National Security and the Environment

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National Security and the Environment

Environmental security is of increasing importance with the greater scientific knowledge of the relationship between humans and the environment and an understanding that new and old environmental problems are a threat to humanity. National security must take into account environmental concerns which affect the well-being of a nation and its people. As a result, environmental security is becoming a priority policy issue.

This political science study presents and discusses the issues and background of the environmental security of the United States, where national security and the environment demonstrate a history of linkage. It differs from earlier work on the subject in its approach, which uses, but goes beyond work in the environmental studies and international relations fields. It employs a comprehensive, but flexible definition of national and environmental security, as well as adopts a single-country focus. Domestic, regional and global environmental security issues are discussed.

Dedicated to my wife, Barbara!

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CHAPTER ONE

National Security and the Environment

Introduction

The end of the Cold War era has allowed the United States to re-examine its national security requirements without the immanent threat of nuclear cataclysm distracting it from other pressing concerns. The fear of the devastation unavoidable in a nuclear exchange with the former Soviet Union, both directly from multi-megaton warhead detonations as well as indirectly through nuclear winter, forced the prevention of nuclear conflict to the top of the national security agenda. With the demise of communism and the breakup of the U.S.S.R., this driving concern has diminished sufficiently to allow the United States to give serious attention to other challenges to national security.[1]

The destruction of the natural environment has the potential to devastate the United States and other nations as seriously as nuclear war and merits the rise of environmental security issues to the top of the national security agenda. Security is linked to environment through a human reliance on the ecosystem such that the national security of any nation cannot be discussed fully without serious attention given to environmental concerns. The

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[1] New conceptions of national security include regional security as well as dealing with threats from drugs, terrorism and economic competition.

purpose of this study is to present and discuss the issues and background of the environmental security of the United States. This study shows how the redefinition of national security to include environmental security is the natural and logical next step in the evolution of security and environmental protection.

This study differs from preceding work in environmental security in both perspective and approach. This study sets forth and operates under a new model with which to approach environmental security. There are compelling reasons for the adoption of a new approach, mostly having to do with the limitations of traditional models. First, a review of the literature has revealed a reluctance to spell out fully a definition of national security that emphasizes three main points: physical survival, psychological perception of threat, and social valuations. Second, there has not been a study to examine environmental security using national security as its primary perspective. The environmental security literature tends to show more concern with the environment than with security in its theoretical underpinnings. Third, the environmental security literature to date pursues mainly from a multinational or global perspective, rather than focus on the nation-state actor, which is still the level at which security policy is made.[2]

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[2] While global may be the most precise unit of analysis under a strict reading of ecological theory, empirically, the politically most appropriate unit remains the nation-

Finally, and related to the latter reason, the nation-state operates at multiple levels of politics and analysis (national, regional and global) with each involving a distinct mode of political behavior, another situation generally not considered fully in the existing literature. This study fills a gap in the overall literature on the subject of environmental security.

The recent salience of environmental security issues, including ozone depletion and global climate change, largely has been made possible by new political and scientific developments, especially the U.S. ascendance to sole superpower and new discoveries in atmospheric chemistry. Homer-Dixon ascribes the political significance of environmental issues to an interaction of three reasons: 1) the end of the Cold War has allowed space for new issues to enter the public discourse, 2) a strong public and media awareness of new environmental problems after the very hot summer of 1988, and 3) a shift in the scientific community's perception of global environmental problems to "threshold" events that can occur very rapidly with serious consequences (Homer-Dixon 1991:79). Additionally, there exists a greater overall environmental consciousness among policymakers and voters than ever before.

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state.

Approaching Environmental Security

Many of the most significant environmental issues of security concern are relatively new to the policy agenda, rising to prominence on a wave of new scientific data which has grown particularly since the 1980s. While concern over the degradation of the ecosystem has been an important policy issue since at least the late 1960s, scientific research and understanding have brought several new ecological problems to light, most notably climate change, the depletion of the ozone layer, and the loss of biodiversity. Each of these environmental problems are what U.S. Vice President Albert Gore refers to as "strategic" environmental issues: they are global in scope and have the potential to damage severely the ecosystem to the point where humans and other species must undergo drastic changes to survive (1992:28-30). The recognition of these concerns has prompted a sharp reassessment of the capacity of the global ecosystem to absorb the degradation of human "business as usual."

A review of the most significant threats to the environment yields a number of similarities in anthropogenic, or human-caused, threats to security. Analysis of environmental security issues is complex as the problems facing the ecosystem are all intertwined in both cause and effect. Some problems, such as climate change and the reduction of the ozone layer in the stratosphere are

global in scope. In contrast, deforestation or desertification are essentially regional phenomena, but with consequences that are felt worldwide through ecological interconnectivity. Environmental concerns such as air or water pollution may be narrow or long-range in scope, but the common tie between these and other forms of ecological degradation is that each contributes to the decline of the integrity of the ecosphere, ultimately making each the political concern of every nation interested in survival and security.

Any issue that threatens the lives and well-being of the American population is by definition a national security concern. The primary function of any government ultimately is to provide for the security of its citizenry: "provide for the common defense, promote the general welfare, and secure the blessings of liberty..." It is therefore quite logical and understandable that increasing numbers of policymakers are linking the protection of the environment to the protection of the nation. From the U.S. Congress, to the Departments of State and Defense, to the White House, and even to the military, national security is in the process of being recognized as inextricably intertwined with the health of the ecosystem. This revelation has the potential to change the face of American national security policy as radically as the advent of atomic weapons did in the 1940s.

A review of American political and natural history reveals that the interrelationship between security and environment is not a new phenomenon of the late 1980s and 1990s, but rather has been a constant undercurrent since even before the birth of the republic. While the global scope of environmental issues may be a recent development, the human to ecosystem interface has been a driving force in the development of the United States. Frequently, human dependency on nature has been the cause, directly or indirectly, as well as the target, of national security policy actions. As will be shown, the issue of environmental security is not new and unfamiliar, rather unrecognized until only now when the risks of poor policy decisions have become dramatically higher.

The United States was selected as the primary case through which to study environmental security for three reasons, mostly reflecting the relative size and significance of the U.S. in global politics and the ecosphere. First, the United States is the greatest energy consumer and polluter in the world, impacting the ecosphere more than other nations due to the sheer scale of its economy and integration into the global flow of money and resources. Second, it has the largest military expenditure in the world, which has directly affected the environment through its activities and reflects the American commitment of resources to national security. Third, the United States

is the premier power in the world: as global environmental issues require global solutions, no nation is in a better political position than the U.S. to lead the rest of the world to protecting the environment and national security. Still, this study draws from relevant foreign cases when useful.

National Security and Environmental Issues

For the United States, as for any nation, national security is a complex term that involves a number of separate but interrelated variables in any full understanding. Its most basic objective is "to protect and preserve the security and prosperity of the United States" (Dietchman 1991:95). While a review of the literature below shows that different researchers posit a variety of definitional emphases, three major component themes emerge which, together, composite a model of what is meant by the term "national security" in political science: 1) the freedom from physical invasion or harm, 2) the freedom from a fear of such physical threats, and 3) the maintenance of fundamental values while pursuing the first two themes. Each of these components is increasingly complex.

The first component of national security, freedom from any physical reduction of the quality of life and property, is the most straightforward. Security is the freedom from risk or loss of the basic requirements of human existence.

In its most primal delineation, security is the attempt to guarantee survival. The concepts of security and survival are fundamental to politics and are universal political goals. If something comes to threaten the security of a nation, it is immediately a political issue of the highest order. The primary relation of humanity to the environment is physical: humans consume oxygen, water and resources, leaving carbon dioxide and various waste products behind.

The second component of national security is psychological, and therefore more subjective than the physical. Security is not merely freedom from physical threat, but freedom from fear of such a threat. For example, it is relatively straightforward to determine whether the United States will be invaded by a known foreign army, but far less so to determine if America should be concerned about a future unknown terrorist attack. National security is a psychological state, a nation needs to feel safe and be free of fear (Snow 1991:5). "The concept of national security is complex and difficult to define and contains objective and subjective elements, but at its core it appears to refer to a society's perception of external threats and its response to them" (Crabb 1991:16). Some researchers emphasize this component.

The psychological component of national security presented above does not exclude an issue from being a security issue as long as it is a fear or concern to the

American people and/or their policymakers. National security, as Franklin Roosevelt put it, is about "freedom from fear," as much as actual physical attack. Lack of unanimity among scientists or inconclusive data are often cited by some as grounds for policy inaction; these arguments are less effectual in national security policy discussions. Scientific research will never be conclusive about some of the environmental security concerns, but this will not affect their inclusion here. National security is not only about reacting to already extant threats, but deterring newly arising problems before they can become threats to the population and territory of the United States.

The valuational component of national security is highly complex and largely will not be discussed in any depth in this study. Values have no economic self-interest and so are difficult to place in the resource allocation battles that characterize American politics, although they are often appealed to in political campaigns. Ecological values are deeply ingrained in American culture; it is important to begin by remembering that throughout American history there has been a strong tie to the land, exhibited in the transcendental poetry of the 1800's to the Earth Days in the present. It can be argued that a healthy environment is an American value. The core values of ecological thinking: emancipation, participation and diversity

(Eckersley 1992), are also among the fundamental values of the United States' ecopolitical culture. This might facilitate a demonstration as to how national and environmental security overlap in the valuational component area, but this remains beyond the scope of the present study.

Environmental security is a redefinition of national security, updating it and building on its previous incarnation. Russia still has thousands of warheads and China has millions of troops, but national security must be more than responding to these and other similarly military concerns. The term "environmental security" is at once a new formulation of traditional security as well as being its next logical evolutionary step beyond its military focus. The discussion of elements of environmental security have been ongoing in national security policymaking for some time. All U.S. administrationss since that of Nixon and the National Environmental Protection Act of 1969 have expressed at least some concern over the environment/security linkage. This particularly has been the case since the end of the Cold War in 1990.

Environmental security is the freedom from physical threat stemming directly or indirectly from anthropogenic environmental change as well as the freedom from the fear of such threat. Environmental security does not mean freedom from volcanos, earthquakes, tornados, or other "acts of God"

unless these natural disasters are somehow caused by human action or have their effects exacerbated by it. For example, hurricanes are natural events, but may be affected by climate change brought on by humans.

Not all national security problems are environmental security problems, and vice versa. There are security concerns that have nothing to do with environmental factors, for example, those caused by human greed for power or territory. This study is not focused on the vast array of environmental issues beyond their role as actual or potential threats to security. For example, the chemical equations by which chloroflorocarbons break down stratospheric ozone is beyond the study's scope here, but the rise in malignant melanoma and cataracts in areas where the ozone layer has thinned is within this study's parameters. There are also environmental security concerns that are beyond the scope of national sovereignty, falling at a level of politics and analysis at the global level; for example, issues such as ozone depletion that manifest themselves at the national level in effect, but which cannot be combatted unilaterally. Whether an environmental concern is also a security concern, and it certainly need not be both, will be determined through its actual or potential threat to one of the aspects of security discussed above: physical, psychological, or valuational.

Post-Cold War Paradigm Shift: The New Salience of Environmental Security

The vast military-industrial complex that former President Dwight D. Eisenhower warned about in his farewell address profited immensely from the Cold War, and it is no surprise that its rise corresponds neatly with that of the national security state. While national security has always been the concern of Washington, the specific construct known as the national security state only came into being in the late 1940s, ostensibly to address the threat coming from the Soviet Union. It brought with it several new government bodies, including the Central Intelligence Agency (CIA), the National Security Council (NSC), and a reorganized Department of Defense (formerly the Department of War). It was informed by science and technology, often in terms of being in a contest with the Soviet Union for the next important development: nuclear fusion, the battle over outer space, or the development of computers. The main actions of the national security state during the Cold War were expressions of George Kennan's containment doctrine; at home, the rooting out of possible domestic communist spies in the witch hunt of McCarthyism, and abroad, a series of larger and smaller wars around the world where the U.S. directly or indirectly checked what it perceived to be Soviet expansion: Korea, Vietnam, Afghanistan, Angola, Nicaragua, etc. The Cold War national security state was

characterized by the expenditure of trillions of dollars of public money, largely through deficit spending financed by borrowing. With the U.S.S.R. gone, with what *raison d'etre* does the national security state claim resource priority?

Without its traditional Soviet adversary, the American national security state has been searching for a new opponent that will provide it with sufficient challenges to justify its accustomed budget. The rush by policymakers such as former Senate Armed Services Committee Chairman Samuel Nunn and former Secretaries of Defense including Richard Cheney and Les Aspin to link security to environment has been in part an attempt to show the potential uses of the military in the post-Cold War era. Spy satellites and reconnaissance aircraft have proven useful in providing climate data as well as photographs of Warsaw Pact troop movements. The Army can feed famine-stricken Somalis as well as perform its traditional duties. The battle for a sustainable world can be described with much of the same vocabulary of the Cold War: survival, research, technology, commitment, and leadership.

Just as the defense community searches for a new post-Cold War mission, so does the political. If the United States is not leading the world in the fight against communist imperialism, what new cause can it lead the world in? One of the harshest complaints about the environmental performance of the Bush administration was its abdication of

the American leadership position in international environmental politics including its performance at the Rio Earth Summit in 1992. The collective security approach demonstrated by the Gulf War was based on some of the same principles needed to deal with global environmental concerns at the Earth Summit. A new American international leadership agenda is available in environmental security just as the anti-Soviet role is fading from memory.

There also has been a change in the recent perspectives of policymakers as they begin to address the issues of environmental security based on the consideration that ecosystem integrity has a direct and significant bearing on national and global security. Peace and national security can only be attained in a system that works to ensure the viability and dynamic equilibrium of the interconnected global ecosphere. As a result, American politics has seen a number of moves to link national security and the environment.

In the legislative arena, the movement to incorporate environmental security into existing national security-programs was spearheaded by a group of national security oriented Senators, including Samuel Nunn (D-Georgia) and Timothy Wirth (D-Colorado). Nunn addressed the issue of environmental security in a June 28, 1990 Senate Floor speech:

> ...I am persuaded that there is also a new and different threat to our national security

> emerging-- the destruction of our environment. The defense establishment has a clear stake in this growing threat. I believe that one of our key national security objectives must be to reverse the accelerating pace of environmental destruction around the globe.

Nunn's words carried much weight for at the time he was the powerful chair of the Senate Armed Services Committee. As a result of Congressional prodding, the military began to share its information gathering capabilities with the scientific community, helping further scientific knowledge concerning environmental issues that have characterized the early 1990s. The military has also been much more forthcoming with its own environmental record and has made efforts to begin cleanup wherever feasible.

The vocabulary of ecological security has also entered into the language of American diplomacy, as evidenced by Benedick's writing in the June 1986 U.S. Department of State Bulletin (1986:55).[3] Beginning from the premise of humanity dependent on a healthy environment, he states that:

> ...from this perspective, the maps of geopolitics and diplomacy vanish, and the underlying interconnectedness of all the components of this unique living system-- animal, vegetable, mineral, water, air, climate-- becomes evident.
>
> In the State Department, we have come to recognize that U.S. national interests in promoting freedom and economic growth can be undermined by instability in other countries

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[3] Richard Benedick is best known for having been the chief negotiator for the United States for the international protection of the ozone layer.

> related to environmental degradation, population pressures, and resource scarcity.

Secretary of State Warren Christopher has also called for a special policy emphasis on environmental issues, saying that they belong "in the mainstream of American foreign policy" (Clifford 1996:A3).

The ascendance of environmental security onto the international political arena is well illustrated by a speech given to the United Nations on September 28, 1988 by then Soviet Foreign Minister Edvard Schevardnadze. Schevardnadze spoke of the need of the global community to address ecological security:

> It is perhaps for the first time that we have seen the stark reality of the threat to our environment--a second front fast approaching and acquiring urgency equal to that of the nuclear and space threat.
>
> For the first time we have seen clearly that, in the absence of any global control, man's so-called peaceful activity is turning into global aggression against the very foundations of life on earth.
>
> For the first time we have understood clearly what we had guessed: that the traditional view of national and universal security based on military means of defense, is now totally obsolete and must be urgently revised.
>
> Faced with the threat of environmental catastrophe, the dividing lines of the bipolar ideological world are receding. The biosphere recognizes no division into blocs, alliances, or systems. All share the same climatic system and no one is in a position to build his own isolated and independent line of environmental defense.

Schevardnadze, who later became President of Georgia, spoke presciently; the Soviet Union was only to last a few years

after that speech, its end closely linked to environmental destruction. "When historians finally conduct an autopsy on the Soviet Union and Soviet Communism, they may reach the verdict of death by ecocide" (Feshbach and Friendly 1992:1). With one superpower deceased at least partly as a result of massive scale environmental abuse, the lesson to the United States is clear: the nation's survival depends on a healthy environment.[4]

Human society is based on the environment it inhabits. It is impossible to discuss human activity, including politics, outside of the context of its ecological habitat. The nation-state is a particular mode or grouping of human activity, one through which members find food, clothing, shelter and access to reproduction, all of which, in turn, are protected by that nation-state. It is finally necessary to accept the fact that humans exist only as members of the ecological community and that all activity and all security depends on the integrity of the ecosystem. Much has been written on the ecological basis of society, for example, Milbrath (1989), Devall and Sessions (1985), Dobson (1990), and Porritt (1984).

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[4] Some researchers believe that China may be the next victim of environmental degradation. "Environmental pressures in China may cause the country's fragmentation" (Weiner 1995:176).

Literature on Environmental Security

Just as the political world is changing to include environmental security, so is the academic world that studies. In political science, the new field of environmental security has begun to generate a body of literature along with it. This section introduces the major works in the field and discusses some of the difficulties and challenges of research in the area of environmental security. Researchers generally appear to be approaching the subject from one of two primary backgrounds: international relations/ traditional security studies or environmental politics. Both sides have much to offer. The subject matter is still very recent, but already a number of important works in the field have emerged. The list for both international relations and environmental politics is growing, and certain researchers deserve attention.

The basic text to any study of environmental security would have to be Norman Myers' Ultimate Security: The Environmental Basis of Political Stability (1993). Myers presents the concept of environmental security, discusses a variety of environmental issues that are security related, and analyzes global issues that must be addressed to achieve "ultimate security." Like much of the research in environmental security, Myers' book is written from the perspective of international politics, concentrating on regional and global issues.

The most detailed work coming from the international relations field may well be from Homer-Dixon, who has analyzed the relationship between resources, environment, and acute conflict. He holds that "Unfortunately, the environment-security theme encompasses an almost unmanageable array of sub-issues, especially if we define 'security' broadly to include human physical, social, and economic well-being" (Homer-Dixon 1991:76-77). Thus, he limits his research scope to acute conflict, that is, conflict involving a substantial probability of violence (1991:77). Waiting for the actual outbreak of violence is perhaps too late in the political process to address issues; security should also mean the prevention of conflict. Ullman notes that "It will not require violent conflict for resource scarcities to affect the well-being--and the security-- of nations on every rung of the development ladder" (1995:26).

With new material being released almost daily, the body of knowledge available concerned with environmental security is constantly being enriched. The international relations literature can be traced back to at least 1983, when Richard Ullman wrote with "the assumption that defining national security merely (or even primarily) in military terms conveys a profoundly false image of reality" (1995:15). Jessica Tuchman Mathews (1989;1994) has also been a strong voice for the redefinition of security to include issues

such as the environment, as have Peter Gleick (1991) and Gareth Porter (1990;1991). Indeed, the literature is beginning to show "the redefinition of national and international security primarily in terms of environmental threats rather than in terms of political-military threats from national or ideological rivals" (Porter 1990:332).[5]

The background literature on security in the international relations field is immense and dominated by the realist[6] school of thought. Realism holds that only policies based on power can lead to international security (Couloumbis and Wolfe 1978:4). In international relations, the realist emphasis on power has generated with it a preoccupation with the projection and use of power, often in the form of military force. As a result, most security threats were, at least until the 1980s, perceived of as military in nature. National security meant a strong defense to both deter and counter foreign aggression. The most well-known researcher in this area is Hans Morgenthau, who holds that power is the central concept of politics. The nation-state must ensure the national interest of survival,

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[5] Sean Lynn-Jones and Steven Miller's edited volume, Global Dangers: Changing Dimensions of International Security (1995) is an excellent collection and includes reprints of work by Ullman and Homer-Dixon, among others.

[6] Neorealism is meant as well.

especially through the maintenance of territorial integrity.[7]

From the environmental politics side, Lester Brown of WorldWatch has been a leader the discussion of environment and security. Renner (1989;1994) has followed the subject also, particularly emphasizing criticism of militarism as a major source of environmental problems, paralleling the work in Europe by Galtung (1982;1990) and Porritt (1984). The relationship of the military to the environment has been examined in Anne Ehrlich and John Birks edited volume, Hidden Dangers: Environmental Consequences of Preparing for War (1990) and Thomas's more journalistic Scorched Earth: The Military's Assault on the Environment (1995). Finally, Earth in the Balance by Albert Gore must also be acknowledged for its importance in bringing the subject of environmental security to a larger audience.

In contrast to most of the authors on the subject, Deudney (1990;1991), writing from the traditional realist paradigm, argues against the very concept of environmental security calling it "analytically misleading and

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[7] Morgenthau's work Politics Among Nations: The Struggle for Power and Peace (1985), co-authored with Kenneth Thompson in its later editions, remains the seminal text of realist international relations theory. Also highly significant is the work of Kenneth Waltz, especially Man, the State and War (1959) and The Theory of International Relations (1979). For a view specifically on American national security, Donald Snow's National Security: Enduring Problems in a Changing Defense Environment (1991) is invaluable.

conceptually muddled." Deudney, an environmentalist, argues that military and environmental threats are fundamentally different and that environmental problems or even resource scarcities do not lead to war. Different kinds of harm result from different perpetrators with different intentions and requiring different defenses (1991:24). Deudney's position forces other researchers in environmental security to test carefully the significance of environmental issues as security issues. Deudney appears to be retaining to the dominant social paradigm's traditional realist model of national security, with scientific evidence and the history of conflict and politics standing as intervening variables too large to allow a connection between environment and security.

Dabelko and Dabelko respond to Deudney by pointing out that "From a policy perspective, it is incumbent upon security policy formulators to appreciate the significance of these antecedent environmental degradations and resultant political instability and conflict" (1992:4). Similarly, Shuman and Harvey recognize that while military and environmental threats are different, much more is actually similar:

> ...there are several important threads tying together the military, economic, and environmental threats. All these threats endanger things Americans value--life, liberty, and property. All these threats originate, at least in part, from outside the territorial boundaries of the United States and therefore must be met through foreign

> policies--that is through policies that influence foreigners to act differently. And all these threats can only be ameliorated through the expenditure of public funds. Money spent protecting Americans from terrorism cannot be spent protecting them from global warming. The challenge for the United States is to design a security policy that effectively meets *all* threats with balance and economy (1993:38-39).

Environment and security *are* related.

Deudney raises one point worth remembering: the aggressive weltanschauung of traditional military thinking and the more reverent balance of ecological thought are practically polar opposites. If Deudney, who is genuinely concerned with the state of the environment, means to warn environmental political scientists to beware of the destructive mindset that has spawned so much ecological degradation and human suffering, it is a warning well heeded. The aggressive stance of radical environmentalist groups such as Earth First! and works such as Foreman and Haywood's Ecodefense: A Field Guide to Monkeywrenching (1987) disturb many concerned with the environment. Leftist environmental thought, such as that of Gorz (1980), is very concerned with ecofacism, which is seen as pro-environment, but disrespectful of human rights and life.

A more useful criticism of the environmental security literature comes from Homer-Dixon, who sees that "a review of all of the recent work on environmental change and conflict reveals a number of difficulties, some methodological and some conceptual" (Homer-Dixon 1991:81-4).

His discussion is important here in identifying areas where the existing literature is perhaps lacking. Homer-Dixon presents six major areas of difficulty, which shall be addressed briefly one at a time (1991).

First, Homer-Dixon sees an exaggerated emphasis on human caused climate change and ozone layer depletion to the neglect of less exciting but equally important terrestrial and aquatic environmental problems including deforestation, soil degradation, and fisheries depletion (1991:83). This observation makes sense in that the two global, "strategic" issues are relatively new to the policy arena, while the more mundane concerns have already been analyzed for some time. This does not change the fact that climate change and severe ozone layer depletion remain future concerns that must be dealt with through projections, while soil and water degradation are already testable and their political and security consequences present in the world today, as seen in Central America or Africa. Additionally, new global environmental concerns are more difficult to discuss in traditional international relations terms. Avoiding this, the present study examines not only strategic environmental security issues, but balances them with a wider variety of environmental security issues.

Second, Homer-Dixon complains that "much of the recent writing on the links between environmental change and conflict is anecdotal" (1991:83). A very new field of study

will often lack a long history of quantitative research and rely more on expert observations and their analysis. As detailed earlier, security is a complex issue containing variables that are not prone to quantitative analysis. This study deepens the usual research scope by including more historical incidents, thus allowing a greater number of relevant data points. The focus on the environmental security of a single nation, the United States, rather than the more general applications of the concept globally, is designed to limit extraneous research variables.

Discussion of this difficulty is continued in his third point, that "environmental-social systems are hard to analyze" (1991:84). Homer-Dixon writes:

> They are characterized by multiple cause and effects and by a host of intervening variables, often linked by interactive, synergistic, and nonlinear causal relations. Empirical data about these variables and relations are rarely abundant. Although the underlying influence of environmental factors may be great, the complex and indirect causation in these systems means that the scanty evidence available is always open to many interpretations. Furthermore, understanding environmental-social systems involves specifying links across levels of analysis usually regarded as quite independent. (1991:84)

Here, Homer-Dixon lays down the greatest problems with the study of not just environmental security in particular, but environmental politics in general. Because of the use of the ecosystem or even the ecosphere as the unit of analysis, the

sheer quantity of interrelated variables is massive.[8] Understanding the complexity of an ecosystem involves new science and new thinking about linkage and causation. Moving back and forth among levels of analysis, with great care, becomes a necessary research method for study in this new field. The requirements of studying environmental politics make it an interesting challenge, although adherence here to a more focused set of research parameters as indicated above should help.

Fourth, Homer-Dixon (1991:84) holds that "the prevailing 'naturalistic' epistemology and ontology of social science may hinder accurate understanding of the links between physical and social variables within environmental-social systems." He defines the "naturalistic view of social science" as one where there is "no qualitative difference between the domains of investigation of the social and natural sciences, suggesting that the procedures used for research and explanation can basically be the same in both domains" (1991:84). This is a fascinating observation, especially since environmental politics is one area of social science particularly informed by and interrelated with the natural sciences. Still, human actions are not subject to the same clean equations as

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[8] For example, chaos theory can show how a butterfly beating its wings in China can cause a hurricane in Florida (Gleick 1987:20-21).

chemical reactions, despite the best intentions of behavioralists and quantitative analysts.

Social science has long suffered an inferiority complex with the natural sciences in terms of the desire for rigid objectivity, and much social science research has been artificially forced into a form conducive to statistical or quantitative analysis as a result. While this is appropriate with empirical data such as demographics, surveys and election results, it is not for concepts such as ecosystem health and security. Homer-Dixon warns that "it may be a mistake to conjoin, in causal generalizations, types of physical event with types of intentional social action" (1991:84). While he treats as unproblematic causal generalizations that include both physical and social variables, he recognizes that causality is an always difficult epistemological construct and only rendered more so by the variety of variables involved in environmental politics. The question of intention may be easier to handle, for outside of cases of ecocide or strategic military damage of an ecosystem, most environmental harm is not done with intention, it is rather a by-product of some action. This study avoids the philosophical dilemma of causality, preferring to establish connectivity and interdependence of variables without succumbing to the untenable quantification of humanity and nature.

Homer-Dixon's fifth difficulty in the study of environmental change and conflict is the multidisciplinary nature of the field. "Researchers must acquire detailed knowledge of a daunting range of disciplines, from atmospheric science and agricultural hydrology to energy economics and international relations theory" (1991:84). This is certainly an additional difficulty, but not as serious as it may seem. The subdivisions of academia increasingly seem more arbitrary than meaningful, more designed to preserve funding and status than to further human knowledge which is not prone to categorization. Environmental studies brings together elements of dozens of different disciplines because they are all fundamentally dealing with the same subject matter. The greatest difficulty is persuading academics outside of the environmental field to accept and understand environmental research, especially those uncomfortable with its interdisciplinary nature. This study draws draw from wherever appropriate, generally from the social sciences but also from the natural sciences.[9]

Finally, Homer-Dixon explains the place of environmental issues within the field of international relations:

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[9] As a result, the different writing approaches of different disciplines may color the chapter in which one or another is particularly useful, for example history in chapter 4 and international relations and law in chapter 5.

> ...the modern realist perspective that is often used to understand security problems is largely inadequate for identifying and explaining the links between environmental change and conflict. Realism focuses on states as rational maximizers of power in an anarchic system; state behavior is mainly a function of the structure of power relations in the system. But this emphasis on states means that theorists tend to see the world as divided into territorially distinct, mutually exclusive countries, not broader environmental regions or systems. Realism thus encourages scholars to de-emphasize transboundary environmental problems, because such problems often cannot be linked to a particular country, and do not have any easily conceptualized impact on the structure of economic and military power relations between states. Realism induces scholars to squeeze environmental issues into a structure of concepts including 'state', 'sovereignty', 'territory', 'national interest', and 'balance of power'. The fit is bad, which may lead theorists to ignore, distort, and misunderstand important aspects of global environmental issues. (1991:84-85)

Homer-Dixon's argument here is a reflection on the two previous points, where international relations is a subdiscipline with a particular, narrow perspective on the world. While his own work remains in the field of international relations, his difficulties in dealing with the mainstream of the subdiscipline are apparent. Homer-Dixon provides the logic behind why the present study chooses to go beyond the international relations literature.[10] Also, while this study pragmatically does focus on one particular nation-state, the United States, an

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[10] This study looks beyond the 'traditional' environmental politics field as well.

effort is made to go beyond a single nation analysis at appropriate points. This study avails itself of the more flexible and diverse approaches offered by the field of political science in general.

Environmental Security in Theory and Practice

This study concerns itself with the relevance of environmental security in the United States through an examination of how environmental security has and does function. Following a theoretical explanation in Chapter Two, Chapter Three bridges traditional security concepts with the environment by examining the long relationship between the military establishment and the environment. Since most realist approaches to international relations theory stress the military aspect of national security, this is a logical place to begin.

While in no way synonymous, the military establishment and national security remain closely linked through public policy in politics as well as academia. As a result, this study begins its overall argument in Chapter Three with an examination of the linkages between traditional military security and the environment. This includes the environment impacting the military and vice versa. While the concept of environmental security is a recent development in the theory and practice of national security, there is a long history connecting the military and the ecosystems in which it

operates. These linkages indicate that the evolution of national security toward environmental security is no radical re-definition, rather an overdue recognition of a long-standing relationship.

The natural environment and the military have always had a dubious relationship. The environment has suffered under military activity both intentionally and as a result of routine military training and testing procedures. Throughout history, military commanders have demonstrated at least a tacit understanding of the connection between ecology and society and have planned their strategy accordingly. Since Biblical times, and probably even before written history, warfare has included ecological attacks on an enemy's agricultural production capabilities, such as when the forces of Abimelech spread salt on the conquered city of Shechem, near Nablus (in the now Israeli-occupied West Bank) about 3000 years ago (Judges 9:45). Just as "scorched earth" tactics have been around for millennia, so has damage caused to the environment indirectly from military activity. The deforestation of what is now Lebanon by Romans and Crusaders for ship-building lumber has changed that area from a lush forest to a rocky arid waste.

In modern times, a new word has entered the English vocabulary: ecocide, which is defined as the deliberate destruction of the environment, often seen in conjunction with a military objective. This tactic is so abhorrent that

there is an international legal Convention on the prohibition of military or any hostile use of environmental modification techniques. The Enmod Convention, as it is called, was drafted in 1977.

The most devastating application of ecocidal military strategy was in the Vietnam War, where the United States used environmental attacks as a primary tactic, the goal being to deprive the North Vietnamese Army and Viet Cong of the shelter, sustenance and cover provided by the rainforest as well as to disrupt agricultural production, especially rice, in the north. Between shelling, bombing, herbicide application and plowing, the United States military left behind a damaged ecosystem that will require centuries to recover, if it ever can. Attacks on German grain fields in World War Two and Confederate lands in the U.S. Civil War indicate that this was a familiar tactic, merely taken to a new extreme as allowed by modern technology.

Why attack the environment if it is not closely related to security? The military has long understood that a nation stands or falls on the ability of its habitat to support it. If military activity can lower the carrying capacity of a specific area, the amount of enemy troops or resistance that can be supported will decline, as per basic population ecology. It then follows that if attacking the ecosystem on which the enemy depends for survival is an offensive military tactic, then defending the "home" ecosystem is the

corresponding defensive tactic. A potential enemy of the United States may choose to attack by undermining ecosystem health and therefore the strength of the nation that depends on it. The fear of the American public and policymakers of a Soviet weather machine in the 1960s and 1970s illustrates this concern. The military must be committed to defend, among other things, the integrity of the ecosystem.

This theory is only beginning to hold true in practice. Throughout the Cold War, the military was essentially exempted from environmental regulation on grounds of "national security." This was conceivable only as a result of the poor understanding at the time of the interrelationship of humans and their ecosystems, as well as the factor of human greed. Military bases, both presently operating and now defunct, are frequently sites of highly toxic and radioactive waste, never treated or stored under the same standards as civilian production (Thomas 1995:132-142). After the Rocky Flats nuclear weapons site was closed down due to environmental abuses, the military began to take notice that "national security" was not an excuse to damage the environment. In 1989, Defense Secretary Dick Cheney launched the "Defense and the Environment Initiative," calling on the military to lead in compliance to environmental standards. The Environmental Protection Agency (EPA) is now able to fine military violators of environmental protection statutes and regulations, a major

step forward to making the military a protector of the environment. Chapter three discusses these issues in depth.

Benefits of Environmental Security

There are a variety of reasons as to why environmental security has become a significant issue. Ultimately, environmental security is one of those rare political issues in which almost everyone can win. Rather than a zero-sum problem, there is an interrelation of different political and environmental issues and the search for a mutually beneficial solution to both. The benefits are wide-spread. This is particularly important in assembling the support of interest groups in agenda building as environmental security policy is created.

First, environmental security provides real security to the nation and, by extension, the global family of nations. As the interrelationship of all parts of the globe are better understood, traditional violent conflict can be reduced at the same time as global interdependence brings about closer co-operation concerning environmental concerns. Physically, violence and pollution are reduced and with them the corresponding threat of such. International tensions, which frequently are based on environmental degradation, can decline and allow scarce political and fiscal resources currently directed to military defense to be spent more productively, say for education or health care. "National"

security is enhanced, bringing with it ancillary securities that the traditional national security approaches fail to do. Values of participation and cooperation are furthered, strengthening American democratic society.

Second, the environment benefits by efforts to protect humans. The healthiest ecosystems are those with maximal diversity and dynamic equilibrium. Human participation in ecosystem development rather than destruction is beneficial to all species, *homo sapiens* included. That environmental security would benefit both the environment and security is essentially expected by definition.

The surprise winner may very well be the military and by extension, the military-industrial complex. Military humanpower and fiscal spending levels can be maintained without major cutbacks in employment by shifting the wide variety of technical skills and technology held by the armed services and intelligence agencies to include environmental information-gathering and protection. Part of the move to environmental security has been to aid the old players; even "Senator Nunn admits the Strategic Environmental Research and Development Program serves the additional purpose of preserving defense funding during a period of military cutbacks associated with the end of the Cold War" (Dabelko and Dabelko 1992:21). The military-industrial complex wins in that it continues to receive government subsidies for research in areas designed to protect the nation's security,

only instead of nuclear warheads, more environmentally friendly technologies would be emphasized.

The American taxpayer wins because environmental security is largely about the prevention of ecological degradation that can lead to conflict. For a tenth of the cost of the U.S. occupation of Haiti in 1994, the ecologically ravished nation could be reforested and environmentally stabilized (Kurlansky 1995). Violent wars are brutally expensive, the cost of the Persian Gulf War could have been better utilized in reducing the American addiction to petroleum.

The international stature of the United States would also greatly benefit from a move to environmental security. The U.S. has been the leader of the free world for half a century, but has fallen behind because of the lingering effects of the massive cost of the Cold War. A fresh new approach to international politics in a field where American research capabilities and technology are second to none would quickly restore and strengthen the leadership role America has played for so long.

Even environmental security, however, would produce a few losers. Anti-environmentalists and other people who seek to weaken the security of the United States would be the most obvious losers. Polluters who do not change to more advanced, environmentally cleaner technologies would be outpaced by those who do in the global market. People with

psychologies that drive them to prefer destruction to diplomacy and consumption to conservation may be limited to that part of the military that would still deal with "traditional" security concerns, which, realizing human nature, may never go away. Still, the drive to self-preservation is a powerful human characteristic and one that by necessity must be applied to environmental protection.

The creation of effective environmental security policy requires agenda building in two places: the systemic agenda, i.e., issues meriting public attention and being within the legitimate jurisdiction of governmental authority (Cobb and Elder 1983:85) as well as the institutional agenda, i.e., "that set of ideas explicitly up for the active and serious considerations of authoritative decision-makers" (Cobb and Elder 1983:86). This study sees environmental issues as already salient for the former and increasingly significant in the specific agenda of American national security institutions. The political challenge of environmental security is to build policies to promote the environment and national security.

Conclusion

The emergence of environmental security is a great challenge for the United States. American policymakers must adopt environmental security to provide citizens with the basic security that is their right according to the

Constitution. Domestically, environmental security means leading through example, especially in updating the military-industrial complex that has given America not only its great stature, but its dismal pollution record as well. Chapter Four examines the domestic environmental security issues faced by the United States throughout its history and to the present. The historical American relationship with the idea of nature and wilderness can continue to follow a harmonic, conservationist path and accept that humans and the ecosystem they inhabit are inseparable, rather than continue to attempt to tame a frontier that long has been abused. In the international arena, the United States must work with its neighbors and the other nations of the globe to ensure environmental security. Chapter Five discusses regional environmental security, with special attention to Canada and Mexico. Chapter Six concerns itself with global environmental security, where the shared biosphere is the arena of environmental policymaking. A full outline appears in Chapter Two.

The concept of national security within the liberal democratic system of the United States has often produced a conflict between the rights of the individual in regard to the rights of the nation as a whole. Just as freedom of speech does not include the right to reveal classified military secrets, so do the rights of property preclude the use of personal property to affect negatively the property

of others, as in the case of pollution. The recognition of the need for environmental security as well as traditional security may disturb some individuals and corporations who may feel their rights are being limited in some way, but the legal history of the protection of the nation and the private property of others could minimize the possibility of challenges to the new requirements of environmental security in the courts.

The politics of environmental security requires new definitions of basic premises only at first glance. Upon deeper reflection, it should become clear that the security of America can only be the security of its ecosystems and the biosphere. The United States should embrace the opportunity to lead itself and the world to a sustainable future, secure for all nations and people.

Chapter Two

National Security and Environmental Security

Introduction

The conceptualization of national security has changed from its traditional formulations to include salient new concerns such as the integrity of the environment. The present chapter provides definitions of central concepts including security, national security and environmental security. The goal here is to demonstrate that environmental security is a natural progression from older approaches, therefore better suited to deal with the serious dangers faced by the United States and the world.

The understanding of the linkages between environmental security and more traditional approaches to national security requires a delineation of both concepts as well as their interaction. Environmental security is closely related to national security, in fact as it is presently formulated, it is a revision that updates it. As such, the concept of environmental security must be viewed as not a radical replacement for traditional approaches, but rather the next developmental step in the principles under which a nation sees its obligations to protect itself and its citizens.

This section constructs a new model for environmental security. It begins by delineating a model for traditional national security that emphasizes three major components,

namely physical, psychological, and valuational, which are extant overall in the literature, but not all normally present in every definition of national security. The subsequent expansion of this model of security to include environmental security is then a matter of incorporating scientific developments, much as how a new environmental understanding has been accepted by national policymakers.

This study offers a new perspective on the subject of environmental security by electing to examine it through the focus of a single nation-state. The environmental security literature is predominantly internationalist, lacking the tighter approach and reduction of variables offered by following a single nation's experiences through the domestic, regional, and global levels of politics. While the ecosphere is one interconnected planet, politics remains the domain of nation-states.

Additionally, this study offers some new solutions to difficulties that traditionally have been used to counter environmental protection proposals. Perhaps most importantly, the qualification of absolute scientific certainty demanded by anti-environmentalists is resolved. There is no such thing as scientific certainty; by applying a stringent model of national security to environmental issues, especially one that includes psychological variables, environmental policy need not be derailed by impossible prerequisites any longer. The Cold War was never

called off because of insufficient data about Soviet economic capacity; worst case assumptions were acted on and World War III was avoided. Incomplete data on ozone depletion did not stop the nations of the world from acting to save the ozone layer and lives by banning CFC's in Montreal. Also, the mere concept of environmental security implies a vastly superior political and budgetary priority for environmental issues than hitherto known.

Traditional National Security

The concept of national security is based, reasonably, on an extension of a more basic permutation of security, which is the condition of freedom from physical harm as well as the freedom from a fear of such. A nation is an aggregate human population bound together through ties based on kinship, culture, history, and values, and normally language and geography as well. National security is therefore the collective security of the nation as a whole. National security can be defined as "the product of efforts to ensure that a nation's territory, institutions, and freedom to interact with other nations are protected from outside intervention" (Meinhold 1992:2), to which must be added the condition that "[a] secure nation is one that can, and believes it can, weather threats to its well-being from many and diverse sources, internal and external" (Deitchman 1991:12).

National security has been a term in common usage but seldom precisely defined. An overview of the literature reveals that most definitions of the term "national security" seem to include three main components: first, the freedom from physical harm to life and property, including but not limited to physical survival; second, freedom from the fear of the first; and third, the maintenance of shared values and national identity while ensuring the first two. It is important to stress that national security encompasses not only the physical and psychological components that would comprise simple security, but also includes additional elements of value and identity that are held collectively as a nation. Former President George Bush defined the interest of American national security as being "The survival of the United States as a free and independent nation, with its fundamental values intact and its institutions and people secure" (Bush 1990:7). The inclusion of values and psychological terms such as "fear" make any analysis of the concept of national security more subjective. As these components to national security are weighted and prioritized in the process of determining national security policy, they likewise play a significant role in environmental security as well. It is worthwhile to examine this model of national security further.

The physical component of the model of national security is the most objective of the three components. National

security means first and foremost survival. For a nation this translates at the very least into secure borders and ensured access to natural resources (Snow 1991:5). Territorial integrity is perhaps the basic foundation of national security, as it is a demonstration that a nation can command the resources, both human and material, to defend itself from or deter beforehand foreign or external attacks on its territory and population (Dietchman 1991:12). The legitimacy of a government and the sovereignty of a nation begin with the ability to protect and defend the nation.

Since Niccolo Machiavelli redefined politics as no longer the study of "end" ideals or states, but as survival, political thinkers have included the idea of survival as the basis of politics in their approaches, either explicitly or implicitly. The Enlightenment social contract theorists on which American political thought is founded described politics as the gathering together of people for the mutual goal of security. In Thomas Hobbes' Right of Nature each human being has the inalienable right to wield power for the preservation of life. Hobbes' premise is that the problem humanity addresses when it enters into political society is the issue of self-preservation in a world of conflict. All people seek happiness, but find themselves in a world of scarcity, which sets off a competition for those scarce resources. Since a life of constant conflict is contrary to

the purpose of happiness, never mind security, cooperation through social mechanisms is necessary. Politics is born and security is its most basic purpose.

One direct linkage between human society and the environment is the human dependence on natural resources. "It is quite possible that by the year 2000 most nations, affluent or less affluent, will have redefined or expanded their definition of national security to include natural resource issues" (Kamieniecki 1993:4). Natural resources are traditionally defined as those inputs into human production or economy taken from the environment, rather than manufactured by humans, including minerals, forest products, seafood, water, air and wildlife.

Physical national security also can be seen to include the secure access to those physical natural resources deemed societally necessary to a nation's well-being. Necessity is subjective and changes over time, but once expressed, needs can be objectively examined. For example, at present, the United States' energy needs are largely fueled by petroleum and related sources, making the United States a very interested player in Middle Eastern politics, which holds the vast majority of the world's oil production and reserves. Although the energy needs of the United States could be met through other energy sources, such as solar or nuclear, history and economics have led to a focus on petroleum. With other alternatives available, the need for

oil is not absolute, but rather societally subjective. Once social and economic desirability has been determined, however, natural resource demand can be approached objectively.

Throughout history, many wars have been fought over resource access, including the Roman wars of imperial expansion, the colonial wars and World War II. For the purposes of this study, natural resource access conflict *per se* is generally treated as a traditional physical national security concern. While the human appropriation of natural resources is one of the most direct interfaces between human society and the larger ecosystem and as such can be viewed as an environmental issue, access to natural resources is a societally determined economic matter and has already found a place for itself in the traditional literature on security and conflict over the centuries. If, however, the manner or technique of natural resource extraction produces ecosystem degradation, it is seen as falling within the parameters of the study. To illustrate the distinction, while the Iraqi invasion of Kuwait for its oil reserves is a resource war but not directly of concern here, Saddam Hussein's ecological assault on the Persian Gulf itself by spilling oil into it is.[1]

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[1] Hussein also lit numerous oil wells, resulting in highly toxic smoke travelling hundreds of miles. Heavy particulates fell on Iranian agricultural fields and snow in the Himalayas was black in places.

Physical damage is quantifiable and generally easily identifiable. Assessment of damages or casualty is a well developed field in insurance and in the legal system. National security is generally perceived of in terms of concerning itself primarily with foreign threats and as such has been geared to defending militarily national borders and interests abroad. Border violations, destruction of property and loss of human life from the actions of foreign armies or agents are examples of physical attack. However, physical national security also can include a variety of domestic threats as well, as the Oklahoma City and World Trade Center bombings illustrate.

The freedom from fear component of national security is explicitly a psychological concept and, not surprisingly, a more subjective variable than simple physical threat. The idea of keeping a nation from fearing some kind of threat, whether real or imagined, is a Herculean task for national security policy. It becomes necessary to determine just how well-grounded fears are, and how important even the less rational ones may be politically. The fear of nuclear war was based on the existence of an openly antagonistic and heavily armed Soviet Union whose stated purpose was to bury the United States. The fear of communist infiltration of the United States that led to the McCarthy hearings in the 1950s was based largely on paranoia and political ambitions. Still, both occurred in the name of national security. The

difficult questions of how fears and other abstract psychological phenomena emerge in a national population are not within the rubric of this study, nor is a discussion of the ideological hegemony under which such may be manufactured or politicized. The significance here of psychological security is underscored by a lack of scientific certainty on many environmental issues. Therefore, sometimes significant public concern over an issue suffices to warrant its inclusion on the national security policy agenda. While the existence of compelling evidence is desirable, it has been demonstrated not to be necessary.

Crabb places the psychological component at the core or the definition of security. He states that "[a] nation's sense of security (or insecurity) is based heavily on official and popular perception" (Crabb 1991:16). From this perspective, national security is primarily subjective, often shaped by feelings and fears rather than concrete real threats. This is critical to a proactive, preventive national security. Repelling invaders once they have landed on American shores is more difficult than deterring the invasion in the first place.

Not all security concerns are well-founded in reality. The United States Air Force spent years investigating extraterrestrial visitors to the Earth (unidentified flying objects, or U.F.O.'s), only to conclude, at least publicly,

that there was no national security threat due to lack of evidence of alien visitation. Vast Central Intelligence Agency overestimation and misrepresentation of the former Soviet Union's military and economic capacities guided much of the Cold War arms race. **A threat does not have to be proven to exist to be a national security issue.**

The third component of national security is even more subjective. For a nation to be secure, stopping physical and psychological threats is insufficient, they must be checked without damaging the fundamental values that constitute that nation. The United States is unique in the world in that its nationhood is determined not so much by blood or language, but by the mutual acceptance of a set of ideas and values including democracy, human rights and equality under the law. If the U.S. were to sacrifice these freedoms and beliefs in order to defend itself, it would no longer be the republic that defines America, rather something else. By contrast, France remained France, whether governed by a king, Napoleon, the people, or the Nazi Vichy regime, as its nationhood was never in question.

Lastly, while the values of participation, democracy, and emancipation are central to both American and environmental political thought, the value and identity component of national security is not used here for reasons of simplicity. The United States exhibits a strong ecopolitical culture, which is "composed of the historical,

religious, political and spiritual elements combining to create cognitive, affective and evaluative orientations...toward the relationship between the human and the natural environment" (Schubert 1993:240). The relationship between the people of the United States and their environment is an intricate web of biological and cultural interconnections. However, a discussion of the ecopolitical culture of the U.S. would be an interesting, albeit ultimately distracting, tangent from the topic at hand.

It is important to remember that any policy concept requires great flexibility to survive the changes in American political climates. In the end, the most accurate conceptualization of national security may be that offered by Marcus Raskin:

> The term 'national security' was not in fact defined in the NSA or any other piece of legislation. It was to acquire meaning through the positive action of those who had the power to introduce the term as they rationalized their activities to themselves and to the public. (1994:79)

This "definition" allows policymakers, especially presidents, to redefine national security to reflect the political and physical demands of any given time. This study stresses that national security is a fluid concept.

The changing and flexible nature of national security is one of its most prominent characteristics. The demands on national security change with time and national security

policy must be able to adjust to new circumstances, both domestically and throughout the globe. Just as the U.S. redefined national security approaches to face the expansionist Soviet threat after the Second World War, the demise of the U.S.S.R. is prompting another shift in how the nation perceives national security. In 1950, the greatest threat was a nuclear armed Soviet Union; in 1995, it may well be the depletion of the ozone layer. The definition of what constitutes a threat to national security must change over time in order to remain viable as technology and science constantly develop and the political landscape evolves. In general, the range of issues that are considered as national security threats is expanding as increased knowledge demonstrates the salience of areas previously not considered under traditional military-centered security.

Traditionally, national security has been almost synonymous with military defense. Lester Brown notes that:

> Since World War II, the concept of national security has acquired an overwhelmingly military character, rooted in the assumption that the principal threat to security comes from other nations. Commonly veiled in secrecy, considerations of military threats have become so dominant that new threats to the security of nations, threats with which military forces cannot cope, are being ignored. (1986:195)

In the United States, the militarization of national security reached its zenith under what is known as the national security state, the military-industrial complex's governmental ruling body. It includes not only the Pentagon,

intelligence agencies and the military services, but various public and private interests united behind the idea of massive public spending for the purpose of "national security."[2]

The National Security Act (NSA) of 1947 was passed by Congress to create the National Military Establishment, which was later renamed the Department of Defense. The NSA also created the National Security Council (NSC) "to advise the president with respect to the integration of domestic, foreign, and military policies relating to the national security" (Crabb 1991:12). The NSC probably exerted its peak influence during the Nixon administration, when Henry Kissinger ran American foreign policy directly out of the NSC, regularly by-passing the Department of State.

The increasing attention being paid to environmental security comes not only because of the growing urgency of ecological problems threatening the basic foundations of human existence, but also because of fundamental shifts in the world military and security structure. With the end of the Cold War, the status quo of the previous 45 years came

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[2] Basically, a series of institutions were brought to life to channel the great human, financial and technological resources of the United States to the protection from the threat of global communism. Readers interested in more detail on the creation of the national security state are encouraged to read Daniel Yergin's excellent book *Shattered Peace: The Origins of the Cold War and the National Security State* (1977). It is also necessary to note that academic research in the security field itself can be considered a part of this national security state.

to its conclusion. For the West, the great bogeyman seemed less threatening and nuclear war has faded as a daily fear for most of the world's inhabitants. The death of communism left a vast agenda vacuum in security policymaking. The world had become addicted to a permanent war economy, a trend that began during the Great Depression of the 1930s, was institutionalized by leaders such as Franklin Roosevelt and Adolf Hitler, and continues to the present: witness the Persian Gulf War. Military spending provided huge infusions of public sector money into the economy, creating growth and jobs outside of normal market forces. As the world faces an uncertain economy in the 1990s, international leaders mourn the loss of a favorite tool of economic manipulation. The appearance of "environmental security" may be a godsend for governments forced to reduce military spending due to lack of an enemy. The United States and other nations are experiencing the pains associated with dismantling a huge war machine, thereby releasing millions of newly unemployed workers into already depressed job markets. Environmental security could mean continued public sector spending on remediation, research and development.

The third chapter of this study examines the relationship between the military and the environment. Can an institution known for applied violence become a protector of the environment? The primary reason for the inclusion of a section on the military and the environment is to

demonstrate from the perspective of traditional national security the close interrelationship between the two. Rather than demand the military establishment change dramatically to accept the new concept of environmental security, it is useful from a research standpoint first to recognize how much the two already have in common.

Changing Ideas of National Security: The Rise of Environmental Security

The rapid disintegration of the Soviet Union and the discreditation of global communism has dramatically redefined the national security agenda for the United States. Almost fifty years of being geared primarily towards containing Soviet expansion produced a particular expression of national security, an expression that now must find a new *raison d'etre*. The national security state was "a defining feature of the American nation during the Cold War. But now that glue that gave that structural cohesion is no longer there" (Raskin 1994:81). It is now understood that "Defense is only one facet of national security, and defense has value only as it contributes to that security" (Hartmann and Wendzel 1988:ix). A myopic focus on traditional military issues is counterproductive to the security of the nation. "A security policy that ignores any of the military, political, economic or environmental threats to U.S. well-

being is unworthy of the name, yet historically U.S. security policy has ignored nearly all of them" (Shuman and Harvey 1993:38). An expansion of traditional security formulations to include environmental security is clearly necessary.

New issues and concerns about national security have entered into the national security policy agenda. Former Secretary of State James Baker writes that "traditional concepts of threats to the security of our citizens need to be updated and extended to include the new transnational dangers--environmental degradation among them" (Baker 1991:169). Security theorists also understand the need for new definitions, as evidenced by national security expert Snow:

> What more than blunting military threats constitute the conditions under which Americans feel and are secure? Structured this way, national security and security policy encompasses a broad range of considerations from the drug problem to economic competitiveness to the environment. (1991:100-101)

These ideas are also reflected by military researcher Meinhold:

> Nonmilitary threats to world peace and security have proliferated to the extent that...may...if left unchecked, produce social outcomes at least as devastating as war. The recognition that grappling with these issues is an integral part of national security is only now dawning. (1992:4-5)

Among the many possible issues to rise to prominence in national security discussions is the deteriorating condition of the global environment. While economic competitiveness is also seen as a security issue, it is differentiated from environmental security because it fails to create a tangible physical threat along the lines of lead poisoning or ultraviolet radiation that can affect American lives and property. Former President Jimmy Carter writes that:

> 'Security' must be redefined for the '90s and beyond, taking into account that the safety of a nation's citizenry--literally, its physical health and well-being--can be jeopardized as much by a neighboring country's smokestacks of diversion of water supplies as by its war machines. Today's 'invaders' are as likely to be environmental refugees as armed soldiers. (1991:M5)

Qualitatively, environmental concerns are very much the concerns of traditional security, only with newly vectored threats. Security policy is changing rapidly and the chance to protect the very foundation of human survival is critical. The very definition of security has changed. Environmental security expert Myers writes:

> ...there is a need to incorporate an environmental dimension into security planning. The conventional approach to security interests surely reflects an overly narrow perception of security problems and of available responses, largely military, to security threats. Could the time be coming when as much lasting security can be purchased through trees as through tanks? (1989:41)

While environmental concerns are certainly not recent arrivals to the public policy agenda, it took the end of the Cold War for them to be recognized as first-rate security issues. "To a large extent, the withering away of superpower competition in the early 1990s has redirected attention away from strictly military issues and towards global environmental problems" (Kamieniecki 1993:4). Environmental researchers have long warned of the severity of the threat from ecosystem degradation and are now being heeded more readily. "National defense, here and elsewhere, is beginning to be seen as more than military preparedness. The greatest threat is no longer from the armed forces of other nations, but in the massive and accelerating decline of the global environment" (Caldwell 1989:28). Earlier, the quick destruction of nuclear war was a more pressing priority than the slow death of ecosystem degradation.

The reason this move towards environmental security finally has been forthcoming is a better scientific understanding of the human relationship with the rest of the ecosphere and the impact that human activity can have on it. The environment is the basis on which all human civilization rests. Correspondingly, this makes a healthy environment the basis of security: "another component of national security, frequently overlooked as such, is the integrity of the global environment that supports American lives with clean air and water, liveable temperatures, abundant agriculture,

and variegated plant and animal species" (Shuman and Harvey 1993:35), although domestic environmental threats may exist as well.

Environmental security is concerned with those environmental issues that threaten national security, that is to say that *environmental security is the freedom from physical environmental threats to safety and well-being, as well as the freedom from the fear of such threats*. Is the environment always a security issue? No, not all environmental problems lead to conflict (or vice versa) (Myers 1993:21). One definition of a security threat is "forces originating from outside the United States that can harm American lives, property, or well-being. These forces include military aggression, political subversion, economic stability, and environmental destruction" (Shuman and Harvey 1993:25).

Writing for the United Nations Institute for Disarmament, Westing attempts to define more tightly environmental security:

> ...it can be suggested that the environmental component of comprehensive human security is comprised of two interconnected segments: a) environmental protection (based on protection from wartime and similar abuse [really, vandalism], protection from medically unacceptable environmental pollution, and--for special areas--protection from any permanent human intrusion); and b) sound resource utilization based on use or harvesting at levels and with procedures that either maintain or restore optimal resource services or stocks. (1991:3)

Westing rightly points out that environmental security is more than just the defensive stance of protecting the present state of the environment, but a continual process in which the relationship between humans and the ecosphere must be readjusted to reflect the long-term well-being of both.

Environmental security is a broad concern due to the nature of the environment as the basis of all human life and activity. "Unfortunately, the environment-security theme encompasses an almost unmanageable array of sub-issues, especially if we define 'security' broadly to include human physical, social, and economic well-being" (Homer-Dixon 1991:76). As Homer-Dixon concentrates his studies on acute conflict, his restriction addresses mostly the physical and not the more psychological aspects of security. Still, his admonition is useful in stressing the connection of the new environmental security to its older, more traditional permutations. The relationship between environmental problems and traditional national security is one full of indirect effects and a staggering number of intervening variables. Homer-Dixon reduces the relationship to two individual questions: 1) "What are the important social effects of environmental change?" and 2) "What types of conflict, if any, are most likely to result from these social effects?" (Homer-Dixon 1991:87). Environmental problems can affect security as a cause factor:

> The political rivalries and tensions that already exist among leadership groups and that, in the extreme, cause violence, are intensified drastically when people believe that their survival is at stake--when there is no fuel wood to cook daily meals, when there is no drinking water, when land is no longer farmable, when exploding populations overwhelm natural resources, to say nothing of health, education, housing and other social infrastructure. (Carter 1991:M5)

The degradation of the environment can spur military human action that can threaten national security.

Environmental degradation can also directly affect human security. The poisonous effects of toxic gas are the same whether they were released by a chemical weapon or a chemical industrial process, the difference being only one of intent. Agriculture is destroyed equally by desertification as by deliberate soil destruction. Environmental destruction can result in insecurity both directly as well as indirectly through intervening social variables.

Differences between Environmental Security and National Security

Environmental security and traditional national security are by no means synonymous terms merely superficially different due to updated language. There exist at least three major areas in which the two concepts diverge: 1) security matters that are not related to the

environment, 2) traditional national defense practices that are ecologically malignant and therefore conflict with environmental security, and 3) environmental security issues which are not national in nature, whose scope goes beyond the capacity of the nation-state to solve effectively, whether alone, bilaterally or through traditional multilateral alliances.[3]

At the broad theoretical level, all environmental issues become national security issues, because anything that damages any portion of the global ecosystem reduces the health of the whole, thereby adversely affecting the environment in any national area. By virtue of the fact that human society depends on the environment for its survival, all issues of environmental security are therefore also national security concerns in the most general sense. For obvious practical purposes, this line of reasoning must be sharply limited. Ecological theory provides a comprehensive worldview, and with a little imagination almost any issue can be fit into the environmental rubric. This study refrains from such an approach that is too all-encompassing in its nature for many reasons, foremost analytical focus.

While human security does depend on the environment, the reciprocal is not true: *not all security concerns are*

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[3] Security matters not related to the environment are not of concern here. The military's poor environmental record is discussed in chapter three and environmental security issues that transcend the nation-state are discussed in chapter six.

rooted in the environmental. For example, human greed for wealth and/or power are often at the heart of much conflict. While environmental factors may be involved, their roles in political instability and insecurity are frequently highly diffuse and indirect in their effect; intervening factors with clearer roles must be given central responsibility. For example, terrorist attacks may ultimately have some root in some ecological concern (such as water availability in the Jordan River basin), but are usually the result of an individual or group desire for power and recognition or a political protest. Similarly, the struggle of the kangaroo rat to escape extinction may be another irreplaceable loss to the nation's and world's biodiversity, but it is not in itself a security issue. As with much in environmental politics, lines of distinction are not easily drawn although by necessity they sometimes must be.

National security and environmental security are clearly incongruous in those areas where traditional security or military defense practices may have been successful on their own terms, but failures or even disasters when viewed from an ecological perspective. The military has not been known for its environmentally benign effects on the planet it fights and practices on; in fact, it has been one of the most powerfully destructive forces in human civilization. In a non-ecologically aware worldview, the natural environment is a separate place from the human

environment and subordinate to its needs, allowing massive ecosystem disruption or outright ecocide in the name of "national security." The following chapter discusses the military's environmental record in detail.

The difference between environmental security and national security based on the limited scope of the nation-state and the global nature of the ecosphere also implies another incongruence between the realms of the two approaches. Some, but not all, environmental problems are *national* security concerns. Snow and Brown write that:

> Environmental concerns, like other transnational issues, are also quasi-national security concerns that fall somewhere between traditional national security issues defined in military terms and foreign policy issues framed in diplomatic terms. They are national security concerns inasmuch as our sense of security and well-being will be affected negatively if ozone depletion is not arrested and reversed. (1994:28)

This statement also demonstrates that while environmental security is not traditional security, it can be when it meets the conditions that make any issue a concern of national security. This is a level of analysis problem, as referred to by Homer-Dixon earlier; the nation-state is ecologically interdependent within the ecosphere, but remains politically sovereign in the chaotic world political system. A later chapter on global environmental security issues will examine this point fully.

Case Selection and Justification

The current era in human history can be characterized by the predominance of the nation-state as the most important unit of political organization. While inherently parochial in scope of interest and responsibility, the nation-state is still the focus of the politics of security. Thus, it is necessary to examine international environmental politics through the "lens of the nation-state" (Choucri and North 1990). The concept of ecological security creeps into the strategic thinking of the nation-state by stressing the interconnectiveness of all countries of the world, a necessary intermediate step to the globalization of the response to certain environmental threats. Until such a time, environmental politics will be enacted solely as a matter of national interest.

The most appropriate scale of analysis for a discussion of ecological security is global. The past century has witnessed the development of the internationalization of security politics, evidenced by two world wars and scores of multinational defense pacts. The threat of nuclear holocaust was a universal fear. There has been a "progressive convergence of domestic and external politics" (Sprout and Sprout 1971:10)(see also Rose 1988). Security is by definition international as the world enters "an ecological paradigm in international relations based on the recognition of the finite nature of the planet and the inextricable

interdependence of the state making up its territory" (Pirages 1978:10-11). The nation-state is clearly less relevant than before.

However, pragmatism is necessary to understanding ecological approaches in security thinking; environmental protection is still not formulated for the benefit of the ecosphere or people affected in foreign countries, but in the interest of the nation which deems its interests threatened by environmental problems at home and abroad. The United States Senate demonstrates this in its defense authorization report for the 1991 budget:

> The committee believes that threats to the environment should be regarded as national security threats for several reasons. First is the possibility that significant environmental changes will contribute to the likelihood of unrest, violence, chaos, and conflict, and that this may ultimately require the use of U.S. military power. (United States Congress Senate Committee on Armed Services 1990:223)

For the present, environmental issues are defined through the demands and needs of the security of the nation-state.

The increased awareness of the nation-state that environmental protection is basic to the maintenance of national security raises serious questions as to the relationship of the nation-state system and militarism and the problems of ecological deterioration. "Finally, the defense establishment is undeniably a part of the *problem* of environmental degradation" (United States Congress Senate Committee on Armed Services 1990:223). The insecurity caused

by environmental decline is systemic to traditional political-economic organization. The problem is one of the entire ecosphere and solutions must be equally global. It is unrealistic to expect the transferral of authority to deal with the environmental crisis from national to supranational organs anytime soon, so the actions taken at the national level are of critical importance, even if ultimately inappropriate to the scale of the issues involved. The nation-state construct is at once part of the problem, as well as the only political unit available with which to begin searching for solutions.

The selection of a particular nation-state, the United States, as the primary case for this study was difficult due to the nature of the issue. The literature review in Chapter One revealed a transnational focus in environmental security, this being due to the global nature of several of the most significant problems being faced, such as ozone depletion or global warming. However, not all environmental security issues manifest themselves at the global, or even regional level, as many issues of pollution or ecosystem disruption have geographically limited effects, at least immediately. Some environmental security issues are only appropriately discussed at the national level. No other study was found using an American or other nation-state point of view to discuss environmental security beyond

specific local cause and effect relations.[4] Additionally, it is useful and practical to examine the issue of environmental security through the perspective of the United States for a number of reasons, mostly having to do with the size, impact and nature of the country.

In terms of size, the United States is without a doubt the most important player on the international political scene. It is the world's largest economy and greatest military power. At least three major factors influence the selection of the United States as a case study. First, the United States as a nation perhaps has been the greatest polluter in human history, due to the magnitude of its economy, consumption of energy and integration into global flows of natural resources. America produces more than any other nation, including waste. Second, the U.S. has by far the world's largest military expenditure, reflecting the American commitment to national security. This has several effects, including the opportunity costs of that expenditure and the environmental damage directly done by the military in combat, training and equipment production. Third, the United States is politically the foremost power on Earth. Global environmental issues require equally global solutions and no nation is in a better position to provide the

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[4] The exception is Levy (1995), who classifies several environmental issues as threats specifically to U. S. security interests, but concludes that this is unimportant. His argument, although interesting, is uneven and unconvincing.

leadership both domestically and internationally to bring the world real environmental security.

The nature of the United States also promotes its choice as a case study. American history has been full of discussion of the relationship of humans and nature from colonial times onward. The democratic political system has allowed open questioning of the value of national security and the protection it actually provides, as shown by the discussion over nuclear weapons or the Persian Gulf War. Freedom of information is also critical for a researcher to gain appropriate amounts of relevant data. Without entering into an essay on the topic, the United States appears to be open and willing to address the concept of environmental security at both the public and policymaking levels, making it possible for this study to be an overview of what has been taking place, rather than just a normative suggestion for future policy consideration.

Case evidence is introduced based first on the criteria presented above: that it be a security issue. Does a given situation threaten the physical well-being of American life, liberty or property? Does a situation or concern create a fear that well-being may be threatened at some time in the future? Whether a case qualifies as a physical or psychological threat will greatly affect the response to it. Canadian troops crossing the border into upstate New York, for example, would warrant a counter-response immediately,

while the fear of this happening would probably only provoke congressional hearings. Lastly, ecopolitical values will be discussed only briefly and when necessary.

The remainder of this study examines the function of environmental security in the United States from the framework of three geopolitical scales: domestic, regional and global. The framework is derived from Gore who used a similar approach is his own classification of environmental threats:

> A useful system comes from the military, which frequently places a conflict in one of three different categories, according to the theater in which it takes place. There are "local" skirmishes, "regional" battles, and "strategic" conflicts. This third category is reserved for struggles that can threaten a nation's survival and must be understood in a global context. (1992:28-29)

Gore's classification system has been adjusted so that "local" refers to the domestic concerns of the territorial United States and "regional" refers to transboundary concerns in North America. Global concerns will remain "strategic," and the term itself will also be used.

Gore's taxonomy for the location of environmental political issues is useful for several reasons. First, it reflects three distinct levels of American politics which, although they overlap, operate differently. Each includes at least a slightly different cast of political actors, constituencies, and vested influences. Not only do they overlap, but they affect each other, e.g., the Vietnam War.

Additionally, while domestic and regional politics function under familiar rules, the form of politics demanded by the new global environmental political issues is still in the process of being developed.

Domestic politics occurs completely within the realm of national sovereignty, thereby ensuring that actions can follow the same set of political rules. Domestic politics in a federal, divided system also has strong roles for state and even local level actors. The United States being a democracy, domestic political issues are also closest to the voters who ultimately hold power. Additionally, this level of politics is often less considered in security studies, allowing room for new perspectives.

Regional or transboundary environmental security issues are those taking place between the United States and its neighbors, with whom it has long-standing relations. Diplomacy is the customary channel through which disputes are dealt with, rather than military aggression. Often, international legal arbitration is turned to for conflict resolution, and there is a history of international jurisprudence in the environmental law field. This generally quiet level of politics often lacks the glamour of more headline grabbing global issues, but remains critical when viewed from the perspective of environmental protection.

Lastly, the global category of environmental security issues is at once a continuation of traditional

international politics and diplomacy as well as a completely new level at which nation-states must come together. Global environmental issues do not allow for isolationism; all nations are affected by the decline of the health of the ecosphere. No nation is completely sovereign. In addition, issues of development, population and international aid are involved in the discussion of finding global solutions to issues such as ozone depletion or climate change, thus multiplying the number of relevant variables. At this level, environmental security requires the creation of a transnational politics that can effectively address issues that have both their causes and effects distributed globally.

Many of this study's findings concerning specifically the United States will be generalizable to other nations as well, particularly Japan and the other industrialized democracies in Europe and elsewhere. Understanding the relationship of environment to security may promote security policies that address ecosystem stress rather than only subsequent violent conflict. While certainly each nation of the world is unique in its perceptions of national security and environmental security, ultimately the shared nature of the global ecosystem and the increasingly shared values of democracy and environmental protection make external relevance possible.

Sovereignty

The primary stumbling block in the path of global environmental management and protection is the notion of national sovereignty. A state is said to have internal sovereignty when it has "exercise of supreme authority within its territory" (Rajan 1978:1). Any nation-state is limited in its sovereignty by virtue of its inextricably being linked to the rest of the single biosphere that humanity inhabits. "In its external aspects, [the nation-state] is subject to many limitations, not all of which derive from its own consent. None of the states--not even the most powerful ones--is absolutely independent" (Rajan 1978:1). There is ultimately only one level of sovereignty: global, although most politics takes place at smaller, more appropriate scales. When a nation accedes to an international environmental agreement, it places a portion of its sovereign right to regulate its domestic development and policy priorities in the hands of a multinational group of which it is only a part. "Any proposed diminution of a state's political freedom or legal jurisdiction is likely to evoke a response which will be expressed, at least in part, as a defense of its sovereignty" (James 1986:1). This may explain the preference of many nations to minimize involvement with larger-scale treaties in favor of bi- or multilateral agreements where sovereignty is shared with

only one other nation, e.g., the United States and Canada (Somers 1987:31-32).

International law is designed to respect and protect a nation's sovereignty. "The basic principle governing transboundary environmental interferences, is, that States shall prevent or abate any such interferences which causes, or entails a significant risk of causing substantial harm" (Lammers 1986:94), or protect the international version of property rights. Difficulty arises at the implementation stage, for a nation will view foreign enforcement of international law within its national jurisdiction as a sovereignty issue (Fouere 1988:37). The desire to maintain sovereignty rights is expressed equally by the industrialized world and the developing nations. "By proposing that nation states give up their unlimited sovereignty, these states [calling for international authority to protect the ecosystem] were challenging one of the pillars of the old system of national security (Porter 1990:335). The United States has been particularly strong in its opposition to international environmental treaties, as shown by its position on global warming at the Rio earth Summit.

Environmental deterioration is a by-product of economic development, with the more advanced countries seeing the results of their growth and projecting that if the remainder of the globe engages in similar practices, the viability of

the ecosphere is in danger. The developing nations view calls for the limitation of certain economic activities with great mistrust. First, they fear a loss of sovereignty just at the time when they are better able than ever to enjoy the benefits of modern sovereignty. "The desire to retain power, and to expand, is basic to all states" (Rajan 1978:9). Secondly, while accepting the ecological reasoning behind Western calls for policy changes, they suspect ulterior economic motives. From Brazil's perspective, for example, in an effort to limit its development as an industrial nation and competitor, "intervention in Brazilian internal affairs is justified on the pretense of averting 'crimes against humanity'" (Mattos de Lemos 1990:307).

It is impossible for any portion of the planet to achieve isolation. Each nation is constantly affected by the environmental actions taking place within the borders of another. As the consequences of these actions become graver, the political pressure for their termination will strengthen. There are two paths to achieve international environmental security: cooperation or coercion. The efforts of the diplomatic community to date have been to reach international consensus to protect the common ecosphere through a series of conventions on the use of various chemicals, production practices, and nature preservation, such as the agreements on ozone depleting chemicals and whaling. As with all laws and regulations, there eventually

arises a case of non-compliance. In international environmental law, the violator would be a sovereign nation, probably with an army to protect what it perceives as its internal sovereign "rights." At times, like these, military force might have to be called on to function in the role of the police to prevent and punish ecologically unsound and illegal activities.

An Outline of National Security and the Environment

The relationship between environment and security has been established in an indirect manner thus far: the declarations of policymakers, the involvement of the military, and even just existentially. The remainder of this study examines how the environment manifests itself as a security issue. The manner in which environment and security feed back to each other is complex and often indirect, changing with specific conditions.

The often diffuse nature of the relationships that create environmental security make it necessary to distinguish between type and degree of connection between variables. As already mentioned, in this study, environmental security issues are grouped into one of three geopolitical scales: domestic, regional and global, each of which also roughly corresponds with the form of politics involved in its discussion. First, domestic environmental security in the United States is examined, followed by

regional environmental security issues, including bilateral and multilateral issues, and finally global scale concerns are discussed. The issues at each of these geopolitical scales involves a different mode of politics and policy: domestic, traditional diplomatic, and new global diplomatic, respectively.

Domestic Environmental Security

Domestic environmental security issues are defined as those that take place entirely within the borders of the United States and its territorial waters. Whether the political actors involved are Americans or foreigners, all are subject to United States' sovereignty, making domestic environmental security a matter of law and public policy rather than diplomacy and international relations. Although taking place within American jurisdiction, national and environmental security can still be domestic concerns. Global warming and ozone layer depletion remain perhaps the greatest threats to the United States, but the less glamorous domestic problems of toxic waste and air pollution also degrade the nation's environment and future. Chapter Four discusses the linkages between environment and security within the United States.

While much of the threat to environmental security is recent in nature, there is ample historical data available to show the long relationship between the environment and

"domestic tranquillity." From the colonial period onward, the effects of nature on humans and, increasing with development, humans on the environment, have caused powerful security impacts in America. Climate changes, pollution, soil degradation and resource exploitation have been political issues affecting security throughout the history of the republic, and even before its founding. Environmental warfare has been commonplace, as has the desire to defend the environment. The relationship between environment and security is characterized by a remarkable continuity over history.

The European settlement of North America was in large part propelled by the Little Ice Age which struck between about 1450 and 1840, drastically lowering agricultural output and causing frequent famines throughout northern Europe. Discontent increased, contributing to the Protestant Reformation and localization of political power away from Rome, the rise of capitalism as trade for food stuffs so that northern Europe, especially Britain and the Netherlands, could feed their growing populations, and finally the migration to new land across the Atlantic. The effects of the Little Ice Age are not to be understated, as new research is showing how hungry, angry citizens rose up during the snowy summers of the late 1790s against not only the French monarchy, but in Massachusetts against taxes and

debts that could not be paid from the proceeds of a meager harvest.

The United States has also seen disruptive internal migration as a result of environmental impetus. The global cooling period after the 1815 eruption of the Tambora volcano in Indonesia (Ladurie 1971:313; Ponting 1991:106) expressed itself in the United States in 1816-1817 by greatly contributing to a large internal migration to the western frontier (Gore 1992:71). Perhaps the most famous case was that of the Dust Bowl refugees fleeing their useless Midwestern farms for California in the 1930's. Contemporaneously, the loss of topsoil due to cotton growing in the southeast contributed to the exodus of poor farmers, including many blacks, to the northern industrial states.

In addition to climate, military degradation of the environment, often in the name of "national security", is another recurring theme in U.S. history. The excessive demands on American forests by the British beginning in 1652 to build ships for the Royal Navy contributed to American feelings of exploitation by the crown and ultimately the Declaration of Independence in 1776. The British colonies by 1775 "had been stripped of the very tall pines needed for mainmasts" (Ponting 1991:279). Military scorched earth tactics were used often in the invasion of the lands of the indigenous North American nations, including the encouragement of wiping out the buffalo, staple of native

diet and culture. The American Civil War of 1861 to 1865 saw the widespread use of scorched earth tactics, exemplified by General William Tecumseh Sherman's "March to the Sea," which left a large swath of the south in ruins.

The modern environmental movement arose in response to the increasing ability of humans to modify their habitat, both intentionally and not. The killer fog that struck London in December 1952, leaving four thousand dead, gave rise to the name "smog" and drove home the dangers in abusing the environment (Commoner 1972:67). Pollution suddenly had a very public body count. Monitoring of humans living downwind from the Hanford nuclear reactor in Washington state showed a governmental willingness to expose citizens and ecosystems to radiation (Thomas 1995:46). Soldiers returning from Vietnam with Agent Orange related illnesses dramatized the damage done to farmers at home by the same or similar chemicals. Overall, new scientific information was teaching that humanity was not separate and superior to the environment, rather inextricably connected to it. Americans began to feel increasingly less secure about their habitat and demanded that the political system address the causes of their fears.

The late 1980s and 1990s have seen a new government attitude in the relationship between environment and security. This is most noticeable in the focus on the changing role of the military in terms of both finally

beginning to clean up after itself as well as taking positive measures by assisting ecological research. Budgetary limitations have slowed down this process considerably. Post-Cold War military activities also have publicly stressed a broadening of the traditional mission to include more humanitarian operations, often disaster relief necessitated by increased population pressures in hurricane or earthquake prone areas. Army Corps of Engineers projects are still environmental engineering, but are beginning to proceed along more ecologically sound lines.

A major difficulty in environmental politics is the gap between intention and action. Many policy pronouncements emanate from Washington each year, but real change is slow in coming. While Bruce Babbitt has made some progress at the Interior Department, for example, most of the Clinton administration's environmental record is rather similar to Bush's. Having an environmentalist Vice President did not get the Carbon Tax passed in 1993 nor motor vehicle mileage standards raised. The military is more open about its clean-up problems than before, but it wonders about funding for costly individual mitigation projects. Ultimately, national security begins at home.

A relatively recent development involving domestic national and environmental security has been violence centered on environmental use. The Federal Bureau of Investigation (FBI) considers the radical pro-environment

group Earth First! to be terrorists due to their history of sabotage and destruction of lumbering and mining equipment and the endangerment of resource extraction workers in the name of a specified political objective (Helvarg 1994:395-398). The government is also concerned about increasing violence from the anti-environment side of the issue and attacks on federal personnel and property in the name of "wise use," states' rights or anti-government politics. The openly antagonistic relationships between various political factions and the government, especially in the western states where natural resource extraction is economically important, is a growing national security concern.

Regional Environmental Security

Regional or transboundary environmental security issues are those where either the cause or the effect of environmental degradation crosses a national boundary. For the United States, this is limited primarily by geography to Canada and Mexico, both being borders which have seen their share of environmental disputes. It is also necessary to remember that the United States maintains economic exclusion zones in waters of the Atlantic, Pacific and Arctic Oceans, as well as the Gulf of Mexico. The generally peaceful nature of the relations between the United States and its neighbors have also characterized most of the interactions between

them on environmental issues. Still, a border violation is an invasion of sovereignty and must be addressed somehow.

The border between the United States and Canada, the longest undefended border in the world, is the border between two large industrial democracies each of which produce a variety of pollutants that easily travel over the frontier. In the famous 1927 Trail Smelter case concerning sulfur dioxide emissions from a mineral smelter in British Columbia travelling south to Washington state, international arbitration ruled that "no state has the right to use or permit the use of its territory in such a manner as to cause injury by fumes in or to the territory of another or the properties or persons therein..." (Okidi 1978:6). The issue was decided to the United States' favor by international arbitration, although the pollution was not eliminated as neither nation wished to establish a precedent.

The issue of acid precipitation was a major stumbling block in U.S.-Canadian relations for a time in the late 1970s and early 1980s. Canada charged that sulfur dioxide emissions from the U.S. Midwest industrial heartland were crossing the border in the form of acid precipitation and damaging Canadian forests and watersheds. While acid rain and acid snow were serious issues in eastern Canada, where it was seen as a sovereignty violation by the superpower United States to the south, the political issue was defused

through the participation of both nations in multinational talks on long-range air pollution.

To the south, the border with Mexico is one of the most polluted areas in the world, particularly the Rio Grande valley and the Tijuana area. Much of the air and water pollution appears to be produced by manufacturing plants owned by multinational and American corporations who moved production south to escape American environmental protection regulations. Relatively little attention has been given to the *maquiladora* pollution problem, although in the negotiations over the North American Free Trade Agreement (NAFTA) between the U.S., Canada, and Mexico, Mexico was required to improve its environmental regulation and enforcement, albeit over a deferred and extended period.

International confrontation can occur off-shore, where natural resources such as fishing rights are of great economic value. Royal Canadian Navy vessels have fired on American fishing ships several times when suspected of illegal fishing. The U.S. is equally concerned about overfishing in its territorial water in the Pacific, where its possession of Alaska and Hawaii leads it to claim control over much of the northeastern quarter of the world's largest ocean. Japan, Korea and Taiwan are frequent culprits in overfishing and illegal drift net usage complaints.

The most serious regional environmental security issue for the United States is the growing number of environmental

refugees breaching the border. Illegal immigration from Central America, as well as elsewhere, is often linked to pervasive ecosystem destruction in the home country. For example, densely populated El Salvador has ravaged its ecosystem through deforestation, soil erosion, and water supply depletion. Its civil war in the 1980s, which was partially financed by Washington, drove almost a quarter of the population north to the United States, most illegally immigrating. Mexico suffers similar problems of overwhelmed carrying capacity and poverty such that each year at least tens of thousands cross the border annually in hopes of a better life.

While transboundary environmental security is not the issue for the United States that it is in other regions such as the Middle East with its limited water resources, the U.S. does have its concerns. Pollution problems will hopefully be worked out through further diplomacy and perhaps mechanisms created by NAFTA. The mounting problem of refugees, however, is not one with easy answers. The best way to deal with this concern may be to act in conjunction with the home government to alleviate the root causes of environmental refugee flight, rather reactively to attempt to cope with the symptoms.[5]

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[5] The Department of Defense program for biodiversity in Africa is an example of work in this direction. Chapter Three discusses this and other approaches in greater detail.

Global Environmental Security

In the end, the most serious of the challenges facing American environmental security are found at the global scale: climate change, ozone depletion, and biodiversity loss being the most prominent. Neither these environmental problems nor their solutions can be dealt with exclusively within a single nation in isolation. Global environmental issues require a new global co-operation to create policy to address and ameliorate them. Seldom in human history have all nations worked together for a single cause, as the situation today demands.

The first global environmental security issue faced by human civilization was the threat of nuclear war, in which all nations would suffer the effects of radiation and nuclear winter, regardless of whether they were actual participants or merely by-standers. Nuclear war is a special case in that the possibility of it occurring is dependent on the specific actions of a limited group of policymakers. Mutual Assured Destruction (MAD) held the two powers capable of global thermonuclear war from the actual use of their nuclear arsenals. Non-Proliferation agreements worked to limit the spread of nuclear weapons with reasonable success. While nuclear blasts by Pakistan, Britain, India, or Israel would doubtlessly affect the global environment, the smaller nuclear powers lack the sheer quantity of warheads and long-range delivery devices that characterized the superpower

nuclear arms race. Fears that China may have joined the United States and Russia in intercontinental missile capabilities have rattled international politics. Still, any nuclear detonations would have profound environmental effects, as the international furor over French testing of warheads in the South Pacific in 1995 reflected.

Stratospheric ozone layer depletion is another global environmental security issue, although it is characterized by geographic and geopolitical limitations in both cause and effect. These features may have served to help the quick action taken by the world's nations in the Montreal Protocol of 1987 and its updates. Diplomat Richard Benedick has written a full account of the diplomatic process (1991). The sources of ozone destroying chemicals are not ubiquitous, with the production concentrated mostly in the northern industrial states, with the south being viewed more as a necessary political partner for the future rather than a primary contributor today.

The effects of increased ultraviolet B radiation allowed through by a thinning ozone layer include sunburn, snow blindness, and immune suppression in the short term, as well as the long-term effects including skin cancer, eye cataracts and melanoma. Similarly, the effects of ozone depletion are biased toward the poles, with the parts of the world nearest the South Pole, such as Tierra del Fuego, already seeing increased cases of cancer and blindness in

animals (Myers 1993:169). Disruptions of American ecosystems are also being detected (Cone 1994:A1). Australia already faces a dramatically increased skin cancer rate, although that is partially due to hereditary melanin deficiency in most of the non-aboriginal population. Ozone layer thinning has also been reported over the North Pole and northern areas of Europe, Russia, and North America. Clearly, some nations have more at stake than others in ozone politics.

The United States itself has a great deal at stake in ozone depletion. Recent scientific data already show a four to five percent thinning of the ozone layer over the temperate latitudes of the United States (Abramson 1991:A36). Each percentage point decline in ozone reduces the filtering of ultraviolet B radiation, a known carcinogenic, such that the rate of skin cancers and cataracts increases linearly (United States Environmental Protection Agency Office of Air and Radiation 1987:9-1 to 9-3). The Environmental Protection Agency has estimated that the U.S. can expect to see over two million new skin cancer cases and thousands of cases of cataracts in the next 50 years, including 200,000 deaths, if the present thinning continues, as it is likely to due to the slow nature of the chemical reactions involved in the upper atmosphere (Abramson 1991:A36). This is a casualty projection similar to one expected from a major war.

While the diplomatic efforts to limit ozone destroying chemical substances has been a success, there remains the burdensome question of enforcement. Compliance is voluntary and some nations of the South, especially China, are complaining about the research and technological costs to them of helping the rich North to deal with a problem it created in the first place. Agreements regarding technology transfer and accompanying financial support have been much slower in coming than the agreements over principles of phasing out CFC's and other chemicals completely. Because international agreements do not have the legal power to override national sovereignty, dealing with noncompliance may pose difficulties in the future.[6]

Probably the greatest challenge to humanity is that of global climate change. The cause of climate change is the excessive release of greenhouse gases into the atmosphere, especially carbon dioxide and methane, disturbing the delicate natural balance of the ecosphere's chemical cycles.[7] These gases come from all nations at all levels of

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[6] Either future environmental regimes will be created with real enforcement authority ceded to them by individual nations or collective security military "police" responses, such as the coalition against Iraq in the Persian Gulf War, will arise to meet this need.

[7] The scientific principle behind the greenhouse effect has been known since the 1896 publication of "On the Influence of Carbonic Acid in the Air upon the Temperature of the Ground" by Svante Arrhenius in Philosophical Magazine and the later works of Alfred J. Lotka on anthropogenic changes of atmospheric carbon dioxide concentrations and their potential effect on climate in the 1920s.

development. While some areas may actually benefit from a more benign climate, it is fair to say that even those areas will feel some negative effects through linkages with the rest of the world. Just as with ozone depletion, global policy responses begun before the finalization of scientific evidence are critically important.

The most commonly discussed figure in terms of temperature change is between 2-4 degrees Celsius, or roughly the same change as the last ice age, only in the opposite direction. If this were to occur, the United States would face massive coastal flooding, threatening most seaports and low-lying coastal areas (see Oppenheimer and Boyle 1990). Increased hurricane activity would destroy much inhabited land further inland (Gore 1992:106). The interior would suffer a chronic drought reminiscent of the great dust bowls, with much of today's grain belt reduced to 1930s-level agricultural productivity. Up to one half of all Americans could become refugees, a number to which can be added an equal amount fleeing from Mexico and Central America. It would not be an overdramatization to say that it would be the end of the United States as the nation it is today. The security stakes do not get any higher.

Even minor climate change has the potential to cause major changes in the United States. Recall the effects of smaller climatic shifts in American history. The difference today is that action can be taken to prevent and/or mitigate

the effects of climate change. International negotiations on climate change through the International Panel on Climate Change (IPCC) have been slowly moving forward, despite the efforts of the Bush Administration to derail them. The outcomes of the 1992 Rio Earth Summit showed the seriousness of the international community regarding climate change and the betrayal of American and global environmental security by the Bush White House.

The present international political system is inadequate to the task of responding effectively to the global environmental security threats now facing the planet. No nation will escape the consequences of decreased protection from the ozone layer or go unaffected if the global climate changes. Likewise, the causes are equally widespread, from carbon based fossil fuel combustion in the US, to rainforest clearing in Indonesia, to bovine flatulence in Argentina. No single nation or group of nations can defend their environment without the co-operation of other nations. Biosphere politics cannot be subdivided, despite an international political system based on sovereign nation-states. Sovereignty must be respected unless it is necessary to violate it to ensure global environmental security. The definition of that necessity is a complex political issue that the world must face.

Global climate change reflects the changing nature of environmental politics more than any other issue. As it did

on the negotiations on chloroflorocarbon (CFC) reduction, the United States is in a unique position to lead the world in combatting this potentially devastating problem, due to its history of leadership in environmental protection and collective security. Despite the footdragging of the recent past, this opportunity still avails itself. For the United States, national security has often been defined by its leadership in global efforts against threats to its and other nations' security, whether against communism in Korea or energy security in the Gulf. As the world redefines the extent of national sovereignty in light of global environmental concerns, the U.S. can either help build a new world politics or have it imposed on it at a later date by a world unwilling to suffer for a single nation's (in)actions.

Conclusion

The adoption of environmental security as part of the defense program is an admission that environmental protection is a "moral equivalent of war," or MEOW, as used by President Jimmy Carter. This study, and others elsewhere, will show that environmental security, even more than military security, is a fundamental survival issue and should be afforded the same attention. The former Director of the Sector on Ecological Law at the Institute of State and Law at the Academy of Science of the U.S.S.R., Alexander Timoshenko, views the shift of ecological issues to the

security level as giving them the highest policy agenda priority, deserved by the fact that it is a survival question. Placing environmental security on par with traditional military security allows a political redistribution of resources in favor of environmental protection (Timoshenko 1990).

Another very important shift in policymaking as a result of the adoption of environmental security would be a transition from reactive to preventative planning (Timoshenko 1990). Little attention is paid to long-term planning in the United States, with perhaps the only exception being the defense establishment, which has always endeavored to function on the premise of "be prepared"--after an invasion is a poor time to develop an effective defense. Still, "today's security system pays little attention to the roots of conflict," write Shuman and Harvey (1993:235), who also point out that a prominent habit of U.S. security policy since World War II "has been to emphasize winning violent conflicts over preventing them in the first place" (1993:18). The nature of environmental security issues facing the United States today stresses the need for preventive policy.

The assault on human survival through ecosystem degradation has already begun, but further spread can be mitigated through preventative policies imbued with a long-range temporal perspective. "From a policy perspective, it

is incumbent upon security policy formulators to appreciate the significance of these antecedent environmental degradations and resultant political instability and conflict" (Dabelko and Dabelko 1992:4). In a preventive, proactive security posture, "national security should emphasize identifying and correcting those environmental factors that engender conflict, violence, war, fear, and similar behavior patterns worldwide" (Crabb 1991:5-6). Environmental security is a better way to ensure a secure nation and world.

Chapter Three

Military Security and the Environment

Traditional military security and the environment always have been interrelated. Security and the military are also inextricably linked. According to Kakonen, "The concept of security is historically so closely connected to nation states and armed forces that it is difficult to change its essence" (1994:2). The linkages of the environment to the military can be seen from two perspectives, with either element as the basis by which the other is regarded: 1) the role of the environment in traditional military security, and 2) the role of the military in environmental protection and degradation. As Kakonen explains, the two security concepts have become intertwined:

> Since environmental problems have gained a visible position in discussion about security, it has become possible to discuss the greening of security. On the other hand, [the] military has taken seriously the challenge raised by environmental problems. The military has integrated the environment into the traditional security, and therefore it is to be feared that the environmental issues will be militarized. (1994:1)

It is disingenuous for critics of environmental security to claim that the mixture of national security and the environment is inappropriate when literally thousands of years of military history demonstrate close linkages between the two concepts. This chapter recognizes the traditional

linkages of the environment to the military, which therefore links the environment to security through the military intermediate. The present chapter differs from those that follow in that rather than showing how various environmental problems are security threats, it discusses how the traditional exercise of security policy through the military has and continues to involve the environment.

While the concept of environmental security is a relatively new phenomenon to both the academic and policymaking arenas, the actual linkage of the environment to military security is long-standing. The environmental factor in traditional security generally has revealed itself in one of two categories: 1) the strategic concern over natural resource access, and 2) the tactical use of environmental warfare. Throughout history, military strategy has operated on the principle that human life and strength are dependent on inputs from the environment and that access to natural resources is critical for security. This also translates into tactics based on the conclusion that destruction of an enemy's habitat is a sound military approach for the purpose of defeating the opponent. As a result, the environment has been a frequent target of military aggression, culminating with the creation of a specific vocabulary for the most destructive tactic of environmental warfare: ecocide-- the deliberate destruction of an ecosystem for military purposes. The military and the

environment would be linked directly forever through this principle alone.

By examining the military establishment's record of relationship with the environment, it is clear that both a positive and a negative linkage exists between the two. Most conceptualizations of national security focus primarily on military security; there is no question of the strong correlation between military and national security. It logically follows that national security is and has been concerned with the environment through these military linkages. Widening the traditional conceptualization of national security to include environmental security therefore is not adding a wholly new variable into the realm of national security. Rather, it is an expansion of the already existing relationship of environment to security from the more limited 'environment as logistical source' formulation to the greater recognition of 'environment as basis of society to be secured.' "Ecological stresses and resource scarcities eventually translate into economic stresses with social and political dimensions" (Brown 1986:204). More than military security is dependent on the security of the environment.

Humanity and nature are inextricably interrelated in a complex ecological web. The military establishment, once merely the line of physical defense from armed human opponents, is now recognizing that it also has a role to

play in environmental defense and security. Environmental security is national security and the mission of the armed services and allied agencies is to ensure that security. Just as reliable access to essential natural resources such as minerals and energy traditionally has been a national security concern, so now is availability to clean, useable air, water and soil, as well as a stable climate and the protection of the ozone layer.

The role of the military vis-a-vis the environment is conceptually complex because the two major linkages are in effect mutually contradictory. First, the military is perhaps the greatest single polluter of the environment, as would be expected from such a huge economic entity, generating massive pollution, toxic and radioactive waste and ecosystem disruption. At the same time, however, the military is the guardian of the nation and its environment, with a mission to protect national environmental security and to protect the environment. In this paradox, the military is definitively linked to the environment, both positively and negatively:

> Some would argue that military involvement in environmental matters is inappropriate, either because the military mission often harms both humanity and the environment or because the strength of the military would be diluted should its focus be broadened to 'nontraditional' social issues such as the environment or the war on drugs. Both arguments wrongly assume that these issues/missions/roles are mutually exclusive from the military mission. These arguments fail to examine the fact that the military

> already plays a significant environmental role, either because it is the law, or because it makes good sense as a logical paradigm in achieving military objections. (Butts 1994:83)

Still, even without the purposive, intentional military destruction of the environment through environmental warfare or even ecocide, the normal day-to-day functioning of the military-industrial complex exhibits a tremendous impact on the environment (Robinson 1979; SIPRI 1980; Thomas 1995). "Military exercises in peacetime can have destructive effects on the environment, as can the production and storage of toxic weapons" (Gleditsch 1994:137). The preparation and practice for warfare scars training grounds. The production of munitions and weapons leaves behind a bitter toxic legacy of poisoned air, land and water on and around military bases as well as weapons research and production facilities. Additionally, the production, testing and maintenance of nuclear weapons have created highly dangerous and extremely enduring radioactive contamination as they leave behind a radioactive poisoning of the land, water, and air at the detonation and production sites. Lastly, the military is a competitor with environmental protection for agenda priorities and funding, the United States alone spending 280 billion dollars each year on military defense that cannot be spent elsewhere. This is a high opportunity cost.

The key concepts of ecology are connectivity, cooperation, and mutual existence, all of which appear to exist in direct opposition to the philosophy of destruction and violence that is the core of the military mentality. All this functions to form a major critique of the military/environment relationship:

> The military establishment is unique in that, when put to use, its potential effects are so destructive as to defeat the object of its own existence--by destroying what it is meant to defend. (Gleditsch 1994:138)

This perspective is certainly valid, but it is also incomplete, as discussed by Butts:

> The military and environmental issues have rarely been linked. In part this is because many of the more outspoken environmentalists are either members of peace organizations or philosophically opposed to war. The environmental transgressions of the military are often portrayed as willful and representative of all military operations. These characterizations are unfortunate, inaccurate and do a disservice to those who are seeking policy options for improving the environment. While the military does have environmental problems, they are not unlike those of any other large organization or landholding agency, private, state or federal. (1994:84)

It is necessary to keep in mind the sheer size of the military when assessing its proportional environmental impact, as well as when searching for positive contributions it may offer environmental protection.

The military has also demonstrated an ability to function as a protector of the environment. The U.S. Army's

defense of Yellowstone National Park from poachers, miners and developers from 1886 to 1918 attests to this (Byers 1994:114-117). More recently, a string of federal and military laws, regulations and directives dating from the mid-1980s fundamentally have changed the relationship between military practices and the environment in which they take place. Essentially, the recognition amongst policymakers of the connection between national security and environmental security has translated into a transformation of military approaches to reflect environmental concerns.

Before examining the positive role of the military in relation to the environment, this chapter presents the uglier side of the traditional pursuit for national security. First, the concept and practice of environmental warfare and ecocide are discussed, as well as their place in international law. This is followed by a discussion of natural resources and the possibility of conflict that human reliance on the ecosystem may engender. The environmental degradation by the military in non-wartime activities is then presented in detail before switching to environmental remediation and protection roles being played by a new, more ecologically conscious military.

Environmental Warfare

The mission of any nation's military is to defend the territorial integrity of its country. The dependence of

human society on nature and its ecosystems has made the environment a potential target for military attack. Environmental warfare "is defined to include all those weapons and tactics that intend to either destroy the environment *per se* or to disrupt on a sustained basis the normal relationship between man and nature" (Falk 1975:98). Since humans are part of a greater ecological unit, the definition of a military enemy has grown correspondingly to include not just a given human population but the entire ecosystem it inhabits. "These deliberate attacks on the natural environment have produced a new word in our vocabulary, *ecocide*--the destruction of the environment for military purposes" (Pfeiffer 1990:37). These military tactics imply at least a tacit understanding of the dependence relationship of human survival to ecosystem integrity, phrased here negatively: killing ecosystems is an efficient way of killing people.

This negative relationship between the military and the environment is nothing germane to the present. Since ancient times, military strategists have acted on the understanding that humanity is dependent on the environment for its survival. The principle of "scorched earth," literally the burning down of all structures, crops and livestock to deprive the enemy of their logistical usefulness, has been in use for millennia. This principle has been a constant in military tactics:

> The environment has always been both a military target and a casualty of war. An enemy's habitat provides food, refuge, cover, and a staging ground for attacks. In prehistoric times, fire-drives deprived an enemy of game animals and cover. Some 3,000 years ago, Abimelech's forces spread salt on the conquered city of Shechem (Judges 9:45), near Nablus, Jordan--perhaps the first recorded use of chemical weapons to destroy an enemy's territory. (Nietschmann 1990:35)

While scorched earth tactics are usually used defensively to inhibit invasions by making logistics more difficult for attacking armies, Robinson notes that:

> Guerilla warfare is a major exception, for here one side deliberately exploits its environment for protection, for surprise, and generally as a means for avoiding direct military engagement by opposing forces. The latter may be strongly tempted, for military reasons alone, to use ecosystemically-mediated modes of offensive action. (1979:14-15)

The scorched earth tactic is efficient at environmental destruction, however, "in no case has its efficacy, analyzed retrospectively using purely military criteria, been conclusively demonstrated" (Robinson 1979:15). Only the ecosystem is guaranteed to suffer.

Just as intentional harm to the environment has been common historically, so has ecological damage resulting as an external circumstance to military activity. For example, "the cutting of forests by Romans to build ships to fight Carthaginians or by Crusaders to solve the logistic problems of their expeditions, have profoundly changed some ecologies," writes Lynn White (1969:342), referring in

particular to the once dense cedar forests of Lebanon. It is an established fact that the environment has always suffered under military activity.

A well publicized recent case of environmental warfare tactics came during the 1990-1991 Persian Gulf War, when Iraqi President Saddam Hussein ordered the pumping of crude oil into the waters of the Persian Gulf for the probable purpose of interfering with possible amphibious assaults, as well as clogging intakes for Saudi desalinization plants (Begley et al. 1991). Combined with the setting on fire of Kuwaiti oil wells to produce massive smoke to impede visibility, the Iraqi wartime actions form a vivid lingering image of the relationship of the environment to military activities:

> Environmentalists are right to be skeptical about the concept of involving the military in efforts to improve the environment. When Saddam Hussein released millions of gallons of oil into the Persian Gulf he demonstrated the extreme environmental consequences of warfare and further associated the military with environmental degradation. Saddam's highly publicized action is but one of many military-generated environmental problems. (Butts 1994:84)

The most infamous example of the use of ecocide as a military tactic was the United States strategy in the war in Vietnam. "Indochina in the sixties provided the first modern case where the environment was selected as a "military" target appropriate for comprehensive and systematic destruction" (Falk 1975;91). Also, the Vietnam War "was the

first major war where ecological concerns were regularly voiced as part of the current debate" (Gleditsch 1994:138). In particular, the U.S. Army used systematic defoliation as a weapon (Sprout and Sprout 1971:18) to deprive the communist opposition of cover and sustenance. It is known that:

> In Vietnam, the United States elevated environmental damage to a primary tactic in its fight against the peasant guerilla forces of the National Liberation Front, or Vietcong, and the lightly armed and highly mobile North Vietnamese army. United States forces bombed and shelled 30 percent of South Vietnam's territory, leaving a moonlike landscape pockmarked by an estimated 250 million craters. Planes sprayed herbicides on 10 percent of the country, destroying 8 percent of the cropland, 14 percent of the forests, and 50 percent of the mangroves. "Rome plow" bulldozers and ship anchor chains cleared vegetation. The war in Vietnam left in its wake extensive impoverished grasslands instead of forests, widespread erosion and dust storms, major declines in freshwater and coastal fisheries, and severe losses of wildlife, especially from the forest canopy--wounds from which the land may not recover for a hundred years. (In France, shell craters from the 1916 Battle of Verdun are still present and thinly vegetated seventy-five years later.) (Nietschmann 1990:35)

The ecosystems of Vietnam were permanently altered. The use of herbicides in Vietnam was not the first wartime use of such chemicals, however, it was by far the largest application of herbicidal operations and the only one for which major attempts to assess the ecological impact were made (Robinson 1979:43).

The ecocidal nature of the American environmental warfare tactics against Vietnam are seen in the choice of the chemical agents which were introduced into the war. Agent Orange, the military code name for a 1:1 mixture of 2,4-Dichlorophenoxyacetic acid (2,4-D) and 2,4,5-Trichlorophenoxyacetic acid (2,4,5-T), and Agent White, code name for a mix of 2,4-D and percloran, both plant hormone mimicking compounds which kill by interfering with the normal metabolism of treated plants, were used against forest vegetation. Agent Blue, code name for cacodylic acid, or dimethylarsinic acid, a desiccating compound, was used against rice paddies and other crops. Between 1962 and 1969, 4,560,000 acres of forest and 505,000 acres of crop land were sprayed. In 1970, President Richard Nixon terminated the use of pesticides, only to have the task of defoliation passed on to "Rome plows," heavily armored D7E Caterpillar bulldozers equipped with 2.5 ton blades.

Precedent for the military use of Agent Orange and other herbicides in Vietnam probably may have come from their earlier use by Great Britain, also in southeast Asia. Britain used herbicides to help suppress the insurgency in Malaya[1] in the mid-1950s for the purposes of "defoliation along lines of communication in order to reduce possibilities of ambushes" and "destruction of crops which were presumably being grown by or for the insurgents"

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[1] Now part of Malaysia.

(Westing 1984:4). A significant smaller scale use came later from another United States ally, Israel, against crops in Aquaba, Jordan in 1972.

The ecological effects of environmental warfare were exhibited in the severe devastation of vast areas of indigenous ecosystems. Tropical rainforests were so heavily damaged that it is predicted that ultimately only savanna-type ecosystems can ever replace them, as evidenced by the elephant grass and cogon grass that have taken hold in the ecosystem and become the dominant plant species, thereby preventing further ecological succession to the rainforest climax community native to Vietnam (Falk 1975:99). Cratering and bombing tactics also have left physical scars throughout the landscape. The U.S. military even went so far as to engage in weather modification tactics to attempt to drown entrenched Viet Cong soldiers.

The use of environmental warfare tactics by the United States Armed Forces in the Vietnam War was not their introduction as a regular American military practice. German grain fields were bombed in World War II in an attempt to starve the civilian population into submission. The series of wars that marked the United States' expansion into indigenous American nations' land regularly saw the mass devastations of diet and cultural staples such as the buffalo and as well as crop burnings. Scorched earth tactics also featured prominently in the American Civil War against

the Confederate States of America (CSA), exemplified by Sherman's "March on the Sea." The Philippine insurrection against the United States, during the period just after the United States seized control of the Spanish archipelago from 1899 to 1903, was met with the systematic destruction of villages, crops and livestock in provinces that were rebelling (SIPRI 1980:16). Additionally, during the Korean War United States aerial attacks on North Korean irrigation dams with the purpose of disrupting rice production further demonstrates a regular American consideration of environmental warfare as a viable tactic.

Environmental Warfare and International Law

Environmental warfare, in addition to being environmentally devastating, is a violation of international law. The accepted international rules governing warfare prohibit any attacks on the ecosystems of a military enemy. After being accused of violating the international code of war with its tactics in Vietnam, the United States government claimed that there were no existing rules of international law that prohibited the military use of herbicides. In response to this claim, the United Nations General Assembly passed Resolution 2603A (XXIV) in 1969, which clearly stated that international law indeed did cover the military use of pesticides as they are "chemical agents" whose use therefore violated the (June 17) 1925 Geneva

Protocol for the Proliferation of the Use in War of Asphyxiating, Poisonous or Other Gases, and of Bacteriological Methods of Warfare (Falk 1975:100). By a vote of 80 to 3, with 36 abstentions, the General Assembly declared "as contradictory to the generally recognized rules of international law the use in international armed conflicts of any chemical agents of warfare which might be employed because of their direct toxic effects on man, animals or plants" (Robinson 1979:4). Critics of the American ecocide in Vietnam were able to find legal precedent to support their case, including other relevant international laws regarding the environment and warfare such as the 1972 Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons, and on Their Destruction, as well as Article 23 (a) of the 1907 Hague Regulations respecting the Laws and Customs of War on Land, which forbids the employment of poison or poisoned weapons. "This rule has customarily been interpreted as prohibiting, *inter alia*, the poisoning of wells and other water supplies" (Robinson 1979:5).

Environmental destruction can be considered an international war crime. In fact, the prosecution of environmental war crimes has legal precedent. After World War II, the United Nations War Crimes Commission in Nuremburg was called on to judge a wartime environmental

case. The commission found that ten Germans in the National Socialist government's Forestry Administration had engaged in clear-cutting Polish timber stands beyond sustainability, being what was necessary to preserve the timber resource. Nine of the Germans were charged as war criminals (Falk 1975:103). Perhaps there is some significance today to clear-cutting being a war crime.

The international community of nations had to respond to the growing threat of environmental warfare made possible by advances in science and technology. The United States' actions in Vietnam helped give momentum to international concern that resulted in the 1977 Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques, also known as the Enmod Convention. Signed into effect on May 18, 1977 by a large number of nations, but not the United States, the convention bans environmental modification techniques that have "widespread, long-lasting or severe effects as the means of destruction or injury to another...party [to the convention]" (Nimetz and Caine 1991:10).

Later that year in December, the Geneva Diplomatic Conference on the Reaffirmation and Development of International Humanitarian Law Applicable in Armed Conflict added two additional protocols to the 1949 Geneva Conventions. Article 35 (3) of 1977 Additional Protocol I prohibits states from employing "methods or means of warfare

which are intended, or may be expected, to cause widespread, long-term and severe damage to the natural environment" (Nimetz and Caine 1991:10). Article 55 (2) prohibits "attacks against the natural environment by way of reprisals" (Robinson 1979:4). It is significant that the United States has not yet acceded to these Protocols (Tumulty 1991). Environmental warfare is not only dangerous, it is illegal.

The Environment as the Basic Resource of Society

Human society is dependent on the environment. It relies on nature for food, air, water, protection from the vacuum of outer space and a stable climate. Even generally non-ecologically minded policymakers such as former President George Bush have been able to see that "[a] sound environment is the basis for the continuity and quality of human life and enterprise" (Bush 1991:165). Still, at the same time it is becoming fully understood that "[f]or the first time in human history the basic requirements of every nation's security--air, water, land, and life itself--are in danger of being permanently destroyed" (Shuman and Harvey 1993:105). The assaults on the environment on which human civilization and survival depend are becoming increasingly familiar as society grows in ecological awareness: climate change, ozone depletion, loss of biodiversity, soil depletion, air and water pollution, human overpopulation,

toxic and radioactive waste production and resource degradation. Science has shown that the ecosphere and human society are inseparable, although human behavior has yet to adapt itself fully to the serious ramifications of that revelation. Security rests on incorporating that lesson.

The President's Council on Sustainable Development's 1994 statement emphasizes that environmental concerns are of central importance to American and global security. The United States has had the understanding of the interrelationship between humans and environment as a matter of official public record since the enactment of the National Environmental Policy Act of 1969. Richard Nixon, writing in the President's Message prefacing the first report of the Council on Environmental Quality in 1970, connected security to ecology:

> Our physical nature, our mental health, our culture and institutions, our opportunities for challenge and fulfillment, our very survival--all of these are directly related to and affected by the environment in which we live. They depend on the continued healthy functioning of the natural systems of the earth. (Nixon 1970:vi)

Environmental awareness has been a factor in American politics for several decades.

The significant first step to environmental security policy was the passage of Public Law 91-190, the National Environmental Policy Act of 1969, on January 1, 1970. Section 101 reads:

> The Congress, recognizing the profound impact of man's activity on the interrelations of all components of the natural environment, particularly the profound influences of population growth, high-density urbanization, industrial expansion, resource exploitation, and new and expanding technological advances and recognizing further the critical importance of restoring and maintaining environmental quality to the overall welfare and development of man, declares that it is the continuing policy of the Federal Government, in cooperation with State and local governments, and other concerned public and private organizations, to use all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans.

Clearly, the awareness of the interrelationship between the security of humanity and the integrity of the ecosystem it inhabits is a familiar phenomenon, just as the undertaking of positive action remains a continuing process.

Natural Resources and Security

Resource scarcity traditionally has been a great causal factor in human conflict. Many theorists have argued that society itself came about as a result of competition over scarce resources. Shuman and Harvey delineate four different ways in which natural resources are linked to conflict: 1) a direct competition for scarce resources can result, for example, over oil resource access, which prompted German and

Japanese expansion in World War II, as well as the United States' involvement in the Persian Gulf War; 2) environmental degradation can directly create friction; 3) the vulnerability of a nation's resource infrastructure can encourage an enemy to attack; and 4) resource mismanagement can create lost financial assets and opportunities that could have been used to strengthen national security (Shuman and Harvey 1993:105-106). Ultimately, natural resources have become an issue of national security and the military (Myers 1993).

Thomas Homer-Dixon specializes in examining the linkages between environmental problems and violent conflict (1991,1994). The possibility of conflict arising from natural resource scarcity is placed by Homer-Dixon into the traditional models of the international relations field:

> Simple scarcity conflicts are explained and predicted by general structural theories. They are conflicts we would expect when state actors rationally calculate their interests in a zero-sum or negative-sum situation such as might arrive from resource scarcity. We have seen such conflicts often in the past; they are easily understood within the realist paradigm of international relations theory, and they therefore are likely to receive undue attention from current security scholars. (1991:106)

Competition over scarce resources is perhaps the oldest root of human conflict in history.

The example of access to energy resources illustrates the validity of the inclusion of natural resource policy in American national security policy. While perhaps of a

different nature than the oxygen and water offered by the biosphere, energy is a basic need for human beings, whether it is a fire in a cave or a complex power utility system providing electricity and fossil fuels for heat, light, and transportation. Fears of the disruption of supplies of a major energy source, petroleum, resulted in a deployment of over a quarter of a million American troops in Saudi Arabia and Kuwait in 1990-1991. It is important to note that the Persian Gulf War was fought to defend access to a resource that has some economically available substitutable commodities, oil not being the only source of energy in existence. An article written by Porter before the Iraqi invasion of Kuwait holds that:

> Once the industrialized world begins to shift away from reliance on petroleum for its energy system, a major justification for military deployments and the possible use of major military force, which is already in decline, will finally dissolve. (1990:341)

A significant amount of American foreign aid goes to promote stability in the Middle East, with the oil issue always close in the background. American military adventures in Angola and Somalia were also directly related to oil production or exploration.

Matthias Finger has examined the role of the environment as a natural resource:

> To be sure, war is in this context basically a means by which the state secures strategic natural resources. And the environment, in this context, is a set of strategic resources. Of course what ultimately makes

> 'nature' into a strategic resource or not depends on society, more precisely on the state of techno-economic development, as well as on the global availability of strategic resources. (1994:172)

The concept of commodity substitution and the social determination of what exactly constitutes a resource is very important. Most natural resources can be replaced by some other to perform the equivalent task. One strategic metal, such as cobalt, can be substituted with an alloy made with another, such as titanium. There is, however, one natural resource that does not have any alternative available. It cannot be repeated too often that the ecosphere is non-replaceable: the Earth, with its ecological interdependencies, is the only planet known to be able to support life as we know it. Equally, it is impossible for any portion of the planet to aspire to autarky. Each nation is constantly affected by the actions taking place within the borders of another. As the consequences of these actions become graver, the demands for policies for cessation of environmental degradation will grow in volume, including calls for the use of military encouragement of environmental protection.

Linking concern for environmental integrity with traditional security considerations is to recognize that the natural habitat of humanity is a strategic resource, in a manner analogous to energy or certain minerals. A strategic resource is one which is limited in supply or access and is

critical to engagement in a military effort or defense. There is only one planet, therefore it functions in a support capacity for all human activity, including the subset of human activity known as military operations. Part of the mission of the military is to protect and defend those resources which are necessary to the continued functioning of defense capability in specific and the economic productivity of a nation in general. Due to the fact that the health of the environment is critical to human survival and national security, it is thereby automatically the concern of the defense establishment to ensure that critical natural resources are available and useable, especially the most important of all: the global ecosphere. At this point, the natural resource aspect of the relationship of the military to the environment returns the circle to the concept of environmental warfare:

> There is only a small step from considering the environment to be a resource for nation-states' development to considering it to be a tool in order to prevent others to access it as such a resource. By this I mean that environmental warfare...has similar epistemological roots as warfare over resources. (Finger 1994:172)

Peacetime Military Environmental Impacts

It is not necessary for the military to engage in active warfare for it to have a detrimental effect on the ecosystem, as just the preparations for war can be as

ecologically destructive as combat. "A large and expensive military establishment contributes to numerous adverse impacts on the habitat of the political community that supports it" (Sprout and Sprout 1978:109). "We also overlook the constant and escalating environmental costs associated with maintaining military forces" (Funke 1994:61). Specifically, military "training exercises, bombing and artillery practice, weapons testing, and refuse disposal affect many environments continuously, unlike actual war" (Nietschmann 1990:36).

Worthy of attention are the environmental costs of the production of the most destructive weapons of all time--nuclear warheads. Due to the dangers of waste storage, plant decommissioning, and radioactive fuel and waste transportation, over the long term nuclear weapons and their production may well be as dangerous to the nation that possesses them as they might be on the nation on which they may be used. Accidents involving nuclear weapons are not unknown, e.g., the 1968 incident at the United States air base in Thule, Greenland, where a B-52 bomber lost 3 of 4 hydrogen bombs, such that "the radioactive fuel of the bombs burned and spread onto snow and ice and through them into water" (Heininen 1994:156-157). In addition to the devastation resulting from nuclear weapon explosions, the further threat of nuclear winter has the possibility of creating massive global-scale ecosystem disruption.

"Ultimately nuclear war not only destroys resources, it moreover erodes the biosphere, the very basis upon which society depends" (Finger 1994:175). Besides having the capacity to render the entire biosphere devoid of life when used as directed, it is understood that:

> Nuclear weapons production has been a central element in U.S. national security strategy for more than three decades, but it is now recognized that the mere production of these weapons has enormous "externalities" in the form of nuclear wastes that present long-term threats to the environment. (Porter 1990:343)

One possible ground for recent calls for a redefinition of "security" may be such inherent contradictions in traditional security formulations.

One reason most hazardous military-generated pollution was permitted to take place was because the military was generally held exempt from environmental regulations; the integrity of the environment being deemed inferior to that of traditional defense. Policymakers were unable or unwilling to admit that environmental protection was a form of national security, especially those members of the government beholden to the special interests of the military-industrial complex. The military was given a special legal position in regard to environmental laws and regulations:

> The Unitary Theory of the Executive prevented federal agencies such as the Environmental Protection Agency from suing DOD [Department of Defense] for environmental violations and the legal

> construct of Sovereign Immunity spared military facilities punitive fines from state agencies. Without the incentive of penalties DOD was slow to adopt a strict environmental ethic and was inconsistent in obeying environmental laws. (Finger 1994:85)

"The government applied the doctrine of 'sovereign immunity' to exempt military facilities from compliance with environmental laws, and to prevent any effective public oversight" (Renner 1994:24-25). The doctrine of sovereign immunity effectively provided the military a position above federal and state environmental laws, all in the name of national security. As a result, many military bases became little more than toxic waste dumps, causing unneeded danger to military personnel and complications in the attempt to convert to civilian use closed bases around the country. Weapons production and research sites generated similarly dismal environmental records.

An example of military environmental havoc is the weapons reservation in Oak Ridge, Tennessee which took just twenty years to amass 4.7 million gallons of chemical wastes and 2.4 million tons of highly toxic mercury (Shuman and Harvey 1993:74). The reservation includes three major facilities: the Oak Ridge National Laboratory, the Gaseous Diffusion Plant and the Y-12 Plant. The 3400 acre Y-12 Plant manufactures components for internal nuclear weapons assemblies, in particular the lithium-deuteride second stage of a nuclear warhead and uranium, beryllium and other

materials for the first stage, as well as enriched uranium for plutonium production. Waterways surrounding the area are dangerously contaminated with uranium. The Gaseous Diffusion Plant, in use from 1945 to 1985, produced enriched uranium for the Hiroshima bomb and now serves as a waste dump for its adjoining facilities. Over 2.7 million cubic feet of low-level wastes are buried there, as well as 124,000 pounds of uranium. During its 40 years of operation the plant released almost 60,000 pounds of uranium into the local environment. Lastly, the Oak Ridge National Laboratory nuclear energy research center has been found to be rife with leaks of strontium-90, cesium-137 and other radioactive isotopes. Over seven million cubic feet of low level waste are buried there (Resnikoff 1990:28-29).

Another case is the DuPont plant at Savannah River, Georgia, which has discharged radioactive waste, including the highly dangerous strontium-90, into a nearby creek at a rate of 30 million gallons per year, contaminating groundwater to 42,500 times the EPA standard (Resnikoff 1990:32). The same facility also suffered a meltdown of nuclear fuel which officials tried to hide from the public (Shuman and Harvey 1993:74). Finally, there are 18 million cubic feet of low-level waste and 350,000 cubic feet of plutonium contaminated waste stored on site (Resnikoff 1990:32).

The case of military pollution that dramatically alerted the nation to the dangers of nuclear weapons production took place at the Rocky Flats Plant in Golden, Colorado. This plant specializes in producing plutonium triggers for nuclear warheads and recycling warheads to recover plutonium. It has been plagued with problems:

> Fires at the plant have distributed a large amount of plutonium into the air, soil, and water supplies. As a result of a contamination incident in October 1988, the plutonium "room" was shut down for several months. In the past, plutonium-contaminated waste has been shipped to the Idaho National Engineering Laboratory. These shipments were halted by the governor of Idaho for a time during 1988, and since September 1989, until the WIPP site is opened in New Mexico. Following an investigation by the FBI, and an argument with federal officials over possible criminal violations, Rockwell Industries announced in September 1989 it was giving up management of the Rocky Flats facility. (Resnikoff 1990:30-31)

Rocky Flats, run under the oversight of the Department of Energy, had to be shut down because of its flagrant illegal environmental abuses (Renner 1994:25). The exemption of the national security state from environmental protection laws and regulations had apparently reached its limits.

Pollution by the military is not limited to radioactive contamination in order to be a serious danger to human life. Chemical and bacteriological weapons and their production also produce toxic wastes that are often dumped at military facilities. The most famous case of this exists just outside of Denver, Colorado at the Rocky Mountain Arsenal:

> Here lies what even the Corps of Engineers calls "the most contaminated square mile on Earth", otherwise known as Basin F; the repository for about 125 different chemical compounds dumped by the Army and Shell Oil, which leased part of the 27 square mile site for a pesticide plant. Over a 30 year period, a deadly menu of chemicals were produced there, including mustard and nerve gases, wheat-killing virus, pesticides, rocket fuel, incendiary bombs and grenades. The Army and Shell oil are presently negotiating their respective shares of the clean-up, expected to total $2 billion. (Grauel 1990:45)

In light of the evidence, it is little wonder that the U.S. Congressional leadership has expressed the sentiment that "the defense establishment also has an obligation to pursue research on environmental clean-up technologies because they are part of the problem" (Nunn 1990). The magnitude of military pollution and the area affected is staggering:

> In the late 1980s, the U.S. General Accounting Office estimated that the Department of Defense was generating some 500,000 tons of toxics annually, more than the top five U.S. chemical companies combined. In April 1993, the Department of Defense reported to the U.S. Congress that it had identified 18,795 sites at 1,800 military installations that showed varying levels of soil and groundwater pollution. Some 94 installations were sufficiently contaminated to merit a place on the EPA's Superfund National Priorities List (NPL). As more abuses come to light, EPA officials expect the number of military NPL sites to double in the next few years. (Renner 1994:27)

While the passage of the 1984 Defense Environmental Restoration Act has been of considerable help in confronting

the problem and forcing the cleanup of military pollution, the problem still persists and will require billions of dollars and decades of time to correct (Grauel 1990:44).

A certain perspective must be kept. Butts points out that "[t]o be fair, many of DOD's problems were created in the years before the United States became environmentally aware and enacted comprehensive environmental laws; but the problems exist nonetheless, and reflect badly on the military" (1994:85). Additionally, "there appears to be no systematic evidence that the negative environmental effects of the military establishment exceed its share of the national product in peacetime" (Gleditsch 1994:137).[2]

Positive Military Roles in Environmental Security

If the mission of environmental protection is added to the traditional definition of security, a military establishment charged with protecting national and international security will find itself with a significantly expanded scope of responsibility. Matthias Finger writes:

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[2] The list of cases of peacetime environmental destruction by the military is considerable. In the literature, Anne Ehrlich and John Birks' (1990) edited volume *Hidden Dangers: Environmental Consequences of Preparing for War,* William Thomas'(1995) *Scorched Earth: The Military's Assault on the Environment* and a number of publications from the WorldWatch Institute, especially Michael Renner's (1989) *National Security: the Economic and Environmental Dimensions* are highly recommended. It is worthwhile to note that criticisms of the military using its poor environmental record against it also can be found in the Peace Studies field.

> However, instead of doing away with the military as the cause of this problem, we observe since the middle of the 1980s all kinds of attempts to redefine 'security'. Simultaneously emerging awareness of global environmental change and degradation merged with a general but fuzzy awareness of threats to everyone's 'security' at the peak of the Cold War, resulting in the new concept of 'global environmental security'. Instead of seeing the industrial civilization (including the military) as a threat to the biosphere, we now have global environmental change and degradation conceived as a threat to the security of human society. (1994:177)

Can an institution that has been one of the greatest causes of ecological destruction in human history realistically be trusted with such a task? Carl Pope, Conservation Director for the Sierra Club, accurately characterizes the defense establishment by stating that, "These are not institutions that have been imbued with an environmental conscience" (Turque 1990:22), as could be seen from the discussion in the section above. Not only does environmental security call for a rethinking of global politics, but it requires a new self-perception of military theory, replacing an age-old preoccupation with violence and destruction with a modern understanding of global interconnectivity and "nurturing." The environment is in need of a protector and the institution best in the position to adopt environmental security into its mandate would seem to require a radical change in its basic mentality. The impelling demands of the post-Cold War world are showing that this is very well possible.

Connecting the military to the environment in a positive manner is not as farfetched as it may seem on the surface. Rationally, it is in fact a logical connection. Beginning with the understanding that the military has always considered the environment a legitimate target of attacks based on its understanding of the ecosystem as the basis of the strength of an enemy's ability to resist or counterattack, it is reasonable to determine that the environment, in this context, has some value in military terms. Without expecting some new deep ecological awareness from the armed forces, it is accurate to say that the environment forms an important logistical and tactical element in traditional defense approaches.

Up to this point in this chapter, military consideration of the environment generally has focused on the support the local ecosystem of a military enemy gives that adversary. Logically, this line of reasoning can be extended to recognize that within the United States the domestic natural environment gives corresponding support to American forces. The economic and military might of the United States is dependent on the environmental basis on which it rests. Therefore, *just as the U.S. military views opponents' ecosystems as targets of attack, it is logical to view the domestic environment as something to defend on the same grounds.*

From this perspective, environmental security becomes a military concern. If military and military-industrial complex activities are detrimental to the environment, it becomes necessary to alter these activities in such a manner that national security would no longer be threatened by the pursuit of national security. This began in earnest with the passage of the 1984 Defense Environmental Restoration Act (DERA). DERA created two complimentary environmental restoration programs: the Installation Restoration Program (IRP) and the Other Hazardous Waste Operations program (OHW). The IRP is concerned that "contamination at DOD installations and formerly used defense properties are investigated and when necessary, the cleanup process is begun," while "[u]nder the OHW program research and development and demonstration programs are initiated that reduce the rates at which DOD hazardous waste is generated" (Butts 1994:98).

The nation's commitment to DERA is exhibited in its increasing funding of the programs, growing each year. In 1984 it received $150 million, in 1985 $314 million, in 1990 $601 million, in 1991 $1 billion, in 1992 $1.3 billion, and in 1993 $1.5 billion. The estimate for 1998 is $2.8 billion, at which point it is hoped the majority of cleanup projects will have been completed.

Another response to the military's dismal pollution record was the 1992 Federal Facilities Compliance Act. The

Act was a daring departure from the responses to military environmental crimes in the past. By act of Congress, the military establishment legally lost its sovereign immunity to regulation compliance:

> The Act requires military facilities to comply with existing laws like any entity in the private sector; the EPA and state regulators are now able to levy fines against military violators. In addition to establishing the military's institutional liability, the courts have affirmed that base commanders can be held personally liable--thus potentially facing the prospect of going to jail for severe violations. (Renner 1994:26)

Corresponding changes in military regulations reinforce the change that now individual military commanders are legally culpable for environmental crimes under their watch. "Policy is reaching the point where a bad environmental record, even short of criminal misconduct, can now damage a military career" (Renner 1994:26).

The concept of environmental protection and the military has already been integrated into American security thinking and policy. In 1989, then Secretary of Defense Richard Cheney initiated the "Defense and Environmental Initiative," directing the Defense Department to become a leader in agency environmental compliance and protection. Cheney's argument was based on the fact that this was "the surest way to maintain our access to the air, land, and water we need to maintain and improve our mission capability" (Renner 1994:25). The environmental support of

national security is becoming more recognized: "...in reckoning the cost of national security we must include all costs of making and sustaining a strong nation... environmental protection and preservation" (Deitchman 1991:129). Also in 1989, the Department of Defense issued Directive 4210.15 on Hazardous Material Pollution Prevention. This radically changed the focus of hazardous waste management from merely "end-of-the-pipe" disposal to a consideration of the "lowest entire life-cycle costs in terms of human health and the environment" (Butts 1994:101).

In an even more dramatic development, the legal position of the military in regard to environmental laws and regulation was completely changed. The principle of sovereign immunity was replaced by the Defense and State Memorandum of Agreement of July, 28 1989. The memorandum called for and invited the open and active participation from states in cleaning up DOD installations. As a result, the Department of Defense now pays individual states to participate in and to monitor the cleanup process (Butts 1994:101).

The 1990 National Defense Authorization Act established a Defense Environment Research Council, with a budget of $150 million in fiscal 1991 and $50 million in fiscal 1992, for the purpose of developing a plan for identifying Department of Defense, Department of Energy and intelligence capabilities that could be useful in understanding

environmental problems "that will pose an increasing threat to our national security in the years ahead" (Dabelko and Dabelko 1992:20). Three areas were focused on: 1) data gathering and analysis, 2) environmental compliance and advanced energy technology, and 3) environmental restoration and clean-up technology (Dabelko and Dabelko 1992:20). This Congressional action came largely from the efforts of the Senate Committee on Armed Services, led by Chairman Samuel Nunn and members Jeff Bingaman (D-NM), James Exon (D-NE), Albert Gore Jr. (D-TN), and Timothy Wirth (D-CO), with help from members Peter Dominici (R-NM) and John Warner (R-VA).

Environmental security has become an official part of American military planning. Butts discusses this transformation:

> The 1991 National Security Strategy (NSS) of the United States (US) was the first NSS to recognize the environment as a US national security interest. Its inclusion reflects popular national and international opinion which realizes that environmental issues have a major impact on economics and health, and are increasingly seen as a threat to development and political stability. Further that environmental issues such as clean air, desertification, and natural resource access have a cross-border component that may contribute to international conflict. By expanding the definition of national security to include the environment, the NSS suggests that the traditional strategies expand their focus to include environmental objectives. (1994:83)

This dramatic change at the Pentagon reflects not only security concerns but political realities:

> DOD discovered that it is cheaper to prevent pollution than to clean it up and it has reduced its hazardous waste pollution by nearly 50 percent. Further, it is investing hundreds of millions of dollars into the development of new cleanup technologies that will benefit private and international toxic and hazardous waste cleanup efforts. DOD also realizes that it must have popular support and it is now investing $1.3 billion per year to comply with existing environmental rules. DOD is becoming an instrument with which the US government can improve national security, and both the government and DOD now realize that the environment is a national security issue, and a DOD responsibility. (Butts 1994:86)

Clearly, a new pattern in American security politics has emerged, one in which environmental security is an overt objective.

Despite the strong momentum towards environmental security, the old pre-environmental security paradigm is not extinct in Washington. During Operations Desert Shield and Desert Storm in 1990-1991, the White House waived the legal requirement for environmental impact assessments for Pentagon projects so that war efforts would not become hampered. "The White House action allows the Pentagon to test new weapons in the West, increase production of matériel and launch new activities at its military bases without the elaborate public review normally required." (Schneider 1991:A14). Since NEPA allows waivers in times of emergency, in August 1990 the first wartime waiver was granted, according to the Council on Environmental Quality. The military was quick to clarify that this was only a

limited waiver, not a return to the environmental abuses of the past:

> Laws controlling pollution and safeguarding endangered species are still in effect on the bases and the Pentagon's general council Terrence O'Donnell asserted today that the military had "no intention of misusing and enlarging the exemption to accomplish other objectives." (Schneider 1991:A14)

As far as it was publicly revealed, the waiver was only used to increase the number of aircraft flights in Massachusetts and land mine testing and detection training at an undisclosed location in the West.

The Case of Yellowstone Park

Environmental security, like national security, is more than merely a statement of principles; it requires the capacity for enforcement, through military means, if necessary. In a case of active positive military action with an environmental protection mission, the U.S. Army was called in to protect Yellowstone National Park from 1886 to 1918 from illegal poaching and resource exploitation (Byers 1994:114-117). The area within Yellowstone park was being overused by a variety of hunters, trappers and miners who did not respect the rules and regulations established in Washington DC by the Department of the Interior. By 1883 Congress had called upon the Department of War (now Defense) to authorize the use of troops to protect the park. In 1886,

the management of Yellowstone was turned over to the Army entirely. The world's first national park, Yellowstone had been founded in 1872 to preserve the natural ecosystem of the Yellowstone area and protect it from development. From the beginning, there was a gap between the intention of wilderness conservation and the actual enforcement of that protection until the arrival of General Philip Sheridan.

Sheridan, the general best known for the decimation of the Shenandoah Valley during the Civil War and further acts of environmental warfare in conflict against the native American nations, was long interested in the beauty of the Yellowstone Valley. Having operated in the area earlier, Sheridan:

> ... had long taken an active interest in the Yellowstone Valley region, sponsoring a number of military expeditions into the area, which had led in turn to the establishment of the country's first national park in 1872. Ten years later Sheridan revisited the park only to find that the poachers were systematically stripping the land of its animals, while a privately owned monopoly, the rather inappropriately named Yellowstone Park Improvement Company was just as assiduously stripping the land of its minerals. Hastily organizing a powerful band of supporters, including Buffalo Bill Cody, naturalist George Bird Grinnell and Montana territorial governor John Schuyler Crosby, his old friend and aide, Sheridan lobbied Congress with partial success to expand the size of the park, set aside a game preserve, and empower the army to act as guards. (Morris 1992:378)

An 1882 visit to Yellowstone Park deeply upset the general:

> Sheridan was enraged to learn of the slaughter of the park's wildlife by hide hunters. He was told that over four thousand elk had been killed in one winter for their hides. The tiny civilian park staff could not hope to stop the well-organized poachers and had proven equally unsuccessful in halting vandalism of the park's natural wonders. (Hutton 1985:354)

Sheridan personally took on the task of protecting the park:

> Sheridan vigorously opposed this leasing of the national trust. 'The improvements in the park should be national, the control of it in the hands of an officer of the government,' he declared in his report of the 1882 expedition. If the Department of the Interior could not protect the park, then he would. 'I will engage to keep out skin hunters and all other hunters,' he told the administration, 'by use of troops from Fort Washakie on the south, Custer on the east, and Ellis on the north, and, if necessary, I can keep sufficient troops in the park to accomplish this object, and give a place of refuge and safety for our noble game.' (Hutton 1985:355)

Working with Missouri Senator George Graham Vest, Sheridan lobbied to change the status and administration of the park. Vest was unable to get a bill on the park passed, but succeeded in getting a rider added to the Sundry Civil Appropriations bill forbidding the Secretary of the Interior from granting monopolies within the national park and then amended that rider to authorize the detailing of Army troops to protect the park. This bill became law on March 3, 1883 (Hutton 1985:356).

The environmental situation in Yellowstone had been worsening, partially linked with a series of scandals. In the long term, this may actually have helped to save the park:

> Scandals in the administration of the park led Congress to cut off all funding in 1886, which deed forced the Secretary of the Interior to call upon the army to administer the park as stipulated in the act of March 1883. (Hutton 1985:359)

The military administration of the park was a great success. "The first four years of military administration of Yellowstone National Park accomplished much," including providing clearly defined objectives for park management and protection (Haimes 1977:27). To protect the park from vandalism, as illegal resource exploitation was legally referred to, and to protect both game and the forests, fifteen stations of cavalry were stationed in Yellowstone (Chittenden 1917:253). The permanent Acting Superintendent of Yellowstone National Park was a United States Army officer (Chittenden 1917:252). The park had found a defender:

> The result of these early years of administration by the army was to halt the destructive trend that would have ended in the dismemberment or revocation of Yellowstone National Park: by introducing order, the basis was laid for eventual improvement of park affairs. (Haimes 1977:29)

Perhaps the greatest single success story in the thirty-two years of military administration of Yellowstone National Park was the rescue of the buffalo from near extinction. Byers writes that:

> Although more than 30 million bison once roamed the plains of North America, by 1885 George Bird Grinnell estimated that no more than 700 survived, 180 of them in Yellowstone Park. Despite official interest in protecting Yellowstone bison, they did not thrive. In the late 1890s and early 1900s, official counts of the Park bison 'herd' ranged from 25 to 50. These were the last wild bison in the United States.
>
> The nationally-publicized capture of a buffalo hunter by soldiers in Yellowstone in 1894, at a crucial period in Congressional debates about protecting the Park, helped to galvanize national opinion and ensure passage of the Lacey Act. This Act placed the Park under the sole and exclusive jurisdiction of the United States, prohibited hunting, and established fines for violations of Park regulations. With the help of a bison reintroduction program that included the purchase of animals from captive herds as breeding stock, bison were thriving in Yellowstone again by the time the Army left the Park in 1918. Without the Army there would probably be no buffalo or elk in Yellowstone today. (1994:116)

The successes at Yellowstone Park also brought the Army into Yosemite National Park in California. Yosemite, made a national park by the Yosemite Act of 1890, was suffering under development and mismanagement, largely sponsored by the State of California (Byers 1994:116). Lumbering and the grazing of some 100,000 sheep were threatening the park's survival. On May 19, 1891, the Fourth Cavalry under Captain Abram Wood took control of the Park, now under Army

jurisdiction. The Army left in 1916 with the passage of the National Park Act, highly regarded for having saved the Park (Schaffer 1992).

The redefinition of the protection of national parks in the 1880s as concerns for the military brought environmental protection into the rubric of what has traditionally been considered to be national security issues: those entailing a military response. The elevation of conservation to this new level of "high" politics proved resoundingly successful. The concept of environmental security raising the political and resource priority of the specific concern affecting both the environment and the security of the nation has precedence in American environmental and military history.

The motivations for the military to accept this role went beyond the desire of Sheridan and others to preserve the nation's biological heritage. One major reason was in order to retain jobs for officers and soldiers in the post-Civil War, post-Indian Wars period at the end of the 19th century. "The officers and men of the cavalry had experience in the rough, mobile life of the American frontier, and many had grown to prefer such a life to that of staid eastern cities" (Byers 1994:116). The training and experience available in the military personnel made them quite capable of the job of protecting Yellowstone from poachers.[3]

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[3] "Looked at in this way, the Army's role in protecting Yellowstone could be seen as a successful example of military 'conversion' to para-military and even non-military

Additionally, the Army provided efficient, organized, effective management, not susceptible to local corruption pressures, because its officers were paid by and had careers created by, the federal government in Washington.

New policies are coming about as a direct result of the redefinition of security:

> In recognition of the end of the Cold War and in an effort to sustain the conditions necessary for peace and to eradicate poverty and environmental problems, the US military has changed the focus of its Security Assistance Program for the developing world from one of selling heavy military weapons and equipment to one of supporting nation building, environmental sustainment and small scale unit building. (Butts 1994:88)

Another positive mission of the military with the environment has been the African Biodiversity Program of the DOD, providing $15 million per year in equipment, technical assistance and training to military forces in several African countries to support wildlife protection activities (Byers 1994:121). Money is being dispensed for fisheries management and protection in Cape Verde, Guinea, Cote D'Ivoire, Sierra Leone and Namibia. Forest and wildlife protection is being supported in Equatorial Guinea, Central African Republic, Zimbabwe and Botswana.

Concern for biodiversity is not limited to the African continent. The Department of Defense is also active in

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tasks, something that has been called for in many countries in the post-Cold War era" (Byers 1994:116).

preserving America's ecological heritage in the vast land holdings of the Pentagon. As DOD land is mostly underdeveloped and still in its natural state, much of it has become a de facto game preserve for endangered species. For example, the endangered Red-Cockaded Woodpecker inhabits timber stands on Forts Bragg, Polk and Benning, as well as Camp LeJeune. Camp Pendleton in southern California functions as a nature preserve for deer and waterfowl, as well as endangered species such as the least Bells Virio and California Least Tern (Butts 1994:97). This new role as protector of the environment has been fit into military operations:

> While this has greatly complicated training at these installations, the military have adjusted and are increasingly making environmental stewardship a parallel mission to operational readiness. Installation commanders must conduct realistic combat simulation training, while managing flourishing herds of game, ensuring the nesting process of endangered species is undisturbed and enhancing wetlands. (Butts 1994:93)

The Pentagon also is working actively on the environmental remediation of Chesapeake Bay, through the multi-agency Coastal America program (Butts 1994:94).

The Legacy Resource Management Program was created in 1991 to fund Department of Defense stewardship of natural and cultural resources. "The purpose of the program is to 'promote, manage, research, conserve and restore the priceless biological, geophysical and historical resources

which exist on public lands, facilities, or property held by the Department of Defense'" (Butts 1994:96). Projects under the program include wetlands restoration and endangered species protection.

The military can be used as a force to protect the environment with its access to manpower, technology and budgetary resource priority. Recent proposals in the United States Senate call for the active involvement of the military in efforts to preserve environmental integrity:

> The U.S. defense establishment should be at the forefront of this technological effort [to protect the environment] for a number of reasons: first, because environmental deterioration in a very real sense threatens our nation's security and the security of the world; second, because the defense establishment has unique data collection and technological capabilities; and third, because the defense establishment helped create some of the environmental problems we face today. (Nunn 1990)

This led to a search for programs to convert Department of Defense, Department of Energy and intelligence agency assets to use in environmental research (Turque 1990:22).

In addition to intentional and coincidental environmental destruction caused by the military, however, the environment and the military are also linked in other manners. The United States Armed Forces are regularly called upon to engage in humanitarian operations, in particular in response to environmental events such as natural disasters. The National Guard is usually among the first called upon to assist with emergency aid and logistical support. Since the

severity of the impact on the human population by hurricanes, floods or earthquakes often is related directly to the population density and level of development in high-risk areas, such events are more than just "acts of God" in terms of anthropogenic causal factors. The Armed Forces play witness to the effects of violent nature on human settlements.

Finally, the United States Army Corps of Engineers is a specialized division of the U.S. Army that is best known for engaging in large public works projects, such as dams. This is just one aspect of environmental engineering, the skill and training available within the Corps of Engineers is now being applied to the process of environmental remediation (Butts 1994:103-105). The Corps of Engineers is working environmental cleanups. In fiscal year 1989, for example, the Environmental Protection Agency was the Corps' largest customer, giving the Corps some 40 percent of the dollar volume of Superfund environmental remediation projects (Butts 1994:104).

The use of military and defense assets for environmental research has been one of the great success stories of the post-Cold War period. The military is in a special position in being able to assist environmental security:

> The military has substantial capacities with which to mitigate environmental problems. It is time to reflect upon the military's unique capabilities, and develop policy

> options which exploit these capabilities for the good of the environment. (Butts 1994:84)

For example, the U.S. Navy is allowing scientists aboard previously off-limits attack submarines to study the Arctic icecap (Broad 1995; 1995a). The National Reconnaissance Office (NRO), whose very name was a classified secret until 1994, now offers images from its satellites to scientists studying global climate change. Much of this became possible through a 1992 agreement between then Central Intelligence Agency (CIA) Director Robert Gates and then Senator Al Gore to create an Environmental Task Force (Dreyfuss 1995:30). In 1991, the U.S. Congress created the Legacy Resource Management Program "to support innovative projects that protect natural, cultural, and historical resources under the Department of Defense's management" (Renner 1994:24). The efforts of Al Gore, both as Senator and as Vice President, have been prominent in setting up military-environmental science cooperation arrangements (Broad 1995:B10).

The resources the military has available to help environmental research and protection are significant. A United Nations study group set up to identify such resources in time for the 1992 UN Conference on the Environment and Development in Rio de Janeiro came up with a large list of assets with potential environmental applications:

> --industrial and technological capacity in transportation, energy and field engineering;

> --organizational capacity within the military sector to educate and mobilize manpower;
> --existing networks of the military sector, universities and other institutions for the dissemination of information and data;
> --satellite technologies, for instance, in the field of remote sensing;
> --research capacity in, for instance, laboratories and computer facilities to detect and combat environmental degradation;
> --personnel and knowhow, military equipment for disaster relief;
> --military equipment, personnel and knowhow for the handling and disposal of dangerous materials, including the destruction of weapons. (Theorin 1992:119)

The possibilities of applying military assets to environmental research and protection are vast:

> The primary capabilities that the military brings to the environmental arena are organization, leadership, vision, resources, size, environmental programs, and a presence in all states. (Butts 1994:84)

Ideas for more environmentally constructive uses of the military machine can be seen around the world. The former Soviet Union took advantage of its military manpower to assist in agriculture and basic resource management. A more creative policy has been produced in New Delhi where the Indian Army has established a special task force to engage in "ecological battle," spread over three theaters of war: the northern state of Kashmir, the expanding Rajastan Desert in the west and in the Himalayan foothills. The Indian initiative has been a success:

> The first 'ecological' battalion was set up in 1982, and there are now close to 1,800 officers, mostly former servicemen. In seven years, a 668-man battalion in Rajastan has

> created an oasis by planting 6.3 million plants along a 31-mile stretch. Ninety-five percent of trees planted have survived; usually two-thirds die. (Depthnews Asia 1990:17)

The military can and has been used in an environmentally beneficial manner.

Strangely, there are also a number of cases, admittedly a very small minority, where war and military activity have had a direct positive effect on the environment. Few and far between, these instances are still worth noting. The environment can sometimes find itself protected during a wartime situation because the normal ecological degradation of the production activity of human economy is interrupted. When such activity is inhibited through military threat, the natural world is given an unintended chance to recuperate. For example:

> In World War I the presence of German submarines shut down the North Atlantic fishing industry, which led to postwar bumper catches. The demilitarized zone between North and South Korea is effectively a nature preserve. (Nietschmann 1990:37)

More recently, in Central America it is seen that:

> Ironically, while Nicaragua's people were suffering from war and impoverishment, the Nicaraguan environment was experiencing some relief from a long history of assaults and exploitation. Trade in gold, mahogany, cedar, animal skins, sea turtles, shrimp, and lobster nearly ceased. Forests and grasses grew over the many plantations, state farms, and ranches that had produced bananas, coffee, cotton, and cattle. Wildlife thrived, and Nicaragua began to regain its rich natural heritage. (Nietschmann 1990b:42)

There is a powerful, but ominous implication here that the use of military threat can function to reduce ecological damage. Military force can be used to stop environmentally detrimental behavior. This may be the result of what Kakonen (1994) referred to as the militarization of the environment. The danger of the misuse of military power is also a real concern, especially in nations such as Kenya and Indonesia, where the use of the military in natural resource conservation has been used to cover military operations against local tribal people (Pelosi 1993).

There follows from the above discussion the possibility of the application of military force for environmental protection or enforcement missions. For example, if a nation refuses to halt CFC production, thereby threatening the ozone layer over other sovereign nations, those nations may be justified in bombing the criminal production facility to halt its dangerous activities. If demilitarized zone sometimes function as nature preserves, perhaps armed troops may be called on to protect the rainforests left in the world. When the stakes are survival and national security, sometimes forceful responses are warranted. The United States Armed Forces are trained for and capable of such missions.

Conclusion

In this chapter, the long-standing interrelationship between traditional national military-based security and the environment has demonstrated that the linking the concepts of security and environment is a reflection of existing realities. Environmental security is merely the extension of an already existing security conceptualization. Environmental security is the recognition of the long-standing relationship between military defense and its reliance on natural resources and its use of environmental warfare and ecocidal tactics, with an expansion to include a positive protective role as well as recognizing the negative. The military's environmental record clearly demonstrates its impact on ecosystems and recent changes are proof of its ability to work to restore and protect the environment.

The implications of the revelations of this chapter include the refutation of arguments attempting to distance environmental protection from security. The linkage of national security to the military is beyond question and now so is that between the military and the environment. By establishing a framework within which traditional security approaches and environmental issues are related, the task of showing that environmental problems can be security threats becomes easier. In building a policy agenda for environmental security, the question of placement of

environmental issues onto the security agenda is facilitated by the long history of linkages between the military and the environment. This chapter has used a "back door" approach to the issue of environmental security; the remainder of this study examines the environmental security threats being faced by the United States and other nations.

Chapter Four

Domestic Environmental Security

This chapter examines a series of specific events from American history through the present to illustrate how environmental security functions in a domestic setting, as well as to show cases in which environmental changes have impacted national security. While ozone layer depletion and global climate change remain perhaps the greatest threats to the United States, the less dramatic more localized problems of resource degradation, toxic waste and pollution also damage the environment on which the nation relies. Although national security commonly is perceived as involving foreign involvement or extraterritorial affairs, security threats can just as easily come from within the United States, e.g. the Oklahoma City bombing. This chapter discusses the linkages of environment to security within America's territorial jurisdiction. This chapter does not attempt to present a comprehensive overview of the domestic environment-security linkage, but merely tries to establish significant events as part of the larger picture of environmental security.[1]

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[1] While some of the events discussed in this chapter may not be environmental security concerns in the strictest sense, their inclusion is necessary to better understand some of the environmental security issues in subsequent chapters.

Domestic environmental security issues are concerned with physical and/or psychological threats stemming from the relation of humanity to the environment and occurring within the territorial jurisdiction of a single nation, in this case the United States. The preponderance of environmental politics literature shows that environmental threats to human life and property generally are seen as issues of domestic public policy and law rather than the more narrowly defined national security perspective used here. Domestic environmental security issues are differentiated from traditional environmental policy problems in that they address fears commonly found in national security thinking: mass casualties among civilians, damage to a nation's critical natural resources, and/or domestic military involvement in destroying or protecting ecosystems.

There is ample historical evidence of the long relationship between the environment and "domestic tranquility." The relationship between humans and the environment has undergone significant change over the course of American history, from nature dominating humanity to humanity powerfully affecting nature. Climate changes, pollution, soil degradation and resource exploitation have been guiding themes affecting security throughout the history of the United States, even back to pre-colonial times. Environmental warfare as a military tactic has been in common use domestically. The protection of the

environment has been a contentious political issue that has, on occasion, necessitated military involvement. Recently, environmental terrorists have resorted to ecotage to further their political goals, while anti-environmental forces have used violent tactics against federal government personnel and property in pursuit of theirs.

There is empirical evidence available showing the effects of pollution and environmental degradation on the security and survival of a global superpower. In their study Ecocide in the USSR, Murray Feshbach and Alfred Friendly begin by stating that "When historians finally conduct an autopsy on the Soviet Union and Soviet Communism, they may reach a verdict of death by ecocide" (1992:1). The study continues to demonstrate in detail how it was possible for a nation rich in natural resources and vast lands to degrade itself to a point where economics and politics were forced into collapse. "The environment was one of the main causes for the downfall of the communist regime" (Jancar-Webster 1993:200). It is possible for a nation to lose its security and future because of environmental degradation. The Soviet Union's collapse provides the negative example for domestic environmental security, one for the remaining superpower United States to heed and avoid.

Pre-Colonial Period Environmental Security

The environment has had a tremendous effect on the formation and population of North America. Perhaps the single most significant environmental event for early American history was the Little Ice Age that affected the globe from roughly 1430 to 1850.[2] Data gathered from pollen records and dendrochronology have shown that temperatures were about one to two degrees lower than present, resulting in severe winters (Ponting 1991:100). This climate change drastically affected agricultural productivity and contributed to frequent famines throughout Europe. "One consequence was a period of much greater internal instability within the European states, which was particularly acute in the early seventeenth century" (Ponting 1991:102). Discontent increased, contributing to the further localization of power away from Rome in the Protestant Reformation, the rise of capitalism as international trade for food stuffs became the only way parts of northern Europe, especially Great Britain and the Netherlands, could feed their starving populations, and the rise of migration to the newly "discovered" lands of North America.

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[2] The exact beginning of the Little Ice Age is disputed as a warming trend took place after the initial cool-off. Some therefore place the start after that warmer period, about 1550 (Gore 1992) or even 1590 (Sakamoto 1976).

The degree to which the climate in northern Europe was different was dramatic. Between 1564 and 1814 the Thames River in England froze at least twenty times, the Rhone in southern France froze over three times in just 1590 to 1603, and even the Guadalquivir in Seville, Spain froze in the winter of 1602-1603 (Ponting 1991:101). Aberdeen, Scotland witnessed an Eskimo paddling up the Don River in 1690. By 1691, 100,000 Scots, about ten percent of the population, emigrated to northern Ireland (Ulster), beginning a conflict with the native Irish that has yet to find resolution (Gore 1992:68-69). Overall, lower temperatures shortened the growing season by a month and brought the altitude at which land could be cultivated down by about 600 feet (Ponting 1991:101). For many, survival meant moving to the new colonies across the Atlantic.

Climate change also had its effects in North America, depressing agricultural production and fermenting conflict. Climate factors were significant in the warfare between the Yuman societies of the Colorado and Gila Rivers (Gleditsch 1994:142). The earlier Anasazi civilization disappeared around 1280 when a combination of climate change and overpopulation overwhelmed agriculture's ability to feed the people (Gore 1992:78). Indeed, maize (corn) production had peaked at about 1100, decreasing with an earlier cooling trend in the twelfth century (Sakamoto 1976:15). Climate-correlated social problems continued as the Little Ice Age

took its toll on agricultural production in the southwestern United States, where 230,000 square miles were cultivated with maize in 1250, but only 85,000 square miles remained in production by 1500 (Ladurie 1971:294). Such a severe diminution of food availability must have had a negative effect on the ability of affected North American nations to adjust to the influx of environmental refugees fleeing the Little Ice Age in Europe.

The climate shift of the Little Ice Age propelled the settling of North America by Europeans and began the conflict between the new arrivals and those peoples already inhabiting the land there. While subsequent climate variations have had significant effects on American politics and security, none to date come close to the magnitude of the Little Ice Age in precipitating severe demographic change and violent conflict in the territory of the United States. Political unrest and conflict in Europe caused by the cooling climate generated emigration to the native-held lands of North America and subsequent violence over the ownership of the land. The Little Ice Age was not a case of environmental security as the climate change was natural, not anthropogenic in origin, however, its security ramifications warrant its inclusion here, as does its precedence for future, possibly human-caused climate changes.

The Colonial Period

The Colonial period of American history has often been characterized as the time when rugged pioneers tamed the wilderness of North America and brought civilization to the savage land. Nature was the greatest challenge to survival faced by early settlers, with winters being potentially deadly affairs. Issues of environmental security began to manifest themselves more concretely, such as the manner in which the British colonial administration degraded the environment to further military production, and in conflicts with native Americans which included the wide-spread use of environmental warfare.

One direct interface of security and the environment in the colonial period was the British colonial administration's policy on "Broad Arrow" timber (Shabecoff 1993:30).[3] The British availed themselves of American natural resources for military purposes. Britain had turned to North America to supply it with timber for its growing navy:

> Another important source of British naval timber were the new colonies in North America. The first pine masts were felled in New England in 1652 and in the late seventeenth century the economy of New Hampshire was almost totally dependent on the timber trade. In 1696 for the first time warships for the Royal Navy were built in North America because of the shortage of

[3] The term "Broad Arrow" refers to the arrows painted onto the tall trees to be set aside to be used as mainmasts for British naval vessels.

> European timber and during the eighteenth century about a third of Britain's warships came from this source. By 1700 most of the timber within twenty miles of the main rivers of New Hampshire had been felled and within another fifty years most of the eastern sides of the mountains had been cleared of timber. By 1772 the newer colony of Maine had overtaken New Hampshire as the main source of supply. But by 1775 even North America had been stripped of the very tall pines needed for mainmasts...(Ponting 1991:279)

The British exploitation of North American forests for naval construction "was a major contributing factor in bringing about the US War of Independence of 1775-1783" (SIPRI 1980:52). In this manner, environmental exploitation contributed to political violence.

The American colonists used the environment as a military target in their wars with the inhabitants of the areas into which they were expanding. Scorched earth tactics were favored early on in combatting the native Americans. As early as 1629, colonists in Virginia cut down hostile opponents' corn crops. "Search and destroy" operations directed at the means of subsistence of the Iroquois nations were ordered by General George Washington and the American military utilized the tactic of crop destruction under Major General John Sullivan in 1779. The nature and tactics of the wars waged by the United States against the nations previously inhabiting North America are treated at greater length below.

The Tambora Eruption and the Great Migration

Just as the Little Ice Age propelled the European settlement of North America forward, another climate event, this one of short duration, helped expand the United States toward the western frontier. Of all single short-term environmental events, no other has affected the development of the United States as significantly as the eruption of Mount Tambora in Indonesia in April 1815.[4] The largest volcanic eruption in recent history, Tambora spewed 150 to 180 cubic kilometers of pumice and ash into the atmosphere (Budyko, Golitsy and Izrael 1988:15). The most critical resulting effect was decreased temperature (Stommel and Stommel 1983:153) and 1816 became known as "the year without a summer." Although not anthropogenic in nature, this event illustrates the linkage of environment to security.[5] While the eruption directly contributed to American suffering, its indirect effect of inducing migration was more significant to national security.

The cloud of dust and ash from Tambora greatly affected global climate patterns for several years and had severe consequences:

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[4] Alternately spelled Tamboro, the eruption was actually a series of eruptions beginning April 5 and continuing through July 1815.

[5] Homer-Dixon's (1994; 1994b) work on environmental change as the cause of acute conflict examines the mechanisms linking environmental change through social effects to political violence.

> Volcanic ash, projected into the atmosphere, intercepts the heat of the sun. In 1815, the eruption of Tamboro in the East Indies produced a famine in the cold winter and wet summer of 1816-17 and glacial advances in the northern Alps. (Ladurie 1971:313)

Budyko, Golitsy and Izrael write that:

> From the limited meteorological observations available at that time, it is difficult to estimate accurately the average air temperature reduction after the Tambora eruption. However, it is clear that this reduction was uneven and in a number of regions attained several degrees, In particular, in the summer of 1816, in Europe and North America the temperature was so low that the year was called "a year without a summer" (the cause of this was unknown at that time). The eruption of Tambora deserves attention, because it is the eruption nearest in time that induced climatic change which, in spite of its comparatively short duration, caused noticeable damage to living nature. In particular, due to drastic decreases in crop yield in a number of regions far from the volcano, many thousands of people died of starvation. (1988:15)

In New England, the temperature in June 1816 was seven degrees below normal (Stommel and Stommel 1983:23). New England experienced snow in July (Dolan 1991:A7). "The year without a summer" progressed through a series of killing frosts:

> June, 1816, began auspiciously enough considering the backwardness of that year's spring. Crops that had survived mid-May frosts and lack of rain were beginning to show progress at last. But on June 6 the first of three unseasonable cold waves crossed into New England from Lake Champlain and, moving eastward, had covered all of New England by the end of the day. The cold and wind lasted until June 11. In northern New England the storm left 3 to 6 inches of snow

> on the ground. A second killing frost struck the same areas on July 9 and a third and fourth on August 21 and 30, just as summer's ravaged harvest was about to begin. Freezing weather destroyed all but the hardiest grains and vegetables.
>
> Indian corn, the New England staple crop, was killed back severely, despite attempts to replant it. (Stommel and Stommel 1983:24)

The result was that "In the summer of 1816 corn ripened so poorly that not more than a quarter of what was sown in Connecticut was usable for meal. The rest---unripe, mouldy and soft--was fed to hogs and cattle but did little to fatten them" (Stommel and Stommel 1983:67). Wheat production was also severely effected, such that wheat prices rose to over $2.50 per bushel, a price not seen again until the Soviet grain failure in 1972 and the subsequent U.S. decision to export wheat to the U.S.S.R. (Stommel and Stommel 1983:84).[6]

The effects of the Tambora eruption were felt to an even greater extent in Europe, from Britain to the Balkans. Rapidly dwindling food stocks created food riots in England, France and Belgium (Ponting 1991:106). The situation was dire enough to warrant the use of military forces to control the hungry populations. In Ireland, the British army fired on a demonstrating crowd, killing three persons and wounding another twenty (Post 1977:73), while in France, armed bands

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[6] Prices are in absolute terms and not adjusted for inflation or de-valuation over time. $2.50 was worth a great deal more in 1816 than it was by 1972.

roved the countryside for food, battling both police and cavalry forces (Post 1977:74). Actual political rebellion came about in the spring of 1817 in Catalonia (Post 1977:76). That the volcanic eruption directly threatened international security is irrefutable.

The fear of political unrest resulting from volcanic-induced climate change was legitimate based on the earlier experiences of the late eighteenth century. After volcanos in Japan and Iceland erupted in 1783, people began to recognize the link between volcanism and climate. In particular, American scientist Benjamin Franklin:

> ... was the first to pay attention to the possible climate effects of volcanic gases and dust. He proposed that a large eruption of the Lacki volcano in Iceland in 1783 resulted in 'dry fog', i.e., haze that caused a cold summer and poor harvests, in Europe. (Budyko, Gloitsy and Izrael 1988:12; see also Gore 1992:60)

These volcanic disruptions to the globe's climate patterns found fruit six years of bad harvests later in the French Revolution of 1789 (Gore 1992:59-60). While no researcher would claim that a volcano caused the French revolution, it was a significant contributing factor to other precipitating conditions already in place. Emmanuel LeRoy Ladurie, leading historian in the study of climatic factors in history, writes:

> More convincing is what might be called "the pinprick effect". The very cold year of 1879 (comparable to 1740) produced a bad harvest, thus inaugurating forty lean years for English agriculture, which was henceforth

> swamped by imports of American and Russian wheat. In the same way, among the undoubted causes of the French revolution (though it was only one among many) was the very poor harvest of 1788, a breeding ground for the *grand peur*, which arose from the bad weather of 1787-88. In both cases, 1879 and 1789, short-term climatic and long-term human factors combined to 'make history'. (1971:314)

The environment certainly acted to make history with the Tambora eruption. The political and demographic landscape of the United States was forever changed by two massive and closely linked waves of population displacement: first, migration from Europe to America, and second, domestic relocations. "That the cold summer actually drove significant numbers of settlers toward the west there can be little doubt" (Stommel and Stommel 1983:154). Gore notes that the situation was indeed intercontinental:

> ... the great subsistence crisis of 1816-17 had also stimulated a flood of migration, not only from Europe to the United States but--because the effects of climate change were felt well beyond Europe-- also within the United States. For example, historical accounts of the westward migration from Maine indicate that after 'the uncommonly cold and unpropitious' springs of 1816 and 1817, a terrible fear of famine lent 'a fresh impulse to the enchanting spirit of emigration. Hundreds who had homes, sold them for small considerations, and lost no time in hastening away into a far country.' (1992:71)

At this time, a wave of emigration numbering in the hundreds of thousands left Europe for the United States in 1816 and 1817 (Post 1977:98).

The domestic population displacement was equally strong. "The United States witnessed a large-scale exodus from New England and a westward movement that paralleled the European migrations" (Post 1977:105). The Great Migration westward was characterized by an accelerated flow of population that "assumes huge proportions after 1815" (Paxson 1924:190) and was evidenced by the rapid admission of six new states into the union in only six years: Indiana in 1816, Mississippi in 1817, Illinois in 1818, Alabama in 1819, Maine in 1820 and Missouri in 1821. "The flow of New Englanders westward became a flood during 1816-17" (Post 1977:106). Not all domestic migrants left from the Northeast:

> Westward migration originated from eastern states other than New England. Crop failures in 1816 prompted migrations from both North and South Carolina. A considerable number of migrants found their way to the southwest as well as to the northwest, many of them being 'driven there from different parts by the failure of their crops.' (Post 1977:107)

Indeed, "By 1817 in North Carolina the amount of abandoned land was equal in area to that under cultivation" (Ponting 1991:259), although this was also attributed to disastrous farming practices, especially in tobacco.

The political effects of the 1815 Tambora eruption and its subsequent population migrations were mixed. Unlike Canada or European nations, the federal government in the United States did not respond to the harvest failures and plights of the New England farmers (Stommel and Stommel

1983:85). Gore (1992:79) notes that the situation did "stimulate the emergence of the administrative state" in terms of handling the distribution of land to new migrants to the west. The greatest political challenge resulting from the migrations westward was the military security issue of the future of the people already inhabiting those areas now open to pioneer settlement.

Between 1800 and 1820, the population of the United States nearly doubled from 5.3 million to 9.6 million. The promise of free land made homesteading in the western frontier appealing to many who migrated there from the eastern states, as well as Europe. "This movement not only pushed the frontier farther west, but it also brought the inevitable conflicts between Indians and white men" (Sarkesian 1984:34). The safety of the pioneers and the ensured access to more living space for the increasing population was entrusted to the United States Army. "In the pattern established before 1812, the Army pushed westward ahead of the settlers, surveying, fortifying and building roads" (United States Department of the Army 1959:154). The story of the Army and the native Americans will be examined later, after discussing environmental aspects of the Civil War. The significant point here is that a climate change precipitated massive population disruptions that caused a series of violent military conflicts between the United States and the original inhabitants of the western frontier.

Environmental Tactics in the Civil War

As noted in the colonial period, American military tactics have consistently included the use of environmental warfare and scorched earth tactics. The U.S. Civil War marked an ominous change in the direction of modern warfare from battles fought between professional armies that largely bypassed civilians to the total war of people against people. The Civil War saw starvation used as a military strategy, as well as the systematic devastation of the enemy's land (SIPRI 1980:16). The military leadership of the United States decided that Confederate forces were operating with guerilla tactics and that scorched earth tactics were necessary to prevent their operation, as they may be effective in this context. Scorched earth tactics are founded on the principle of human security being reliant on the environment.

The first significant application of the Union's devastating scorched earth tactics took place in Mississippi in 1862. General Ulysses S. Grant directed his troops to live off the land and destroy enemy sustainance in December of that year (Walters 1973:90). Grant ordered his troops to "get into the interior of the enemy's country as far as you can, inflicting all the damage you can against their resources" (Boyd 1891:250). The agriculture and livestock of the Yazoo Valley was systematically destroyed by troops

under General William Tecumseh Sherman (Walters 1973:90). General Grant was apparently pleased by the results and incorporated similar tactics into his orders later in the war for Union moves into both Georgia and Virginia.

One of the most brutal campaigns in the history of warfare took place in Georgia in 1864 with Sherman's "March to the Sea." Grant's orders were to "Take all provisions, forage and stock for the use of your command. Such as cannot be consumed, destroy..." (Morris 1992:184). These orders were enthusiastically executed by General Sherman, who directed his men to inflict a massive destruction on the state of Georgia so as to interfere with the Confederacy's ability to sustain and feed itself.[7] Sherman's orders were specific:

> ...in districts and neighborhoods where the army is unmolested, no destruction of such property should be permitted; but should guerrillas or bushwhackers molest our march, or should the inhabitants burn bridges, obstruct roads, or otherwise manifest local hostility, then army commanders should order and enforce devastation more or less relentless according to the measure of such hostility. (Boyd 1891:355)

In regard to these orders, Walters (1973:154) comments that "It is difficult to escape the conviction that these orders were issued by Sherman more for the record than for the governing of his troops' actions in the forthcoming campaign." The fact that Confederate General Beauregard

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[7] Even burning the city of Atlanta to the ground.

called for the people of Georgia to "remove all negroes, horses, cattle and provisions from Sherman's army and burn what you cannot carry. Burn all bridges and block up the roads in his route" (Boyd 1891:364) only served to exacerbate the situation. In the end four million hectares of Georgia were devastated by Sherman in September and October 1864 (SIPRI 1980:16) as he consumed all available provisions in a territory fifty miles wide, inflicting $400 million (in 1864 dollars) of property damage to structures and agriculture (Boyd 1891:373).

Following the destruction of Georgia, the Shenandoah Valley of Virginia was subjected to an even more systematic devastation by General Philip Henry Sheridan in November and December 1864. The Shenandoah Valley provided Confederate troops a corridor to the Union capital of Washington D.C. where they could also draw supplies and support from local supporters. Sheridan ordered his troops to destroy anything of use to enemy troops. The damage done in the Shenandoah Valley was summed up in Army reports: including 3,445 tons of hay valued at $103,607, 410,742 bushels of wheat valued at $1,025,105, 515 acres of corn valued at $18,000, 1,231 sheep killed valued at $6,340, 725 swine killed valued at $8,000, 255 tons of straw valued at $2,550, 272 tons of fodder valued at $2,720, and other property totalling $3,193,172 (Burr and Hinton 1888:214).[8] The defeat of the

[8] All values in 1864 dollars.

Confederacy was accomplished at least in part through attacking the land it depended on with environmental warfare tactics.

Environmental Warfare versus Native Americans

As seen above, during the colonial period American military forces also utilized environmental warfare tactics against the indigenous people of North America. Sarkesian traces the official adoption of such anti-guerrilla tactics as having risen to the forefront of U.S. military thought with their successful use during the Second Seminole War of 1841, which was characterized by "search-and-destroy operations aimed at Seminole food production" (1984:163). Whether agricultural or hunter-gatherer in nature, native American nations, just like the United States, depended on the local ecosystem for survival, a fact which was frequently exploited by the U.S. military.

Scorched earth tactics were the norm for the expansionist wars fought to secure the western frontier for American settlers. In the U.S.-Navaho wars of 1860 to 1864, the United States Army "deliberately destroyed the sheep and other livestock as well as the fruit-tree orchards and other crops of the Navaho as part of its successful strategy of subjugation" (SIPRI 1980:16). Later, in the wars with the Sioux, Apache, Comanche, Cheyenne and other nations from 1865 to 1898, "The US strategy of subduing the Indians

included the systematic destruction of their food stores, crops, and games" (SIPRI 1980:16). The most focused attack on the habitat of the native Americans, however, was the campaign to eliminate the buffalo.

The buffalo was the central part of the culture of the native American nations inhabiting the Great Plains. "For his survival, the Plains Indian depended completely on the buffalo" (Shenton 1964:121), such that "'Kill a buffalo, starve an Indian' was a motto favored by General George Custer's cavalry forces in the West" (Helvarg 1994:46). The population of buffalo was relentlessly pursued so that a population numbering some ten to fifteen million in 1850, by 1890 was reduced to less than 100,000 (Shenton 1984:121). The extermination of this species was a deliberate military tactic, based on an understanding of the opponents' relationship to the ecosystem:

> General Phil Sheridan, commander of the armies of the West whose famous quote was actually, 'The only good Indians I ever saw were dead,' appreciated the strategic value of the bison killing. Addressing a group of Texas legislators, he admitted that buffalo hunters were 'doing more to settle the vexed Indian question than the entire regular army has done in the last thirty years. They are destroying the Indians' commissary.' (Helvarg 1994:47)

This is the same General Philip Sheridan who also successfully used environmental warfare tactics against the Confederate army and people in Virginia in 1864.

Conservation and the U.S. Army

Just as the United States Army saw the environment as a military objective for attack, it also has demonstrated the logical converse: that the environment also needed to be defended to protect the security of the nation. By the late nineteenth century, the conservation movement had gained serious momentum in the U.S., led by influential people alarmed by the rampant degradation of America's natural heritage. The conservation movement began to question the long-term health of America's ecosystems rather than concentrate merely on immediate economic development.

The origins of the conservation movement and American environmentalism and, by extension, the study of environmental security can be traced in part to the 1864 publication of George Perkins Marsh's Man and Nature. Marsh (1965[1864]) pointed out the environmental degradations of modern development: deforestation, soil erosion, dust of the Great Plains, coastal ecological disruption, and the expansion of sand dunes. This marked a highly significant shift in the relationship between humanity and nature: rather than the environment determining humanity, "Marsh said man made the earth" (Glacken 1985:53). This change in perception of the relationship between humanity and the environment began to manifest itself in political concern: in 1871, the United States Fish Commission was founded to examine the depletion of coastal fisheries, as was the

Division of Forestry within the Department of Agriculture to study the condition of the nation's forests (Moneyhon 1980:144). By 1877, the environmental situation was such that Secretary of the Interior Carl Schurz (1877) reported that lumber supplies were falling short of necessities, deforestation was affecting river navigation, and that soil erosion was a serious problem, all concerning the long term resource security of the nation. The sustainability of normal resource exploitation practices was called firmly into question as a national security issue.

The American environment had been undergoing an onslaught of human modification. Marsh (1965[1864]:3) saw the necessity "...to point out the dangers of imprudence and the necessity of caution in all operations which, on a large scale, interfere with the spontaneous arrangements of the organic or the inorganic world..." The impact on the environment was massive, for example, "Since the first colonists arrived at Jamestown in 1607, the United States has lost about 45% of its original forested area" (Miller 1988:209).[9] The nation's food security was also being affected. By the middle of the nineteenth century wheat yields in upstate New York were barely half of what they had

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[9] Miller (1988:209) goes on to point out that "Since 1920, however, the country's total forested area has remained about the same, covering about one third of all U.S. land area."

been a century earlier (Ponting 1991:259). Much of this ecological damage came quickly:

> By 1685 (within a century of the first settlement) Virginia was already suffering severe flooding brought about by deforestation and in the next century Georgia was badly affected by erosion, with gullies over 150 feet deep in some places. (Ponting 1991:259)

The process of settling the territory of the United States was also the conquest of nature. With few exceptions, such as the creation of national parks and the use of the Army to protect them, environmental concerns did not recieve a great deal of attention in the 19th century.

The Dust Bowl

Despite the increasing domination of nature by humans, the environment is still able to affect human society-particularly when extreme climate events work to reinforce pre-existing anthropogenic ecosystem disruption. The Dust Bowl of the 1930s was rendered more than just another severe drought by the extremely poor soil management practices of the farmers in the affected regions. While the dry weather was a natural event, the tragedy of the Dust Bowl was a result of human action--meeting the anthropogenic qualification for being considered an environmental security issue. Gore has discussed the relationship of human activity and nature in that context:

> Perhaps the largest forced migration in American history was the mass departure from

> Kansas, Oklahoma, Texas, parts of New Mexico, Colorado, Nebraska and other Plains states during the period of the early 1930s referred to as the Dust Bowl years. Like the Great Potato Famine, the Dust Bowl resulted from unwise land use, which heightened the vulnerability of the land and its people to unexpected climate changes. During the 1920s, there was a revolution in agriculture throughout the High Plains states. Mechanization led to development of the tractor, the combine, the one-way plow, and the truck. These, in turn, led to the 'great plow-up' of the late 1920s. Agricultural experts mistakenly believed that the repeated plowing of land until it was smooth and pulverized made it better able to absorb and hold rainwater. Agronomic research, focusing on different ways to increase water absorption, completely overlooked the problem of wind erosion, which became a far more serious threat because of these very changes in agricultural methods. (1992:71)

The Dust Bowl devastated the soil resources of the United States.

January 1933 saw the beginning of four years of dust storms that stripped the land of its topsoil. By May 1934 350 million tons of topsoil had been blown away (of which some 12 million tons were deposited on the city of Chicago alone) and by 1938 ten million acres of land had lost the top five inches of topsoil and another 13.5 million acres lost the top 2.5 inches (Ponting 1991:260). By 1938, 850 million tons of soil were being lost each year (Ponting 1991:261). In 1934, only 15% of the land between Texas and Oklahoma could be harvested (Gore 1992:72) and in 1935 some five million acres of wheat were destroyed by dust storms (Ponting 1991:260). Temperatures broke the record levels

reached in 1930 and 1934 in the summer of 1936, including highs of 109 degrees F. in Iowa, 120 degrees F. in South Dakota, and 121 degrees F. in Kansas and North Dakota (Ludlum 1982:165).

The human tragedy of the Dust Bowl was seen in the 3.5 million environmental refugees forced to flee the affected areas. Respiratory diseases increased by 25% and infant mortality went up by one third by 1938 (Ponting 1991:261). These casualties mark the direct national security issues of American life and well-being. These refugees were often not welcome in their new destinations. "'Okie' dustbowl refugees who tried to find work as migrant farm laborers in California were turned back at the border by armed state troopers" (Helvarg 1994:53), although a great many did settle in California. Massive population displacement also necessitated change in the areas to which the refugees moved.

The causes of the Dust Bowl were extensive and continuing monocropping on marginal land, an excessive reliance on chemical fertilizers and a lack of understanding of the soil formation processes (Ponting 1991:261). Poor land use resulted in the long-term degradation of what had once been land rich with topsoil. By the 1970s, the United States had lost a full one third of its topsoil, with 200 million acres of cropland ruined or highly marginalized and another 166 million acres suffering from unacceptable

erosion rates (Ponting 1991:261). About 700,000 acres of productive land are lost each year, with topsoil being depleted at eight times the rate at which it forms (Ponting 1991:261). The Dust Bowl was an environmental security disaster, both in terms of short term suffering as well as the compromise of long-term soil quality and therefore food security.

The Dust Bowl provided the United States its first large-scale example of how the security of the nation can be compromised by failure to protect the environment. Topsoil depletion and massive population upheaval, respectively, concern the future ability of the nation to sustain its population and the domestic tranquility disturbed immediately by the arrival of thousands of poor refugees in places already suffering from the Depression. The case of the Soviet Union shows the long-term political and national security results of environmental mismanagement in the agriculture sector (Feshbach and Murray 1992:49-70). The prevention of ecological degradation became even more clearly seen to be in the nation's best interests.

Pollution: Costs and Prevention

The discussion of environmental security can be seen as a serious extension of the concern over the effects of environmental degradation on the nation and its people. One area in which both environmental protection and national

security find common ground is in concern over the killing of American citizens. Both are intended to counter physical threats. When American lives were threatened by the Barbary pirates or Grenadan communists, the military was called on to protect those lives. Domestically, environmental degradation and pollution have been producing casualty numbers consistent with significant armed conflicts, but only recently have researchers connected this death toll with security through the concept of environmental security. Now, the conception of national security is changing so that the killing of American citizens by terrorists in Lebanon and by illegally dumped toxic waste in New York groundwater both can be viewed as concerning national security. This change was made possible by the growing awareness of the human toll of pollution and environmental degradation over the last several decades.

The economic development of the United States also produced environmental degradation as a result of industrial activity, as well as coming from agriculture or resource extraction. As the conservation movement worked to protect the nation's natural areas, at the same time the progressive movement strived to improve the conditions in primarily urban places. The recognition of pollution as a threat to public health and safety gained significant strength in the late nineteenth century with increased scientific knowledge, in particular the germ theory of disease (Melosi 1985:506).

As a result, people began to take seriously the dangers of unfettered industrialism. For example, the state of Massachusetts gave the State Board of Health power to control river pollution in 1878 (Melosi 1992:107).

Concern over pollution was not unheard of before the Progressive Era. In 1273, for example, coal burning was prohibited in London. Later, in 1661, John Evelyn wrote a report on air pollution for King Charles II.[10] Still, it was not until industrialism was fully under way that humanity impacted the environment in a manner as to cause serious dangers to life and property:

> Until the late nineteenth century, pollution was generally regarded as a nuisance and nothing more, that is aggravation with little inherent danger. This suggests a stronger emphasis on aesthetics and a lesser emphasis on health. Environmental reformers reversed that emphasis in the 1890's by recognizing the relatively obvious relationship between smoke, water, and noise pollution and disease. (Melosi 1985:505)

Thus, there was a rise in environmental awareness in the 1890 to 1920 Progressive period.

Pollution, particularly air pollution, was determined to be the cause of outbreaks of public sickness and even death, such as the December 1873 air pollution incident in London that killed 700. By the 1890s, air pollution incidents had become common:

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[10] Titled Fumifugiumior, The Inconvenience of the AER, AND SMOAKE OF LONDON (see Paehlke 1989:24).

> Newspapers reported chronic 'Londoners' (a combination of smoke and fog) in several cities, which led to work stoppages, shortening of the school day, and many accidents. Although there were few scientific measures for smoke pollution, the assault on the senses set off protests. Citizens in Pittsburgh and Saint Louis complained about frequent nasal, throat, and bronchial problems. Some observers speculated that deaths from pneumonia, diphtheria, typhoid and tuberculosis could be traced to smoke, as could psychological trauma. (Melosi 1992:95)

Temperature inversions in the United States were common in cities reliant on bituminous coal, whose dense, toxic smoke polluted Pittsburgh, Cincinnati, Saint Louis, and Chicago (Melosi 1992:94).[11]

With Progressives campaigning for increased awareness of pollution issues among the general populace as well as with businesses, grass roots action was able to produce some governmental responses to the problem. The action taken was primarily at the local level:

> The greatest success of smoke abatement proponents was the implementation of tougher local laws in almost every city by 1912. Yet local authorities were unwilling to curb industrial development and selectively enforced the ordinances. During World War I, when unrestricted production became a patriotic duty, smoke abatement fell on hard times. Smoke pollution did not subside until the use of coal diminished in the 1920s. (Melosi 1992:106)

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[11] Of America's largest cities, New York City, Boston and Philadelphia used the less polluting anthracite coal, and San Francisco relied on natural gas.

Pollution became a lesser concern during the period from World War I to World War II, including the Depression. Increases in scientific knowledge and national wealth after that time made it possible to continue pollution abatement.

Rapidly, pollution was amassing a serious casualty count of dead and wounded victims. Pollution disaster events increased in frequency. An early disaster took place in Oil City, Pennsylvania in June 1892, when a spilled tank of naphtha ignited killing about 300 people in the resulting conflagration (Melosi 1992:95). Air pollution was the culprit in the Donora Smog Disaster of 1948, when a five day temperature inversion in the small town twenty miles up the Monongahela Valley from Pittsburgh left 19 dead and 14,000 ill (Ludlum 1982:234,239). The pollution incidents became more severe. Los Angeles has battled its smog problem since the 1940s. In 1953, Minemata, Japan saw an industrial mercury poisoning incident which left 46 dead and 120 ill (ReVelle and ReVelle 1984:216).

The worst air pollution disaster came in the City of London in December 1952. A high pressure circulation combined with low temperatures producing fog. Coal home fires burned to keep Londoners warm. Industrial pollution added to the weather event to leave 4,000 dead, seven times the normal death rate, mostly from bronchitis or pneumonia (Holford 1976:121). "Many of the victims dropped dead on London streets; about fifty bodies were removed from one

small park in the South End of the city" (Crenson 1971:6). This event was the worst since 1873, although "A subsequent investigation of similar 'fog' episodes in the winter months of 1873, 1880, 1882, 1891, and 1892 showed that there were suspicious increases in the London death rate in each of these foggy periods" (Crenson 1971:6).

New York City suffered a similar incident in the week of November 12-23 in 1953, when some two hundred died (Ludlum 1982:240). A temperature inversion caused headaches, nausea, burning of the eyes, and loss of appetite (Crenson 1971:1). This incident, however, was not as well-known as the earlier one in London:

> Not until nine years later, in 1962, did a careful study of mortality statistics reveal that the dramatic buildup of dirty air was accompanied by a fairly sharp increase in deaths. By comparing the mid-November daily death rates for 1953 with those for previous and subsequent years, investigators were able to estimate that there had been about two hundred deaths in excess of the usual number during the week of the pollution incident. (Crenson 1971:2)

The death toll from pollution was seldom measured as such, normally it was just blended into the mortality statistics under the individual specific causes of death.

Another air pollution event also demonstrated the interconnectivity of the global atmosphere. In November 1962, an air pollution incident swept around the world. First noted in New York City, there were increased

complaints by elderly residents regarding their respiratory conditions. It then continued eastward with the wind:

> In London, where heavy pollution set in about a week later than it did in New York, approximately seven hundred excess deaths were recorded...In Hamburg, where the wave of pollution crested next, it was thought to have brought an increase in deaths from heart disease. A week later the pollution rate in Osaka increased sharply and about sixty excess deaths were recorded. (Crenson 1971:6)

The severity of the threat of pollution to human life was clearly growing.

None of these incidents caused political unrest or violent rebellion. Still, thousands of people died because of the failure of government to protect the environment. Rather than allow some crisis of legitimacy, the United States government responded with legislation to address the degradation of the environment. The United States Rivers and Harbors Act of 1899, section 13, which prohibited the discharge of wastes (other than sewer liquids) into navigable water without a permit from the Corps of Engineers (Melosi 1992:109) and the Oil Pollution Control Act of 1924, which dealt with the dumping of fuel at sea, represent two early steps in environmental protection legislation. The Water Quality Act of 1965 set federal standards for water quality. After the National Environmental Policy Act of 1969, a slew of legislation was passed: the Clean Air Act (1970, amended in 1977, revised in 1990), the Clean Water Act (1972, amended 1977 and 1987), the Toxic Substances

Control Act (1976) and the Resource Conservation and Recovery Act (1976, amended 1984), as well as laws dealing with oceans, pesticides, land management, nuclear waste and the global climate.[12] All of these are still no guarantee of protection: a breakdown of the Milwaukee water purification system in April 1993 killed 50 people and made 370,000 ill (Helvarg 1994:440).

Ecoterrorism

Terrorism is considered to be one of the "new" threats to national security (Snow 1991:129-130) and the F.B.I. treats terrorism as a national security issue (White 1991:168-170). As such, environmental terrorism must be included as a national security threat as such. The Federal Bureau of Investigation lists at least one domestic environmental group as being terrorists: Earth First! (Helvarg 1994:402-403). Environmental radicals have resorted to acts of ecological sabotage to further their goal of environmental protection.[13] Perceived of as acts of civil disobedience, ecosabotage has a long tradition in the United

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[12] This includes the Marine Protection Act (1972), the Coastal Zone Management Act (1972), the National Forest Management Act (1976), the Nuclear Waste Policy Act (1982, amended 1987), the Superfund Amendments and Reauthorization Act (1986), the Global Climate Protection Act (1987) and the Ocean Dumping Act (1988).

[13] Ecological sabotage is also referred to as ecosabotage, ecotage, or frequently monkeywrenching, after the simple tool often used by ecosaboteurs.

States, dating back to Henry David Thoreau who mused on taking a crowbar to the Billerica Dam in his A Week on the Concord and Merrimack Rivers. In the 1960s, "The Fox," an ecosaboteur in Kane County Illinois delivered sludge and dead fish to corporate offices, blocked factory sewage and drainage systems, and sealed off smokestacks, always leaving a note advising the company to "clean up their act" (Day 1989:216-217).

Ecosabotage has been defined by environmental ethicist Martin:

> Person P's act A is an act of ecosabotage iff (if and only if)(1) in doing A, P has as P's aim to stop, frustrate, or slow down some process or act that P believes will harm or damage the environment, (2) P's act A is motivated by a sense of religious or moral concern, (3) A is illegal, and (4) A is not a public act. (1994:609)

Ecosabotage differs from most terrorist acts in that it is purposefully about the protection of life, human or otherwise. Dave Foreman, former leader of the Earth First! radical group, wrote in the ecosabotage manual Ecodefense: A Field Guide to Monkeywrenching that:

> Monkeywrenching is non-violent resistance to the destruction of natural diversity and wilderness. It is not directed toward harming human beings or other forms of life. It is aimed at inanimate machines and tools. Care is always taken to minimize any possible threat to other people (and to the monkeywrenchers themselves). (1987:14)

Earth First! and others focus on spiking trees so that if they are subsequently cut down for timber, the spikes can

destroy very expensive timber saws and equipment. The trees being spiked are usually on publicly owned Forest Service land (Manes 1990:10-11). At least one lumberjack has been injured when his chainsaw hit a spike. Survey markers have been uprooted, bulldozers decommissioned, and roads spiked to prevent access to remote areas. In the oceans, the group Sea Shepards has sunk several whaling ships. Two Spanish whalers and one from Cyprus were sunk with mines and two from Iceland were sunk by opening key valves (Martin 1994:609).[14] Ecotage also has seen use in Malaysia and Thailand (Taylor et al. 1993:76).

The principle behind ecosabotage is that "the cost of the repairs, the hassle, the delay, the down-time may just be too much for the bureaucrats and exploiters to accept" (Foreman 1987:14). The damage done to resource extraction equipment will inflict increased repair and insurance costs that will reduce corporate profits to such a degree so as to make resource exploitation cost prohibitive (Hellenbach 1987). Additionally, increased costs are usually passed on to the consumer, such that increased prices bring lower demand for environmental products, for example, forest products. Ecosabotage has cost millions a year in damaged equipment, lost time, and legislative and law enforcement

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[14] The environmental group Greenpeace commits acts of civil disobedience, not ecosabotage or political violence (Martin 1994:609-610). As a result, they are not under discussion here.

expenses. The U.S. Forest Service twice reportedly has withdrawn timber sales after learning the timber stands had been spiked (Martin 1994:617).

The national security threat of terrorism is perhaps less drastic with ecological terrorism as opposed to the bombers of Oklahoma or the World Trade Center, but the rise of political violence remains a serious problem for the United States. When terroristic violence becomes the preferred means by which to express a political agenda, there may be a defect in the opertaion of the democratic process that may resurface at any time to again threaten the peace of the nation. The fact that environmental protection has become an issue engendering political violence only underscores its importance as a security concern.

Anti-Environment and Anti-Government Violence

Environmentally-motivated political violence is a significant indicator of environmental problems developing into national security issues, as shown by Homer-Dixon (1991). Unlike the tactics of radical environmental groups, the radical anti-environment use of violence is frequently aimed at people. Environmentalists and government employees are finding themselves the target of violent radicals who espouse a political philosophy based on state's rights, mistrust of government and cheap access to public resources. The atmosphere in many western states has grown increasingly

antagonistic since the mid-1980s, with violence becoming more frequent in the 1990s. The situation is one resembling open rebellion against federal authority:

> Federal agents and environmental activists are working scared, thanks to physical threats from right-wing extremists backed up by sympathetic local officials. Over the last 18 months, anti-government vigilantes, from the militias to conservative "Wise Use" groups, have threatened and intimidated their perceived enemies in Nevada, New Mexico, Oregon, Washington, Texas and Idaho. (Curran 1995:15)

This is also an outgrowth of the right-wing extremism and terrorism described by White (1991:182-192).

While there is a significant amount of violence against environmentalists (Helvarg 1994:358-391), such acts are not as directly threatening to national security as attacks on government personnel and buildings. Attacks are encouraged by anti-environmental political leaders such as former Secretary of the Interior James Watt, who in 1990 said that "If the troubles from the environmentalists cannot be solved in the jury box or at the ballot box, perhaps the cartridge box should be used" (quoted in Helvarg 1994:358). While the prospect of interfactional political violence within the United States is in itself a potential disruption of domestic security, it is often difficult to prove exactly the political nature of some such violence:

> Because much of the violence directed against environmentalists around the country is aimed at individuals rather than institutions, it makes it easier for Wise Use advocates, industry representatives,

> even politically compromised members of law enforcement to claim the attacks are personally motivated and unrelated to environmental conflicts...(Helvarg 1994:379)

This being the case, this section will concentrate on the anti-government violence of the anti-environmental movement.

The list of attacks on government personnel and property is rapidly growing. In 1983, three Environmental Protection Agency personnel were shot at in Alabama while investigating illegal toxic dumping (Day 1989:213). Later that year in Philadelphia, an environmental inspector was beaten and federal agents attacked by dogs (Day 1989:213). The most well-known case was the October 1993 bombing of the Bureau of Land Management office in Reno, Nevada (Curran 1995:15). This attack marked a new phase in the tensions in the West:

> At around 12:45 A.M. on October 31, the new range war over grazing and mining seems to escalate dangerously. In the early morning hours of Halloween day, someone tosses a leather satchel or case containing a powerful explosive device onto the flat roof of the bureau of Land Management building in Reno, Nevada. The bomb blows a three-foot hole in the roof, causing $100,000 worth of damage to the building and six office workstations below. The explosion can be heard from five miles away. Witnesses report a black Honda with an American flag attached and a pickup truck speeding away from the scene just after the blast. The FBI and ATF are called in to investigate. A short time later, BLM receives a letter warning, 'If you think Reno was something, you ain't seen nothing yet'. It is postmarked in North Platte, Nebraska, and signed the 'Tom Horn Society.' Tom Horn was a late-nineteenth-century gunman hired by western livestock

> interests to kill rustlers and scare off settlers. (Helvarg 1994:422)

The attacks continued in 1994 with the bombing of the Carson Ranger District Office for Toiyabe National Forest (Curran 1995:15). Guy Pence, whose office it had been, was also targeted in a separate August 1994 bombing which destroyed his family van while it was parked in his driveway (Larson 1995:54, also Siegel 1995).

Another well-publicized incident occurred further south in Nevada when:

> In July 1994, two US Forest Service rangers were reportedly run off the road by a bulldozer driven by County Commissioner Dick Carver in the Toiyabe National Forest in Nye County, Nevada. The government says that Carter--backer by an armed group of locals--was illegally attempting to reopen a road through Forest Service land. Carver was later quoted as saying, 'If just one ranger had gone for his gun, he would have been drilled by fifty people with sidearms.' (Curran 1995:15)

The events of that day have become a symbol of local resistance to federal government control of western lands. Nye County Commissioner Dick Carver became well-known in anti-government circles, earning him a cover story and profile in Time magazine (Larson 1995).

Mirroring the concerns over ecoterrorism, the rise of anti-environmental political violence exposes another threat to the domestic security of the United States. Pro- and anti-environmental tactics can generally be distinguished in

that ecosabateurs as a rule endeavor to avoid harming other humans while the anti-environmentalists intentionally target people. The response to ecosabatoge is a different threat to the authority of law. Referring to anti-environmental violence abroad, Taylor et al. still characterize the situation domestically:

> Such reactionary violence far outpaces in scope and brutality the more occasional, poorly armed, and ususally defensive violence of those involved in popular environmental movements. (1993:71)

The desire to exploit the environment has produced an attitude of illegal responses to the protection of the nation's environment, challenging the authority of the government to provide for security.

Conclusion

This chapter has shown the interrelationship between environment and national security throughout American history. In a discussion of environmental security, it is necessary to demonstrate that a strong linkage between environmental events and national security exists, as seen in cases such as the Tambora eruption. History has shown such connections. The dependence of humanity on the environment has been seen in this sampling of American historical events. The Little Ice Age sends Europeans across the Atlantic. A volcano erupting a half a world away forever changes the demographic face of the United States and

furthers military conflict with indigenous peoples. The struggle against nature experienced by early settlers and pioneers instilled an environmental consciousness that translates into military adoption of environmental warfare tactics. This was perhaps embodied in the figure of Philip Sheridan, both despoiler and preserver of the environment.

American environmental history also shows the development of increasing awareness of the role of the environment in human society and human effects on the ecosystem. Environmental security is the latest step in a progression that began with colonial environmental legislation, moved through transcendental art and literature to the Progressive and Conservation movements, to the modern environmental movement that arose since the late 1960s. Throughout this history, the importance of the environment has grown with understanding. Environmental security is the realization that the nation's security and future depend on the environment. The fact that environmental politics is engendering increasing violence over the right to destroy or defend the ecology on which America relies only serves to further underline the salience of this issue.

Chapter Five

Regional Environmental Security

Environmental security becomes more similar in appearance to traditional national security formulations when environmental issues cross international frontiers. A nation experiencing damage to its ecosystems is seeing a degradation of its environmental security; when such damage is caused by actions originating from within the territory of another nation it can be seen as an international act of aggression. Environmental deterioration can be a source of international tension and even outright conflict between the countries involved. Pollution and other environmental problems can easily cross national borders and situations where one country experiences the negative environmental effects of activities located in another abound. Some of this can be attributed distinctly to point sources and therefore can be dealt with through the international legal system with its clear definitions of damage and culpability, but, unfortunately, also poor enforcement. Political tensions can arise when pollution or environmental degradation responsibility can be ascertained, but not proven legally, conclusively or completely. Fundamentally, the political problem is the strength of the notion of national sovereignty, where one nation does not wish to have

its internal affairs influenced or interfered in by another, nor have its territory compromised.

Utilizing the typology set forth by Kamieniecki, Kandel and Schubert (1995:267), international environmental security issues can be seen as belonging to two distinct categories. The first category (Type I) can be characterized by traditional environmental issues such as air pollution, water pollution, toxic and hazardous waste disposal and natural resource conservation which commonly are addressed at the domestic levels of policymaking.[1] However, environmental concerns frequently can cross national borders, thereby becoming transformed into potential international incidents regarding border integrity and national sovereignty. By definition, transfrontier environmental security issues automatically entail a different approach to political action than domestic issues precisely because of their bi- or multinational nature.

For example, air pollution has traditionally been considered to be a predominantly local phenomenon. As pollution regulations were slowly implemented since the 1950s and especially since the 1970s, one industry response was to raise the height of smokestacks to dilute the concentration of pollutants. This solution to local pollution served to insert pollutants higher up into the atmosphere and thereby turning a previously localized

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[1] That is the local, state and/or national levels.

concern into a long-range international, even global environmental issue. At this point, domestic pollution becomes something that violates the sovereignty of other nations and a potential cause of international political conflict.

The second category of international environmental security issues is inherently global in scope (Kamieniecki, Kandel and Schubert 1995:267). Environmentally degrading causes and effects both are characterized by a planet-wide geographical dispersion, as seen in the cases of ozone depletion and global climate change. These special international environmental issues require a new and different approach to environmental politics than traditional diplomacy and bi- or multilateral negotiation have been able to offer: they demand a global response. The present chapter deals with Type I environmental security issues, leaving those of Type II to Chapter six.

For the United States, as for all nations, regional environmental security is defined largely by geography. The U.S. shares only two land borders, with Canada and Mexico, and it is with these neighbors that most regional environmental security concerns are related.[2] The U.S. shares a 2000 mile land border with Mexico, a large portion of which is the Rio Grande. The 5525 miles of the land

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[2] The maritime borders with Cuba and the Bahamas have not seen significant environmental security concerns, while that with Russia (earlier, the Soviet Union) has seen some.

border with Canada involves nearly 300 lakes and rivers, including the Great Lakes (except Lake Michigan), the Saint Lawrence River, the Columbia River and the Yukon River. Both frontiers also include significant subsurface groundwater deposits. Many researchers feel that it can be justified to treat the entire North American region as a single ecological unit (Szekely 1994). In addition to its terrestrial borders, the United States also maintains 12 mile territorial waters and a 200 mile exclusive economic zone (EEZ) into the three oceans it has coasts on: Arctic, Pacific and Atlantic (including the Gulf of Mexico). Under the 1976 Magnuson Fisheries Conservation and Management Act (MFCMA), the U.S. regulates all foreign and most domestic fishing within this 200 mile jurisdiction and anadromous species (such as salmon and steelhead trout) beyond the EEZ, as well as on the submarine continental shelf beyond 200 miles (Broadus and Vartanov 1994:72).[3]

This chapter focuses on several of the most important areas of regional environmental security. Each area discussed in this chapter is fully an environmental security issue, directly or indirectly involving physical damage to American well-being and often also involving the psychological or immediate threat of political violence. The most serious diplomatic issues between the United States and

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[3] The United States also shares in the global ecological commons of the atmosphere, biosphere, climate and the oceans, but these are dealt with in Chapter six.

Canada in the last few decades has been the destruction caused by acid precipitation, commonly referred to as acid rain. The management of inland waterways, both lakes and rivers, shared with Canada and Mexico has been a long-standing concern for the U.S., as has been cross-border air pollution. The rapidly growing threat to the resource security of ocean fisheries that the United States looks to for food and trade is yet another salient issue. Finally, environmental degradation is directly linked to political instability and the growing problem of environmental refugees, both of which greatly concern the U.S.

International Environmental Diplomacy and Law

International conflict is a situation best avoided, particularly when the actors are sovereign states with armies. One alternative to violent action is the remediation of injuries possible through the system of international law. The incidence of transfrontier pollution is a constant reminder that the environmental effects of human activity cannot be limited by national boundaries. Reduced to its simplest, such pollution is a case of injury, either to property, people, or both, and as such is subject to international law. The international legal system has long had to deal with transboundary environmental problems, as "only through international agreement can countries decide

not to inflict environmental harm on one another" (Economist 1990:13). Broadus and Vartanov write that:

> *International environmental law is an essential component of environmental security*. As a system of legal norms and principles governing relations among nations in protecting the planet's natural environment, it provides necessary means for the protection against threats to national well-being or the common interests of the international community associated with environmental damage. (1994:223)(italics added)

Some basic definitions are called for at this point. The term "pollution" means the introduction by humans, directly or indirectly, of substances or energy into the environment resulting in deleterious effects to the well-being of human health, living resources and ecosystems, degrade natural properties, and impair or interfere with amenities and other legitimate uses of the environment. The expression "transfrontier pollution" means "any pollution which, provoked by activities conducted in the territory or under the control of one State, produces effects deleterious to the environment in other States or in areas beyond the limits of any national jurisdiction" (Centre for Studies and Research in International Law 1986:26). There are two forms of transfrontier pollution that must be considered, each with distinct legal ramifications. In addition to normal transboundary pollution, there is also "long-range" pollution: meaning pollution causing deleterious effects in one state "at such a distance that it is not generally

possible to distinguish the contributions of one or more particular state(s) of origin" (Vukas 1986:347).[4] If direct responsibility for ecological damage cannot be ascertained, the law cannot ascribe blame and recommend compensations. It is especially this type of pollution that leads to the systemic deterioration of the biosphere.

In the famous *Trail Smelter* case (United States v. Canada), international arbitration was called on as a result of international tensions arising because of sulfur dioxide emissions from a mineral smelter in British Columbia entering the state of Washington to the south. Wenner describes the background to this landmark case:

> One case that illustrates the unwillingness of nation states to rely on international organizations because of the latter's encroachment on national sovereignty involved air pollution between two neighbors whose history of amicable relations should have enabled them to settle their differences with a minimum of posturing. (1993:168)

The case appears to have been a relatively straightforward incidence of economic injury. Washington agricultural interests complained that there had been significant damage to both agricultural crops and timber because of sulfur emissions from a Canadian copper smelter in Trail, British Columbia. The complaint went before the International Joint

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[4] This issue has been addressed by the Convention on Long-Range Transboundary Air Pollution, signed in Geneva on November 13, 1979 and entering into effect on March 16, 1983.

Commission (IJC), which in 1931 determined the amount of damage in Washington state to be $350,000.[5] This, however, did not resolve the issue:

> ...as the international commission had no means of enforcement, the decision proved a pyrrhic victory. Canada regulated the smelter to a degree, but no compensation was paid, and the U.S. government remained dissatisfied. (Wenner 1993:168)

The issue had resurfaced in 1933 and by 1935 the two governments had agreed to submit the matter to an international arbitration tribunal (made up of a Canadian, an American and a Belgian).

In 1937, this tribunal agreed with the IJC assessment of damages caused by the Trail Smelter at $350,000, with additional damage since 1932 adding another $72,000 to the total. Related claims regarding pollution of the Columbia River and livestock damage were dismissed. The arbitration decided that "...no state has the right to use or permit the use of its territory in such a manner as to cause injury by fumes in or to the territory of another or the properties or persons therein..." (Okidi 1978:6). Legal principle asks that "...every state should take measures to prevent activities within the area of its jurisdiction from causing injuries beyond the limits of its jurisdiction" (Okidi

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[5] The formation and purpose of the IJC are discussed below.

1978:7).[6] This became an important precedent of international environmental law, introducing the concept that "even a sovereign nation owes neighboring states some preventative protection from pollution by industry within its jurisdiction" (Wenner 1993:169).[7] The Trail Smelter case also helped in establishing the polluter-pays principle for environmental injury (Regens and Rycroft 1988:148). In the end, however, compensatory action was not forthcoming:

> By the terms of the settlement, Canada also agreed to impose a smoke abatement system on the smelter, but the settlement fell short of eliminating the pollution because neither country involved wished to establish a precedent that would impose excessive costs on industry on either side of the border. (Wenner 1993:168)

National sovereignty became a more important principle than just compensation for damages, illustrating the tensions between a desire for redress but a fear of losing even a measure of control within national jurisdictions.

International environmental law is actually a well-developed body of jurisprudence, but it suffers one severe shortcoming: the lack of enforcement capacity (Sands 1994b).

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[6] "Because there were no international precedents to use, this decision was based almost entirely on precedents from the U.S. Supreme Court concerning disputes between states within the United States about air pollution" (Wenner 1993:168).

[7] The state does appear to have the sovereign right to inflict environmental harm on its own territory, a loophole in the law that fails to comprehend the interconnectivity of the entire ecosphere.

As nations are extremely reluctant in relinquishing any degree of sovereignty to a supranational organization, none are eager to cede power to an enforcement mechanism that they may find themselves subject to some day. Cases of transfrontier environmental pollution have led to the formation of a number of international agreements regarding the shared use of environmental resources, such as the Rhine River or the Mediterranean Sea agreements. The important of international environmental law is that it provides for an internationally acceptable structure for conflict resolution in regard to environmentally-based disputes. As environmental problems can be a factor in international tension and even interstate violence, it is important to maintain an alternative arena for political resolution outside of the battlefield.

Acid Precipitation and Other Air Pollution

The atmosphere shared by the world's nations can be a source of international conflict when it becomes degraded for one nation by the activities of another. The *Trail Smelter* legal case illustrates this concern. Air quality is a fundamental human need, perhaps the most basic of all, considering the aerobic nature of human respiration. The use of this global commons is a focal point of international environmental diplomacy and often also of the negotiations

between neighboring countries whose frontiers are permeated by air pollution.

Efforts at international negotiations over transboundary pollution have not always been successful, as evidenced by the case of acid rain. In a major case of wide-ranging acid precipitation, "... Canadians are complaining that America's polluting industries are primarily responsible for the fall of acid rain within their borders" (Kamieniecki, O'Brien and Clarke 1986:307), creating diplomatic and political tension between two close allies who generally share a peaceful co-existence. A peaceful relationship with neighboring Canada is important for the United States, but "In respect of US-Canada the problem [of air pollution] is of a much greater dimension, and is arguably one of the most serious points of tension in their bilateral relations" (Szekely 1994:256). For Canada, the acid rain problem represented an encroachment on its sovereignty and the integrity of the ecosystems within its borders. In the United States, however, acid rain was perceived as an outgrowth of the discussion on the Clean Air Act, and less as a separate, special problem (Regens and Rycroft: 1988:118), thus lowering its priority on the environmental agenda. This has resulted in what Canadians see as an unwillingness to cooperate on the part of the United States (Szekely 1994:256).

Acid rain is an atmospheric mixture of sulfur and nitrogen emissions and water which creates acids, such as sulfuric acid, which fall to the earth as rain or snow.[8] Acid rain was first identified in Manchester, England in the 1850's and explained in detail by early British pollution inspector Robert Smith in the 1872 volume Acid and Rain (Ponting 1991:365). Worldwide, acid precipitation is most severe in eastern Canada, the northeastern United States, Scandinavia, north central Europe, and northeastern China. Canada is particularly hard hit:

> Of Canada's 161 million hectares of productive and accessible forests, 46 million hectares, or 28 per cent of the total, receive wet acid sulphate depositions greater than 20 kilograms per hectare per year, the threshold at which sensitive lakes are known to become acidified. (Szekely 1994:252)

The ecological effects are serious:

> In freshwater lakes that serve as collectors of acid rain and storm water runoff, increasing acidity has eliminated many fish species. Many ecologists suspect that acid rain may significantly affect the structure and functioning of terrestrial ecosystems as well, possibly resulting in reduced timber and agricultural production. (Ackerman and Hassler 1981:66)

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[8] Acidity is measured on a logarithmic scale, where a pH or 6.5 is neutral (neither acidic or alkaline). Normal precipitation measures a 5.7 pH due to the presence of some normal carbonic acid. In an extreme case of acid precipitation, the city of Wheeling WV recorded a pH of 1.5, for comparison, battery acid is 1.0 (Ponting 1991:366).

The *Waldsterben* of the forests in Germany is proof of the devastating result of acid rain on a biological system. Acid rain results in the acidifictaion of water sources, causing the leaching of toxic substances from mineral deposits and distribution systems, e.g., mercury, aluminum, copper, lead, cadmium and asbestos (Somers 1987:8). There has been significant corrosion of buildings and monuments due to the acrid nature of emissions from automobiles and power plants in cities throughout eastern and southern Europe. Additionally, there has been a measured effect on human health, as measured in increased respiratory illness and decreased lung capacity in children (Somers 1987:8).

The political ramifications of such ecosystem damage resulting from actions taking place within the United States' national jurisdiction and violating the right of Canada not to be so affected as laid down in the Trail Smelter decision are international tension. Acid rain became a contentious political issue between the U.S. and Canada:

> In a simple case, such as the acid rain problem between the United States and Canada, pollution is created in one nation and then crosses the border so that its effects are felt in another country (sulfur dioxide emissions from the Ohio Valley migrate to Canada and those from southern Ontario pollute the northeastern United States). Relatively well-defined point sources of the environmentally offensive act can be determined, establishing legal responsibility for damages. Here, as in northern Europe, diplomatic negotiation can take place under a level of scientific certainty as to the causes and effects of the specific problem under discussion.

> (Hence, the efforts of the Reagan administration to deny this footing to Canadian negotiators until the end.) (Kamieniecki, Kandel and Schubert 1995:267)

The chief tactic blocking an international agreement to limit the creation of acid rain has been the lack of complete scientific certainty in modelling the cause and effect of the problem. In the case of United States-Canadian negotiations, this was the cornerstone of the Reagan administration policy on the matter. In the cost/benefit method of policy analysis favored by the Reagan administration, the lack of exact delineation of the costs of acid rain, in contrast to the easily accounted for benefits of business as usual, created a policy standstill (Caldwell 1984:329-330; Regens and Rycroft 1988:132).

While talks between the national governments in Ottawa and Washington moved slowly throughout the 1980s, negotiations at the sub-national level led to some positive policy action. While legally not empowered to negotiate treaties with foreign powers, it came to pass that:

> ...states have reached bilateral agreements with Canadian provinces to deal with some of the issues surrounding transboundary air pollution. For example, Michigan and Ontario have agreed to share air quality and acid deposition data, exchange info on air quality standards and trends, and provide each other with annual inventories of emissions and control requirements. In addition, they have agreed to cooperate in joint studies of applying models to estimate dose-response relationships for sensitive ecosystems and to evaluate regulatory strategies. (Regens and Rycroft 1988:143)

This reflected the strong political position of the Canadian provinces relative to the national government there, as well as the wide range of degree to which acid rain was a significant political issue in different American states, which also are often the source of policy innovation within the U.S.

On the national level, negotiation proceeded both bilaterally and multilaterally, with mixed results. On August 5, 1980, Canada and the United States signed a Memorandum of Intent regarding transboundary air pollution (Regens and Rycroft 1988:149,185-191). This Memorandum was an attempt for the two nations to build on the Convention on Long-Range Transboundary Air Pollution, a 1979 international framework convention to deal with, among other issues, acid precipitation (Porter and Brown 1991:22). This diplomatic path was slowed with the election of Ronald Reagan to the American presidency in 1980 and his administration's largely anti-environmental position. The slow progress of negotiations also was in part due to the tremendous influence wielded by Senate Majority Leader Robert Byrd, of the high-sulfur coal producing state of West Virginia.[9]

Responding in part to American reluctance to move forward on the issue, Canada declared in 1984 that it would implement emissions reductions unilaterally (Regens and

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[9] Much federal air pollution legislation, including renewal of the Clean Air Act, was stalled until Byrd's replacement by George Mitchell, or acid rain-damaged Maine.

Rycroft 1988:150). Subsequently, the framework convention was strengthened by the 1985 protocol on the Reduction of Sulfur Emissions or Their Transboundary Fluxes by At Least 30 Percent, which grew out of a March 1984 meeting in Ottawa of what became known as the 30 Percent Club (Regens and Rycroft 1988:150-151). Known as the Helsinki Protocol, this agreement went into force in September 1987 (Porter and Brown 1991:74). The United States, Great Britain and Poland, which together account for 30 percent of total world emissions, refused to sign (Porter and Brown 1991:71,74). Failing executive action on acid rain, the U.S. Congress responded with the Acid Deposition Control Act of 1986, a compromise calling for a 10 million ton decrease in sulfur dioxide emissions and a 4 million ton reduction of NOX's (Regens and Rycroft 1988:153).

In contrast, international negotiations on another component of acid rain, nitrogen oxides (NOX's), proceeded more smoothly. Another Protocol addition to the Long-Range Pollution Convention was signed in Sophia, Bulgaria in 1988, this time with the United States acceding. The Protocol Concerning the Control of Emissions of Nitrogen Oxides or Their Transboundary Fluxes became a compromise dictated by the United States, freezing NOX emissions at their 1987 levels (Porter and Brown 1991:74). As a pioneer in emissions controls for automobiles and industry, the U.S. wanted to receive appropriate credit for the steps it had already

taken toward cleaner air. Other nations, most having yet to make any comprehensive efforts at pollution control, wanted all protocol adherents to make reductions equally based on present emissions. A compromise was found for NOX's, but not for sulfur dioxide.

Finally, after more than a decade of bilateral negotiations on the acid rain issue, the United States and Canada found common ground. In 1991, the two nations signed an Agreement on Air Quality, which introduced specific targets and timetables for sulphur dioxide emissions reductions, as well as for other polluting gases. This area of contention between the nations was dealt with and their relationship was able to return to a more relaxed condition.

Between the United States and Mexico, the most serious issue involving air pollution is that stemming from the intense industrial production taking place at the border, from Texas to California. While progress has been slow, there has been significant diplomatic activity to further it along. Szekely describes the situation:

> Following entry into force of the 1983 La Paz Agreement on Cooperation for the Protection and Improvement of the Environment in the Border region, successful negotiations led to the adoption of two important Annexes. Annex IV addresses transboundary air pollution from copper smelters in the triangle formed by the Phelps Dodge (Arizona), Nacozari and Cananea (Sonora) smelters. The first plant was closed, the second was required to operate with a desulphurization plant, and the third froze production at its then current capacity. Annex V to the La Paz Agreement

> aims to combat the air pollution problem in the Ciudad Juarez-El Paso region. This had become a matter of growing concern for the communities of both border cities, as a result of increased generation of particulates from Juarez and from El Paso from industrialization and increased levels of consumption, as well as the contribution to air pollution generated by motor vehicles. (1994:256)

Annex IV, the Agreement of Cooperation between Mexico and the United states Regarding the Transboundary Air Pollution Caused by Copper Smelters Along their Common Border was signed in 1987. Annex V, the Agreement between Mexico and the United states on the International Transport of Urban Air Pollution came in 1989 and also allows for further cooperation between other twin cities along the border.

International River Management

The United States has experienced a large degree of cooperation in the issues of international river management and pollution prevention with both Canada and Mexico. This can be attributed largely to the early agreement on the importance of shared waterways as evidenced by the Treaty Relating to the Boundary Waters and Questions Arising Along the Boundary Between the United States and Canada, signed January 11, 1909 (Sands 1994a:xxiv) as well as the 1889 Convention to Avoid the Difficulties Occasioned by Reason of the Changes which Take Place in the Beds of the Rio Grande and Colorado River and the 1906 Convention Providing for the Equitable Distribution of the waters of the Rio Grande for

Irrigation Purposes, both between the United States and Mexico. The Boundary Waters Treaty with Canada created a special standing binational panel to address issues of concern to the waters shared by both nations, including quality and quantity concerns: "The International Joint Commission was established to administer and discharge the purposes of the Boundary Waters Treaty" (Carroll 1983:44).[10] In the south, the International Boundary and Water Commission (IBWC) is already over a century old.

In the arid region of the southwest U.S. and northern Mexico, water is a critical natural resource. For Mexico, water is considered to be a limiting resource for the country's future development (Linden 1990:60). Indeed, "Water security will soon rank with military security in the war rooms of defense ministries" (Starr 1991:19) as nations compete for limited water resources for their growing demands. The threat posed by water shortages and quality degradation has become a serious international security concern (Starr 1991; also Gore 1992; Myers 1993; and Linden 1990).[11] While the peaceful relationships between the United States and its two neighbors should preclude violence over

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[10] John Carroll's Environmental Diplomacy: An Examination and A Prospective of Canadian-U.S. Transboundary Environmental Relations (1983) is a comprehensive study of the issues between the two nations and provided much useful detail.

[11] Starr's work is definitive in the area of water and security issues.

the water resource as is feared in other areas of the world, especially the Middle East, international tension could still arise and affect the security position of the U.S.

While the water quality of the Great Lakes had become a concern as early as 1912 (Carroll 1983:129), it took the interest of the IJC in 1964 to prompt a study report that led to concrete action. As a direct result, on April 15, 1972, President Richard Nixon and Prime Minister Pierre Trudeau signed the Great Lakes Water Quality Agreement of 1972. "The agreement was a direct outgrowth of the 1964 IJC reference and the 1970 IJC report, and reflected a joint effort to protect all use of the lakes" (Carroll 1983:130). While there were differences between the two nations on the allocation of responsibility of pollution abatement, phosphate reduction, and specific commitments on abatement existed (Carroll 1983:130), the agreement was important in that:

> Acting under the Boundary Waters Treaty of 1909, the two governments agreed in 1972 to initiate binational efforts to control a number of toxic substances from municipal and industrial wastes, to reduce pollution from shipping and dredging activities, and to undertake a number of major scientific studies, including one on the significance for water quality of pollution resulting from various land uses. The resulting coordinated binational action- with municipal programs costing over $8 billion and covering industrial controls, reduction of phosphate in detergent, and massive cleanups-led to a noticeable reduction in the eutrophication process. The lakes became clearer. (Somers 1987:32)

The 1978 Great Lakes Water Quality Agreement worked to build on its predecessor, providing:

> ...for a more specific approach to the control both of toxic contamination and of various dispersed or non-point sources. So far, the successes have been limited, largely because of the extent and complexity of the ecosystems themselves, but also because of the institutional mechanisms that must be involved in bringing about the necessary changes. (Somers 1987:32)

Some recent issues brought before the IJC include the pollution of the waters by Thunder Bay, Ontario because of the dumping of taconite waste into Lake Superior by the Reserve Mining Co. of Silver Bay, Minnesota (Somers 1987:8) and the negotiations over the Garrison Diversion Unit in North Dakota, which would "permit large quantities of irrigation water with its share of pollution runoff and exotic fish and other biota to enter Canadian drainage" (Carroll 1983:175).

Originally, the foreign policy stance of the United States regarding water issues with Mexico was less than cooperative:

> In 1895 U.S. Attorney General Judson Harmon said that the United States could divert as much of the water of the Rio Grande River as it wished before it reached Mexico. The Harmon Doctrine exemplifies the principle of national sovereignty by stating specifically that an upper riparian owner can lay claim to all the water in a river simply by virtue of the fact that the water passes through its territory first. (Wenner 1993:167)

This attitude was improved through diplomacy with the 1889 and 1906 Conventions. Furthermore, in 1944 the United States

and Mexico entered into treaties distributing the waters of the Rio Grande River and the Colorado River between the U.S. and Mexico (Wenner 1993:167).

Water quality issues have remained more elusive in resolution. For example, the quality of the water in the Colorado River by the time it crosses into Mexico is severely degraded because of increased salinity caused by crop irrigation (Wenner 1993:167). "During the sixties, a major water controversy did disrupt the political relationship" (Szekely 1994:254). The issue became a major source of contention for Mexico:

> Mexico argued the water was unusable on its entry into Mexico. This controversy continued until 1973, when the U.S. agreed to treat the water to reduce its salinity. In doing so, the United States made it clear it was not relinquishing any of its sovereign powers, nor recognizing any international obligation to act in a responsible manner concerning the quality of water it allowed to pass over its borders to the next riparian state. Nevertheless, it agreed to treat the water because it recognized the burden it was placing on the Mexican economy as well as the fact that the U.S. also receives water from other nations. (Wenner 1993:167)

Severe damage was caused in the Mexicali Valley by this salinization. The issue was addressed by the IBWC's Minute 242 and resolved thereafter by U.S. remedial action.

In another case, this time concerning a river originating in Mexico and flowing north into California, Washington and Mexico City agreed in 1944 to work

cooperatively to clean up the New River. Still, it was not until 1972 that Mexican President Luis Echeverria Alverez ordered an end to the dumping of raw sewage in the river. The New River is an ecological disaster:

> Like a toxic stew, the New River flows inexorably into the United States: pea-soup green in color and texture, laden with fecal matter and carcinogens, topped with detergent foam, and carrying the virus that causes polio and the bacteria that cause typhoid and cholera.
>
> For half a century, the river has been a bi-national disaster, carrying the human and industrial wastes of Mexicali into the Imperial Valley with impunity and earning the ignominious distinction as the dirtiest river in the United States. (Perry 1995:A1)

Progress is slowly coming in the cleanup of the river in the post-NAFTA era. The U.S. Congress has appropriated $5 million for "quick fix" repair jobs on Mexicali's sewer system, which is overloaded by a growing population already over one million (Perry 1995:A20). Additionally, the U.S. Environmental Protection Agency is examining the role played by American corporate facilities located across the border in Mexico. NAFTA is allowing a stronger commitment to border pollution, as shown when:

> The EPA requested that the American owners of 95 *maquiladoras* voluntarily submit lists of the kinds and amounts of chemicals the plants are using. When the owners balked, the EPA upped the ante and served the plants' American headquarters with subpoenas compelling compliance. (Perry 1995:A20)

However, NAFTA is also expected to increase greatly industrial production and pollution along the U.S.-Mexican

border as more firms begin production in Mexico where environmental regulations are less stringent and poorly enforced.

The creation of NAFTA and its Environmental Side Agreement has not worked to increase the environmental security of the United States. Szekely holds that:

> Despite the impressive body of regional environmental law already in place, an assessment of NAFTA, including the North American Agreement on Environmental Co-operation (the NAFTA Side Agreement) indicates that environmental concerns have only been marginally addressed. Such rules as have been included are superficial and minimal, suggesting that their primary purpose has been to deflect critical public opinion without getting to the heart of the need for effective regional environmental regulation. Accordingly, even after NAFTA, international environmental regulation and protection for the North American region remains basically an open issue. (1994:250)

NAFTA essentially defers to the General Agreement on Tariffs and Trade (GATT) for its environmental demands, meaning that each nation chooses its own level of environmental protection and regulation. NAFTA negotiations represented an opportunity to harmonize the lower standards of Mexico with the U.S. and Canada, an opportunity now perceived by some as lost (Szekely 1994:263). As it stands, the future of trilateral environmental negotiations between the U.S., Canada and Mexico remains unwritten.

Maritime Fisheries

The world's maritime fisheries are being decimated by systematic overfishing. Decades of seafood harvests in excess of sustainable yields have resulted in vast areas of ocean where stocks have become either depleted or drastically overfished, including 70 percent of the commercial species in every ocean and sea according to the United Nations Food and Agriculture Organization (Russell 1995a:22-23). There are an estimated one million industrial scale fishing vessels in the world (Russell 1995a:17). Competition over dwindling fish and seafood stocks are leading to a variety of international stresses and even open conflict. A particularly significant point for this study is that "Americans and Canadians have a long-standing conflict over fishing rights, with more than 10 violent incidents since 1987" (Shuman and Harvey 1993:106). The United States also has been involved in disputes with other nations, including France over Atlantic fisheries and China over those in the Pacific. The requirements for an issue to be environmental security are clearly met in this case: American resources and well-being are directly being damaged and there is an ongoing trend for violence, often involving military force.

International violence over fishing stocks has become increasingly common. Simple disputes can easily escalate into international incidents; for example:

> Last March, in a new kind of gunboat diplomacy, the Canadian government seized a Spanish trawler after a chase on the high seas. The Spanish *Estai* has been fishing for turbot in international waters, just outside Canada's 200-mile national coastal limit, so the European Union cried foul. Canada countered that, international waters or not, the Spaniards tactics were nevertheless destroying the Canadian turbot fishery: only 2 percent of the fish in the *Estai*'s cargo hold had reached spawning age, and its net had an illegally small mesh. (Russell 1995b:21)

The use of military ships to enforce fishing restrictions is a common occurrence. "The *Estai* was merely the latest example of the spread and intensification of international conflict over dwindling populations of food fish (Russell 1995b:21). Other recent cases abound: Russian border ships have fired on Japanese vessels, an Argentinean gunboat has sunk a Taiwanese vessel (the crew was rescued), a Norwegian patrol boat has exchanged shots with an Icelandic ship and Philippine patrol boats have arrested Chinese fishermen (Parfit 1995:10,22). Nations have found it necessary to police their waters from illegal overfishing. Violence not involving military or border vessels is also common: Scottish fisherman have attacked a Russian trawler, Indian traditional fishermen have been accused of burning commercial trawlers, and fishermen in New England have overturned cars in protest (Parfit 1995:10,20).

The United States asserts its maritime economic zone to be part of its sovereign jurisdictional area. With the 1976 passage of the Magnuson Fisheries Conservation and

Management Act (MFCMA), the United States declared exclusive management rights over all fisheries resources except tuna within its 200 nautical mile EEZ. Entering into effect in 1977, maximum sustainable yields for fishing were determined, as were optimum yields for when maximum sustainable yields are adjusted according to economic, social, and ecological conditions (Broadus and Vartanov 1994:54). In 1994, this led the federal government to pass an emergency fishing closure in the Georges Banks in the Atlantic (Russell 1995a:16), a move designed to protect the resources within American sovereign territory.

Most nations are adherents to the international Law of the Sea Convention, which entered into force in 1994. The United States has declined to join, primarily due to disagreements over seabed mineral nodule exploitation rights. In Articles 117-118 of the Law of the Sea, several principles also maintained by the U.S. are present:

> ...fishing states are required to conserve high-seas fisheries exploited by their nationals and to cooperate with other states in these efforts. Thus, in the case of straddling stocks, the fishing states must cooperate with measures adopted by the coastal states if these measures are necessary to conserve the resource. (Broadus and Vartanov 1994:64)

Instead, the United States has preferred to enter into a series of bi- and multilateral agreements regulating the maritime resources significant specifically to its EEZ jurisdiction.

The United States has bilateral agreements, known as governing international fisheries agreements (GIFA's), with many nations, including Canada, Estonia, the European Community, Iceland, Japan, Korea, Lithuania, Poland, and Taiwan, as well as a special agreement with Russia (Broadus and Vartanov 1994:73). The Fisheries Conservation Amendments of 1990 contain three anti-driftnet measures that the United States applies to any nation involved in such practices. In its 1991 bilateral driftnets GIFA's with Canada, Japan, Korea and Taiwan, position transmitters and on-board observers are called for, and the U.S. maintains the right to board and inspect possible violators in designated areas of the high seas (Broadus and Vartanov 1994:73). In its own national version of the Law of the Sea, the Fisherman's Protective Act of 1967's 1978 Pelly Amendment, the United States declared that:

> ...nations whose actions diminish the effectiveness of international fishery or endangers species conservation agreements, programs, and resolutions to which the United States is a party or otherwise subscribes are subject to certification by the Secretary of Commerce. Such certification triggers the President's authority to embargo fish products from violating countries. (Broadus and Vartanov 1994:74)

The United States has followed through on these standards. In August 1991, the U.S. Secretary of Commerce certified Taiwan and Korea for violating sanctions, although further action was deferred as both nations took punitive action

against the culprit ships (Broadus and Vartanov 1994:79). The United States also is party to the Convention for the Conservation of Anadromous Stocks in the Northern Pacific Ocean, also signed in February 1992 by Canada, Japan, and Russia (Broadus and Vartanov 1994:77) and the Convention on the Conservation and Management of Pollock Resources in the Central Barents Sea with Russia, Japan, Korea, China and Poland as negotiating partners (Broadus and Vartanov 1994:66).

One great success in international diplomacy has been between the United States and the Soviet Union and later Russia in their negotiations concerning the conservation of fishing stocks in the northern Pacific. Between the two nations' 200 mile EEZ's, much of the area is covered by national jurisdiction, except the anomalous area of the central Barents Sea known as the "Doughnut Hole" (Broadus and Vartanov 1994:60). In May 1988, the U.S. and the U.S.S.R. signed an Agreement on Mutual Fisheries Relations (Broadus and Vartanov 1994:77). This came about with some legally dubious reasoning:

> The 1988 nonbinding Resolution 396, adopted by the U.S. Senate, declared a joint moratorium with the Soviet Union on fishing within the Central Bering Sea, including enforcement measures against states that do not comply-an action that is also without clear basis in conventional or customary law. (Broadus and Vartanov 1994:64)

It is significant that the Cold War adversaries jointly recognized the threat to their mutual food security posed by the overfishing of the north Pacific.

Decimation of global fishing stocks will take years or even decades to recover. Sustainable harvesting can only begin when stocks of adult fish rise to levels such that new young spawn can be produced at a rate equal to the world's need for ocean food. Food crises have the potential to cause widespread political unrest that can affect international stability and seafood plays an important part of the diet of much of the world's population, especially in developing nations. Rising international violence over the maritime fisheries resource only serves to underscore its importance to many of the nations of the world, including the United States.

International Instability

Ecological degradation and social and military conflict are closely connected (Homer-Dixon 1994, Myers 1993). In 1996, Secretary of State Christopher declared that "Addressing natural resource issues is frequently critical to achieving political and economic stability and to pursuing our strategic goals around the world" (Clifford 1996:A3). Environmental stresses produce international

political instability and thereby affect the national security of the United States:

> Once instability and violence begin to appear in the affected countries, other nations might decide to define such conflicts as 'threats' to their national interests. They might then intervene in the domestic and regional conflicts (as did the United States for other reasons in Central America, where environmental conditions have played no small part in the continuing deterioration of already weak and violence-ridden societies). (Lipschutz 1991:55)

This creates a policy choice for the U.S. as it is forced to respond:

> The question for the United States, then, is which is more expensive: making the commitment to the development of these societies or dealing with the security threat and immigration problems that the collapse of these regimes will entail. (Mason 1986:219)

There clearly exists at least an indirect security threat for the United States.

The United States also is affected by declining environmental conditions where already stressed marginal land is being beset by the demands of rapidly growing populations, especially in the developing world. Eberstadt connects the population problem to political security concerns:

> By some assessments rapid population growth threatens to destabilize governments in low-income countries- through food shortages, for example or by overwhelming the state with social service demands or by creating an unmanageable and volatile crush in urban areas. (Eberstadt 1991:116)

The United States requires a stable world political system to ensure its own security and finds itself threatened by the problems caused by environmentally-rooted situations around the globe. In the examples of El Salvador, the Philippines, Somalia and Haiti, environmental problems have directly contributed to severe social upheaval resulting in civil war. Closer examination of each case may be useful.

Civil War has raged in El Salvador for over ten years. It is one of the most densely populated nations in the world (over 650 persons per square mile) and suffers from rapid population growth. These numbers place great strain on the Salvadoran ecosystem (Myers 1993:123), such that the country has "suffered more environmental impoverishment than any other country, notably through soil erosion, deforestation, and depletion of water supplies" (Myers 1989:33). The source of the civil strife and the concurrent environmental damage can be traced to not only the population problem, but also the economic patterns of land ownership. "Vast acreage is devoted to growing crops for export, enriching wealthy landowners and international corporations and pushing the poor onto the hillsides and into the rainforest" (Hall and Karlinger 1987:11). In these marginal areas, the soil can only produce a few harvests before becoming depleted and the environmental refugees are forced to relocate again. The appeal of guerilla organizations promising the land reform needed to allow the Salvadorans to feed themselves is

strong. Thus begins a cycle of entrenched elites fending off increasingly desperate masses whose exclusion from better agricultural land only intensifies the deterioration of the environment in marginal lands that radicalized them in the first place. For the people of El Salvador, the civil war is a fight for survival.

The United States was involved closely both financially and militarily in the Salvadoran civil war. Since the introduction of the Monroe Doctrine, the U.S. has considered the stability of Central America as critical to its own national security. After the rise of the Sandinistas in Nicaragua, the same fear of the "Domino Effect" spread of communism as had occurred in southeast Asia drove American support of the right-wing dictatorship in San Salvador. At the height of the civil war, 1986, the U.S. government supplied El Salvador with $122 million in military aid (Myers 1993:128). This money was spent to further the interests of American national security, however:

> ...a strong case can be made that an environmentally impoverished country will go on experiencing the very economic and social problems, followed by the political upheavals, that the United States sought to contain through its conventional support for El Salvador. (Myers 1993:128)

In the geopolitically strategic Philippines, a similar environmental pattern emerges. Homer-Dixon writes that in the Philippines:

> ...population displacement, deforestation, and land degradation appear to be

> increasingly powerful forces driving the current communist-led insurgency. Here, too, the linkages between environmental change and conflict are complex, involving numerous intervening variables, both physical and social. (1991:83)

Population pressures for economic growth have led to an overtaxation of the natural resource base. "The economic outlook is unpromising in part because of environmental mismanagement" (Myers 1989:26). The symptoms of environmental degradation include severe deforestation, subsequent erosion, and river sedimentation. Once again, a pattern of land distribution favoring large farms for export crops keeps the rapidly expanding population moving onto marginal lands in rainforest and steeper areas, bringing a cycle of ever increasing ecological damage. Particularly troublesome has been the overharvesting of regional fisheries which has impacted severely this nation where ocean products form a significant portion of the diet. Attempts by the citizenry to articulate their dissatisfaction with government environmental and development policies meet with limited success. Groups that address the land ownership issue are quickly associated with the communist-led separatist movement, for example, the National Democratic Front which has been labelled by the United States as a terrorist organization (Ruiz 1990). A considerable degree of the civil unrest in the Philippines can be attributed to the inability of the weakening

ecosystem to support the population. The U.S. maintains a strategic interest in its former colony, primarily based on historical ties and its position near potential troublespots in East Asia.

Reviewing the most recent military deployments of the U.S. armed services, environmental problems in the target nations are frequently present. Besides Somalia, the case of Haiti is illustrative, as much of its violence can be directly traced to deforestation (Weiner 1995:172-173). With only two percent of its area left forested, Haiti saw its amount of arable land decrease by over 40 percent from 1950 to 1990 (Myers 1994:132). The Haitian situation also became a refugee crisis for the United States:

> Environmental refugees spread disruption across national borders. Haiti, a classic example, was once so forested and fertile that it was known as the 'Pearl of the Antilles'. Now deforested, soil erosion in Haiti is so rapid that some farmers believe stones grow in their fields, while bulldozers are needed to clear the streets of Port-au-Prince of topsoil that flows down from the mountains in the rainy season. While many of the boat people who fled to the United States left because of the brutality of the Duvalier regimes, there is no question that-and this is not widely recognized-many Haitians were forced into the boats by the impossible task of farming bare rock. Until Haiti is reforested, it will never be politically stable. (Mathews 1989:168)

The United States national security state must learn to weigh the costs of military peacekeeping missions with the costs of environmental remediation.

Environmental Refugees

The most pressing concern for the United States resulting from the degradation of the environment in other countries is the creation of environmental refugees who flee their ecologically damaged homelands for the U.S. This presents a sticky problem in that the U.S. is founded by immigrants and refugees, indeed "the United States's international power and security can be traced to its approach to immigration" (Eberstadt 1991:127). Theoretically, the concept of the environmental refugee can be difficult due to the existence of intervening contributing factors, as Homer-Dixon describes:

> Environmental scarcity is more likely to produce migrants rather than refugees, because it usually develops gradually, which means that the push effect is not sharp and sudden and that pull factors can therefore clearly enter into potential migrants' calculations. (1994:20)

Despite this, the connection between environmental degradation and the involuntary displacement of people from affected areas clearly establishes the salience of the environmental refugee issue. That international conflict can result from the dislocation of environmental refugees was demonstrated in the 1969 Soccer War was caused by illegal migration from El Salvador to the Honduras propelled by population growth and the inability of the land to support the burgeoning numbers. "...Some analysts say it's a first

class example of an ecologically driven conflict" (Homer-Dixon 1991:89).

The United States always has been a popular destination for international immigration, with the largest numbers coming from its southern neighbor Mexico. Mexico exhibits severe ecological deterioration: 70 percent of the land suffers from erosion, ten percent of the soil is highly salinized, and about 1000 square miles per year are lost from production to desertification (Myers 1993:140). "People are already leaving the state of Oaxaca because of drought and soil erosion" (Homer-Dixon 1994:8). This has resulted in "Growing streams of people crossing the U.S.-Mexican border, fleeing the environmental degradation and its accompanying poverty and violence" (Lipschutz 1991:54). Immigration to the U.S. from Mexico numbers some 150,000 legal and 150,000 to 350,000 illegal per year (Myers 1993:144). Mexico is also not the only source of environmental refugees in Central America:

> By 1982, at least 500,000 Salvadorans had entered the United States (many of them illegally), or one in nine of the entire population. All told, almost one in four of all Salvadorans, counting internally displaced people as well as international refugees, have fled their homelands. While political repression and unequitable social factors have often played a role, many of these migrants can legitimately be called environmental refugees. (Myers 1993:125)

The problems of environmental destruction in other nations can and will arrive at America's borders, straining the

social net and potentially bringing instability to American neighborhoods. While the threat posed by the immigration of environmental refugees may prove to be merely psychological, the issue still qualifies as one of environmental security.

Conclusion

The international relations of the United States are increasingly being affected and informed by environmental conditions. The territorial integrity of the U.S. is violated by transfrontier pollution, illegal fishing and illegal immigration of environmental refugees, infringing on the nation's security. Different environmental security issues are being handled through different approaches, some are generally neglected. The diplomatic approach has dealt with most of the American concerns involving Canada, although Canada's issues with the U.S. may not be satisfactorily resolved for Ottawa. The pollution corridor at the Mexican border is only slowly being addressed, as it is predominantly American companies that are responsible, just outside of the EPA's jurisdiction. The security of fishing stocks is being dealt with through multilateral negotiations, although the high seas remain an area of contention internationally. Finally, the reactive nature of much of America's foreign policy has failed to prevent the creation of environmental refugees and lax border control has not prevented their entry into the United States.

Each of the issues discussed in this chapter exists or existed as a security threat to the United States. In some cases, the threat was direct and physical, as in an attack on American resources of public well-being, as with fisheries depletion or transboundary air pollution. In other cases, the threat was indirect and perhaps more a matter of perception in nature, as with refugees or the abstract concern for sovereignty. In other cases, the concern is that of insecurity as caused by instability in the international political system in which the U.S. exists as a nation.

The future appears to yield only more environmentally-rooted international security concerns. For example, water is rapidly becoming a limited resource, with U.S. government intelligence services reporting at least 10 places worldwide where war could break out over dwindling shared supplies (Starr 1991:17). The United States sometimes may be in a position to respond:

> A quiet pool of dedicated water-related talent, hidden in the recesses of the U.S. government, could mark the United States as a leader in the global effort to respond to the water emergency. (Starr 1991:32)

Attempts to negotiate to have Canadian water supplies piped to American population centers have been unsuccessful and plans to take more water from the Great Lakes have been seen as ecologically dangerous. In the south, the quantity of water available is expected to limit the growth of

California, Nevada and Arizona, as well as that in the border regions of Mexico.

The prevention of international instability is rapidly becoming the environmental security mission of the U.S. When faced with scenarios in which "environmental pressures in China may cause the country's fragmentation" (Weiner 1995:176), the risks of inaction are enormous. The greatest threats to instability, however, would come from the dramatic transformations expected with global climate change, the subject of the next chapter.

Chapter Six

Global Environmental Security

National environmental security is dependent on the integrity of the ecosystems in which a nation exists, including the global ecosphere. Some environmental problems become international environmental security concerns because they respect no borders, threaten human lives, and violate the territorial integrity of states (Baker 1991:169). The past century has witnessed the internationalization of traditional security politics as the nations of the world have become increasingly politically and economically intertwined, as evidenced by two world wars and scores of multinational defense pacts. Similarly, environmental security has become international with the recognition of "...an ecopolitical paradigm in international relations based on the recognition of the finite nature of the planet and the inextricable interdependence of the states making up its territory" (Pirages 1978:10-11).

Because of the ecological interconnectivity of the constituent elements of the biosphere, the most appropriate scale for a discussion of environmental security in many cases must be global. No nation exists in isolation to the global ecosystem. Any attempt to find environmental security must recognize the interrelationship between domestic and global environmental concerns. Global environmental security threats "have implications for our national welfare, and for

international stability and security, and therefore have to rise in priority in our nation's domestic and foreign policy formulation" (Press 1989:55).

A new class of global environmental problems has arisen, including ozone layer depletion and global climate change, that are fundamentally strategic in nature (Gore 1992:29). These problems differ from other environmental problems in character, being fundamental in cause and more pervasive in impact on society (Firor 1992:143). These global environmental security issues directly and indirectly threaten American security in many ways: physically, psychologically and in terms of values. Global environmental threats such as ozone destruction and climate change "may imperil the property, health, and livelihood of every U.S. citizen" (Shuman and Harvey 1993:13). Global environmental security threats are of paramount national importance:

> They threaten nations' economic potential, and therefore often their internal political security, their citizens' health (because of increased ultraviolet radiation from ozone depletion, for example) and, in the case of global warming, possibly their very existence. No more basic threat to security exists. (1993:34)

Myers illustrates the idea of this threat:

> If tens of millions of people die as a result of ozone-layer depletion, this will be equivalent to an extreme bombardment from the air; and if some nations lose entire portions of their territory or are even eliminated outright by sea-level rise, this will be equivalent to extreme takeover by a foreign invader. (1993:165-166)

In addition to geographic scope, the threat posed by ozone depletion or global warming is also of a different nature than that of other environmental security concerns. These problems involve the complex system of the planetary ecosphere, of which human understanding is far from complete. This kind of scientific complexity is normal; for example, the role of heterogeneous reactions and hydroxyls in stratospheric ozone depletion chemistry is still being studied, as is the role of clouds in global climate regulation.[1] One ominous scientific development is the discovery of the 'threshold effect' in global systems, where change does not occur slowly, predictably and more prone to adaptation, rather it is sharp and sudden.[2] The discovery of the Antarctic ozone hole in the mid-1980s was "a paradigm-shattering example of such nonlinear or "threshold" effects in complex environmental systems" (Homer-Dixon 1991:80). Subsequently, this development has changed perceptions regarding environmental concerns:

> Scientists, policymakers, and laypeople are beginning to interpret data about environmental change in a new light: progressive, incremental degradation of environmental systems is not as tolerable as it once was, because we now realize that we

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[1] This has allowed critics of environmental security to use "uncertainty" about threats in their lobbying. The issue of certainty in the context of security was addressed in Chapter Two.

[2] This functions much like the proverbial "straw that broke the camel's back". See T.M.L. Wigley. 1985. "Impact of Extreme Events". Nature. Vol.316, No.6024. July 11.

> do not know where and when we might cross a threshold and move to a radically different and perhaps highly undesirable system. (Homer-Dixon 1991:80)

The ecosphere has shown remarkable resilience in absorbing the disruptions inflicted by human activity, however, human efficiency and capabilities in damaging the global habitat are improving constantly, while ecosystem degradation is compounded.

This chapter focuses on the two major global environmental security issues: ozone depletion and global climate change. Ozone depletion has been almost universally recognized as a security threat and has seen action taken by the international community. Global climate change remains at an earlier phase of policy formulation, although much has already taken place in terms of scientific understanding and policy groundwork. Other global environmental security issues are faced by humanity, including the loss of biodiversity and the spread of new diseases, but are not discussed here.

Nuclear War and Nuclear Winter

Global environmental security issues have a precedent in the threat posed to global ecosystems by nuclear weapons (Gore 1992:34-35). Kondratyev and Nikolsky write that:

> Many catastrophic consequences of a global-scale nuclear war threaten the civilization of our planet, but the possible impacts on the environment and climate are, perhaps, a

> most threatening danger fraught with an ecological collapse. (1988:173)[3]

The use of nuclear weapons would have been a serious threat to the security of the environment. "Nuclear war--via the (global) environment--destroys what we all depend upon in common, i.e. the biosphere. It is therefore a threat to 'common security'" (Finger 1994:175).[4]

Of the consequences of nuclear war, perhaps the greatest threat (after the damage caused by immediate radioactive blasts) is nuclear winter, which is predicted to occur as a result of massive quantities of dust entering the atmosphere and blocking solar heat radiation from reaching the Earth's surface.[5] This could cause a cooling of at least the northern hemisphere, if not the entire planet, as well as alter rainfall patterns (Finger 1994:174). The term "nuclear winter" was introduced by Sagan and Turco at the 1983 Conference on Biological Effects of a Nuclear War.

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[3] See also Kondratyev and Nikolsky (1988) pp.175-195 for greater details on the ecological effects of nuclear war.

[4] Political tensions over civilian nuclear power are also significant, especially in the wake of the Chernobyl accident in the U.S.S.R. (now Ukraine). These are not, however, global in nature, despite the potential for widely distributed effects. Recent incidents include tensions between: Germany and France over the Cattenom reactor which did not meet German safety standards, Austria and Germany over the Wackersdorf reprocessing facility, Ireland and the United Kingdom over the Sellafield reprocessing facility's illegal dumping of radioactive waste into the Irish Sea, and Hong Kong and China over the Daza nuclear plant.

[5] See Budyko, Golytsyn and Izreal (1988:44-65) for in-depth details on the processes of nuclear winter.

Crutzen and Birks started the scientific discussion on the topic in the United States in 1982, while Budyko, Golytsyn and Izreal did likewise in the U.S.S.R. in 1982-1983.

Additionally, fires resulting from nuclear war might substantially contribute to ozone layer depletion through the introduction of NO and N_2O (NOX) into the atmosphere.[6] The synergy between the cooling and ozone depleting effects of nuclear war would harm the biosphere and generate up to twice the number of casualties that might be expected from just nuclear blasts and radiation (Finger 1994:174-175). Massive ecosystem disruption could be expected as photosynthesis, and therefore plant productivity, is reduced. Other effects could include freezing to death of trees, crops, animals and unprotected humans, limitations on water supplies, outbreaks of infectious insect- and rodent-born diseases, and mass starvation (Lynch 1987:6).

The threat of nuclear winter contributed to a change in the perception of the relation of a nation's security to the global ecosphere. The concept of the "global environmental security issue" can be recognized in the nuclear winter issue:

> Implicitly the theory of nuclear winter has far-reaching consequences on the perception

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[6] A 10,000 megaton nuclear war made up of one to five megaton bombs would inject NOXs into the stratosphere, resulting in a 30-70% reduction of stratospheric ozone over the northern hemisphere and a 20-40% reduction in the southern. It would take three years to return to normal (Baum 1982:28).

> and the conception of the environment. Instead of being perceived as a set of ecosystems mostly falling into nation-state boundaries, the environment becomes one single, complex and highly interrelated system. (Finger 1994:175)

The entire world had the threat of nuclear winter, an environmental threat, in common.

Global environmental security issues, such as global climate change and ozone depletion, function similarly to nuclear winter in pervasiveness of physical effects and psychological insecurity resulting from fears of the devastating results that may occur. However, there are substantial differences between current global environmental concerns and nuclear war: "Environmental disaster, unlike the decision on nuclear weapons, depends on the acts of millions conducting not actions of war but functions they feel necessary for their health and welfare" (Newsom 1989:70). Still, this does not change the extent of the destruction possible.

Ozone Layer Depletion

The depletion of the global stratospheric ozone layer became recognized as an international security concern with the accumulation of scientific data about the atmospheric phenomenon, prompting unprecedented international cooperation in a series of Conventions to ban the responsible chemicals. Ozone (O_3) is an oxygen molecule which, when present in the earth's stratosphere, forms a

layer which absorbs solar ultraviolet (UV) radiation, preventing harmful rays from penetrating the atmosphere and reaching the surface. Ozone levels over northern midlatitudes were down 13-14% from normal in January 1993 (Zurer 1993:8). The security implications of ozone depletion stem from directly resulting deaths and illnesses that would result from increased Ultraviolet-B (UV-B) radiation and indirect effects on food supplies and ecosystem viability. UV-B radiation is connected with cancer, blindness, and immune system depression in animals as well as the disruption of photosynthesis in plants.

The stratospheric ozone layer is being destroyed by anthropogenic chemicals that break down the ozone molecule. Certain chemicals combined with ultraviolet radiation from the sun cause a solar photodissociation chain reaction that consumes ozone. The largest group of ozone destroying chemicals are the CFCs and carbon tetrachloride, which comprise a total of 70% of the anthropogenic organochlorine loading of the troposphere (CFC-12, 28%, CFC-11, 23%, CCl_4, 13%, CFC-113, 6%) (Fraser et al. 1991:I-2) An additional 14% comes from methyl chloroform and 3% from HCFC-22 (Fraser et al. 1991:I-6), but this may change as hydrocholroflorocarbons (HCFCs) are used as substitutes for CFCs. The role of halons and other bromides such as bromine methyl bromide (CH_3Br) and anthropogenic fire-suppressant halons $CBrF_3$, $CBrClF_2$, and $CBrF_2CBrF_2$ form another threat,

especially since bromine is 50 times as efficient in removing ozone as chlorine (Rowland and Molina 1994). Also significant in ozone chemistry are nitrous oxide and methane, which link the biospheric nitrogen cycle to the global ozone balance and terrestrial life to the natural level of ozone in the stratosphere (Johnston 1992:4). Overall, the chemical destruction of stratospheric ozone is such that:

> The loss of ozone molecules from such chain reactions, when combined with the future steady-state levels of CFCs would disturb the delicate natural balance between the processes of ozone formation and destruction, and produce a new atmospheric situation with a substantially depleted ozone layer. (Rowland and Molina 1994:9)

A short history of the ozone issue may be useful.[7] The integrity of the ozone layer first entered into public discussion over concern with the effects of NOX emissions from supersonic transport (SST) aircraft in 1971 (Johnston 1992). The depletion of the ozone layer from chloroflorocarbons (CFCs) entered the policy agenda after Rowland and Molina discovered the destructive effects of these chemicals in December 1973.[8] By December 1974, the first U.S. government hearings on the CFC-ozone depletion

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[7] For a more detailed history of the ozone issue from the diplomatic and scientific policy aspects, see Benedick (1991) and Litfin (1994), respectively. Roan (1989) is also a good overview.

[8] Rowland and Molina, with Crutzen won the 1995 Nobel Prize for Chemistry for their work on ozone depletion chemistry.

theory were being held. In June 1975, the state of Oregon banned CFCs, a move more symbolic than substantial due to the relatively minor contribution to the overall problem contributed by the one state, but still significant in that it provided a test area for the subsequent national substitution of aerosol CFCs (Rowland and Molina 1994:10). As a result, in October 1978 CFCs in aerosols were banned in the United States. Aerosols were targeted because two-thirds of the CFCs in the United States in 1974 were used as aerosols (Rowland and Molina 1994:9). This was the first phase of the planned policy response to combat ozone depletion.

In February 1978, the U.S. government decided to postpone Phase Two, which was the regulation of CFCs used in refrigeration, air conditioning, and other industrial processes, under intense pressure from the chemical and automotive industries.[9] This process was further delayed by the incoming environmental policymakers of the Reagan administration (see Vig and Kraft 1984). Correspondingly, the National Academy of Sciences (NAS), which estimated ozone depletion at 16.5 per cent in November 1979 and

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[9] Industry scientific skepticism was led by the DuPont Chemical Company. Another important special interest working against measures to protect Americans from the threats posed by ozone depletion was the automotive industry, which used CFC-12 in air conditioners and CFC-11 in manufacturing foam seat cushions into the 1990s. The auto industry worked to focus public and policymaker attention on aerosols and away from its own uses (Rowland and Molina 1994:9).

concluded that a wait-and-see approach was not practical, had lowered its estimate to 2-4% by March 1984 (Roan 1989:xiv-xv). However, ozone politics changed forever with the discovery of the Antarctic ozone hole in 1984.[10] This threshold event provided a focusing event for ozone policy agenda setting, drawing public and policymaker attention to the issue (Benedick 1991).

A Framework Convention of the Protection of the Ozone layer was signed in Vienna in March 1985. With mounting scientific evidence and further research on the Antarctic ozone hole, the Montreal Protocol was signed in September 1987, calling for a 50% reduction in worldwide CFC production. The United States Senate ratified the Montreal Protocol unanimously in March 1988, which was also when the DuPont Chemical Company announced that it was discontinuing CFC production. When scientific information began to point to the existence of a corresponding ozone hole over the more populated northern hemisphere, international concern and action quickly followed. Meeting in London in 1990, the nations of the world agreed to ban the production of CFCs

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[10] The ozone layer was depleted first over the South Pole because of a combination of special physical and meteorological circumstances unique to the Antarctic. The polar vortex traps extremely cold air in winter to the near total exclusion of warmer air from the mid-latitudes. As a result, temperatures in the stratosphere can drop below -90 degrees C., which allows for cloud formation even in the very dry stratosphere. These clouds, in turn, provide particles with surfaces on which certain crucial heterogeneous reactions can then take place (Zurer 1987:10).

completely by the year 2000; later, in 1992 at Copenhagen the deadline was brought forward to 1996.

The threat to humans due to ozone layer depletion comes from the harmful effects of ultraviolet B radiation which is not prevented by the ozone layer from reaching the surface. UV radiation affects humans directly through damage to human health and indirectly through the degradation of ecosystem health. UV-B radiation is known to damage cell DNA (Makhijani, Makhijani and Bickel 1988:51), which translates medically in humans into cancer and depression of the immune system. Additionally, ultraviolet radiation can have severe effects on the eye, including acute photokeratosis or "snow blindness," which is like a sunburn on the cornea and conjectiva, as well as the development of cataracts (Makhijani, Makhijani and Bickel 1988:56). The United States can also expect to see 18 million additional eye cataract cases by the year 2075 (Benedick 1992:21). These effects are also found in non-human animals.

One major source of expected mortality resulting from ozone depletion is cancer. Makhijani, Makhijani and Bickel report that:

> One of the most threatening effects of UV-B for humans is its link to skin cancer. There is scientific consensus on the link between high life-time exposure to UV-B and development of two less serious forms of skin cancer: basal cell carcinoma and squamous cell carcinoma.
>
> Of even greater concern is the more complex link between UV-B exposure and

> malignant melanoma, a rare but lethal form of skin cancer. (1988:50)

The U.S. Environmental Protection Agency revealed in 1991 that the ozone layer was reduced by 4-5%, predicting 200 thousand additional skin cancer deaths in the next 50 years (Abramson 1991:A36) and an additional 1.5 to 4.5 million deaths by 2075 (Benedick 1991:21). The United States witnessed a 500% increase in malignant melanoma over the period from 1950 to 1980 (World Resources Institute 1993:310).[11]

The direct assault on human health by cancer may become secondary to dangers posed by the degradation of the human immune system. Myers explains this problem:

> More important, depletion of the ozone layer will depress humans' immune systems. This will leave us more susceptible to established diseases such as herpes and AIDS, and vulnerable too to a new array of diseases, tumors, and parasites we can expect in a greenhouse-affected world--tropical diseases will spread into temperate-zone communities, which will have no built-in resistance to them. (1993:166)

Scientific evidence indicates that:

> ...as a result of damage from increased UV-B exposure, micro-organisms (parasites, bacteria, viruses, etc.) which attack the skin could escape the normal surveillance of

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[11] This is of particular concern to the U.S. in that "The victims of malignant melanoma are almost exclusively Caucasians, particularly fair-skinned Caucasians, who have very little melanin pigment in their skin. Whites are seven to 10 times more likely to contract malignant melanoma than Blacks" (Makhijani, Makhijani and Bickel 1988:51). With a 83.9% ethnic White population in the 1990 Census, the United States has a citizenry at risk.

> the immune system. As a result, a parasite such as leishmania or the herpes simplex virus could penetrate the skin, leading to serious infections such as visceral leishmaniasis...which is lethal. (Makhijani, Makhijani and Bickel 1988:50)

The combination of the spread of tropical disease and parasite species to temperate areas where immune systems are depressed has, therefore, lethal potentials.

In addition to the direct effects on human health caused by ultraviolet radiation, ozone depletion also poses a threat to the terrestrial and aquatic ecosystems on which humans rely. At the basis of the global food web are tiny ocean-dwelling organisms known as phytoplankton. Unfortunately, there is no other life form that is as susceptible to UV-B radiation than phytoplankton (Myers 1993:167). Additionally, scientific research has demonstrated that UV-B radiation affects the rate of not only photosynthesis, but the nutrient content and growth of plants as well. "Two-thirds of the plants studied so far have displayed some degree of UV sensitivity, especially plants of the pea and bean, squash and cabbage families" (Makhijani, Makhijani and Bickel 1988:59). Photosynthesis, the conversion of solar energy into a form usable by humans and other animals, is the basic chemical process on which human life completely depends. Ozone depletion therefore creates a potential for the diminution of food supplies, in addition to general ecosystem disruption.

Ozone depletion is a significant risk and powerful threat to the health and well-being of human beings. Levy brings up an important point regarding potential ozone-related health problems:

> It may be asked, why not consider this a public health risk rather than a security risk? It is, of course, a public health risk, but is seems to meet fairly traditional criteria for security risks as well. The threats are to highly important national values, and they stem from global, not merely domestic, sources. (1995:49)

The protection of the nation's citizens from physical threats is by definition a primary security concern.

The national security dimensions of stratospheric ozone depletion are straightforward. "[Environmental concerns] are national security concerns inasmuch as our sense of security and well-being will be affected negatively if ozone depletion is not arrested and reversed" (Snow and Brown 1994:18). National security is at stake:

> The problem of stratospheric ozone depletion has much in common with conventional security risks. The values that are threatened are the lives and well-being of Americans, in addition to such other values as the lives and well-being of other citizens, ecosystem health, crop productivity, and materials destruction. (Levy 1995:48)

With American citizens directly in physical danger from UV-B and with a degree of public knowledge of the risk allowing a psychological fear of the physical threat, the threat to national security is serious.

One major political significance of the ozone depletion issue is that it has provided a positive example of policy response to a global environmental security issue. A wide range of political factors had to be dealt with to reach an agreement for action on ozone depletion: economic special interests, scientific uncertainty, technological limitations, and the lack of political willpower (Benedick 1991:xiii). Despite such obstacles, the actions taken by the United States and the other nations of the globe are minimizing the dangers from ozone depletion to those inevitable with the quantity of ozone depleting chemicals already in the atmosphere and preventing their further loading.[12] This has been wise policymaking:

> The United Nations Environment Programme estimates that had ozone-layer depletion continued uncontrolled, the price tag (through crop and fisheries losses and so on) for the United States alone could have climbed to $175 billion by 2075; and if human mortality were assessed at usual compensation rates, the costs would have been tens of times higher. (Myers 1993:168)

The response to the ozone problem poses one challenge to the categorization of ozone depletion as an environmental security issue: the problem entered the policy agenda, policy was formulated and decisions were made all without the explicit definition of the problem as one of national security. As a result, Levy concludes that "Contrary to a

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[12] The potential problem with the enforcement of ozone protecting international agreements remains in question. See Chapter Seven.

key assumption underlying the environment and security literature, the ozone case suggests that as a society we managed to cope with a serious environmental problem fairly well without labeling it a 'security problem'" (1995:50), ultimately questioning whether there is therefore any merit in using the term "environmental security" at all (1995:60-61). Levy seems to overlook the fact that the relatively swift policy response to the scientific data concerning ozone depletion's grave affects on human and ecosystem health was primarily motivated by the desire to protect American lives and well-being. It therefore can be argued that the ozone issue was always at least implicitly related to national security. A response need not engage the military to address a security concern.[13]

Global Climate Change

Global climate change, which is also referred to as global warming or greenhouse warming,[14] is an environmental security concern that threatens the stability on the global climate system on which much human activity, especially agriculture, depends. Global climate change is based on the

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[13] Levy (1995:49) makes an analogy of the policy to combat ozone depletion with the doctrine of containment that defined U.S. national security policy in regard to communism. In such a case, ozone policy would be modelled on an earlier security policy approach.

[14] The terms global warming and greenhouse warming are imprecise as not all areas are expected to get warmer. Some, such as Western Europe, are projected to cool significantly.

greenhouse effect, which is the process by which solar heat is trapped between the planetary surface and a layer of gases in the atmosphere, predominantly carbon dioxide. This is a natural event which allows the Earth to retain enough solar radiation to keep warm enough to support life in the cold of outer space.[15] The activities of humans, however, have interfered with the balance of nature and caused a small but significant increase in atmospheric carbon dioxide (CO_2) concentrations, as well as those of other "greenhouse" compounds. Concern for the climatological consequences of this increased greenhouse gas are the basis of intense political discussion regarding appropriate policy response.[16] Al Gore has called the threat of global climate change "...the most serious problem our civilization faces" (Healy 1994:A13).

The potential impacts of global climate change are serious security concerns. "Global warming could have catastrophic consequences for the habitability and

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[15] Human understanding of this physical process which now may threaten global security has existed at least since the 1896 publication by Arrhenius "On the influence of carbonic acid in the air upon the temperature of the ground" in the April issue of the London, Edinburgh and Dublin Philosophical Magazine and Journal of Science. In fact, "[t]his trapping of heat by atmospheric gases has been recognized and studied for more than a century, and it is one of the better understood features of the atmosphere and climate" (Firor 1992:144).

[16] For an overview of the political and scientific issues involved with global warming, see Oppenheimer and Boyle (1990) and Gribbin (1990).

productivity of the whole planet. The accompanying strain and upheaval on the international scene in turn could have serious foreign policy consequences for all countries" (Wirth 1989:3). Gore sees global warming as a strategic threat serious enough to escalate "international tensions to the point of actual warfare, including the risk of nuclear war" (Stammer 1992:A26). According to former Senator Wirth: "The projected effects of this worldwide climate disruption dwarf many of the environmental problems of the past and augur political, economic, and social disruptions of an enormous scale" (1989:3).

There is mounting scientific evidence of warming, steadily increasing the degree of certainty over the threat posed by global climate change. Recent data have shown that mountain glaciers are receding, the tree line is moving north, and there are increased outbreaks of non-native diseases (Petit 1995:A6). The year 1995 was the hottest in recorded human history with an average temperature of 59.7 degrees Fahrenheit (Begly 1996:24). The same year saw a number of dramatic climate-related events: a 48 mile by 22 mile iceberg (roughly the size of Rhode Island) broke off the Antarctic ice shelf, zooplankton was decimated by warming seas off southern California, eleven hurricanes struck the United States, a heatwave in the Midwest left 800 dead, and Siberia was over five degrees warmer than normal. On December 15, 1995, some 200 scientists from over 100

nations ratified an International Panel on Climate Change (IPCC) report that stated that the Earth had entered a period of climate instability likely to cause "widespread economic, social, and environmental dislocation". This report, which was even endorsed by nations normally adverse to any anti-global warming statements, such as Kuwait and China, forecast as 1.8 to 6.3 degree increase in global temperatures by 2100 (Begly 1996:25). Uncertainty about climate change is disappearing rapidly (Morris 1996), although global climate change remains more elusive than ozone depletion.

The discussion of global climate change is often saddled with the conditional tense as there is no complete scientific certainty to particulars concerning climate forecasting, despite the mounting evidence. Uncertainty has been a prime characteristic of the global climate change issue (Skolnikoff 1990:83). Even with the present state of knowledge about climate and modelling methods, climate experts still are not able to produce a definitive prediction for the complex biosphere, only probabilities and scenarios. Flavin comments on the political significance of such uncertainty:

> Although the idea of making decisions based on such uncertainty may seem problematic, it is important to remember that few political decisions even on issues such as whether to go to war--are based on complete foreknowledge of the future. (1994:18)

Uncertainty can be manipulated to undermine efforts to combat carbon dioxide and nitrogen oxide emissions, risking the radical change of climate and customary human lifestyle. There does exist one full-scale model of global warming and that is the planet Venus, where a runaway greenhouse effect has produced surface temperatures of over 500 degrees F. This could be viewed as a "worst-case scenario."

Several gases function to create this "greenhouse": water vapor, carbon dioxide, methane, nitrous oxide, and other natural and man-made gases, including CFCs. Each of these gases has a different atmospheric concentration, infrared-trapping effectiveness, and rate of increase. "Thus they also vary in their importance to the normal climate and in their importance to human-induced climate change" (Firor 1992:144).[17]

Carbon dioxide is receiving the most attention because of the sheer quantities of it being released into the atmosphere as a result of the combustion of fossil fuels as

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[17] One powerful metaphor for the dilemma faced by policymakers is that of Pascal's Wager. Medieval mathematician Blaise Pascal was once asked whether or not one should believe in God, i.e., obey the Church. Pascal answered by setting forth the possibilities and their consequences: if there is no God and one does nothing, everything is fine; if there is no God and one acts as a good Christian, then one has led a good life and perhaps wasted some time; if, on the other hand, there is a God and one believes, the reward is heaven; and if there is a God and one does not believe, the result is eternal damnation. If a greenhouse devastated Earth is substituted for hell and environmentally sound development is put in for paradise, Pascal's wager becomes an interesting addition to the global warming debate.

well as deforestation. Before the advent of human civilization, the atmosphere held some 580 billion metric tons of carbon. Today, that figure has grown to 750 billion metric tons, and is increasing at a rate of 3 billion tons a year.[18] The natural carbon cycle is massive: 100 billion tons of carbon exchanged between the land and the atmosphere and another 90 billion tons between the oceans and the air (Leggett 1993:47). Just the relatively small anthropogenic contribution is enough to disturb the natural balance and affect the global climate.

Methane is created by organic material which decomposes without sufficient oxygen, production at rice paddies, bovine flatulence, industrial and municipal waste dumps and sewage, and natural gas wells and pipelines. Methane is significantly linked to agricultural activities (Firor 1992:145). Methane is a less serious long-term threat than carbon dioxide since its levels can fall back to normal in a few decades, while CO_2 takes centuries. Methane is removed from the atmosphere by hydroxyl radicals, which unfortunately themselves are being removed by the pollutant carbon monoxide. Nitrous oxide, halogens, and other gases are also linked to human activity.

The result of the accumulation of these gases is that

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[18] This comes from the insertion of 6 billion metric tons a year from fossil fuels and another 2 billion tons from deforestation, minus 5 billion tons that are in turn absorbed by plants in photosynthesis and by the oceans (Leggett 1993:47).

sometime in the next 50 years the world is expected to warm an average of 3-8 degrees Fahrenheit, with the result that grain belts and other productive agricultural areas may turn into dust bowls, forests may die off, heat waves may become more extreme, and bodies of water may evaporate (e.g., the Great Lakes are expected to go down a foot, causing navigation problems) (Shuman and Harvey 1993:37). The impacts would vary by region. There would be increases in agricultural production in Russia, Canada, and northern Europe because of benefits such as a longer growing season and less frost kill, as well as increased agriculture in the southern middle latitudes, where parts of Latin America, North Africa, and middle India would gain from increased precipitation. However, agriculture would decrease in the United States, Western Europe, and southern Canada because of increased temperature, decreased water availability, and decreased soil moisture (Drennen and Kaiser 1993:7-8). Dustbowl-like conditions could be seen in the U.S. grain belt, while Western Europe gets colder because of changes in the Gulf Stream (Mathews 1989:169). Overall, a review of major global climate models (GCMs) yields an average 3.9 degree Celsius increase in temperature and a 10.1% increase in precipitation (Drennen and Kaiser 1993:3).[19]

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[19] The most widely referred to GCM in the U.S. is probably the GISS model, which was developed at the Goddard Institute for Space Studies. Others include those of the Geophysical Fluid Dynamics Laboratory (GFDL), Oregon State University (OSU), the National Center for Atmospheric

The resulting impacts of such a shift in climate are difficult to project due to the complexity of the biosphere and the human relationship to it. Still, it is necessary to try if policy to prevent and/or adapt to global climate change is to be forthcoming. One approach to estimating the societal impact of warming averaging 0.3 degrees per decade is to examine the impact of climate changes in the past (Firor 1992:153). For example, the Little Ice Age discussed had only a 0.05 degrees Centigrade temperature decrease per decade (Firor 1992:153), but resulted in some monumental impacts on human life and civilization, including a fairly complete restructuring of political power, economics, and demographics. The magnitude of the temperature shift expected with global warming would occur at six times the speed of that of the Little Ice age.

The Dust Bowl 1930s can be used as an analog of what might happen, at least in the Midwest, under the projected doubling of atmospheric CO_2 concentrations. Crosson argues that "the actual climate record does a far better job than GCMs in reflecting the spatial and temporal variability of the climate" (1993:118). The analog approach is disadvantaged by the fact that the 1-2 degree C. increase over "normal" climate seen during the Dust Bowl is only a fraction of the 3-8 degrees C. expected by GCMs under CO_2

Research (NCAR) and the United kingdom meteorological Office (UKMO). See Lewandrowski and Brazee (1992:134+) for more details.

doubling. This would mean that the hotter and drier direction of the climate in the Dust Bowl would be an underestimate of global climate change possibilities (Crosson 1993:118). An examination of the historical events related to climate change may be a reliable predictor of future occurrences. Based on events discussed in Chapter Four, the seriousness of the threat posed by global climate change to the United States cannot be stressed enough.

In addition to a change in temperature, another threatening direct physical result of global warming might be the rise in sea level. A likely effect of global warming will be a slight melting of the polar ice caps and a subsequent rise in sea levels. By the year 2100, global warming could cause the oceans to rise 0.5 to 2 meters (Smith and Tirpak 1990:319). Consequences could be widespread:

> The anticipated increase in the elevation of the oceans could permanently inundate low-lying coastal plains, accelerate the erosion of shorelines and beaches, increase the salinity of drinking water aquifers and biologically sensitive estuaries and increase the susceptibility of coastal areas to storm damage. (Wirth 1989:8)

With millions of people living within coastal areas that could soon be found underwater, as many as 50 million people could become "environmental refugees" as a result of rising sea levels (Tolba 1990:245). The nation of the Maldives, in the Indian Ocean, will disappear within a hundred years if present ocean level increases continue; for its people there

is no greater security threat than one which threatens physically to eliminate their nation's entire territory.

The impacts on human settlements would be severe. "A one-meter rise could inundate 5,000-10,000 square miles of dryland if shores are not protected, and 4,000-9,000 square miles of dryland if only developed areas are protected" (Smith and Tirpak 1990:319). Coastal living, particularly along the U.S. Atlantic and Gulf coasts, would become increasingly untenable as many shoreline dwellings and other buildings are not sufficiently above existing sea level or located far enough landward to ensure their survival and the safety of residents during major storm activity (Leatherman 1989:43).[20]

Governments and taxpayers will find themselves dealing with the rising cost of staving off the rising ocean from major American coastal cities including New York City, Washington DC, Miami and Boston, a price tag projected in the billions or even trillions of dollars (Shuman and Harvey 1993:37). "Protecting developed areas against such inundation and erosion by building of bulkheads and levees, pumping sand, and raising barrier islands would cost $73-111 billion (cumulative capital costs in 1985 dollars) for a one-meter rise by 2100" (Smith and Tirpak 1990:319).

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[20] See Leatherman (1989:43-59) for further details.

Humanity will also find itself threatened by the increase in extreme weather events, or "heavy weather."[21] Extremes of hot or cold and drought or flood can be expected to become common. The greatest threat from global climate change may not be the average temperature increase, rather "...the possibility that in the course of heating up, the atmospheric and oceanic systems that regulate the world's weather could be suddenly and drastically disrupted" (Flavin 1994:15). Smith and Tirpak write that:

> Many regions of the country are likely to experience changes in water availability and water quality. The frequency of droughts and floods may change. Under some scenarios, summer soil moisture and water availability in middle latitudes may be reduced due to temperature increase, a northward shift of the rainbelt, and an earlier onset of winter snowbelt and spring runoff. Even under warm-wet scenarios, in many regions the positive effect on supply of increased precipitation may be more than offset by temperature increases that reduce supply by evaporation and increased water demand. (1990:281)

Almost all parts of the United States would see major changes with global climate change.[22] The Travelers Insurance Corporation predicts that a 9 degree F. increase in average global temperature by 2010 would extend the hurricane season by 20 days, causing a 33% increase in

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[21] This terms comes from the science fiction novel Heavy Weather by Bruce Sterling (1994).

[22] For details by region, see Smith and Tirpak (1990). For additional material on California, see also Knox (1991).

hurricane landfalls and a 30% increase in catastrophic losses in the United States (Healy 1994:A13).

The most serious social impacts from global climate change would come from the extreme resulting weather events which are on the tails of the distribution curves of weather events, as the probability distributions for most climate variables describe a bell curve: "a shift in the mean by one standard deviation would change a 1-in-20-yr extreme to one that occurs on average 1 yr in 4, while the 1-in-100-yr extreme would become a 1-in-11 year event" (Homer-Dixon 1991:90).[23] The change to heavy weather is already being felt, with $48 billion in weather related losses for 1990-1995 (compared to $14 billion for the entire 1980s) (Gerstenzang 1996:A14), with the year 1992 alone seeing weather-related disasters costing $23 billion (Flavin 1994:14).

One area deserving particular attention for the impact that global warming is having on it is the tundra. Enormous quantities of the major greenhouse contributing gas methane are expected to be produced and released into the atmosphere through the decomposition process as the frozen tundra thaws (Gore 1992:52). The tundra is also involved in the global carbon cycle, with 1×10^9 metric tons of carbon fixed in the tundra; when added to the amount in the far northern

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[23] Homer-Dixon draws from T.M.L. Wigley's "Impact of Extreme Events". Nature Vol. 316, No. 6024 July 11, 1985. pp.106-7.

coniferous forests, this quantity equals half that in the atmosphere (Abramson 1993:A5). Research has shown that the tundra is no longer absorbing, but now releasing CO_2, bucking a 6000 year trend; as a result of increased temperatures, the water table is sinking and increased drying has increased the decomposition of organics in soil (Abramson 1993:A5). Once this begins, "...the cycle reinforces itself: more tundra thaws, releasing still more methane into the atmosphere" (Gore 1992:53). Unfortunately, the process appears already to be under way:

> ...the speed of warming in some recent measuring periods has been astonishing. For example, in March 1990, the average recorded temperature throughout Siberia was an astonishing 18 degrees Fahrenheit higher than any previous March on record. (Gore 1992:53)

One other effect of global climate change is the potential loss of biodiversity as species struggle to adapt to rapidly changing ecosystems.[24] Trees and other plant species cannot migrate northward at the same rate as which climate change may occur. Animal species besides humans may also find themselves victims of disease outbreaks resulting from the new range of pathogen-bearing pests. Considering the human interconnectivity with the other members of the ecosphere, this becomes yet another potential threat to environmental security.

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[24] Ryan (1992) has written about this subject in detail.

Global climate change relates to security directly, posing a physical threat to individual life and well-being. Outside of ecosystem disruption, this manifests itself in at least two ways: direct health problems and decreases in food availability. Climate change will see the "...releasing of opportunistic, highly competitive pests and pathogens from ecological controls and predation in urban and rural settings" (Epstein 1994:A14). The warming earth has seen a rash of disease outbreaks: Ebola in Africa and the flesh-eating disease in Canada and the United States in 1995, pneumonic plague in India in 1994, the Hanta virus in the U.S. in 1993, and cholera in South America in 1992 (Petit 1995:A6). Many diseases and parasites are expected to spread as the climate grows warmer. Lyme disease, Rocky Mountain spotted fever, malaria, dengue fever and encephalitis all could grow as ticks and mosquitos spread. Climate change contributes to vector redistribution and creates new breeding sites for pests (for example, *aedes aegypti* mosquitos, carriers of yellow fever and dengue, were once limited to 1000 meters in elevation, but have been found as high as 2200 meters in India and Columbia) (Epstein 1994:A14).

Outside of the dangers from disease, human health is affected directly by temperature:

> Although there may be increases in weather-related summer deaths due to respiratory, cardio-, acular, and cerebrovascular disease, there may be decreases in weather

> related winter deaths for the same diseases. In the United States, however, on average, weather-related deaths are greater in summer than in winter. Thus, global warming could produce a net increase in deaths. (Smith and Tirpak 1990:525)

Agriculturally, global climate change has the potential to be devastating to food production, although much scientific uncertainty exists in this area, with both positive and negative impacts expected. Some areas could see increases in agricultural yields as a result of increased CO_2 availability, a lengthened growing season, and the amelioration of cold temperature effects on growth, while other areas would experience decreases resulting from a shorter growing period (as high temperatures speed crops through development), decreased water availability (because of increased evapotranspiration, a decrease in soil moisture, and decreased precipitation), and poor vernalization (i.e., some temperate cereal crops, such as winter wheat, need a period of low temperatures) (Rosenzweig and Parry 1993:99). Overall, predictions call for agricultural yields to go down about 12% (Crosson 1993:121), with some seeing U.S. yields down 21-33% without mitigating carbon dioxide direct effects, or down 2-14% with them (Rosenzweig and Parry 1993:98). The potential for hunger may in turn threaten political stability.

The extent of the threat to human food production appears to hinge on the extent to which increased

atmospheric carbon dioxide spurs plant growth. This has become a controversial scientific issue. Carbon dioxide acts as a fertilizer, increasing the rates of net photosynthesis and decreasing the size of stomatal openings, thereby increasing water use efficiency (Drennen and Kaiser 1993:8). Different crop plants react differently to CO_2 levels: for example, maize has a low response to CO_2, while soybeans respond more positively (but are more sensitive to temperature) (Rosenzweig and Parry 1993:7). According to Wolfe and Erickson:

> Most of our information regarding plant response to CO_2 is derived from controlled environmental experiments where water and nutrients were in adequate supply, temperatures were near optimum, and weed, disease, and insect pests were not present. Under these circumstances, many C3 species (includes wheat, rice, soybean, and certain weeds) show a significant increase in photosynthetic rate and water use efficiency per unit leaf area at high CO_2 concentrations. Plant growth and yield may increase by as much as one-third with a doubling of CO_2. The C4 species, including the important crop plants maize, sugarcane, millet, and sorghum, usually show relatively little benefit from increased CO_2.(1993:173)

If increased CO_2 functions as a fertilizer, crop yields could, for certain species, actually increase, or at least see the negative effects of climate change mitigated substantially (Drennen and Kaiser 1993:11). Regions in the northern U.S. are expected to be generally less severely affected while southern regions could see large yield losses due to climate change (Drennen and Kaiser 1993:11). "Not

surprisingly, crops that were irrigated did not have as severe yield reductions as rainfed crops" (Drennen and Kaiser 1993:11). Most adaptation would occur at the farm level: shifting planting dates, increasing fertilizer usage, increasing irrigation, and developing new crop varieties (Rosenzweig and Parry 1993:94).

However, it is important to recognize that the optimistic projections for the benefits of increased carbon dioxide available to plants must be held in perspective. More than just carbon dioxide is involved in plant development, with factors such as water, nutrient and chemical inputs necessary to provide the optimum conditions needed to maximize benefits from CO_2 fertilization not often found in the field. This lack of optimum conditions is particularly true for natural ecosystems and for agricultural countries where irrigation, as well as fertilizers, herbicides, and pesticides are not available or affordable (Wolfe and Erickson 1993:173-174). Additionally, some areas may see potential benefits from CO_2 negated by other climate change-associated impacts, including crop damage due to increases in air pollutants or UV radiation (Wolfe and Erickson 1993:174). "Given the uncertainties regarding resource availability and crop response to CO_2 in a future CO_2-rich environment, a conservative policy approach would be to assume no CO_2 fertilizer effect" (Wolfe and Erickson 1993:174).

The security implications are as enormous as they are obvious. Global climate change may cause unpredictable disruptions in global political stability, greatly increasing the risk of war. Wirth holds that this risk significant enough to recommend that global climate disruption gets the immediate attention of the U.S.:

> The projected climate disturbance and its accompanying impacts are sufficiently dramatic in quality, magnitude, and rapidity that policymakers should give the most serious consideration to the security implications of the ongoing failure to anticipate and arrest global warming.(1989:10)

According to Wirth, global climate change poses special problems for the United States:

> While all countries are likely to be losers in the global climate gamble, some countries have more at stake than others. The United States has a particularly large investment in the status quo. Its current pre-eminence in world affairs ultimately derives from the strength of the country's economy. The productivity of the country's natural resources, such as the incomparably valuable farmland of the Midwest, was an essential prerequisite to America's elevation as a dominant superpower in the latter half of the 20th century. Impending climate change means that this productivity can no longer be taken for granted. The greenhouse effect threatens the overall health of the American economy and could require a massive diversion of resources to nonproductive adaptive activities. (1989:11)

Despite the severity of the threat, responses to global climate change have been relatively slow. While the U.S. is the largest polluter on the planet and therefore can make a great impact with unilateral steps to lessen environmental

degradation, the U.S. cannot reach environmental security unless it can persuade other nations to work together with it to slow and, if possible, arrest global warming (Shuman and Harvey 1993:144). The nations of the world must work together if environmental security is to be achieved. The result of worldwide concern over the threat from global climate change was the 1992 Framework Convention on Climate Change, which came out of the United Nations Conference on Environment and Development (UNCED) at Rio de Janeiro (the "Rio Conference"), whose objective was the stabilization of greenhouse gas concentration in the atmosphere at a level that would prevent dangerous anthropogenic impacts on the climate system (Article 2).[25]

Despite apparent early interest in battling global climate change, the Bush administration reversed its policy intentions and instead fought to continue business-as-usual (Schubert 1993a). In light of scientific uncertainty, this was referred to as the "no regrets" environmental policy (Gray and Rivkin 1991). As a result, the international negotiation of climate change were forced to compromise with the stance of the U.S. (and other nations) (Bodansky 1994:212). While the Climate Convention was significantly watered down, largely to please the Bush administration and

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[25] See Bodansky (1994) for a full treatment of the United Nations Framework Convention on Climate Change.

oil producers, it remains a very important step in promoting environmental security.

As a result, when compared to the actions taken to protect the ozone layer, "the Convention is a modest achievement and falls short of existing agreements such as the Montreal Protocol and London Amendments" (Bodansky 1994:223). This is an unfair comparison between a framework convention and a more advanced negotiating stage. Drennen compares the Climate Framework treaty to its earlier counterpart on ozone depletion:

> When compared to another recent Framework Convention, the Vienna Convention for the Protection of the Ozone Layer (1985), this Convention compares favorably. In terms of commitments, the Vienna Convention (Art. 2.1) only required Parties to 'take appropriate measures...to protect human health and the environment against effects resulting or likely to result from human activities which modify or are likely to modify the ozone layer.' The 'appropriate measures' were not further elaborated on. Yet despite the Vienna Convention's vague language, it began a process leading within two years to a partial phaseout of ozone destroying chemicals (Montreal Protocol, 1987) and within five years to a complete phaseout (London Amendments, 1990). (1993:200-201)

While the Climate Framework Convention does not specify what level of greenhouse gas concentrations signify a danger level, "it seems clear that the objective of the Framework Convention is to prevent continued exponential buildup of greenhouse gases" (Drennen 1993:198-199). The Framework Convention does require that all signatories supply detailed

inventories of greenhouse gas sources and sinks (except those already covered under the Montreal Protocol). Developed countries are further required to adopt national policies for limiting greenhouse gas emissions and increasing removal by sinks with the specific goal of returning to their 1990 levels. Some nations, led by Germany, have gone further and pledged carbon emissions reductions. The Convention does call for a mixture of general and specific obligations on the part of its acceding nations (see Bodansky 1994:214).

The Framework Convention is only a framework on which to build future, more specific and binding treaties and protocols. Leggett observes that:

> The relative speed of the climate negotiation, the growing stridency of scientists' warnings about global warming, the potential for conflict arising from climate change, all these developments point to the conclusion that climate politics will come to play a major if not dominant role in international affairs in the years ahead. (1993:42)

The work begun at Rio was only the start of the process in addressing global climate change (Brenton 1994:195).

The political battle over making global climate change prevention policy has generally been one between status quo interests, especially the fossil fuel industry on one side and environmentalists and others concerned with the nation's security on the other. The wave of costly climate-related disasters has brought a new player into the political arena:

the insurance industry. Insurers are concerned that continued losses due to extreme weather events could bankrupt their industry (Begly 1996:29). Globally, the insurance industry is roughly comparable in size and political clout as the fossil fuel lobby and is fully capable of promoting its interests in the policy arena (Flavin 1994:20). "The entry of the $1.4 trillion-a-year insurance industry into the debate over global climate change could mark a watershed" (Flavin 1994:12).[26]

The only way to prevent global climate change is to drastically reduce the amount of green house gases released into the atmosphere, particularly carbon dioxide. This entails a "paradigm shift in international energy policy" replacing fossil fuels with cleaner alternatives and maximizing energy efficiency (Leggett 1993:42). This would translate into a fundamental shift in the American and global economies, to the detriment of the fossil fuel and related industries:

> ...the scale of the impact of action on ozone is marginal by comparison with action on climate. The latter, if pursued thoroughly, would require total restructuring of an absolutely central industrial sector--energy production-- and

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[26] Because it is based on assessing uncertainty, the insurance industry is particularly well-suited to deal with global climate change policymaking. It has "...effective tools for quantifying the financial risk involved in possible future disasters-even if the probability of a particular event is small. To an insurance executive, the very uncertainties associated with climate change may be the best reason for taking it seriously" (Flavin 1994:13).

> so would have major repercussions on the whole global economy. (Brenton 1994:167)

The most used argument against policy to prevent global climate change has been the potential costs of action. Aggressive moves to lower carbon dioxide emissions by 70% are projected at over $2.7 trillion over the next 40 years, but this figure would be ameliorated by the concurrent expectation that greater efficiency in fuel and energy usage would save consumers and industry some $5 trillion so that "Far from being ruinously expensive, efforts to head off a feared global warming could actually save money or even turn a profit in the long run, environmentalists, government analysts and even some business leaders and economists say" (Stevens 1992:B5). Policies for reducing carbon dioxide emissions are both technically feasible and cost-effective (Porter and Brown 1993:93). In a 1992 study,[27] it was "calculated that US carbon dioxide emissions could be cut by 10 per cent by the year 2000, while reducing energy costs by tens of billions of dollars and creating a net total of 82,000 new jobs" (Leggett 1993:56). For example, with the use of electricity-saving devices from more efficient light bulbs to better insulation, the United States could reduce its oil consumption by almost 80 per cent (Griffin 1993:86). For the U.S., the greatest potential to reduce carbon

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[27] Jointly sponsored by the American Gas Association, the Solar Energy Industries Association, and the Alliance to save Energy.

emissions quickly and painlessly is in energy savings and efficiency. In 1994, the U.S. Department of Energy persuaded 600 members of the electric utility industry to adopt a "memorandum of understanding" to undertake measures to reduce carbon emissions voluntarily (Healy 1994:A13). The reduction of the use of the heavily polluting fossil fuels has a variety of other health and environmental benefits as well (Firor 1992:157).

Conclusion

Global environmental security threats are national security issues of the gravest importance, potentially affecting the lives, safety and even the territory of the United States and its citizens. The U.S. has the opportunity to prevent at least some of the dangerous impacts of anthropogenic climate change and ozone depletion by actively and aggressively working to limit the responsible chemicals and pollutants. Unfortunately, the optimal time for action was the period in the late 1980s when scientific evidence already was pointing to the extent of the dangers ahead, but environmental policies were decimated by the administration of George Bush, especially with the actions of his Chief of Staff John Sununu (see Schubert 1993a). The time lost has added to the degree and duration of resulting changes in the ozone layer and to the global climate. There is also the potential threat of a threshold having been crossed that

will guarantee extreme responses in the affected global systems.

Ozone depletion and global climate change threaten global environmental security and share many similarities, but also reflect a number of fundamental differences. The most significant difference is that ozone depletion comes from the use of a narrow range of human-manufactured chemicals, most of which only came into use in the last few decades. In contrast, global climate change comes from a wide range of gases, most even naturally occurring, whose role in human civilization if basic to most people's everyday lives both historically and in the immediate present. The reliance of humans on CFCs is nothing compared to that on fossil fuels or deforestation. Despite the broad application of the ozone depleting chemicals, they are nonetheless a focused target for remedial action, whereas the variety of greenhouse gases calls for a restructuring of basic economic activity, as well as the recognition that humans cannot prevent methane release from the tundra or cattle. The atmospheric chemistry required to understand the ozone depletions process and its effects is incredibly complex, but has been proven to be within the capabilities of present-day science. In contrast, the magnitude of variables involved with the global climate make a full comprehension of the threat involved beyond the range of even the most powerful supercomputers. As a result, the

entrenched interests involved in global climate change policy is reflective of the complexity and breadth of the scientific variables. Lastly, according to Levy (1995), ozone depletion was addressed without resorting to its assignation as a security issue, while the far more serious in magnitude of effect climate change issue still requires a position in the policy agenda commensurate with its potential impacts.

Still, the two global environmental concerns do share some qualities beyond being merely global and serious threats to the health and well-being of the Earth's inhabitants. There is a recognition of international interconnectivity that promotes the need for international cooperation for common security. Both issues share a basis in scientific understanding of the seriousness of the effects of humans on the non-human environment as well as the limitations on human consumption and degradation of the natural world. There are a number of useful lessons to be gained from examining the policymaking process on both global environmental concerns. Included among them are the role of science, the need to act while there still may be uncertainty, public education, multilateral negotiation, the need for leadership, and recognition of the importance of the private sector (Benedick 1991:205-208). There is no room for doubt that ozone depletion and global climate change

both pose serious threats to environmental security and political stability.

This chapter has discussed the global environmental security threats faced by the United States. While the global banning of CFCs and the stabilization of greenhouse emissions are important starts to promoting security, they are insufficient. Environmental security must take into account the interrelation of all parts of the biosphere, including those beyond American jurisdiction. Environmental security must be a joint effort of the people of the globe, as none can escape the affects of failure to cooperate. The U.S. was chosen for this study not only because of its impact on the global environment but also because of its unique position to lead in the search for environmental security. The final chapter concerns itself with this quest.

Chapter Seven

Finding Environmental Security

The United States and the other nations of the world face a variety of challenging threats to their national environmental security, from within as well as without. The question of how best to ensure environmental security becomes a paramount policymaking dilemma. The first phase in any policymaking process is issue identification, in this case the recognition of the serious environmental issues that must be addressed to protect national security. Beyond this study's endeavor to identify a comprehensive range of environmental security concerns, it also has discussed, albeit to a lesser degree, the various locations of environmental security issues within the policymaking process: agenda setting, specification of alternatives, authoritative choice, and implementation (from Kingdon 1984:3; see also Cobb and Elder 1983), as well as identified many of the political actors potentially intertested. Environmental security issues have been addressed and effectively resolved in some cases, while in others they have yet to enter the political agenda fully.

Environmental Security Agenda Setting

Environmental security faces two challenge in terms of policymaking: getting onto the more general policy agenda

and getting onto the security agenda in specific. The former can be seen as the systemic agenda, i.e., consisting of those issues meriting public attention and within the legitimate jurisdiction of governmental authority (Cobb and Elder 1983:85), while the latter is an institutional agenda, " that set of ideas explicitly up for the active and serious consideration of authoratative decision-makers" (Cobb and Elder 1983:86). Entry onto the policymaking agenda usually requires one or both of two issue characteristics: a crisis or other such prominent event signaling the inexorable pressure of a problem on the political system (Kingdon 1984:17) or "...a process of gradual accumulation of knowledge and perspectives among the specialists in a given policy area, and the generation of policy proposals by such specialists" (Kingdon 1984:18). The first is represented by the threshold event that galvanizes public and official opinion around the seriousness of an issue, such as the discovery of the Antarctic ozone hole or the discovery of the contamination at Love Canal. The latter comes from the growing understanding of an issue provided by ongoing research which reaches a plateau where evidence is essentially irrefutable and demands a policy response, such as with oxone depletion or fisheries depletion.

Further difficulty in placing environmental issues onto the security agenda comes from a combination of not only the fact that it is a new formulation that differs from

traditional approaches to national security, but the high status afforded security concerns as well. Despite proof of its salience, environmental security remains a new concept and thus causes resistance in policymakers and special interests accustomed to the status quo. Additionally, the nature of many of the issues in environmental security require a significant expansion in the way security is considered, including dealing with "day to day" activities not normally seen as affecting security, i.e., clear cut logging or the use of fossil fuels.

The relative status of security issues reflects the fundamental importance of national survival. Essentially, in terms of the functions of a state, ensuring the security of its people and territory is the most basic requirement, therefore making security policy the most important area of public policy. The large budgetary share allocated to defense in the United States reflects its national commitment to security. The implication here is that by placing environmental issues onto the policy agenda as security-level concerns, the full seriousness of the threats posed by environmental degradation can be addressed and alleviated in a timely manner. As seen in this study, the threats to environmental security faced by the United States and other countries are at least as potentially destructive to the nation as traditional threats, up to and including nuclear attack. It is not a question of the appropriateness

of placing environmental threats on the security agenda, rather the possible political reluctance to see the relatively quick elevation of newer policy issues from obscurity outside of the scientific community to foremost public concern. Simple recognition of the generally incremental policymaking process and the slowing effect of the wide variety of political forces at play in the American pluralist system make the resistance to the concept of environmental security not surprising, if still disheartening in light of the degree of the threat to the nation's security being faced.

Pragmatically, the elevation of environmental threats to the top of the public policy agenda as the security issues they actually are means a priority in policymaking attention and resources. National security is "where the money is" in terms of mobilizing the American public and its politicians (Wiarda and Wiarda 1986:181). Levy feels that the linking of environment and security is basically as rhetorical device which is attempting "...to raid the security issue in order to reap some of the deference that they believe politicians and publics pay to it" (Levy 1995:45). This statement seems a facile reaction to the seriousness of the issues at hand and ignores the customary political tactic of placing an issue on the policy agenda as high as possible to get maximal attention and priority. However, the fact that this is a useful political strategy

does not change the fact that the environmental issues discussed here *are* serious threats to security and, therefore, should be treated as such to avoid serious consequences.

Beyond the first step of identifying environmental security threats as important policy issues and placing them on the public policy agenda, there still remains the need for progress on subsequent policymaking steps, namely creating and implementing policy to ensure environmental security. In many cases, the creation and implementation of policies to limit environmental degradation and thereby promote national security have been taken, although not necessarily for that explicit purpose. Throughout the environmental security discussion in this study, both success and failures can be seen, e.g., domestically, cleaner air and water but continuing deforestation, regionally, some relief from overfishing but continued border pollution problems, and ozone protection protocols but little action on climate change globally.

International Cooperation on Environmental Security

As the world shares a single biosphere, environmental security by definition must include a great degree of international cooperation. With an unprecedented 178 nations represented and 117 heads of state attending, the 1992 United Nations Conference at Rio underscores the seriousness

of environmental threats and indicates that "...the goal of diplomacy is shifting from conflict management to common endeavor" (Speth 1992:145). The world is seeing the rise of the need for common security, which is based on a shared international desire for survival and necessitates regional and even global cooperation (Thorsson 1991:57).[1] The United States recognizes this, as evidenced by the words of former Secretary of State James Baker:

> The splendor of nature unfolds and unites all of mankind. Now, together, the earth's peoples must work so that this precious web of life shall embrace, in beauty and in peace, all the generations to come. (1991:171)

Cooperation is necessary because many of the environmental security threats being faced manifest themselves in areas of the global commons: the atmosphere, the climate, and the oceans.[2]

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[1] Common security is not to be confused with the older concept of collective security: "A distinctive and important difference can be seen between the traditional doctrine of collective security and the innovative concept of common security. Whereas collective security is meant to derive from membership in a major alliance or the United Nations and depends largely upon deterrence, common security derives from a shared interest in survival and depends largely upon regional cooperation and co-existence" (Thorsson 1991:57). There is, however, considerable overlap, for example collective security also "requires a common definition of aggression and willingness to act when it occurs" (Bennett and Lepgold 1993:215).

[2] Ironically, part of the cause of the increased rate of environmental degradation is the increased international economic and social interdependence and interconnectivity (Gaddis 1991:109).

The primary mechanism by which nations work together to address a common area of concern is the international regime. A regime can be defined as "...a system of norms and rules that are specified by a multilateral legal instrument among states to regulate national actions on a given issue" (Porter and Brown 1991:20) or a contract "...in which nations bind themselves to behave over a narrow range of issues in mutually beneficial ways" (Shuman and Harvey 1993:151).[3] The success of the 1972 United Nations conference in Stockholm, the first major international environmental conference "...set the pattern for environmental negotiations in the years to come in the intensity of public and press interest it attracted and the openness of the negotiations" (Brenton 1994:xiii). Once having placed environmental issues on the international political agenda, cooperation on addressing problems together in the form of regime agreements began. Important regimes in international environmental security include the 1979 Long-Range Transboundary Air Pollution Convention, the Montreal and later Protocols on protecting the ozone layer, and the Rio Convention on the global climate.

The major difficulty with international regimes is that they require the surrender of a portion of national sovereignty to some transnational agreement or organ. The

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[3] See Young (1989) for a detailed look at international environmental protection regimes.

rise of global security threats amounts to the greatest change in the nation-state system since it first emerged 400 years ago (Myers 1993:227). Nations are traditionally loathe to yield any degree of power, with the United States being no exception. As seen in Chapter Five, the U.S. has preferred to work through bi- and multi-lateral negotiations to deal with environmental security issues involving its neighbors and maritime concerns. The U.S. has exhibited a "...predilation for unilateralism" (Shuman and Harvey 1993:8) with negative results including not acceding to the Law of the Sea Treaty as it would limit claims to seabed resources (Shuman and Harvey 1993:153). The actions taken by the Bush administration, in particular by Sununu, to weaken the international agreement on global climate change made at the 1992 Rio conference (Brenton 1994:170-1) serve to underscore both the American reluctance to surrender sovereign power as well as to remind the world on the importance of all nations participating in a common environmental security. Still, the U.S. cannot isolate itself from the environmental problems at hand (Myers 1993:231).

While international cooperation is necessary to ensure environmental security, it is naive to expect the sudden surrender of national sovereignty to supranational groups, even if the purpose is to ensure national security. Environmental threats involve a broad number of concerns,

many of which derive directly from daily economic activities that are seen as essential to the functioning of a nation, e.g., fossil fuel use. This may account for why international environmental diplomacy is unlike traditional foreign policy subjects in being the cause of intense domestic political controversy (Brenton 1994:3). To be effective or even established at all, international regimes must acknowledge national resistance to losing sovereignty: Regimes must make their adherents feel some sense of obligation without making them feel coerced (Shuman and Harvey 1993:152).

One approach to minimizing the loss of national sovereignty in working for environmental security is to limit diplomatic talks to the smallest possible group of negotiating partners, thus keeping ceded powers as close to home as possible, rather than submitting to some global environmental organization. The United States has operated under such an approach regularly, as evidenced particularly well by the series of arrangements and treaties it has created bi- and multilaterally concerning the exploitation of maritime resources. Additionally, the U.S. has been reasonably effective in negotiating with its NAFTA partners in regard to environmental concerns, even if much room for implementation improvement exists. Although some of the actions of individual nations which affect the planet as a whole can be addressed domestically, there remain some

issues, most prominently global climate change, that simply cannot be discussed seriously at anything less than the global level.

The need for global cooperation brings with it a need for leadership. The United States is particularly well positioned to play a world leadership role in dealing with environmental security threats (Press 1989:59; Myers 1993:244). As preeminent superpower and global economic and political leader, the U.S. has the ability and the stature necessary to lead the world to environmental security. After banning aerosol CFCs domestically, the U.S. led the international movement to convince other nations of their dangers, in part to establish a "level playing field" for domestic industry (Porter and Brown 1991:75). However, "...America can exert moral leadership in this area around the world only if it puts its own house in order, because the rest of the world knows full well our role in creating the problem" (Griffin 1993:83). The impact of the United States on the global environment is unsurpassed by that of any other nation; whatever steps to promote American national environmental security are asked of other nations must first reflect the need for the U.S. to address the impact of its business-as-usual on the security of other countries. For example, the argument for preventing nations such as Brazil from exploiting their tropical rainforests loses some of its potency when coming from a nation that

allows the continued deforestation of its own temperate rainforests in the Pacific northwest (Griffin 1993:92). Part of being a world leader is setting an example, as the United States has done in the areas of democracy and human rights. Leading in environmental security requires securing the home front first.

Compliance and Enforcement

One likely area where the United States may find itself called upon in the search for environmental security is the role of global police officer. This should not be a problem for the U.S. as "Americans have readily accepted pain in connection with their integrative role as a global peacekeeper" (Gaddis 1991:112), as seen in two World Wars, Korea, Vietnam, and more recently, Bosnia. Environmental security is a form of security, which can require the use of force to protect it, just like any other form of national security. The possible role of the military in environmental security enforcement has not been given much coverage in the literature (Oswald 1993:133).

When nations agree to international regimes to limit environmentally dangerous activities, a possible situation is created where a nation may refuse to comply, perhaps citing 'national interest,' and thus endanger global

environmental security.[4] When one nation's actions threaten others in the international community and if diplomacy and sanctions fail, the response in the last resort is military, as shown by World Wars, U.N. police actions, and the multinational coalition in the Persian Gulf War. The psychological and physical insecurity possible from environmental noncompliance is a growing problem:

> Three factors underlie this increased concern with compliance. First, the growing demands and needs of States for access to and use of natural resources, coupled with a finite, and perhaps even shrinking, resource base, lay the groundwork for increasing interstate tension and conflict. Second, as international environmental obligations increasingly affect national economic interests, States that do not comply with their environmental obligations are perceived to gain unfair economic advantage over other States. Finally, the nature and extent of international environmental obligations have been transformed in recent years as States assume greater environmental treaty commitments. (Sands 1994:51)

Besides noncompliance with international regimes, there is also the possibility of a "free rider" problem, where non-adherents not obligated to obey an international convention benefit from a more secure global environment while their environmental actions work counter to environmental

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[4] Or, in a worst-case scenario, if the United States is the nation refusing to comply with actions required for global environmental security, the military would have to defend the U.S. "right to pollute."

security.[5] In any case, any military coercion would require a strong legal framework under which to operate legitimately and according to international norms (Oswald 1993:129).

It is also likely that environmentally induced political unrest abroad may require the use of U.S. troops to protect American interests, as seen in the cases of Haiti and El Salvador mentioned in Chapter Five. Policymakers have recognized this as another reason for the military to pay more attention to the environment (United States Congress. Senate Committee on Armed Services 1990:223). As such, the military must examine environmental situations worldwide to assess potential troublespots. Military planning often focuses on worse-case scenarios (nuclear first-strike, foreign invasion, etc.) and their prevention (Leggett 1993:46). Having to use American forces to respond to environmentally-induced situations is a worst-case scenario, but worst-case scenarios are exactly the ones for which the military and national security policymakers prepare.

The most serious environmental security threat is global climate change, due to its pervasive causes and multifaceted effects. Much of human civilization relies on climate stability in regard to agriculture and dwelling; radical changes would likely produce equally radical political strife. This is not merely a recent perspective:

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[5] Overcoming the free rider problems is a perrenial policy difficulty. Here, possible solutions could include punative tarriffs or diplomatic isolation.

> The suggestion that environmental change might spark political conflicts that could harm U.S. security interests is not new. Following surprising declines in world food production in the early 1970s as a result of abnormal weather patterns, the U.S. Central Intelligence Agency (CIA) conducted an analysis of the climate change risk in 1974 and concluded that should abnormal weather continue, U.S. interests would be threatened by the resulting political instability overseas. (Levy 1995:55)

The devastation possible as a result of climate change involves threats to territory at least as devastating as those posed by invading armies; there is at least as much reason to respond to this threat as seriously (Leggett 1993:46). Fundamental change in the way day-to-day business and life are conducted, such as decreasing reliance fossil fuels, is necessary to respond effectively to the threat of global climate change.

Selling Environmental Security

Public policy is created through a series of steps starting with the articulation of a need. The subsequent step of policy creation is support building or consensus gathering. Having determined the need for policy to protect the nation's environmental security, it becomes necessary to sell ecological security to the political interest groups that will support its passage. While by no means comprehensive, a list of the political actors involved with

environmental security must include the military, business, the public, and government, including the bureaucracy.

The military has a great deal to benefit from the elevation of environmental security to the top of the political agenda. As discussed in Chapter Three, continued funding in the post-Cold War can be assured with an expansion of mission. In addition to budgetary priority, improved status could also be garnered by providing real security to the nation. Perhaps most importantly, troop levels would not need to be reduced further and the public sector financing of defense-related research and development, both of which are important to the American economy, could continue under its new environmental mission.

Business, reasonably, must view environmental security as either a potential opportunity for profit or a threat to the existing status quo. Those industries which cannot compete without harming the environmental security of the nation would stand to suffer, such as energy companies that cannot see beyond fossil fuels or forestry products firms that insist on clear-cutting. The key to selling environmental security to the business sector is emphasis on the profit motive: American companies are in an excellent position to capitalize on the changes required through an environmental secure policy approach. As most of the threats to the environment can be attributed to the use of technology, technological improvement would be necessary to

continue established levels of production and consumption, only in a more ecologically benign manner. Research and development are among the greatest strengths of U.S. industry. It could be expected that the number of jobs available for the capable and trained American work force would rise. Also, the insurance industry stands to lose substantially if global climate change does manifest itself as expected, and so stands to gain by supporting changes that may prevent disasters.

In a democracy, the ultimate interest group is the public. In the short run, the public, as workers and taxpayers, would probably bear the brunt of the impacts of changes required as the economy switches to a form that does not threaten environmental security. Still, security is a basic concern for the citizenry and ranks high as an issue when a threat is perceived and it would served in the long run. The environment has become a core American value, to the point that in 1990 "...the majority of the respondents to a Louis Harris poll said that a clean environment was more important than a satisfactory sex life" (Brenton 1994:125). The public benefits from environmental security by getting a real security for themselves and their children.

Lastly, the government itself is a big winner with environmental security. The institution of government would face eroding legitimacy if it is unable to deliver a sense

of security to its citizens, who are increasingly frustrated with the inability of government to deal effectively with environmental problems. Political theory reveals that the fundamental purpose of government is to protect the security of the citizenry, a function that has been allowed to lapse in regard to the health of the natural environment. With power deriving ultimately from the people, providing security is necessary for the legitimacy and, ultimately, the survival of the state.

Conclusion

The new appreciation for ecological security manifesting itself in the policy agendas of international politics is a hopeful sign that humanity is coming to terms with the basics of its own survival. Unlimited growth and consumption of the planet's resources is suicidal. By defining ecosystem viability as a survival issue, something it could never be less than, in the context of a traditional defense establishment, environmental protection can move to the primary position on the policy agenda, bringing with it the necessary resources to provide real and lasting security to the globe's inhabitants. Gore phrases the needed response straightforwardly: "We must make the rescue of the environment the central organizing principle for civilization" (1992:269).

One great advantage of placing environmental security onto the security agenda is that it promotes the search for preventative policy. Security policy deals with risks and fears as much as actual events, making it perhaps the best place to address the incredibly serious threats being faced. During the Cold War, no one argued that the United States should not waste money on a military because there were no Red Army troops marching through Peoria, and it makes equal sense not to demand inaction on environmental security threats today. The ultimate concern regarding environmental security is not if it will be achieved, but how. If preventative action is not taken in advance of serious environmentally-induced changes, responses will have to be pro-active: dealing with food shortages, refugees, increased mortality, political instability and governmental illegitimacy. The fear of ecofacism, the swift violent response to mounting environmental disasters to keep order, has been a major concern for environmental thinkers for some time (Gorz 1980:77-91). The definition of security this study has worked under included the maintenance of the values that define the nation; a loss of respect for human rights, individual liberties and constitutional guarantees would mean the end of the United States in any meaningful context. This must be avoided.

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