



ENVIRONMENTAL CHANGE AND HUMAN SECURITY: RETHINKING THE CONTEXTS OF SUSTAINABLE DEVELOPMENT

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ABSTRACT

Environmental themes have emerged as a major theme in the post cold war discussion of human security. There has been a considerable amount of detailed empirical work on the relationship between environmental change and likely conflicts which has shown that there are many complex interconnections but that the likelihood of large scale warfare over renewable resources is small. Nonetheless environmental difficulties do render many people insecure. A parallel conceptual discussion suggests that the empirical work needs to be placed in the larger context of global economic changes and large scale urbanization of a growing humanity. This urban population increasingly draws resources from rural areas disrupting indigenous populations and feeding the transformation. Given the scale of these processes a policy of carefully considering these interconnections and reducing the total resource throughput is now necessary to improve security and develop sustainable modes of living for the future.

ENVIRONMENTAL SECURITY

Security is a complex cultural politics of defining danger. Who is endangered and by what is rarely nearly as simple as the clarion calls to arms in a crisis suggest. Many things with a vaguely environmental designation now apparently endanger modern modes of life in the North. Growing population pressures and environmental crisis in the South have long been of concern to policy makers and academics. Thus we have security agencies as well as environmental protection agencies, intelligence services and departments of the environment as well as international treaty obligations for many states relating to both. Routine discussions of ozone depletion are part of weather forecasts in many places. Smog alerts likewise have long been a daily occurrence in all too many large cities. Some discussions of these things suggest that pollution is a technical matter, or that ozone holes are a matter of risk or hazards, rather than security. But given that these matters are part

of the discourse of international politics, and that such "threats" to human and state wellbeing are routinely invoked to facilitate political discourse and policy initiatives, these themes are now linked together in a global discourse in which environment can no longer be separated from matters of what is now called "global" security.

In the post cold war years environmental concerns also became linked to security debates in another way. One of the most powerful lines of argument against the cold war modes of security thinking were the obvious dangers of technological violence to everyone who might be harmed by nuclear warfare. And the realization that all humanity would be affected by at least the indirect effects of "nuclear winter" and related food production disruptions emphasized the insecurity of all humanity in the face of the supposed provision of security by nuclear weapons. Extending this argument a little it became possible once again to understand that states, the supposed providers of security, frequently rendered their own populations insecure in many ways. Security clearly mattered to humans rather than states. Themes of poverty and misery that had been important in the early days of the United Nations, but which had been swept aside in the cold war, were dusted off and reintegrated into discussions of what has become "human security".

Environment change and resource shortages are an integral part of these discussions. They have also taken place against a backdrop of important questions within the North-South political dialogue. In 1992, the largest summit of world leaders ever took place in Rio de Janeiro, to deal with issues of environment and development. The world political community is planning to try again to reach some far reaching agreements on these themes at the forthcoming World Summit on Sustainable Development in September 2002. Although the level of attention does fluctuate, clearly the global environment has become a matter of continuing international political concern. Some alarmist accounts have suggested that the future security threats to the affluent North will come about because environmental degradation will lead to starvation and the collapse of societies in the South, leading in turn to a massive migration of "environmental refugees." The highest profile articulation of these concerns in the United States, which was widely cited at the time in Washington, was Robert Kaplan's alarming predictions of a "coming anarchy" published as the cover story in the Atlantic Monthly in February 1994.

The 1990s spawned two major interconnected discussions among Northern scholars on these themes. First was the debate about security, how it was defined and how it might be redefined now that the cold war is over. This extended to discussions of what other threats, apart from the those related to warfare, ought to be included in comprehensive definitions and policies, and also to who and what was being secured in the process. Environmental considerations have been a prominent part of this discussion. Second there was a more empirical discussion of the narrower question of whether environmental change actually caused, or could plausibly in future cause, security concerns for states in general and the North in particular. By the end of the 1990s the results of this substantial body of empirical research work were appearing in print. The Woodrow Wilson Center's "Environmental Change and Security Project" with its annual reports has emerged as the clearing house for both policy and empirical discussions.

The evolution of the debate on environment and security has sometimes been discussed in terms of three stages. First was the initial conceptual work that called for a broader understanding of security than that dominant in the cold war discourses on the subject. Second was the attempt to sketch out how the posited links between environment and insecurity could be specified and hence turned into a practical research agenda for scholarly analysis. The third stage is the search for empirical verification or refutation of the initial postulates. While studies are still in progress, by 2000 enough detailed field work had been done to give at least a broad outline of the likely relationships, and to definitively dismiss much of the early alarmism about international conflict in the form of "ecowars," if not about environment as a factor in causing large scale violence. Its now time to feed these conclusions back into the larger conceptual discussion which first set the empirical research in motion, or in the terms of stages, to move to a fourth stage of synthesis and reconceptualization. This requires the ingenuity to think in new ways taking the insights of ecology into consideration while simultaneously questioning the traditional assumptions of security and insecurity.

ENVIRONMENT AND CONFLICT RESEARCH

One of the problems in formulating matters in terms of environment and conflict is the simple fact that environment is a catchall category. Even focusing in a little more narrowly on renewable resources or on pollution doesn't produce categories that are very clearly defined. River water supplies, soil moisture levels, deforestation rates and so on are much more useful as indicators of specific factors that might influence conflict or the lack thereof. Nonetheless it is obvious that health issues connected to pollution do matter politically as elites in the former Soviet Bloc discovered in the 1980s, and as politicians in many other places discover in the aftermath of poisoning episodes or in the case of tragedies such as identifiable industrial causes of birth defects. But as the Aral sea case, where the sea is literally drying up, and where loss of livelihood is connected to huge health impacts that are obviously an indirect consequence of industrial agriculture, simple behaviouralist assumptions that people will flee or fight as a result of such assaults on their health and well being are not borne out. While many people are suffering, there has not been extensive outmigration or overt conflict as a result.

Equating such phenomena as climate change, toxic industrial pollution, soil erosion, deforestation, aquifer depletion and shortages of farmland for subsistence farmers under the simple label of environment is not very helpful. Such diverse processes relate to even more varied human societies in such numerous ways that research and policy can only rarely make useful contributions when matters are at this level of generalization. Not surprisingly researchers have divided up environmental themes into many more specific items to investigate. Researchers have focused on water, forests and other resources, in order to isolate the dynamics around particular resources in specific places. The important point that needs emphasis is that simplification is unavoidable, but it is not without consequences for how the research is conducted, and what the results of the research imply about both scholarly endeavor in these matters as well as state and corporate policies for dealing with security. On the other hand the urgency of dealing with environmental matters, which is so very obvious when the total human disruption of

the biosphere is considered, is frequently lost in dividing up issues for detailed study and policy consideration. It's not surprising then that there is no agreed definition of environmental insecurity.

With those caveats in mind the research into environment and conflict can be briefly summarized as follows by suggesting six interconnected approaches to the general topic. The Toronto school, as the research groups collectively led by Thomas Homer-Dixon came to be called, emphasized the construction of scarcity by complex social and environmental processes which lead to political instability in some circumstances. Simple scarcity as a result of environmental change and population growth is only a part of a much more complex situation where social factors intersect with natural phenomena. Specifically they note situations where elites operate to extend control over productive resources, in a process of "resource capture" and displace peasants and subsistence farmers in "ecological marginalization". This may lead to conflict as people resist displacement, and also lead to environmental damage as they are forced to eke out a living by clearing marginal land or moving to the cities. In some cases this may be connected to state failure and political violence, not least where insurgencies feed on grievances related to injustice and inequity in developing states.

The ability of states to respond to such processes are obviously key to understanding where social breakdown and violence occur. These factors feed into concerns about the collapse of states and the phenomenon of "failed states". In Thomas Homer-Dixon's analyses declining state capacity is related in at least four ways to increasing environmental scarcity. Increased financial demands on the state for infrastructure are one factor. Second is the problem of dealing with elite demands for financial assistance or to change the law to their direct benefit, because third, predatory behaviour by elites may lead to defensive reactions by weaker groups. Fourth, a general reduction in economic activity reduces state revenue and fiscal flexibility aggravating all these difficulties. None of this research suggested that war between states was likely as a direct consequence of environmental scarcity although the indirect consequences of social friction as a consequence of large scale migration, in part across national boundaries has in some cases cause international tensions. Neither are wars over water very likely because the specific circumstances for such wars are not common.

Second, the major European research project in the 1990s, the Environment and Conflicts (ENCOP) project led by Gunther Baechler linked concerns with environment more directly into concerns with development and social change in the South (why use global South – why not just South?). Using many different case studies the ENCOP project concluded that conflict was related to environmental change in many ways, but that conflict was likely to be related to the disruptions of modernity. More so than the Toronto school Baechler suggested that violence was likely to occur in more remote areas, mountain locations and grasslands where environmental stresses occur in places that already have political tensions and unjust access to resources. Here the concept of environmental discrimination is used to emphasize this politics and to connect directly to what Baechler calls 'maldevelopment'. Overall this is linked into the ongoing processes of "the great transformation" from subsistence to market modes of economy. In many

cases violence is about resisting expropriation of resources and the environmental damage done by development projects; the Bougainville case where a long standing and violent insurgency is directly linked to opposition to a giant mine is exemplary.

Third, in the late 1990s NATO researchers drew on the work of both the Toronto group and the ENCOP findings and added some additional insights from contemporary German work on climate change and related matters to investigate the relationships between environment and security. This is distinctive enough from the Toronto and ENCOP analyses to be considered a separate approach to the problem. They suggested that environmental matters could be understood in a complex series of "utilization", "development" and "sink" syndromes some of which might cause conflict. The comprehensiveness of these syndromes clearly suggested that the notion of environment as a causal factor in conflict was simply too broad to be a useful analytical category, but also suggested that it is an important factor in contemporary social change and that it mattered in many ways. NATO has also sponsored some high profile workshops trying to encourage dialogues with Eastern Europe and the Post-Soviet states on these themes, the proceedings of which suggest that numerous ways of thinking about these issues are possible.

A fourth school of thinking, linked to the Peace Research Institute in Oslo has turned the environmental scarcity leading to conflict argument on its head suggesting that the connection between resources and violence in the "South" is a matter of fights over control of resources that are in abundance rather than over ones that are scarce. Linked to discussion in economics concerning the difficulties of development in resource rich areas the suggestion here is that many wars are about control over revenue streams from resources. Whether it is timber in Burma, diamonds in Sierra Leone or oil fields in many places, violence is about struggles to control resources that have substantial international market value. In some cases violence also links directly to the disruptions of native peoples in these areas in a similar manner to a discussion in the ENCOP framework of core-periphery conflicts. This line of argument has recently been reinforced by a number of studies that trace the violence surrounding resources directly to the larger patterns of global political economy, and which are sometimes sharply critical of the neo-Malthusian tendencies in the thinking of the Toronto school in particular.

Fifth, in a recent volume Michael Klare has linked these concerns back into older arguments about wars over resources and in particular into discussions of conflict over global oil supplies. This is the classic stuff of geopolitics and reproduces neo-Malthusian narratives of forthcoming stresses and strains in the international system due to decreasing supplies of petroleum. Klare suggests that similar dynamics relate to water shortages and revisits the classic concerns about Egypt, Sudan and Ethiopia fighting over the Nile waters that are essential to Egypt's agriculture and industry. Klare's analysis once again reiterates the findings of most of the other literature on environment and security that suggests the violence and conflict related to environment and resource matters is likely to occur in the South rather than in the affluent North where many of the world's resources are actually consumed. What he does not do, as most of his predecessors in the field also failed to do, is question the apparent inevitability of continuing with resource

consumption patterns that lead to these difficulties, rather than considering the possibilities for technological innovation and changed patterns of consumption. Neither does he seriously consider the possible climate disruptions in the medium term future if unrestricted carbon fuel consumption continues.

It is here that perhaps a sixth approach to these matters is relevant, an approach summarized in the term Global Environmental Change and Human Security with the unfortunate acronym GECHS. Vulnerabilities of populations to changing environments, and specifically concerns with climate change disruptions, is the driving force in these studies where the welfare and survival of people rather than states is the key focus of research. This overlaps in part with the ENCOP concerns with human development and its focus on the juxtaposition of violence with the parts of the world that have the worst scores on the UN human development indices. It emphasizes the importance of understanding the complexity of both environmental and social processes in specific contexts and the obvious point that the poor in rural areas are frequently the most vulnerable to both environmental change and the disruptions caused by political violence. Here however the connections with traditional themes of development are prominent. The consequence of such thinking is the obvious absence of neat or simple scholarly generalizations and the recognition of the complexity of the processes that relate environment to human security. Human insecurity is very context dependent and research and policy alike have to recognize this complexity. States are not necessarily useful categories for thinking about these matters.

The point here is not that some, or all, the empirical research is flawed, but rather that the diversity of perspectives show how theoretical assumptions constrain likely policy advice by how the initial questions are specified. Much more can be said about both the empirical research and the larger conceptual and policy debate if the assumptions are investigated with an eye to what gets left out by the modes of reasoning in the discourse. Asking questions about the implications of the research and its methods based on different ways of thinking, and especially asking questions from places outside the mainstream of scholarly and policy discussions, also challenges the implications of the empirical research findings by offering different interpretations of the conclusions. In short the scholarly research is unavoidably caught in the larger political assumptions that structure the design and implementation of inquiry. Security for whom, where and provided by what social arrangements is inextricably entangled in this discussion. Policy makers need to think carefully about both what is secured and the context in which discussions of security and specifically sustainable development take place.

CONTEXTS OF HUMAN SECURITY

The highest profile articulation of the theme of "human security" comes from the United Nations Development Program (UNDP) in its 1994 Human Development report. These themes were subsequently adopted by the Commission on Global Governance the following year in their deliberations on what needs to be done on the global scale in the face of numerous challenges humanity faces. Environmental factors are one of the themes listed in the UNDP threats to human security. In the discussion of specifically global

threats to human security, that is those factors caused by the actions of millions of people rather than the deliberate aggression of specific states, environment is discussed in terms of transboundary air pollution, CFCs and ozone depletion, greenhouse gases and climate changes, biological diversity reduction and coastal marine pollution and global fish catch reductions. The argument about human security suggests clearly that it is best engineered by preventive action anticipating future problems.

But stopping to think carefully about assumptions of a universal humanity facing common challenges in a world of huge inequities and political violence should raise some cautions about such formulations as well as about discussions of sustainable development. In short there is an important geography to these matters that needs attention. The greatest enthusiasm for global approaches to security and for rethinking the concept come from the states in North America and Europe whose security situations can be understood to be ones least likely to face direct military threats. This point is crucial and operates to make the critical scholar very cautious in making too many generalizations on the one hand, but on the other it raises the crucial questions of the geography of these discursive innovations. Is it politically significant that these discussions are happening where and when they are? If it is a matter of maintaining the overall pattern of resource consumption within limits that will not disrupt the global order of Northern prosperity then it seems clear that many aspects of the human security of Southern populations will be compromised ever further than has so far been the case. This is so both because of the large consumption of resources in the North and the ecological and social disruptions caused in many rural areas of the South by the extraction of these resources. This is not the sole cause of Southern insecurity, but it is an important part.

The case of greenhouse gases and the possibilities of agreements on such matters as the Kyoto protocol link all these facets of the security situation together. The difficulties are related to both the history and geography of such matters. Clearly the rich industrialized part of the world has become so by using resources and fossil fuels in particular to power its development. States arriving late on the development scene are not surprisingly unwilling to forgo opportunities for economic growth to deal with poverty and underdevelopment. But American negotiating positions have frequently been hampered by the argument from within the United States that all states must agree on international arrangements prior to American support for an international regime for greenhouse gas limitations. But given the very different economic situations of states, agreements on how to establish a baseline for common standards remains very difficult. Opportunities for technological innovation are frequently foreclosed by this traditional environmental focus on emissions limitation and regulation.

The geographic dimension relates to the long history of European conquest and the growth of the global economy directly. This is so because, especially in the case of petroleum, but frequently also in the case of other resources, supplies are extracted there for export and subsequent consumption in the North. The attribution of responsibility for greenhouse gas emissions is thus complicated. Is gas flared off a well in Nigeria to be counted against Nigeria when the oil from the well is used to fuel cars in Europe? Is a

forest in Russia that is absorbing carbon dioxide count as a national carbon "sink" or is it a global sink? In addition, once "emissions" and sinks are established as an item that can be traded, bought and sold the geography of this becomes even more complicated. Rich countries can buy "sinks" in the poor countries to offset their carbon dioxide production, but given their much greater wealth, this gives them the opportunity to forgo reductions of greenhouse emissions thus avoiding the crucial issue of reducing total carbon dioxide levels in the atmosphere to try to ensure long term climatic stability.

Linked to the larger literature on environmental security, and the concerns about elite appropriation of resources in the South, it is not hard to construct scenarios where international agreements concerning sinks are carried out by governments unconcerned about traditional access to forests or the use of forests for survival by the poor and marginal, precisely those who are most insecure. From Bougainville to Burma marginal peoples suffer from dispossession, violence and the expropriation of resources to feed international markets. Elsewhere many others are forced off subsistence plots of land to make way for expanding commercial agriculture or the infrastructure of highways and especially dams. Arguments about intellectual property rights, control over ancestral territories, traditional seed varieties and medicinal plants are all part of this process of commercial expansion that is at the heart of most development projects.

The people displaced in these processes become migrants often finding their way to the burgeoning cities of Southern states where they join many others trying their luck in the city and in turn become part of the urban economy fed in some way by the expanding commercial agricultural system. In short there is a large scale geographic dimension to what Karl Polanyi called the great transformation to commercial society. In the twentieth century this geography was most powerfully evident in the move from countryside to city; it was undoubtedly the century of urbanization. But this crucial transformation, with all its environmental and social consequences frequently gets lost in many economic specifications of state "development".

These then are the global interconnections that the environmental security research struggles to incorporate into both academic analysis and policy advice. Putting all this into one simple overview is a conceptually risky business but the following sketch suggests how all these pieces can be put together in a fairly simple scheme that allows the dilemmas of human security to be clarified and the appropriate contexts factored into policy advice. First, is the simple recognition that the rich and powerful urban elites have a disproportionate impact on the natural systems of the planet and make many of the policy decisions that matter in terms of resource use and pollution. Second, the global population is growing, but more important it is becoming urbanized, and as a result increasingly dependent on resources and food supplies from sometimes remote rural areas. Third, this process is happening in the context of rapid integrations and dislocations of the global economy, an economy that has become highly dependant on petroleum products to keep it all moving. Fourth, nation states, even where they function effectively are frequently not useful political entities for decision making about phenomena that flow across their borders in a highly uneven global economy.

Putting the elements into a single summary concept can be done by drawing from the work of some Indian scholars and extrapolating to the global scale. In considering the state of Indian society in the 1990s Madhav Gadgil and Ramachandra Guha used a threefold classification of people in terms of their ecological situation. "Ecosystem people" are locally based populations who use their own labour to survive by cultivating and harvesting food and other resources from specific localities. Many of these people have been displaced from their homes in recent decades becoming "ecological refugees", who often gravitate to the rapidly expanding urban centres across the planet. There they meet and become the third category, the "omnivores" or those who literally eat everything, often foods and other resources brought from great distances to the metropolises. This framework suggests that the ecosystem people are often in danger of being turned into ecological refugees because of the disruptions caused by market systems that demand ever larger supplies from rural areas be transferred to the cities for the use of the omnivores. The classification is unconventional but it is easy to argue that it provides a useful framework for examining matters at the global scale. The crucial points are that the omnivores, that includes most Canadians, are able to draw resources from great distances whereas the ecosystem people are tied to localities for subsistence. When serious environmental disruptions occur, whether droughts, storms or floods, ecosystem people are often turned into impoverished ecological refugees; the omnivores have the economic flexibility to simply buy their foods and resources from some other part of the globe.

The human consequences depending on which category one falls into are obviously very different. One's perception of the problem is also likely to be very different. But it is crucial that policy makers deciding on what to do about sustainable development bear in mind their position in these matters is nearly always as omnivores. This suggests that urban definitions of matters are less than helpful, especially when the environment is constructed in terms of urban aesthetic criteria as something that needs to be "protected" from the rural populations that live on or near regions considered valuable as either national parks or recreation areas such as golf courses or ski resorts. Such understandings frequently fail to understand the complexity of rural social arrangements or the ecological contexts of local residents. Such difficulties are compounded by urban assumptions that peasants are backward and incapable of using resources wisely in a rational, because logical in a short term commercial, way.

The problem of the environmental dimensions of human security at the largest scale, sometimes partly finessed by the concept of sustainable development, is with the notion of environment itself. Assuming that environment is something out there, separate from humanity and economic systems lies at the heart of the policy difficulties facing discussions of sustainable development and security thinking. Environment is treated as an independent variable, something beyond human control that stresses human societies in ways that need a policy response. But, as the burgeoning literature in environmental history has now made abundantly clear this assumption is not adequate for either scholarship or policy formulation. Ecology is all about the flows of energy and food through complex systems made up of living things as air, water and soil. Human activity is now a major part of these flows; we are literally remaking the biosphere indirectly in

terms of changing the air that we breathe, and directly by the disruptions of forests and grasslands due to mining, deforestation and spreading agriculture. This is done on a scale that requires us to understand humanity as a major force remaking the planetary ecosystem; environment is no longer the backdrop to human activities, it is increasingly the human made context for our lives. Policy to deal with sustainability and security has to start from these insights, but will require rethinking some basic assumptions about what counts as progress and how to "do" development.

POLICY IMPLICATIONS: POLITICAL INGENUITY

The most important new research on environment and security has thus brought into focus the need for political ingenuity and adaptability. In his book *The Ingenuity Gap*, as well as in his other writings on environment and conflict Thomas Homer-Dixon tries to escape the intellectual limitations of thinking about these matters within the conventional international relations discussions. In doing so he poses the problem in terms of the repeated collapse of discussions into debates between optimists and pessimists, cornucopians and neo-Malthusians. He recognizes that this is a pointless argument both when it comes to thinking about environment and when providing policy advice. Instead he focuses on the supply of ingenuity and the need to think about how to facilitate adaptability rather than falling back on traditional notions of states providing security. In doing both these things he moves the debate ahead in a very useful way. Likewise Gunther Baechler insists that the questions of vulnerability and security must be considered in conjunction and that innovation and that conflict resolution requires both detailed political work and the provision of options to marginalized populations. In contrast Michael Klare's more traditional analysis of resource geopolitics points to the dangers of war over resources and in particular over oil, but has few political ideas about how to get out of this potential mess, and even fewer suggestions about reducing the dependence on oil and other resources.

Political ingenuity is clearly at a premium in thinking about adaptation for marginal populations. But it will also need to be applied in large measure if attempts to change the unsustainable consumption patterns of the world's elites are to be tackled and both direct disruptions of rural ecologies, due to resource extraction and indirect disturbances due to pollution and atmospheric change, effectively constrained by wise policy choices. Above all thinking about the kind of technologies and structures that are needed to minimize resource use in the medium and long-term future are now much more important than further tinkering with "end of the pipe" regulations. Here the crucial point about ecology is that it focuses on humanity within a biosphere, interconnected across state boundaries with actions in one place linked to consequences elsewhere.

The scheme of ecosystem people, environmental refugees and omnivores discussed in this paper offers an alternative way of thinking through the geography of insecurity that is supposedly the whole rationale for policies of sustainable development. It suggests that the ecological connections between widely distant places are a necessary focus of attention in thinking about environmental insecurity because it allows a focus on the forces setting people in motion and deals with the distant consequences of local actions.

It puts the questions of the ethics of foreign policy and the human impacts of trading practices squarely in the discussion of human security. More specifically the formulation of these matters in the terms used by the Wuppertal Institute in Germany is especially suggestive. Focusing on the distant consequences of Northern consumption, the mining wastes, deforestation and displaced peasant farmers they point to the consequences of this "environmental rucksack" that is "carried" by Northern consumers as the key to sustainable development in both places. Reducing the total material throughput in the economy is the key to reducing total ecological damage while simultaneously supporting economically benign modes of trade to improve the prospects of the poorest parts of the population in the South. Poverty reduction is linked to the mitigation of the worst environmental destruction as a result of unrestricted exports.

Solar and wind energy is perhaps emblematic of the suggestions for innovative thinking that emphasizes the connections between ecological flows and human security. Small scale use of the technology has spread over the last few decades; large scale use for electricity generation is in its infancy. The crucial point in the use of these technologies is that once produced and installed they minimize the flows of material through ecosystems. Wind and sun provide the energy. No fuels have to be transported. No pollution changes the atmosphere. There however remain major marketing and policy issues to be resolved before their widespread use becomes the norm. Combined with intelligent building design which minimizes energy requirements the potential for practical reductions in greenhouse gas emissions are huge.

The technical difficulties seem trivial in comparison to the political and administrative hurdles in the face of ecological design, as the great difficulties that face many innovative urban architects in many countries attest. Local governments and building codes are one of the major areas where policy innovation is needed if sustainable communities are to mean communities that do not put large environmental impacts on distant places. Innovative design and policies to minimize the ecological impact of new buildings and transportation systems are at the heart of a sustainable development policy that simultaneously tries to enhance human security.

Security during the cold war suggested that we were threatened from some external source of danger. Assuming that environmental threats are somehow external to our lives is a fundamental mistake once ecology and the scale of contemporary human processes in the biosphere is taken seriously. Recognizing modern modes of living as part of the biosphere suggests that we might best act to ensure security for many people by rethinking resource consumption and accelerating the processes of "dematerializing" and "decarbonizing" consumption economies. Efficient uses of energy are much easier to implement and environmentally benign in comparison to proposals such as drilling for oil in the Arctic wildlife refuge in Alaska. This involves increasing the amount of service, leisure and cultural pursuits that do not involve large uses of materials and fuels and reducing the amount of transportation using carbon fuels. In the process our economies will become more resilient to international disruptions and less damaging to future generations.

As a final note it is worth emphasizing that in the aftermath of the events of September 11th and the subsequent military actions close to the Persian Gulf it is urgently necessary to rethink energy policy for all petroleum dependant states. This is not a new argument, but it is once again important. The 1970s oil crisis offered the possibility of rethinking energy dependence on oil, especially petroleum from the Middle East, but the opportunity was missed and the global economy remains dependant on large supplies from this politically troubled region. Given the political instabilities there, a policy of relying on unrestricted petroleum use to fuel development of any sort is very unwise, regardless of the potential further climate disruptions that such policies inevitably imply.

But the overriding point here is that understanding environmental regulation as a matter of putting scrubbers on pipes or cleaning up pollution is now a completely inadequate mode of thinking for environmental security. Biodiversity protection is clearly important, although more than merely parks are needed for this task, but the insights of ecology clearly suggest that designing buildings, industrial systems and transport technologies that don't divert large material flows through ecosystems in the first place is what is absolutely crucial. This is the message that governments need to take to Johannesburg in 2002: technological innovation to meet human needs while increasing efficiency and reducing resource throughput within a biosphere that we are already changing is the appropriate way of thinking about both environmental and human security.