Environmental dimensions of national security

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For many readers, the concept of "environmental security," or the integration of environmental issues and national security considerations at a national policy level, may well be novel. It may even appear somewhat oxymoronic. It is, in fact, neither. Rather, it reflects recent history and trends, and the significant evolution of our knowledge of both fields. This is not to say that the concept is well understood—as the papers in this volume illustrate, that is a work in progress—nor, for that matter, that the concept is even universally accepted as valid. There are those in both the environmentalist and security communities who view such an integration with deep skepticism, even alarm.

More broadly, however, it can be argued that the debate about the validity and meaning of environmental security is a part of, and a reflection of, a number of basic trends that, taken together, mark this post-Cold War period as one of fundamental change. It may therefore be useful to explore this broader landscape within which the integration of previously disparate policy areas may be (is?) occurring, and at least alert the reader to some of the developments in the environmental and national security policy arenas. Hopefully, this discussion will provide a context within which the following papers and reference material can be more easily understood.

Post World War II acceleration of change

The great Austrian economist Joseph A. Schumpeter remarked upon the "gale of creative destruction," which characterizes capitalistic systems, a phrase that, taken broadly, aptly characterizes our time. The rate of change since the end of World War II along many critical dimensions has accelerated dramatically, and by all indications is set to continue. Consider only a few of the readily evident fundamental trends:

- the revolutionary nature of the globalizing economy, which not only changes regional and global class structures and distribution of income, but increasingly generates economic activity at a geographic scale beyond the nation-state;
- the end of the bipolar Cold War structure with its ironically comfortable definition of global geopolitics as conflict between capitalist and communist world ideologies;
- the "information revolution," which, among other things, sees modern electronic technologies and international information networks used as revolutionary weapons against the state (how quickly were the Chiapas rebels on the Internet? And did this change an internal police action to be resolved by military means into an international cause celeb that had to be addressed through negotiation instead?);
- the recognition that the scale of human economic activity is for the first time fundamentally affecting a number of basic global and regional physical, chemical and

biological systems, and the earliest beginnings of a scientific capability to model and understand these complex systems;
- the rise of the service economy, and a concomitant change in patterns of work and the social contracts that previously linked workers with firms;
- the devolution of power from the nation-state to local, regional and international institutions, to nongovernmental organizations (NGOs), and to transnational corporations and capital markets; and, partially as a result of these shifts; and
- the redefinition of virtually all social institutions, from the family to universities to private firms to the nation-state itself.

Granted that any effort to fully discuss these trends would require tomes, not a single introductory essay, they nevertheless suggest some basic unifying themes that are defining our time—and are useful in thinking about linkages between environmental issues and national security.

For example, it appears that we are moving towards a globalized economy and society that will not, however, be necessarily as homogeneous as those that characterized the Cold War period. Rather, both economy and society will become more complex in the technical sense: there will be more communities (perhaps, as a result of the Internet, of common interest rather than delineated through accident of geographical proximity), units, systems, interests, political and social entities, and technology clusters, at many different levels. Concomitantly, there will be many more interrelationships among them. Substantially more sophisticated policy structures will be required to understand and define—not to mention manage—the interests of nation-states in such an environment.

Additionally, it appears fairly clear that we as a species are moving towards an engineered world, in which our social and technological choices, whether made deliberately or not, determine the structure of the natural environment not just for humanity, but for all life as a whole. This trend is a product of the Industrial Revolution itself, but is becoming more widely apparent as science gains more ability to define the impact of human activity on fundamental natural systems. Indeed, in many ways we already live in an engineered world; the principal reason we don't recognize this is that the anthropogenic engineering of the globe has not been planned, but has simply happened as a result of the evolution of technology, increased population growth, and growing consumption levels. Use of the term "engineered world" does not imply, by the way, the usual over-simplistic technological optimism ("pump enough tropospheric ozone into the stratosphere and you will have solved the ozone depletion problem"). Rather, it implies what might become a new form of engineering—call it "earth systems engineering"—that recognizes the complex and unpredictable nature of the interactions among artifacts, culture, and the physical world; attempts to understand salient behaviors and interrelationships among these systems through, e.g., modeling; and is appropriately humble and experimental.

An analogous caution applies to policy development and deployment. Policy, including foreign policy, security policy, environmental policy, and science and technol-
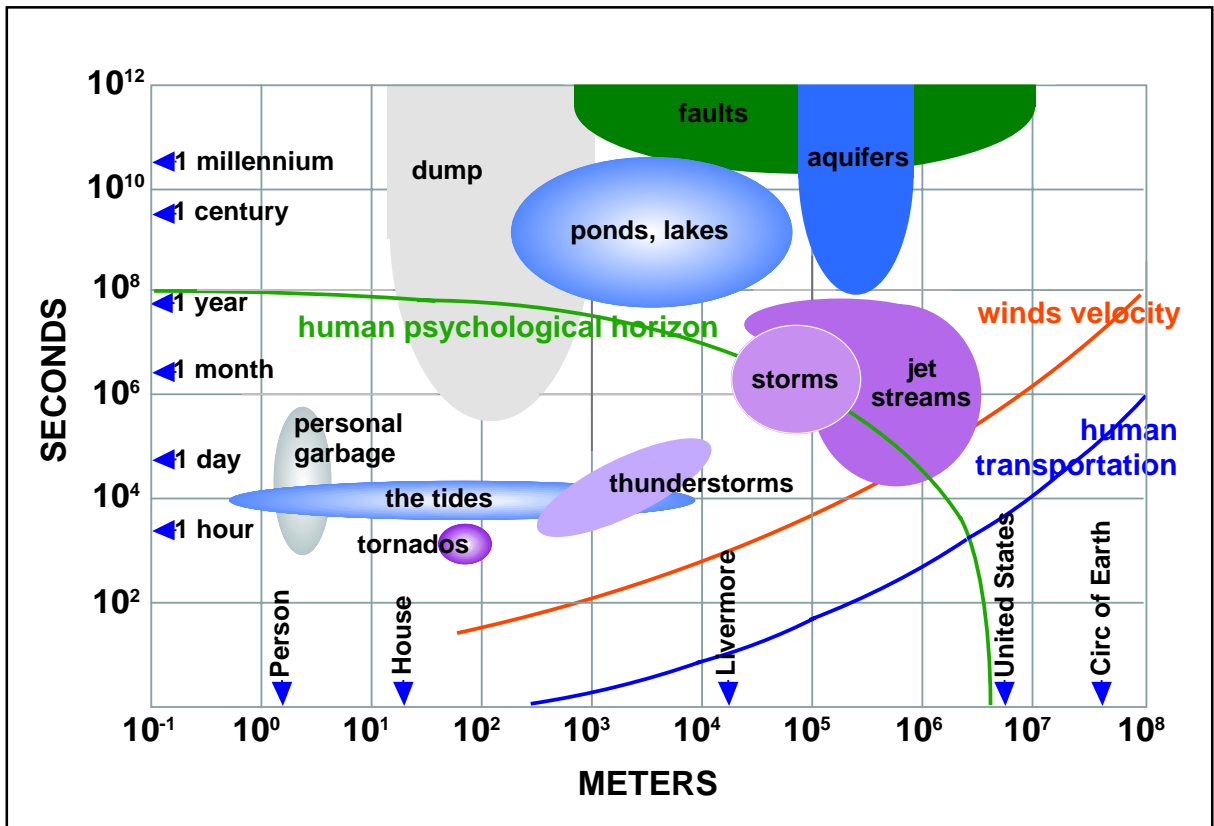
Figure 4-1. Human psychology and natural system scale.

ogy policy, generally functions in the short term and focuses on the interests of a specific geographic area. Limits arise either from political structure—such as terms of office, boundaries of nation-states—or, more fundamentally, from human psychological bounds. Most people don't think beyond a time horizon of a few years, and a geographic range of miles, or, at best, their region. Many of the natural and human systems with which national security and environmental policy in the broadest sense must deal, however, lie beyond these intuitive boundaries (see Figure 4-1). The evolution of successful nation-states, and, obviously, of many of the natural systems perturbed by human activity, occur over decades or even centuries. A critical question, therefore, must be how pragmatic policy systems can be developed that integrate gracefully and robustly over very disparate temporal and spatial scales.

In fact, the degree to which virtually every modern institution—from the family to major religions to academic and research institutions to the private firm to the nation-state—is changing is both unparalleled in modern times, and little recognized in the aggregate. While they are stable in the short term, in the long term at least some of these institutions will be quite different. Cultural systems (including the environmental and national security communities, for example) tend to find such change uncomfortable, and will accordingly try to minimize the reality of such all-encompassing change, if not actively resist it. Whether this is desirable is immaterial: it is a real phenomenon, and will be a difficult challenge for policy development.

Paradoxically, the opposite sin, that of apocalyptic projection, must be avoided as well, particularly as regards environmental perturbations. Although occasionally framed in such terms, it is highly unlikely that human activity at anywhere near current levels actually threatens "the world", "life", or even the existence of our species. This is not to minimize the irreversibility and critical nature of, for example, loss of biodiversity and habitat, which are clearly occurring even now. From a human perspective, however, what is threatened is the stability of global economic and social systems: should they collapse or shift dramatically, the impacts on human happiness, health, and mortality could be substantial, and recovery could take a long time.

Finally, it is important to recognize that the relationship among human population levels, patterns of economic behavior (including choice of technologies and consumption patterns), cultural systems and institutions (including private firms and nation-states), and supporting natural systems is a complex one. In particular, it is highly likely that there are a number of paths and conditions that could be sustained over some period of human generations, ranging from a Malthusian world where population levels are maintained by the mortality rate, to a world which is consciously designed to support a high level of biodiversity and a limited human population. Each might have a different mix of institutions and respective roles (nation-state, private firms, NGOs, international agreements and implementing bodies such as the World Trade Organization, etc.). This implies an interesting concept: that of choice at a social, rather than individual, level; "social free will." Given the religious, social, cultural, political, economic, and other constraints that exist, how free is a society, or global society taken as a whole, to choose alternate paths? What does it mean to exercise (presumably bounded) free will at the level of the social organization, be it private firm or nation-state, rather than at the individual level? And how can individuals impact these "organizational choices" in a predictable manner? More pragmatically, if one wishes to discuss the integration of global long-term environmental issues and the quintessential characteristic of the nation-state —that is, national security—can one avoid for long an assumption about a desirable path and end state?

The evolution of environment from overhead to strategic

The integration of environmental considerations into the national security apparatus of any nation, including the United States, can be seen as one example of a broader transition of environmental issues from "overhead" to "strategic" for consumers, producers, and society itself (Allenby, in press). Used in this sense, "overhead" issues are those that are ancillary to primary functions, much as environmental issues are treated under traditional command-and-control, end-of-pipe regulatory structures. "Strategic" issues, on the other hand, are those which are viewed as integral to the primary activity (Table 4-1). For a firm, for example, building a water treatment plant at a manufacturing facility is overhead; changing product designs and business plans in response to European ecolabeling initiatives is strategic.

Table 4-1. Transition of environment from overhead to strategic accountability.

Time Focus	Past	Present; emphasis on past	Present/future looking
Endpoints	Reduction of immediate human risk	Reduction of immediate human risk	Sustainability, including: • global climate change • loss of biodiversity • degradation of water, soil, and atmospheric resources • ozone depletion
Geographic/ Temporal Scale	Local immediate	Point source; immediate	• Regional and global systems at all time scales
Principal Activity	Remediation	Compliance	• Industrial ecology • Design for environment • Environmentally conscious design and manufacture
Focus of Activity	Waste substances sites	Emitted substances; emphasis on end-of-pipe controls	• Products and services over life cycle • Industrial and consumer behavior in actual economy • Resultant environmental impacts
Relationship of Environment to Economic Activity	Overhead	Overhead	Strategic

On a social level, the transition of environmental issues from overhead to strategic inevitably implies conflict with existing legal and policy structures. Such structures—including, for example, those dealing with consumer protection, government procurement, antitrust, trade, or, in this case, national security—have generally been created over the years without any explicit consideration of their environmental implications. In effect, the environmental externalities associated with existing legal and policy regimes have been both unrecognized, and ignored. This is natural enough, given the treatment of such issues as overhead until recently.

The increasing focus on complex environmental perturbations such as stratospheric ozone depletion and global climate change, and concomitant development of new, integrative fields such as industrial ecology, however, has demonstrated that the overhead approach is inadequate to achieve fundamental progress in responding to environmental challenges. The broadening awareness of the fundamental linkages among cultural, technological, economic and environmental systems (Allenby and Richards 1994; Socolow et al. 1994; Graedel and Allenby 1995; IEEE 1995) has, at the same time, made the need to integrate environmental dimensions into existing legal

systems more apparent. The environmental externalities imposed by these structures as they are currently constituted are seen as no longer acceptable. Several examples may clarify this transition.

That the integration of environment with other policy systems is not necessarily an easy process can be seen by the conflicts and problems that have arisen as the world's trade system, embodied in entities such as the World Trade Organization (WTO) and the North American Free Trade Agreement (NAFTA) zone, struggles to combine free trade and environmental protection. In many cases such as this, not just regulations, statutes and treaties, but cultural models and worldviews are involved, and the synthesis of legal requirements is accordingly complicated by the need for acculturation of, and mutual acceptance by, previously disparate groups. Thus, for example, a trade community which had heretofore dealt with environmental requirements, if they dealt with them at all, as protectionist trade barriers, is having to come to terms with environmentalists. The latter, in turn, tend to view the global economy, and thus trade, as somewhat suspect in itself, but an ideal tool to impose extraterritorial environmental requirements. Using trade in this way is, however, strongly constrained by international law, which, being based on the foundation of the absolute sovereignty of the nation-state, significantly limits the ability to impose one country's environmental values on another through trade (Hartwell and Bergkamp 1994). Moreover, both groups are also beginning to understand that free trade, economic development, and environmental protection are all valid policy goals, but it may not be possible to optimize all at the same time (Repetto 1993). How to evaluate the inevitable tradeoffs has not yet been determined.

Even after two years of intense discussion, for example, the WTO's Committee on Trade and Environment (CTE), set up as a forum to discuss such issues, remained deadlocked as of 1997 on a number of critical issues. These included establishing the compatibility of WTO trade rules with measures taken under multilateral environmental agreements (known as MEAs); who settles disputes when MEAs and WTO rules conflict (both structures are based on treaty and international agreements and thus of equal legal stature); how to resolve disputes alleging that ecolabelling schemes constitute nontariff trade barriers; and how to treat environmental taxes and charges in light of WTO trade rules. Disputes not only pit developed against developing countries (the latter concerned with environmental standards that might discriminate against products from their countries, and thus act as protectionist trade barriers). There are also disagreements among OECD countries, with the Europeans in particular claiming that American trade representatives show little enthusiasm for environmental considerations. Thus, although the adjustment for both the environmental and the trade communities is coming along, it remains difficult and is by no means complete yet (Raul and Hagen 1993).

Another example may be drawn from industry. The quasi-governmental ecolabel, the Blue Angel, is awarded to products within designated categories that meet certain requirements derived from environmental policies. In many German markets, the ecolabel is highly desirable, and can confer market advantage. In the case of the Blue Angel for personal computers, two of the more rigorous requirements were that

the product be designed to be modular, and that the manufacturer have a takeback program in effect. Modular design means that each functional assembly—the modem, the disk drive, etc.—must be removable by the consumer, so that the system can be upgraded without throwing away the whole unit. The environmental purpose is to reduce the waste stream from obsolete personal computers. This requirement is, however, an extremely difficult design challenge, especially where the technology is evolving so rapidly. It means, among other things, that the design team must segregate function within different units, ensure that the interfaces among units are robust to technological evolution, and do so while still being competitive with products that don't bother to get the Blue Angel. Among the obvious implications of this requirement is that the manufacturer will sell less units, which has obvious implications for product management and business planning.

Product takeback, which means that the manufacturer must take its products back when the consumer is through with them, and refurbish them, recycle the components, or recycle the constituent materials, makes the manufacturer responsible for the product at its end of life. The purpose of this requirement is to internalize to the manufacturer the end-of-life costs of its product, which will, over time, result in more environmentally efficient designs, and reduce the waste generated by trashed personal computers. Takeback programs have, however, significant business implications. It means that a manufacturer that may be low cost in manufacturing machines but cannot develop an efficient reverse logistics system to get its products back—or cannot design a machine that is easily refurbished, upgraded, or recycled—may well not be competitive. It also means that a manufacturer must learn to think of its product in terms of managing its lifecycle, rather than simply manufacturing it and forgetting about it. In the long term, post-consumer product takeback is a step towards the so-called "functionality economy," where customers buy function rather than product, and manufacturers remain responsible for the product through its entire lifecycle. In one sense, this is not as radical as it sounds; many leasing programs resemble this system already. In another sense, however, it turns manufacturing firms into service firms, and dramatically changes the very nature of the firm.

With both modular design and product takeback, it is obvious that one is dealing with strategic challenges for the firm, not simply overhead. Environmental considerations cannot simply be treated by putting another scrubber on the plant, but must be integrated into virtually every facet of the firm's operations: business planning, product design, strategic planning, financial management, research and development. Indeed, the electronics industry has developed a new competency, called "Design for Environment," or DFE, to reflect the need to integrate relevant environment constraints and objectives into its design and manufacturing operations.

The relatively arcane world of military specifications and military standards (MILSPEC and MILSTD in the United States) for products, and the interrelationship of this legal structure with stratospheric ozone depletion, provides a third relevant example. The military in most countries is a large purchaser of goods and complex weapons systems, and the manufacturing, design, and maintenance of these products is usually governed by complex sets of contracting, procurement, and operating requirements, including MILSPEC and MILSTD. These requirements, of course, have been drawn up over the years to ensure appropriate performance of products and systems

under the extreme conditions of military use, and have virtually never had any environmental inputs. They form a powerful and complex cultural and legal system.

Depletion of stratospheric ozone, on the other hand, is a classic and elegant example of unanticipated impact of human economic activity on fundamental natural systems. In this case, anthropogenic gases, primarily the chlorofluorocarbons (CFCs), which are quite stable, were found to be migrating to the upper atmosphere where, subject to energetic sunlight, they released their chlorine, which, in turn, catalyzed the destruction of stratospheric ozone. Stratospheric ozone in appropriate concentrations in the stratosphere is important because it blocks highly energetic sunlight from hitting the earth's surface, where it can cause significant damage to living things. Once this relationship was understood, the international community accordingly crafted a response, the Montreal Protocol, which aimed to eliminate production and use of CFCs.

So far, so good. The MILSPEC/MILSTD regulatory structure protects the performance characteristics of military systems, and the Montreal Protocol responds to a serious environmental threat. But CFCs are not just an emission from certain industrial processes that can be controlled by a scrubber (thus treating environment as overhead). Rather, they were at the time a critical material in electronics and metal piecepart manufacturing - in other words, they were an integral part of the manufacturing complex. They were strategic to manufacturing, not overhead. And this created conflict between the two previously disparate regulatory structures of environment and MILSPEC/MILSTD.

Thus, it is perhaps not surprising that, when the American electronics industry began to phase out ozone depleting substances pursuant to the Montreal Protocol, the single biggest barrier to prompt phaseout was not technical, not economic, not scientific—but MILSPEC and MILSTD. In fact, because of cross referencing in government, industrial, and commercial documents, and use of the rigorously tested MILSPECs and MILSTDs as industry standards around the world, it has been estimated that half of all CFC-113 use worldwide for the manufacture of electronics circuit boards was driven by U. S. MILSPEC and MILSTD (Morehouse 1995). Weapons systems like the C-130 aircraft, for example, had literally thousands of maintenance applications where the only acceptable process involved CFCs.

Overcoming this barrier did not imply ignoring the procurement system and the attendant specifications, or reducing the technical rigor of performance requirements. After all, the policy rationale for this particular system—robust performance under adverse conditions—was both strong and continuing. Rather, the process involved the integration of environmental and performance requirements into a new generation of MILSPEC and MILSTD, which met the goals of both environmental and military procurement policy. This case study is, in effect, not just one of environment being recognized as strategic to the interests of society, but one of environmental security as well.

And this, in general, is the pattern throughout social and legal structures as environment is increasingly recognized as legitimately strategic for society: initial conflict, followed by negotiation and identification of the valid policy principles of both regimes, followed by creation of a new integrative structure. It is Hegelian in a way: the thesis of the existing legal structure is challenged by the antithesis of the newly recognized environmental requirements, which then combine in a synthesis which (in an

ideal world) combines the appropriate elements of both. Thus, the concept of environmental security can be seen as one example, but not a unique example, of a dynamic occurring in many areas.

Changing dimensions of national security

With this as background, it is now useful to turn to that function that, for many nation-states, is the most critical: national security. The constellation of issues that support, or threaten, the fabric of a state and its territorial integrity are, virtually as a matter of definition, those of most concern. Two principal and comfortable assumptions that have supported the traditional view of such issues are 1) that the nation-state is relatively absolute, and, 2) since the beginning of the Cold War, that the conflict between capitalism and communism in various forms defined global geopolitics. These assumptions, at least in their absolute form, are becoming less valid. The termination of the Cold War, and, concomitantly, a global geopolitical structure based on rival nuclear superpowers with clearly opposed ideologies, has resulted in a more complex security environment. Regional and local historical, political, cultural, environmental, and economic pressures that were repressed during the preceding decades are now emerging, and, in conjunction with the loss of state control of weapons of mass destruction, proving to be significant sources of potential security threats and destabilization of existing states.

The degree to which these changes are viewed as real or lasting varies; it would be inaccurate to imply consensus at this point. As in any rapidly changing environment, there are significant differences in individual and institutional perception, and the importance given to various potential trends and developments. Some believe little change is required; some, like Jessica Mathews (1977) (and Brown, infra) believe that global civil society is being redefined:

> The end of the Cold War has brought no mere adjustment among states but a novel redistribution of power among states, markets, and civil society. National governments are not simply losing autonomy in a globalizing economy. They are sharing powers—including political, social and security roles at the core of sovereignty—with businesses, with international organizations, and with a multitude of citizens groups . . . . The steady concentration of power in the hands of states that began in 1648 with the Peace of Westphalia is over, at least for a while. . . .

> Increasingly, resources and threat that matter, including money, information, pollution, and popular culture, circulate and shape lives and economies with little regard for political boundaries. International standards of conduct are gradually beginning to override claims of national or regional singularity. Even the most powerful states find the marketplace and international public opinion compelling them more often to follow a particular course.

> The state's central task of assuring security is the least affected, but still

not exempt. War will not disappear . . . [n]ontraditional threats, however, are rising—terrorism, organized crime, drug trafficking, ethnic conflict, and the combination of rapid population growth, environmental decline, and poverty that breeds economic stagnation, political instability, and, sometimes, state collapse. . . These trends have fed a growing sense that individuals' security may not in fact reliably derive from their nation's security.

Under these circumstances, the Cold War operating definition of national security based on a bipolar world and primarily military confrontation, is thought by many to be too limited. Accordingly, a number of suggestions for expansion of the concept, focusing primarily on the concepts of "economic security" and "environmental security", have accordingly been made (Mathews 1989; Renner 1989; Executive Office of the President 1996). (This publication focuses on environmental security issues: economic security, although related, is conceptually and analytically a separable topic.) And it seems true that, if environmental issues and perturbations are strategic to a society, one would expect them to become a prominent dimension of national policy (Mathews 1989; Homer-Dixon et al. 1993; Homer-Dixon 1994a).

American policy has indeed begun to evolve in response to these recent challenges, in part by recognizing the need to manage a new set of issues, generally captured in the concept of "environmental threats" as part of a broader national security mission. Thus, in 1996 the Administration noted that (Executive Office of the President):

The decisions we make today regarding military force structures typically influence our ability to respond to threats 20 to 30 years in the future. Similarly, our current decisions regarding the environment and natural resources will affect the magnitude of their security risks over at least a comparable period of time. . . . Even when making the most generous allowances for advances in science and technology, one cannot help but conclude that population growth and environmental pressures will feed into immense social unrest and make the world substantially more vulnerable to serious international frictions.

In a subsequent speech at Stanford University on April 9, 1996, Secretary of State Warren Christopher explicitly recognized the need to include additional dimensions in American foreign policy:

. . . our Administration has recognized from the beginning that our ability to advance our global interests is inextricably linked to how we manage the Earth's natural resources. That is why we are determined to put environmental issues where they belong: in the mainstream of American foreign policy.

. . . The environment has a profound impact on our national interests in two ways: First, environmental forces transcend borders and oceans to threaten directly the health, prosperity and jobs of American citizens.

Second, addressing natural resource issues is frequently critical to achieving political and economic stability, and to pursuing our strategic goals around the world.

In carrying out America's foreign policy, we will of course use our diplomacy backed by strong military forces to meet traditional and continuing threats to our security, as well as to meet new threats such as terrorism, weapons proliferation, drug trafficking and international crime. But we must also contend with the vast new danger posed to our national interests by damage to the environment and resulting global and regional instability. . . . A foreign policy that failed to address such [environmental] problems would be ignoring the needs of the American people.

Thus, it is fair to conclude that, at least for some leaders in the Clinton administration, the need for an "environmental security" policy is increasingly recognized and accepted. It is less clear that the dimensions of this requirement, and the means by which it can be institutionalized in existing policy structures, have been adequately worked out. After all, there are many resource scarcities and environmental perturbations around the world, most of which will impact the United States only minimally. In 1995, for example, the National Science and Technology Council identified:

. . . a broad class of global threats evident in the post-Cold War world affect our nation's security. . . . In the modern world . . . environmental degradation can have global consequences that threaten the populations of all nations. Great human suffering due to natural disasters or to other environmental economic or social and political factors may lead not only to large numbers of refugees crossing international borders but also to instability that increases the likelihood of ethnic and regional civil conflict. . . . global threats such as climate change, ozone depletion, and ocean pollution may take years or even decades to become apparent and build toward crisis. Yet each of these poses challenges to the health and long-term well-being of both U.S. citizens and people throughout the world.

Incidents and issues in each of these areas may raise foreign policy or security concerns, but clearly in most cases will not. Moreover, the resources to respond to challenges in these areas are limited, and their allocation must be prioritized to ensure that national security is not jeopardized, and that the most benefit is obtained for their use. This raises a critical analytical point.

It is very important to differentiate between the perspectives of a global view, where one views human security or, more broadly, biological security as a whole, and a nation-state view, which focuses on the interest of the nation-state rather than global systems (see Figure 4-2). Even at the level of the nation-state, it is necessary at a minimum to differentiate between national security issues and *foreign policy* issues, between those situations that implicate American foreign policy initiatives in some way, and the more limited subset that proximately involve national security. For example, disease in
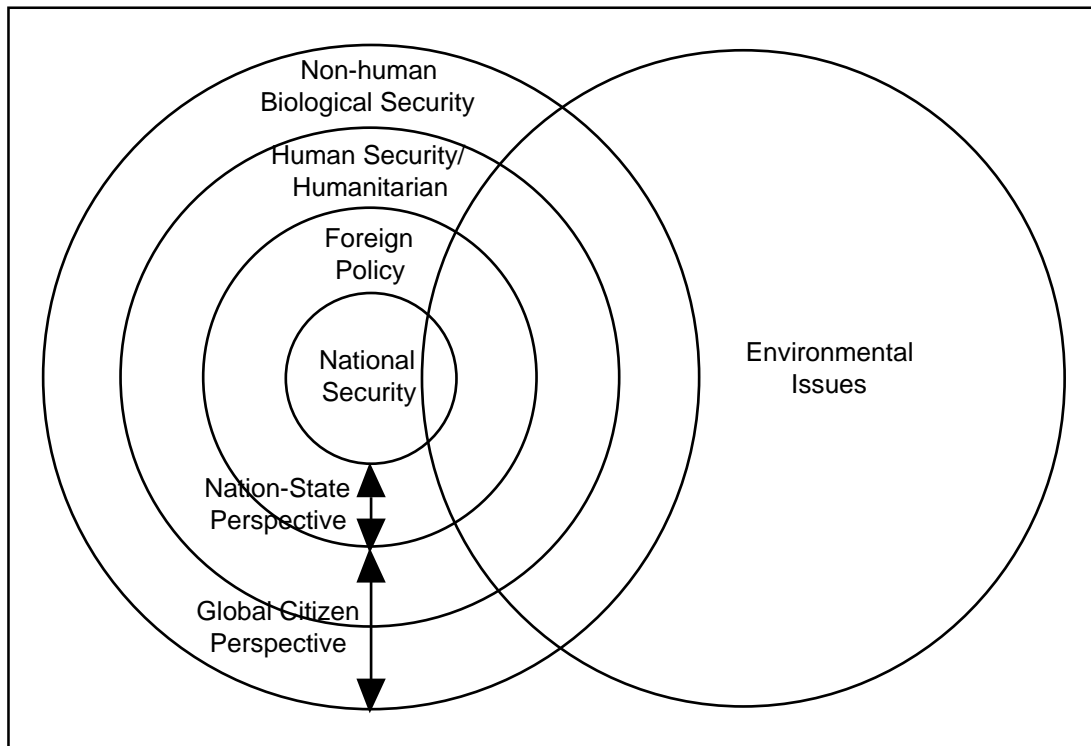
Figure 4-2. Intersection of environmental and security issues.

an African state that limits the ability of the state to develop economically by reducing the ability of the population to work and imposing substantial health care costs, is an obvious humanitarian concern, and may generate appropriate relief efforts. If resources are available, for example, the international NGO community, which tends to take the global rather than the nation-state view, usually attempts to respond to such conditions. Depending on circumstances, such a condition may be a foreign policy concern of the United States. It will probably not, however, be viewed as a national security issue.

On the other hand, destabilization of Chinese agricultural production as a result of changes in precipitation patterns, which leads to augmented internal and external population migrations, raises not only humanitarian issues appropriately dealt with through foreign policy initiatives, but is quite clearly a potential national security issue as well.

It is important to realize that designating a set of issues as national "security" issues in no way implies the necessity of an adversarial approach, although this was usually the case during the Cold War. Rather, it increasingly identifies areas where collaborative confidence building measures are increasingly being used. It is generally in the interests of all states involved in a situation where destabilization or conflict might occur to work together to avoid such an outcome if possible.

In this light, it is probably fair to say that the initial attempts in the United States to expand the Cold War concept of national security to include other dimensions, such as environment, have, perhaps, been too inclusive. Many considerations and issues that realistically do not have significant potential to substantially and adversely impact the security of the United States or its citizens have been included, and, conversely, little

consideration has been given to excluding issues that, even if they may have such impacts, are not appropriately considered as a part of national security (for reasons of institutional capabilities and culture, for example). This has perhaps unnecessarily impeded acceptance of the fundamental legitimacy of the extended concept, particularly in the security community, which tends to favor traditional, military definitions (Fleishman 1995). Moreover, a failure to specify issues and concerns can, as the trade example indicates, lead communities to talk past each other, and become fixated on perceptual, rather than real, differences. Accordingly, it would greatly facilitate the successful implementation of an enhanced national security mission if it can be rigorously defined in such a way that it can both be operationalized, and understood as legitimate by the national security community as a whole.

The nub of the problem is, of course, that there is no commonly accepted definition of national security. Webster's New World Dictionary defines "security" in relevant part as "protection or defense against attack, interference, espionage, etc. (funds for national security)," which, although seemingly specific, allows enormous leeway: "interference" is a subjective term, and the "etc." allows in what the rest of the definition might preclude. Nor are the U.S. government's attempts at definition necessarily more rigorous. The Administration, for example, has defined three goals in its *national security strategy* (Executive Office of the President 1996, 11-12, italics added):

> **- Enhancing Our Security**. Taking account of the realities of the new international era with its array of new threats, a military capability appropriately sized and postured to meet the diverse needs of our strategy, including the ability, in concert with regional allies, to win two nearly simultaneous major regional conflicts. We will continue to pursue a combination of diplomatic, economic, and defense efforts, including arms control agreements, to reduce the danger of nuclear, chemical, biological, and conventional conflict and to promote stability.
>
> **- Promoting Prosperity at Home**. A vigorous and integrated economic policy designed to put our own economic house in order, work toward free and open markets abroad and promote sustainable development.
>
> **- Promoting Democracy**. A framework of democratic enlargement that increases our security by protecting, consolidating and enlarging the community of free-market democracies. Our efforts focus on strengthening democratic processes in key emerging democratic states....

This definition, carried through in other Administration documents, encompasses a broad range of potential threats and issues, including but not limited to economic development, trade, and, included in the concept of sustainable development, virtually all regional or global environmental perturbations (e.g., National Science and Technology Council 1995). Many in the traditional national security community (sub silentio for the most part) view these definitions as far too broad, even as they may accept them as legitimate foreign policy issues, at least on a case-by-case basis.

Perhaps the most measured definition which also captures the ambiguity of the term is provided by Jack Goldstone (1996):

> There is only one meaningful definition of national security, and it is not inherently military, environmental, or anything else. Variations of that definition guided us throughout the cold war, and long before. That definition goes something like this: A "national security" issue is any trend or event that (1) threatens the very survival of the nation; and/or (2) threatens to drastically reduce the welfare of the nation in a fashion that requires a centrally coordinated national mobilization of resources to mitigate or reverse. While this seems common sense, it is clear from this definition that not any threat or diminution of welfare constitutes a national security threat; what does constitute such a threat is a matter of perception, judgment, and degree—and in a democracy, a legitimate subject for national debate. . . . What has begun is an empirical assessment, within an existing and long-reasonable definition, of whether environmental trends, because of their threat to our survival or welfare, must be given attention according to this definition.

The question of whether, or how, to integrate environmental and security considerations can therefore be seen as at least partially empirical, requiring both intellectual structure, and data gathering and assessment, to answer. This implies a necessary role for science and technology, a theme that many of the papers in this volume implicitly support. Developing such focused knowledge through appropriate research and development activities fulfills the critical need, given limited resources, to create a filter mechanism that can provide at least a conceptual framework to support issue identification and prioritization (see Allenby in this volume). Common sense, for example, dictates the policy principle that, all things equal, investment in relevant science and technology (S&T) should primarily be directed at creating a targeted S&T base that defines and supports specific critical elements of an enhanced national security mission, rather than being scattered across all potential foreign policy issues, or even potential environmental security issues. This would appear to be a fruitful approach, at least initially: rather than immediately jumping to the level of ideological confrontation, it reduces unnecessary conflict by first asking what issues can be resolved through empirical assessment and greater scientific and technological knowledge, and what issues properly remain in the domain of ideology and politics.

The role of institutional cultures and capabilities

The clash in underlying cultures between environmentalists and members of the national security community is apparent (but can be over-emphasized). Environmental NGOs often tend to be open, nonhierarchical, and liberal in ideology. They also tend to have the global, rather than the nation-state, perspective, as well as some aversion to technology and traditional military activities.

Conversely, the national security community in most countries is conservative, insular, heavily focused on military threats and challenges, secretive, and powerful; it also tends to focus on short-term, obvious problems. In this, it simply reflects the nature of its mission. Culturally, such security communities are among the least likely to embrace environmental considerations, and, when they do so, to do so only in a mission-oriented context (see, for example, Department of Defense 1995). More specifically, some in the security community believe that environmentalists and environmental scientists, facing cuts in their research funding, are urging "environmental security" as a means to obtain funding from security research programs, which in many countries remain relatively robust.

In this inherently somewhat adversarial positioning, the security community resembles the trade community, and the initial dialogs with environmentalists have some of the same cultural tension on both sides. Yet, as in trade, these institutional differences need not prevent collaboration on issues of joint interest. Indeed, as this volume itself demonstrates, to some degree a broader integration is already beginning in countries such as the United States, although the dialog appears to be tentative, somewhat contentious, and relatively unsophisticated at this point.

Another often overlooked point bears emphasis: Even if an environmental perturbation may pose a significant threat to a nation, it may still not be a national security issue if it falls outside the competency and culture of the national security community and its component institutions.

For example, assume arguendo that anthropogenic global climate change is both real and can be shown to have such substantial negative impacts on the United States that it clearly meets usual operational definitions of national security threats. An argument can still be made that it is not a "national security" issue, at least in toto. This is because the scientific and technological research and development capabilities to understand and respond to the phenomenon would reside broadly throughout the civilian research community, not within the traditional security organizations (the Department of Defense and the CIA, for example). Moreover, the scientific process most likely to result in rapid development and deployment of relevant knowledge would be the traditional one of open dialog and peer review, not the more secretive one that tends to characterize science and technology within the security community. A National Science Foundation, not a Department of Defense, would be institutionally and culturally better positioned to support such a program. This does not mean, of course, that the security establishment would not have some specific concerns (e.g., would any critical allies or areas of the world likely be destabilized by sea level rise), only that the issue, taken as a whole, is best not viewed as a "national security" issue.

Another example is stratospheric ozone depletion resulting from anthropogenic release of chlorofluorocarbons (CFCs) and other ozone depleting substances. In the absence of mitigation (which fortunately seems to be occurring), estimates of potential impacts include upwards of a million new cancer cases annually in the United States alone, with concomitant substantial mortality and economic loses. Many other significant human health and biological (agricultural) impacts are also possible. Such occurrences would obviously constitute a significant threat to the citizens of the United States, yet virtually no one has argued that ozone depletion should be handled as a "national security" issue. Indeed, trying to do so might well have derailed the broad

research and technology deployment effort with which industries in many different sectors responded to the challenge of eliminating CFCs from their operations. At the same time, as the discussion of MILSPEC and MILSTD illustrates, there are dimensions of the ozone depletion issue that had significant operational impacts on military operations and weapon systems, and had to be addressed by, and within, the military and security communities.

Conclusion

At the conceptual level, therefore, we may initially pose a three-part test to determine whether an environmental issue or perturbation should be considered as an "environmental security" issue:

1. Are the potential impacts of the environmental perturbation in question substantial enough to be considered a national security threat?

2. Are the links between the environmental threat and the relevant impact(s) relatively certain and proximate? For example, one might argue that a collapse of the Mexican tuna fishery might encourage increased migration of unemployed tuna fishermen to the United States, which might cause political problems in California, which might generate social unrest in that state. The framework of the suggested problem is so speculative, however, and the links between the potential cause and the effect of concern are so vague and uncertain, that it is hard to argue that the state of the Mexican tuna fishery is an issue of national security for the United States.

3. Even if the environmental threat is substantial, certain and proximate, is the national security apparatus institutionally and culturally the most capable of mounting an effective response? And, if so, to all or only to selected dimensions of the threat?

It is difficult to consider these questions without recognizing the uncertainty implicit in the concept of "environmental security" at this nascent stage. Equally, however, it is apparent from the papers in this publication that the costs of failing to respond appropriately to the fundamental suite of changes now affecting both the environmental and national security areas, albeit in different ways, could be large. Accordingly, a reasoned discussion of the issues, with minimal unnecessary conflict among the different communities that must be involved, would appear to be highly desirable. It is the intent of this volume to support such an outcome.

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