the World: The Environment and the Collapse of Great Civilisations*. St. Martin's Press, New York.

Porfiriev, B. N. 1992. The Environmental Dimension of National Security: A Test of Systems Analysis Methods. *Environmental Management* 16: 735-742.

Porter, G. 1990. Post-Cold War Global Environment and Security. *The Fletcher Forum* (Summer): 332-44.

Porter, G. 1992. Economic and Environmental Security in U.S. National Security Policy. Paper presented at the Environmental and Energy Study Institute Roundtable on Environment, Economics and Security in the Post-Cold War World, Washington, D.C., May 1992.

Porter, G. 1993. *Environmental Security and U.S. Foreign Policy*. Working Paper, Environmental and Energy Study Institute, Washington, D.C.

Porter, G. 1995. Environmental Security as a National Security Issue. *Current History* 94: 218-222.

Porter, G., and J. Welsh Brown. 1991. The Environment and World Politics: Security, North-South Relations and Trade. In: *Global Environmental Politics*, Boulder: Westview Press. pp 107-142.

Postel, S. 1984. *Water: Rethinking Management in an Age of Scarcity*. Washington: Worldwatch Institute, Paper No. 62.

Postel, S. 1992. *Last Oasis: Facing Water Scarcity*. New York: W.W. Norton & Co.

Postel, S. 1993. *Politics of Water*. Worldwatch Paper, Worldwatch Institute, Washington, D.C.

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

Preston, R. 1994. *The Hot Zone*. New York: Random House.

Princen, T. and M. Finger. 1994. *Environmental NGOs in World Politics: Linking the Local and the Global*. New York: Routledge.

Prins, G. 1990. Politics and the Environment. *International Affairs* 66: 711-730.

Prins, G., and R. Stamp. 1991. *Top Guns & Toxic Whales: The Environment & Global Security*. London: Earthscan Publications, Ltd.

Prins, G., ed. 1993. *Threats Without Enemies*. London: Earthscan.

PRIO (International Peace Research Institute, Oslo) and UN Environment Programme. 1989. Environmental Security: A Report Contributing to the Concept of Comprehensive International Security. Report from a conference in Moscow, 28 November - 1 December, 1988.

Renew America. 1994. *Environmental Partnerships: Improving Opportunities for Military/Civilian Cooperation*. Renew America, Washington, D.C.

Renner, M. 1989. *National security: the economic and environmental dimensions*. Worldwatch Paper 89. Washington, D.C.: Worldwatch Institute.

Renner, M. 1991. Assessing the Military's War on the Environment. In: Lester Brown, ed., *State of the World 1991*, New York: W.W. Norton.

Renner, M. 1991. Military Victory, Ecological Defeat. *Worldwatch* (July-August).

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

Renner, M., M. Pianta, and C. Franchi. 1991. International Conflict and Environmental Degradation. In: Raimo Väyrynen, ed., *New Directions in Conflict Theory*, London: Sage. pp 108-128.

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

Robinson, J. P. 1979. *The Effects of Weapons on Ecosystems*. Vol.1, United Nations Environment Programme Studies. New York: Pergamon Press.

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

Rogge, J. (ed.). 1987. *Refugees: A Third World Dilemma*. New Jersey: Rowan and Littlefield.

Romm, J. 1992. *The Once and Future Superpower: How to Restore America's Economic, Energy, and Environmental Security*. New York: William Morrow.

Romm, J. 1993. *Defining National Security: the Non-Military Aspects*. New York: Council on Foreign Relations Press.

Roots, E.F. 1992. International agreements to prohibit or control modification of the environment for military purposes: an historical overview. In: H.B. Schiefer, ed., Verifying Obligations Respecting Arms Control and the Environment: A Post Gulf War Assessment. Workshop Proceedings, Arms Control and Disarmament Division, External Affairs and International Trade Canada, Ottawa.

Rowlands, I. 1991. The Security Challenges of Global Environmental Change. *Washington Quarterly* 14(1): 99-118.

Russell, J. 1991. *Energy and Environmental Conflicts in East-Central Europe: The Case of Power Generation*. Energy and Environmental Programme, Royal Institute of International Affairs, London, England.

Russett, B. 1982. Security and the resources scramble: will 1984 be like 1914? *International Affairs* 58: 42 - 58.

Saad, S. 1991. For Whose Benefit? Redefining Security. *Eco-Decisions* (September): 59-60.

Saad, S. 1995. For whose benefit? Redefining security. In K. Conca, M. Alberty, & G.D. Dabelko (Eds.), *Green Planet Blues: Environmental Politics from Stockholm to Rio* (pp. 273-275). Boulder, CO: Westview Press Inc.

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

Salih, M.A.M. 1992. Environmental Conflicts in African Arid Lands: Cases from the Sudan and Nigeria. In: Jyrki Käkönen, ed., *Perspectives on Environmental Conflict and International Politics*, London: Pinter Publishers. pp 116-135.

Sandberg, Kristin and Dan Smith. 1994. "Conflicts in Africa." *North/South Coalition Information Bulletin* 2-94 (December): 5-19.

Sands, P. 1994. Enforcing Environmental Security. In: P. Sands, ed., *Greening International Law*, New York: The New Press. pp 50-64.

Saviano, S. 1994. Environmental Change and Acute Conflict: The Ethiopian Famine of 1984-85 and Civil War. Paper presented at the Annual Meeting of the International Studies Association, Washington, D.C., March 1994.

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

Schettler, T.H. 1995. Reverberations of Militarism: Toxic Contamination, the Environment, and Health. *Medicine & Global Survival* 2: 7-18.

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

Schrijver, N. 1989. International Organization for Environmental Security. *Bulletin of Peace Proposals* 20(2): 115 - 122.

Serageldin, I. 1996. Population Dynamics, Environment, and Conflict. Paper presented at the Conference on Population, Environment and Development, Tata Energy and Resources Institute, Washington, D.C., 13-14 March 1996.

Sharp, W.G. 1992. The Effective Deterrence of Environmental Damage During Armed Conflict: A Case Analysis of the Persian Gulf War. *Military Law Review* 187.

Shaukat, H. 1991. Environmental Issues and Security in South Asia. Adelphi Papers (Autumn): 262.

Shaw, C. and A. von Lazar. 1992. The Nature of Security and the Security of Nature: Sustainable Growth After the Cold War. In: Paul Painchaud, ed., *Geopolitical Perspectives on Environmental Security*, Université Laval, Québec: Cahier du GERPE, No. 92-05.

Shiva, V. 1994. Conflicts of Global Ecology: Environmental Activism in a Period of Global Reach. *Alternatives: Social Transformation and Global Governance* 19:2: 195-207.

Shuman, M.H., and H. Harvey. 1994. *Security Without War: A Post-Cold War Foreign Policy*. Boulder: Westview Press.

Siegel, L. 1992. Operation Ozone Shield: The Pentagon's War on the Stratosphere. Boston: National Toxic Campaign Fund (NTCF), Boston, MA, February.

Siegel, L. and G. Cohen. 1991. America's Worst Environmental Nightmare: The U.S. Military's Toxic Legacy. *New Solutions* (Winter): 37-47

Silton, T. 1993. Out of the Frying Pan...Chemical Weapons Incineration in the United States. *The Ecologist* 23:1: 18-24.

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

Smil, V. 1992a. *Potential Environmental Conflicts Involving Countries of the North Pacific*. Working Paper #4. University of York: North Pacific Co-operative Security Dialogue - Research Programme.

Smil, V. 1992b. *Environmental Change as a Source of Conflict and Economic Losses in China*. Occasional Paper Series on Environmental Change and Acute Conflict. Toronto: Peace and Conflict Studies Program.

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

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

Solem, E. 1995. Environmental Security and International Relations: Trends, Discontinuities and Decision-making. Paper presented at the Thirteenth Nordic (and First Baltic) Peace Research Conference, Lohusalu, Estonia, 29 June-2 July, 1995.

Soroos, M.S. 1991. Global Change and Environmental Security: National Policy Options and the Prisoner's Dilemma. Paper prepared for the 15th World Congress of the International Political Science Association, Buenos Aires, Argentina, July 1991.

Soroos, M.S. 1992. Conflict in the Use and Management of International Commons. In Jyrki Käkönen, ed., *Perspectives on Environmental Conflict and International Politics,* London: Pinter Publishers. pp 31-43.

Soroos, M.S. 1992. Why I am Insecure About Environmental Security. ed. Paul Painchaud, Cahier du GERPE, No. 92-05 University of Laval, Quebec.

Soroos, M.S. 1994. Global Change, Environmental Security, and the Prisoner's Dilemma. *Journal of Peace Research* 31:3: 317.

Soroos, M.S. 1995. Environmental Security: Choices for the 21st Century. *National Forum* 75:1: 20-24.

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

Speth, J.G. 1990. Environmental security for the 1990s. *Development* 3-4: 9-16.

Spillman, K.R. and G. Bächler (eds.). 1995. *Environmental Crisis: Regional Conflicts and Ways of Cooperation*. Environment and Conflicts Project Occasional Paper No. 14. Zurich: Center for Security Studies and Conflict Research.

Sprinz, D. 1996. Regulating the International Environment: A Conceptual Model of Environmental Security and Instrument Choice. Paper presented at the NATO Advanced Research Workshop, Bolkesjo, Norway, 12-16 June 1996.

Sprout, H. and Sprout, M. 1971. *The ecological perspective on human affairs*. Princeton: Princeton University Press.

Stanley Foundation. 1989. *Environmental Problems: A Global Security Threat*. Report of the 24th UN of the Next Decade Conference, New York City, June 1989.

Starr, J. 1991. Water Wars. *Foreign Policy* (Winter): 17-36.

Starr, J. R. 1988. *The Politics of Scarcity: Water in the Middle East*. Boulder: Westview Press.

Starr, J. R., and D. C. Stoll (eds). 1987. *U.S. Foreign Policy on Water Resources in the Middle East*. Center for Strategic and International Studies, Washington, D.C.

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

Stern, E.K. 1992. 'High Politics' and Crisis: Military and Environmental Dimensions of Security. In: S. Lodgaard and A. Hjort af Ornäs, eds., *The Environment and International Security*, Oslo: International Peace Research Institute. pp 85.

Stern, E.K. 1995. Bringing the Environment In: The Case for Comprehensive Security. *Cooperation and Conflict* 30: 211-237.

Stoett, P.J. 1994a. Global Environmental Security, Energy Resources and Planning: A Framework and Application. *Futures* 26:7: 741-758.

Stoett, P.J. 1994b. The Environmental Enlightenment: Security Analysis Meets Ecology. *Coexistence*: 127-146.

Stoett, P.J. 1995. *Atoms, Whales and Rivers: Global Environmental Security and International Organization*. Commack, NY: Nova Science Publishers, Inc.

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

Stranks, R.T. 1995. *A View of the Forest: Environmental Stress, Violent Conflict and National Security*. Policy Staff Paper, Department of Foreign Affairs and International Trade.

Stubbs, R. 1980. Why can't they stay in Southeast Asia? The problems of Vietnam's neighbours. In: E.L. Tepper, ed., *Southeast Asian Exodus: From Tradition to Resettlement*. Ottawa: The Canadian Asian Studies Association.

Suhrke, A. 1991. *Environmental change, population displacement and acute conflict*. Draft paper. The American University.

Suhrke, A. 1992. Environmental degradation, migration and conflict. Paper presented at the Brookings Institutions, Washington, D.C., May.

Suhrke, A. 1992. *Environmental Degradation, Migration and Social Conflict*. The Christian Nichelsen Institute, Bergen, Norway.

Suhrke, A. 1993. *Pressure Points: Environmental Degradation, Migration and Conflict*. Occasional Paper No. 3, Project on Environmental Change and Acute Conflict, University of Toronto Peace and Conflict Studies Program, and the American Academy of Arts and Sciences, Washington, D.C., March 1993.

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

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

Suhrke, A. and A. Visentin. 1991. The environmental refugee: a new approach. *Ecodecision* 2: 73-74.

Suliman, M. 1992. *Civil War in Sudan: The Impact of Ecological Degradation*. Occasional Paper No. 4, Environment and Conflicts Project, Swiss Peace Foundation, Berne, and Center for Security Studies and Conflict Research, Zurich, Switzerland, December 1992.

Suliman, M. 1993. Civil War in Sudan: From Ethnic to Ecological Conflict. The Ecologist 23: 104-109.

Suter, K.D. 1995. Environmental Security. In: *Non-Military Aspects of International Security*. Paris: UNESCO.

Svensson, U. 1988. Environmental Security: A Concept. Presented at the International Conference on Environmental Stress and Security, the Royal Swedish Academy of Sciences, Stockholm, Sweden, December 1988.

Swain, A. 1993. Conflicts Over Water: The Ganges Water Dispute. *Security Dialogue* 24: 429-439.

Swain, A. 1993. *Environment and Conflict: Analyzing the Developing World*. Report No. 37, Department of Peace and Conflict Research, Uppsala University, Uppsala, Sweden.

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

Symonides, J. and V. Volodin. 1995. Concept and New Dimensions of Security: Introductory Remarks. *Non-Military Aspects of International Security.* Paris*:* UNESCO.

Szasz, P.C. 1992. Environmental Destruction as a Method of Warfare: International Law Applicable to the Gulf War. *Disarmament* XV:2: 128-161.

Tarasofsky, R.G. 1994. International Law and the Protection of the Environment During International Armed Conflict. In: P. Sands, ed., *Greening International Law*, New York: The New Press. pp 243-249.

The Economist. 1994. Swords into Sensors. The Economist (January): 85-86.

Theorein, B. 1992. Military Resources to the Environment. *Bulletin of Peace Proposals* Vol. 23:2: 119-122.

Thomas, C. 1992. *The Environment in International Relations*. London: The Royal Institute of International Affairs.

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

Thomas, R. 1993. Who is the Enemy? Redefining Security. *Ecodecision* 9: 41-44.

Thompson, Colonel R.L. 1978. Water as a source of conflict. *Strategic Review* 62: 62 - 71.

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

Timberlake, L. 1985. *Environment and Conflict*. London: Earthscan Publications.

Timberlake, L. and J. Tinker. 1984. *Environment and Conflict*. London: Earthscan Briefing Document.

Timberlake, L. and J. Tinker. 1985. The environmental origins of conflict. *Socialist Review* 15(6): 57 - 75.

Timberlake, L., and J. Tinker. 1984. *Environmental Conflict: Links Between Ecological Decay, Environmental Bankruptcy and Political and Military Instability*. Earthscan Briefing, London, 1984, Earthscan Publications.

Timoshenko, A.S. 1992. Ecological Security: Response to Global Challenges. In: Edith Brown Weiss, ed., *Environmental Change and International Law: New Challenges and Dimensions*, New York: United Nations University Press.

Toro, Taryn. 1992. German naturalists defend the Red Army's legacy. *New Scientist* 11 April: 10.

Trolldalen, J.M. 1992. International Environmental Conflict Resolution: The Role of the United Nations. World Foundation for the Environment, New York, NY.

Trolldalen, J.M., N.M. Birkeland, J. Borgern and P.T. Scott. 1992. Environmental Refugees. Discussion Paper, World Foundation for Environment and Development and the Norwegian Refugee Council, Oslo, Norway.

Turner, B.L. (ed.). 1990. *The Earth as Transformed by Human Action.* Cambridge University Press, Cambridge.

Turner, S. 1991. Intelligence for a New World Order. *Foreign Affairs* 71: 63-72.

Tyler, P.E. 1990. Senators Propose Shift of Defense Funds to Study Environment. *The Washington Post*, 29 June 1990, A7.

U.S. Environmental Protection Agency (EPA). 1988. *The Potential Effects of Global Climate Change on the United States* (Draft). Washington, D.C.: U.S. EPA.

U.S. European Command. 1993. *Environmental Security in USEUCOM in the Year 2003*. U.S. European Command Draft Vision Document.

U.S. Government. 1991. *National Security Strategy of the United States*. Washington, D.C.: U.S. Government Printing Office.

U.S. News & World Report. 1995. The Ultimate Security Risk: Holes in the Ozone Layer. *U.S. News & World Report*, 17 February 1995, 6-7.

Ullman, R.H. 1983. Redefining security. *International Security* 8(1): 129 - 153.

UNDP (United Nations Development Program). 1994. *The Human Development Report, 1994*. Oxford: Oxford Univ. Press.

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

United Nations Environmental Program. 1993. Updated Scientific Report Environmental Effects of the Conflict between Iraq and Kuwait. United Nations Environmental Program, GC.17/Inf.9., New York, NY, 8 March 1993.

United Nations Institute for Disarmament Research. 1992. Disarmament-Environment- Security. UNIDIR Newsletter No. 18 United Nations Institute for Disarmament Research, July 1992.

United Nations Publications. 1993. Potential Uses for Military-Related Resources for Protection of Environment. Disarmament Study Series, No. 25, United Nations Publications, New York, NY, 1993.

United Nations. 1989. Environmental Problems: A Global Security Threat? Report of the 24th United Nations of the Next Decade Conference, New York City, June 18-23, 1989.

United Nations. 1989. Study on the Climatic and Other Global Effects of Nuclear War. Disarmament Study Series #18, United Nations, Report of the Secretary-General, New York, NY, 1989.

United Nations. 1991. Charting Potential Uses of Resources Allocated to Military Activities for Civilian Endeavours to Protect the Environment. United Nations, Report of the Secretary-General, A/46/364, New York, NY, 17 September 1991.

United Nations. 1992. Protection of the Environment in Times of Armed Conflict. United Nations, Report of the Secretary- General, A/47/328, New York, NY, 31 July 1992.

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

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

United States Congress, Office of Technology Assessment. 1991. Complex Cleanup: Environmental Legacy of Nuclear Weapons Production. United States Congress, Office of Technology Assessment, OTA-O-484, Washington, D.C., February 1991.

United States General Accounting Office. 1995. Military Bases: Environmental Impact at Closing Installations. United States General Accounting Office, GAO/NSIAD-95-70, Washington, D.C., February 1995.

United States Senate Committee on Environment and Public Works. 1992. The Environmental Aftermath of the Gulf War: A Report. United States Senate Committee on Environment and Public Works, Gulf Pollution Task Force, Washington, D.C., March 1992.

Vaahtoranta, T. 1992. The Control of Atmospheric Pollution: Is There an East-West Conflict? In: Jyrki Käkönen, ed., *Perspectives on Environmental Conflict and International Politics*, London: Pinter Publishers. pp 44-54.

Vayda, A. 1976. *War in Ecological Perspective: Persistence, Change and Adaptive Processes in Three Oceanian Societies*. Plenham Press, New York.

Väyrynen, R. 1990. Towards a Comprehensive Definition of Security: Pitfalls and Promises. Paper presented at the 31st Annual Convention of the International Studies Association, Washington, D.C., April 1990.

Vesa, U. 1993. Environmental Security and the Baltic Sea Region. In: P. Joenniemi, ed., *Cooperation in the Baltic Sea Region*, Washington, D.C.: Taylor and Francis. pp 87-98.

Vesilind, P.J. 1993. Water, The Middle East's Critical Resource. *National Geographic* 183:5.

Vest, G. 1993. *Environmental Security in the Year 2003*. Department of Defense, Washington, D.C.

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

Vogler, J. and M.F. Imber (eds). 1996. *The Environment & International Relations.* London & New York: Routledge.

Waddell, J.M. 1992. *Environment as an Element of National Security*. Working Paper, U.S. Army Corps of Engineers, Office of Strategic Initiatives, Washington, D.C.

Waever, O. 1993. *Securitization and Desecuritization*. Working Paper No. 5, Centre for Peace and Conflict Research, Copenhagen, Denmark.

Wæver, O. 1995. Securitization and Desecuritization. In R. Lipscutz (Ed.), *On Security* (pp. 46-86). New York: Columbia University Press.

Waever, O., B. Buzan, M. Kelstrup and P. Lemaitre. 1993. *Identity, Migration and the New Security Agenda in Europe*. Guildford: Pinter.

Wæver, Ole. 1995. Securitization and Desecuritization. In: *On Security*. Ronnie D. Lipschutz, ed. New York: Columbia University Press. pp. 46-86.

Walker, R.B.J. 1990. Security, Sovereignty, and the Challenge of World Politics. *Alternatives* XV: 3-27.

Wallensteen, P. 1986. Food crops as a factor in strategic policy and action. In: Westing, op cit.

Wallensteen, P. 1992. Environmental destruction and serious social conflict: developing a research design. In: Hjort af Ornäs and S. Lodgaard (eds.), The Environment and International Security. Uppsala: International Peace Research Institute.

Walt, S.M. 1991. The renaissance of security studies. *International Studies Quarterly*, 35 (2), 211-239.

Wapner, P. 1995. Politics Beyond the State: Environmental Activism and World Civic Politics. *World Politics* 47: 311-40.

Wapner, P. 1996. *Environmental Activism and World Politics*. New York: SUNY Press.

Waterbury, J. 1992. Three Rivers in Search of a Regime: The Jordan, the Euphrates, and the Nile. Paper prepared for the 17th Annual Symposium of the Center for Contemporary Studies, Georgetown University, Washington, D.C., April 1992.

Weinberg, B. 1991. *War on the Land: Ecology and Politics in Central America*. London: Zed Books.

Weiner, M. 1993. Security, Stability and International Migration. *International Security* (Winter 1992-93)**:** 91-126.

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

Weiner, S.K. 1992. Environmental Concerns at U.S. Overseas Military Installations. Working Paper, Center for International Studies, Defense and Arms Control Studies Program (DACS) , MIT, Boston, MA, July 1992.

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

Westing, A.H. (ed). 1986. *Global Resources and International Conflict: Environmental Factors in Strategic Policy and Action*. Oxford: Oxford University Press.

Westing, A.H. (ed). 1988. *Cultural Norms, War and the Environment*. Oxford: Oxford University Press.

Westing, A.H. (ed). 1991. *Disarmament, Environment, and Development and their Relevance to the Least Developed Countries*. Research Paper No.10, UN Institute for Disarmament Research, United Nations, New York.

Westing, A.H. 1980. *Warfare in a Fragile World*. London: Taylor & Francis.

Westing, A.H. 1984. *Environmental Warfare*. London, England: Taylor and Francis.

Westing, A.H. 1985. *Explosive Remnants of War: Mitigating the Environmental Effects.* London: Taylor and Francis.

Westing, A.H. 1985. *Herbicide in War: The Long-Term Ecological and Human Consequences*. SIPRI Publication, London: Taylor and Francis.

Westing, A.H. 1986. Environmental factors in strategic policy and action: an overview. In: A.H. Westing, ed., *Global Resources and International Conflict: Environmental Factors in Strategic Policy and Action*. New York: Oxford University Press. pp 1 - 20.

Westing, A.H. 1986. An Expanded Concept of International Security. In: A.H. Westing, ed., *Global Resources and International Conflict*, Oxford: Oxford University Press.

Westing, A.H. 1988. The military sector vis à vis the environment. Journal of Peace Research, 25(3): 257 - 264.

Westing, A.H. 1988. *Global Norms, War and the Environment*. Oxford: Oxford University Press.

Westing, A.H. 1989. The environmental component of comprehensive security. *Bulletin of Peace Proposals* 20(2): 129 - 134.

Westing, A.H. 1989. Comprehensive Human Security and Ecological Realities. *Environmental Conservation* 16: 295-198.

Westing, A.H. 1989. Environmental Security for the Danube Basin. *Environmental Conservation* 16:4: 323-329.

Westing, A.H. 1989. Regional Security in a Wider Context. In: A.H. Westing, ed., *Comprehensive Security for the Baltic*, London: Sage. pp 113-121.

Westing, A.H. 1989. The Environmental Component of Comprehensive Security. *Bulletin of Peace Proposals* 20: 129-34.

Westing, A.H. 1991. *Disarmament, Environment, and Development and Their Relevance to the Least Developed Countries*. UN Institute For Disarmament Research (UNIDIR) publication, New York: United Nations.

Westing, A.H. 1991. Environment and Security: The Case of Africa. *Ambio* 20: 167-206.

Westing, A.H. 1992. Environment as an Instrument of War: Technical Aspects. *UNIDIR Newsletter* 19: 4-6.

Westing, A.H. 1992. Environmental Refugees: A Growing Category of Displaced Persons. *Environmental Conservation* 19: 201-207.

Westing, A.H. 1994. Perspectives on Environmental Conflict and International Politics. *Environment* 36:1 (January/February).

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

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

Westing, A.H. and M. Lumsden. 1978. *Threat of Modern Warfare to Man and His Environment: An Annotated Bibliography*, No. 40. Paris: UNESCO.

Westing, A.H.(ed.). 1989. *Comprehensive Security for the Balkans: An Environmental Approach*. International Peace Research Institute, Oslo (PRIO), and UN Environment Programme. London: Sage Publications.

Westing, A.H.(ed.). 1990. *Environmental Hazards of War: Releasing Dangerous Forces in an Industrialized World*. International Peace Research Institute, Oslo (PRIO), and UN Environment Programme. London: Sage Publications.

Widstrand, C.(ed.). 1980. *Water and Society, II. Water Conflicts and Research Priorities*. Oxford: Pergamon Press.

Wijkman, A. and L. Timberlake. 1988. *Natural Disasters: Acts of God or Acts of Man?* Philadelphia: New Society Publishers.

Wiley, Karen B. and Steven L. Rhodes. 1998. The transformation of the Rocky Mountain Arsenal. *Environment* 40(5):4-11, 28-34.

Wilson, E.O. 1998. *Consilience: The Unity of Knowledge.* New York: Alfred A. Knopf.

Wilson, T.W., Jr. 1983. Global Climate, World Politics and National Security. In: V.P. Nanda, ed., *World Climate Change: The Role of International Law and Institutions*, Boulder: Westview Press. pp 71-78.

Winnefeld, J.A. 1994. The Changing Nature of Intra-State Conflict: The Environmental Connection. Santa Monica, CA: RAND, September 1994.

Winnefeld, J.A., and M.E. Morris. 1994. *Where Environmental Concerns and Security Strategies Meet*. Santa Monica: RAND.

Wirth, D.A. 1989. Climate Chaos. *Foreign Policy* 74: 3-22.

Wirth, T.E., Under Secretary of State for Global Affairs. 1994. Sustainable Development: A Progress Report, address before the National Press Club, Washington, D.C., 12 July 1994.

Wolf, A. 1995. *Hydropolitics Along the Jordan River: Scarce Water and its Impact on the Arab-Israeli Conflict*. Tokyo: United Nations University Press.

Wolfowitz, P.D. 1992. The New Defense Strategy. In: Alison and Treverton, eds., *Rethinking Security* : *Beyond Cold War to New World Order*, New York: W.W. Norton and Company.

Wolpin, M.D. 1992. Third World Military Roles and Environmental Security. *New Political Science* 23: 91-119.

Woodrow Wilson School Policy Task Force. 1996. Environmental Change, Population Movement, and Violent Conflict. A report of the Woodrow Wilson School Policy Task Force, Princeton University, Princeton, NJ, 15 May 1996.

Woolsey, R.J., Director of Central Intelligence. 1993. The Future of Intelligence on the Global Frontier, address to the Executive Club of Chicago, Chicago, IL, 19 November 1993.

World Commission on Environment and Development. 1987. *Our Common Future*. Oxford: Oxford Univ. Press.

World Commission on Environment and Development. 1987. Peace, Security, Development and the Environment. In: *Our Common Future*, New York: Oxford University Press. pp 290-307.

Young, O.R. 1993. Discussion. In: R. Shultz, R. Godson, and T. Greenwood, eds., *Security Studies for the 1990s*, Washington, D.C.: Brassey's. pp 349-51.

Zebich-Knos, M. 1996. Global Environmental Conflict in the Post-Cold War Era: Linkage to an Extended Security Paradigm. Paper presented at the International Studies Association Annual Meeting, San Diego, CA, April 1996.

Zohlberg, A.R., A. Suhrke, and S. Aguyayo. 1989. *Escape from Violence: Conflict and the Refugee Crisis in the Developing World*. New York: Oxford University Press.