SECURITY AND ECOLOGY IN THE AGE OF GLOBALIZATION

By Simon Dalby

Abstract

The environment has 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. This article argues that, while the interconnections between the environment and conflict are many and complex, 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 of environmental security research 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. All these dynamics are also complicated by the rapidly increasing scale of human activities, which has induced a level of material- and energy-flow through the global economy that is a new and substantial ecological factor in the biosphere. Given the scale of these processes, societies should carefully consider these interconnections and reduce their total resource throughput to improve environmental security and develop sustainable modes of living for the future.

Many situations with a vaguely environmental designation now apparently endanger modern modes of life in the North (as the affluent industrialized parts of the world are now often called). Growing population pressures and environmental crises in the South—the poor and underdeveloped parts of the planet—have long concerned policymakers and academics. Many states have developed security and intelligence agencies, environmental ministries, and international treaty obligations that address population and environmental dynamics. Weather forecasts for many areas now include routine updates of ozone-depletion levels and the variable daily dangers of exposure to ultraviolet radiation. Some discussions address pollution as a technical matter and such phenomena as ozone holes in terms of risks or hazards rather than as security concerns. But since these matters are now also part of international political discourse and policy initiatives, environment cannot be separated from matters of what is now called "global" security.

Environmental change and resource shortages are integral to these discussions, which have also taken place against a backdrop of important questions within the North-South political dialogue. In 1992, the largest summit of world leaders took place in Rio de Janeiro to deal with issues of environment and development. Although the level of high political attention to these issues does fluctuate, the global environment has clearly become a matter of continuing international political concern. Some alarmist accounts have even suggested that 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."

In 1994, Robert Kaplan garnered much attention in Washington and elsewhere with his alarming predictions of a "coming anarchy" premised on the assumption of resource shortages (Kaplan, 1994; see also Kaplan, 2000). Kaplan suggested that these resource shortages would occur in part because global population would grow faster than the ability of agriculture to support it (a traditional Malthusian argument). But Kaplan's argument also fits into larger recent arguments about how resource shortages in general cause conflict—the so-called "neo-Malthusian" arguments that underlie a substantial part

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of environmental-security literature.

The 1990s spawned two major interconnected discussions among Northern scholars on these themes. The first discussion centered on security—its definition and how it might be redefined after the Cold War. This debate included dialogue on which other threats (apart from those related to warfare) ought to be included in comprehensive definitions and policies; it also examined who and what was being secured in the process (Buzan, Wæver, & deWilde, 1998). The redefinition of security has prominently featured environmental considerations (Deudney & Matthew, 1999; Lowi & Shaw, 2000; Barnett, 2001). Second, a more empirical discussion looked at the narrower question of whether environmental change actually threatened (or could plausibly threaten) security for states in general and the North in particular (Diehl & Gleditsch, 2001). By the end of the 1990s, as the lengthy bibliographies in previous editions of *ECSP Report* attest, the results of this substantial body of empirical research work were appearing in print.

Some researchers argue that the environment-security debate has evolved in three stages (Rønnfeldt, 1997). First came the initial conceptual work that called for a broader understanding of security than that which dominated Cold War discourses. Second, theorists attempted to sketch out how to specify links between environment and insecurity in order to establish a practical research agenda for scholarly analysis. The third stage has featured a search for empirical verification or refutation of the initial postulates. While studies are still in progress, enough detailed field work had been done by 2000 to give at least a broad outline of the likely relationships between environment and security and to dismiss definitively much of the early alarmism about international conflict in the form of "ecowars."

It is now time to feed these conclusions back into the larger conceptual discussion that first set the field's empirical research in motion. With the wisdom of a decade's research to draw on, environmental security discussions can now move to a fourth stage of synthesis and reconceptualization (Dalby, 2002). In addition to this fourth stage, scholars and policymakers now have to consider current research on biospheric systems and what is now called global change science in their effort to think clearly about both environment and security. Considering matters in these terms adds some crucial dimensions that the 1990s alarmist accounts of neo-Malthusian scarcities left out. Policymakers need to carefully consider both the context of security discussions as well as what their policymaking aims to secure; neither is as obvious as is frequently assumed. In particular, taking ecology seriously requires questioning more than a few conventional assumptions.

Environment and Conflict

With these caveats in mind, the development of environmental conflict research through the 1990s can be briefly summarized as six interconnected approaches. First, the Toronto school—as the research groups collectively lead by the University of Toronto's Thomas Homer-Dixon came to be called—emphasizes the construction of scarcity by complex social and environmental processes that in some circumstances also lead to political instability (Homer-Dixon & Blitt, 1998; Homer-Dixon, 1999). The Toronto school argues that simple scarcity as a result of environmental change and population growth is only part of a much more complex situation in which social factors intersect with natural phenomena. These researchers emphasize situations in which elites extend their control over productive resources (in a process called "resource capture") and displace peasants and subsistence farmers ("ecological marginalization"). Resource capture and ecological marginalization, argues the Toronto school, may lead to conflict (as people resist displacement) and environmental damage (as these displaced people are forced to migrate to cities or to eke out their livings by clearing marginal land). In some cases, this process may be connected to state failure and political violence, especially in those developing states in which insurgencies feed on grievances related to injustice and inequity.

Identifying where social breakdown and violence occur depends on understanding states' ability to respond to such processes. In Homer-Dixon's analyses, declining state capacity relates in at least four ways to increasing environmental scarcity. First, environmental scarcity increases financial demands on the state for infrastructure. Second, the state faces demands by elites for financial assistance or legal changes for their direct benefit. Third, this predatory elite behavior may lead to defensive reactions by weaker groups—whether in the form of opposition to legal changes that alter

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property ownership arrangements or as direct protests against infrastructure "developments" that dispossess the poor. Finally, the general reduction in economic activity caused by the combination of these dynamics can reduce state revenue and fiscal flexibility, further aggravating difficulties. None of the Toronto research suggests that interstate war is likely as a direct consequence of environmental scarcity, although the indirect consequences of social friction caused by large-scale migration—in part across national boundaries—has in some cases caused international tensions. Frequent alarmist newspaper headlines notwithstanding, water wars are also unlikely; the circumstances that would motivate such wars are rare (Lonergan, 2001).

From Bougainville to Burma, marginal peoples suffer from dispossession, violence, and the expropriation of resources to feed international markets.

The second approach, embodied in the Environment and Conflicts Project (ENCOP) led by Günther Baechler, links environmental concerns more directly to development and social change in the South (Baechler, 1998). ENCOP examined many different case studies and concluded that, while conflict and environmental change are related in many ways, conflict is more likely to be linked directly to the disruptions of modernity. In summarizing and clarifying the overall ENCOP model, Baechler (1999) stresses that violence was likely to occur in more remote areas, mountain locations, and grasslands—places where environmental stresses coincide with political tensions and unjust access to resources. For ENCOP, the concept of "environmental discrimination" (which emphasizes situations in which politics creates inequitable access to natural resources) connects directly to what Baechler calls a condition of "maldevelopment."

ENCOP links maldevelopment to a society's transition from subsistence to market economy. In many cases, ENCOP argues, violence occurs as people resist expropriation of resources and the environmental damage caused by development projects. For example, in Bougainville, Papau New Guinea, a long standing and violent insurgency has been directly linked to opposition to a giant mine (Böge, 1999). Colin Kahl's (1998) research tackles these matters in a slightly different but loosely parallel way. Drawing on a detailed analysis of Kenya, Kahl shows how threatened urban elites may aggravate traditional conflicts over land and other resources, especially when these resources are in short supply. Kahl's reading reinforces the ENCOP point that at least a substantial part of rural violence may have its roots in urban politics. A foreign-aid policy of building state capacity in such circumstances may only worsen these situations.

In the late 1990s, NATO researchers took on the relationships between environment and security by drawing on the findings of both the Toronto group and ENCOP and adding insights from contemporary German work on climate change and related matters (Carius & Lietzmann, 1999, Lietzmann & Vest, 1999). In this third environmental security approach, these NATO researchers suggest that environmental matters can be understood as a complex series of syndromes, some of which might cause conflict. The comprehensiveness of these syndromes clearly suggests that the notion of environment as a causal factor in conflict is simply too broad to serve as a useful analytical category. But the NATO work also suggests that the environment is an important factor in contemporary social change. NATO has also sponsored high-profile workshops to encourage dialogues on these themes with Eastern Europe and the post-Soviet states; the proceedings suggest numerous possible ways of thinking about these issues (Lonergan, 1999; Petzold-Bradley et al., 2001).

A fourth school of thinking, linked to the International Peace Research Institute, Oslo (PRIO), has turned the environmental scarcity-conflict argument on its head by suggesting that violence over resources in the South occurs in the struggle to control *abundant* resources (de Soysa, 2000). This research incorporates some economists' discussions about development difficulties in resource-rich areas; it suggests that many wars concern control over revenue streams from resources that have substantial market value. (Examples include timber in Burma, diamonds in Sierra Leone, or oil fields in the Middle East.) The PRIO research directly links violence in some cases to the core-periphery disruptions of native peoples noted by ENCOP. A number of recent studies have reinforced the PRIO argument by tracing the violence surrounding resources directly to larger patterns of

global political economy. These studies sometimes sharply criticize the "neo-Malthusian" tendencies of the Toronto school, which focus on shortages of resources that are supposedly both common and linked to conflict (Peluso & Watts, 2001).

Conflict over abundant resources frequently causes environmental disputes, but environmental change is not a simple cause of conflict in these cases. However, resources have become part of the "new wars"[1] in the South (Kaldor, 1999). The control of resource exports is now part of a complicated political economy of violence that links identity struggles to (a) international business connections that supply weapons to the protagonists, and (b) the absence of effective state structures. These patterns are frequently complex and not simply matters of greed-driven conflict. Both the international economy as well as political connections to diasporic communities (such as the Tamils in Toronto or the Irish in New York) are factors in these patterns of violence and the role of international organizations in quelling it (Le Billon, 2001).

Michael Klare (2001) has subsequently linked these concerns over resource control and conflict back to older arguments about "resource wars," in particular to discussions of conflict over global oil supplies. Klare's argument (the fifth approach) reprises classic geopolitics and reproduces neo-Malthusian narratives of forthcoming stresses and strains in the international system due to decreasing supplies of petroleum. He also suggests that water shortages might create similar dynamics, and he revisits classic concerns about Egypt, Sudan, and Ethiopia fighting over the Nile River waters upon which Egypt's agriculture and industry depend. Klare's analysis reiterates the findings of most environment and security literature, suggesting a greater likelihood of violence and conflict related to environment and resources in the South rather than in the affluent North. But as with most of his predecessors, he fails to question the Northern resource-consumption patterns that lead to these difficulties. Klare also fails to seriously consider the possible climate disruptions in the medium-term future if unrestricted carbon-fuel consumption continues.

In this vein, a sixth approach is relevant—an approach summarized in the term Global Environmental Change and Human Security (GECHS).[2] These studies examine vulnerabilities of populations to changing environments—specifically, disruptions such as those caused by climate change. GECHS-style research also addresses the welfare and survival of people rather than states (Matthew, 2001). This focus overlaps in part with ENCOP's research into why the incidence of violence correlates highly with those geographic regions that earn the lowest scores on the UN human-development indices. GECHS research emphasizes how important it is to understand the complexity of both environmental and social processes in specific contexts. It also stresses the obvious point that the rural poor frequently suffer the most vulnerability to both environmental change and the disruptions caused by political violence (Renner, 1996). Human insecurity is very context-dependent, and research and policy alike have to recognize this complexity.

Contexts of Human Security

Empirical research into environment and conflict has generated considerable insight into the practices of violence; it has also made very clear that research results are in part determined by how questions are formulated. But these advances must then be connected back into the larger debate about security that has been in play in the North since the end of the Cold War—a debate that has explored environmental themes as part of an emphasis on the security of people, not states. The highest profile articulation of "human security" comes from the United Nations Development Program (UNDP) in its *Human Development Report 1994* (UNDP, 1994). These discussions have dusted off and reintegrated themes of poverty and misery that had been important in the early days of the United Nations but which had been swept aside during the Cold War.

The *Human Development Report 1994* includes environmental factors as one of its human security themes. In its discussion of global threats to human security (dangers caused by the actions of millions of people rather than the deliberate aggression of specific states), the *Report*'s use of "environment" generally refers to threats such as transboundary air pollution, CFCs and ozone depletion, greenhouse gases and climate changes, biological-diversity reduction, coastal marine pollution, and global fish-catch reductions. The *Report* clearly suggests that environmental threats to human security are best dealt with by preventive and anticipatory action rather than crisis intervention.

But the *Report*'s assumption of a universal humanity that faces common challenges in a world of huge inequities and political violence has limitations as well as consequences for discussions of sustainable development. The greatest enthusiasm for global

approaches to security comes from North America and European states, which are least likely to face direct military confrontation (Stares, 1998). Is the locus of both this enthusiasm and the environmental security debates noted above politically insignificant (Barnett, 2000)? Current consumption patterns threaten the South because of (a) the North's extensive consumption of resources, and (b) the ecological and social disruptions caused in many rural areas of the South by that resource extraction (Redclift, 1996). While this pattern is not the sole cause of Southern insecurity, it plays an important role overlooked in the neo-Malthusian specifications of conflict caused by resource shortages. If the North merely seeks to maintain its overall pattern of resource consumption within limits that will not disrupt Northern prosperity, merely reformulating the concept of human security will continue to compromise the real security of Southern populations.

The case of greenhouse gases and multilateral environmental agreements (such as the Kyoto Protocol) makes clear the link between consumption and security (Adams, 2000). Intensive resource use (particularly of fossil fuels) has powered the development of the industrialized world. Not surprisingly, states that have begun to develop more recently balk at forgoing such heavy resource use. U.S. negotiating positions have also frequently been hampered by the common U.S. stand that all states must agree on international arrangements before the

Logging Camp in Kalimatan, Indonesia

"If the North merely seeks to maintain its overall pattern of resource consumption within limits that will not disrupt Northern prosperity, merely reformulating the concept of human security will continue to compromise the real security of Southern populations."

Photo: Chris Stowers/Panos Pictures

United States can support a regime for greenhouse gas limitations. Widely varying national economic situations, however, have made establishing common standards for such an agreement difficult. Meanwhile, the overall focus on emissions limits and regulations continues to foreclose opportunities for technological innovation by focusing once again on end-of-the-pipe thinking rather than on ways to rebuild economies that reduce resource throughputs.

The geographic messiness of the global economy—which is marked by resource extraction from the South and export to the North (Grove, 1997)—complicates formulating a treaty on greenhouse gas emissions. Does gas flared off a well in Nigeria count against Nigeria when Europe uses the oil to fuel its cars? Does a Russian forest that absorbs carbon dioxide count as a national or a global carbon "sink"? In addition, the establishment of "emissions" and "sinks" as tradable items further complicates this geography. Rich countries can buy sinks in poor countries to offset their carbon dioxide production—allowing the wealthy to forgo reductions of greenhouse emissions. While such mechanisms may be of use for some economic policies, they might also allow policymakers to avoid the crucial issue of reducing total carbon dioxide levels in the atmosphere.

One can also easily envision scenarios in which governments implement international agreements concerning sinks with disregard for traditional access to forests or the use of forests for survival by the poor and marginal—precisely those who are most insecure. From Bougainville (Böge, 1999) to Burma (Talbott & Brown, 1998), marginal peoples suffer from dispossession, violence, and the expropriation of resources to feed international markets. Elsewhere, the poor are forced off subsistence plots to make way for expanding commercial agriculture or large infrastructure projects such as highways and dams. Arguments about intellectual property rights, control over ancestral territories, traditional seed varieties, and medicinal plants are all part of the commercial expansion that lies at the heart of most development projects (Miller, 2001). In addition, as noted above, displaced people become migrants, often landing in burgeoning Southern cities where they, too, become part of the urban economy that the expanding commercial agriculture sector must feed. In the process, these growing numbers of urban consumers make ever-larger demands on the surrounding countryside to supply the food and other commodities they use.

In short, there is a large-scale geographic dimension to what Karl Polanyi (1957) called "the great transformation" to commercial society. The 20th century was undoubtedly the century of urbanization, powered by rural-urban migration; and this crucial transformation (with all its environmental and social consequences) frequently gets lost, both in many economic specifications of state "development" and in discussions of scarcity-induced violence.

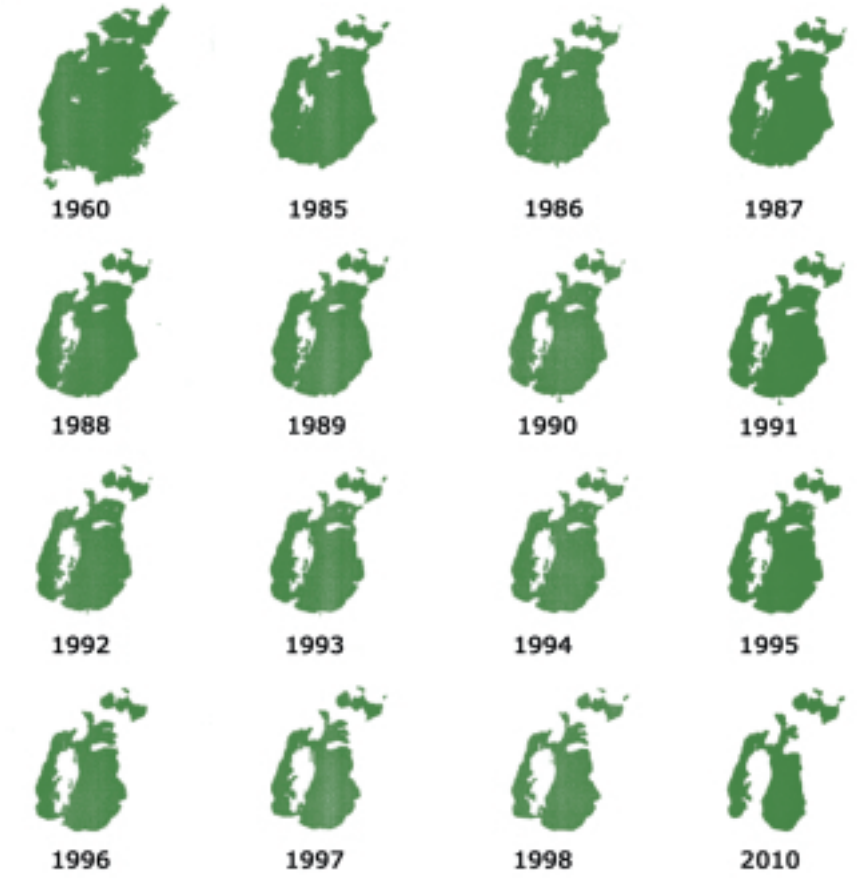
"Environment" and "Ecology"

But the category of "environment" itself is not always useful in these discussions. While environment is at once an unavoidable general category of great importance, it also needs to be broken down into sub-categories if useful, practical research is to be carried out. Indeed, "environment" (traditionally understood as the backdrop for human activity) is no longer very helpful in formulating policy options within the biosphere. On the other hand, the global economy's various environmental disruptions are as a whole the most worrisome dynamic for human security in many places. Such nuances are of fundamental importance for analysis and policymaking.

For the question of how environment and conflict interact, even a narrower focus on renewable resources or pollution does not produce clearly defined analytical categories. River-water supplies, soil-moisture levels, or deforestation rates are much more useful indicators of specific factors that might influence conflict or its absence. Nonetheless, health issues connected to pollution clearly do matter politically, as elites in the former Soviet bloc and elsewhere have discovered from the 1980s on. But the case of the Aral Sea—whose disappearance (an indirect result of industrial agriculture) is leading to a loss of livelihood and significant related health impacts—does not confirm the simple behaviorist assumption that such assaults on health or well-being will cause people to flee or fight. (See Figure 1 for a chronology of Aral Sea dessication.) Poverty, state restrictions on migration, and numerous social and cultural factors complicate matters.

Combining such diverse phenomena as climate change, toxic industrial pollution, soil erosion, deforestation, aquifer depletion, and shortages of subsistence farmland into the category of "environment" is also frequently not helpful. These phenomena relate to a variety of human societies in such numerous ways that generalized concepts can rarely make useful contributions to their analysis.

Figure 1. Chronology of the Dessication of the Aral Sea



This series of images of the Aral Sea was derived by satellite remote sensing data and conventional data (WDB II for the mask of 1960; NOAA-AVHRR and RUSRS satellite imagery from 1985 through 1998; and bathy-metry projection for the year of 2010).

Source: http://www.dfd.dlr.de/app/land/aralsee/chronology.html

Researchers interested in conflict have divided environmental themes into many more specific targets of investigation, such as water, forests, and other resources. Researchers have also started to look at individual resources in particular places. In addition, there is no consensus definition of environmental insecurity (Barnett & Dovers, 2001).

The assumption that the environment is separate from both humanity and economic systems lies at the heart of the policy difficulties facing sustainable development and security thinking. The idea of environment as an independent variable—something that is beyond human control and that stresses human societies in ways that require a policy response—presents a problem for the environmental dimension of human security. As the burgeoning environmental history literature has now made abundantly clear, the sheer scale of human activity renders this assumption inadequate for both scholarship and policy formulation (McNeill, 2000). Instead, researchers and decision-makers should focus more specifically on *ecology*.

Ecology studies the flows of energy and food through complex systems made up of living things, air, water, and soil. Human activity is now a major part of these flows; and the disruptive impacts of humanity are not simply a matter of climate change but rather a matter of numerous and simultaneous changes to many natural systems. We are literally remaking the biosphere—indirectly by changing the air that we breathe, and directly by disrupting forests and grasslands through mining, agriculture, deforestation, and urbanization. (See Figure 2 for a sense of how much land has been transformed globally by human activity.) The scale of this transformation requires us to understand humanity as a major force remaking the planetary ecosystem (IGBP, 2001). Environment is no longer simply the backdrop to human activities: it is increasingly the *human-made context* for our lives. Policy that usefully addresses both sustainability and

security has to start from these scientific insights—even if our conventional categories for managing human societies do not easily fit with these new understandings.

Ecology should not be restricted to a matter of environmental politics among nation-states (Litfin, 1998). Contemporary research shows that the flows of resources and materials that support the global economy are causing most environmental change. From shrimp to oil to timber and coffee, Northern consumption is supplied by resources from all over the world with unavoidable environmental consequences (Redclift, 1996). These consequences, however, are often obscured from Northern consumers who buy the commodities that the global economy apparently miraculously and mysteriously supplies.

A Conceptual Synthesis?

The preceding discussion outlines the global interconnections that environmental security research now struggles to incorporate into both academic analysis and policy advice. Putting all of this discussion's elements into one simple overview is a conceptually risky business. But the following sketch—and it is no more than a sketch—suggests how all of these pieces can form a fairly simple scheme that allows us to clarify the dilemmas of human security and to factor the appropriate contexts into policy advice.[3]

First, we must recognize that rich and powerful

Uzbekistan: Munyak, Aral Sea

The tideline, which once reached Muynak, has now receded over 100 kilometers because the Aral's sources were pumped dry for cotton irrigation: "Environment is no longer simply the backdrop to human activities: it is increasingly the human-made context for our lives. Policy that usefully addresses both sustainability and security has to start from these scientific insights."

Credit: Dieter Telemans/Panos Pictures

urban elites have both (a) a disproportionate impact on the earth's natural systems, and (b) also make many of the policy decisions regarding resource-use and pollution. Second, global population is growing; and more importantly, it is becoming urbanized. As a result, this population increasingly depends on resources and food supplies from rural areas that are sometimes remote. Third, this process is happening in the context of rapid globalization—with its inherent dislocations—of an economy ever more dependent on petroleum products. Fourth, nation-states (even well-functioning ones) are frequently not the appropriate political entities to make decisions about many economic and environmental matters that flow across their borders in a highly uneven global economy.

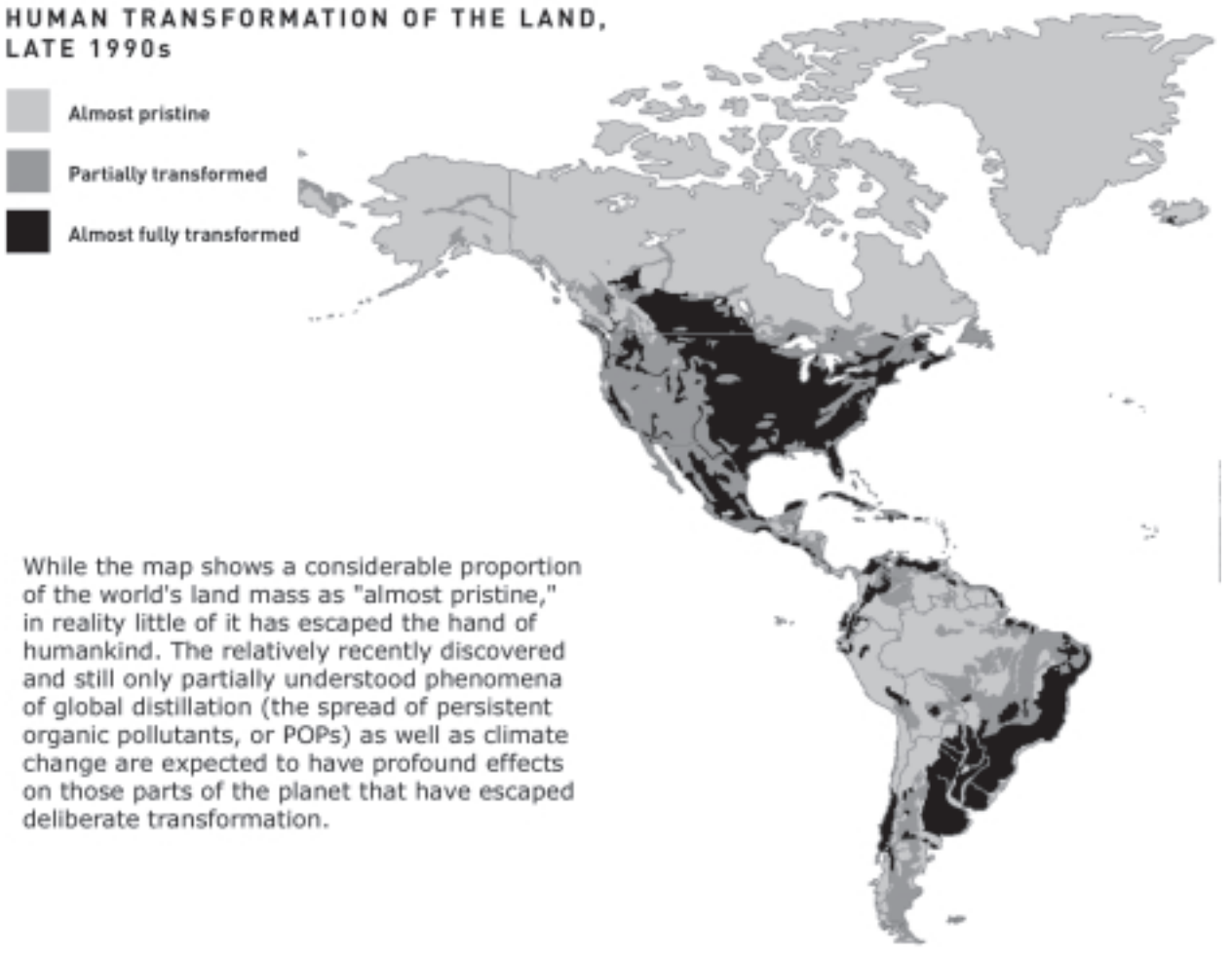
Extrapolating from the work of some Indian scholars to the global scale allows us to put these elements into a single summary conceptual scheme. In considering the state of Indian society in the 1990s, Madrav Gadgil and Ramachandra Guha (1995) classified people in terms of their ecological situation by using three catergories. First, Gadgil and Guha termed as "ecosystem people" those locally-based populations who use their own labor to survive by cultivating and harvesting food and other resources from specific localities. Second, many of these people have been displaced from their homes in recent decades, becoming "ecological refugees." Finally, these ecological refugees often gravitate to rapidly expanding urban centers, where they become "omnivores"—those who literally eat everything, often foods and other resources brought from great distances to the metropoles. Many omnivores in developed countries may also live or spend a substantial part of their lives in rural areas; but their economic support system is dependent on flows of resources from a distance.

These categories are obviously not mutually exclusive: many people have the characteristics of more than one category. For example, suburban dwellers growing vegetables for their family's use are in that sense analogous to ecosystem people, and most ecosystem people are involved in at least a few commercial transactions for luxury goods. But Gadgil and Guha's categorical scheme has the advantage of specifying people in terms of their functional position in both ecosystems and (more generally) within the biosphere. Their labels also challenge us to think about our own ecological situations. Most of the people who read policy discussions of environmental security are likely to be omnivores. And the processes of extracting the resources that support their lives—be those resources oil from Ogoniland in Nigeria, diamonds from Sierra Leone, or tropical timber from Angola—may be the cause of considerable disruption and violence (Le Billon, 2001). The ecological-situation framework suggests that disruptions caused by the spread of the market system—which demands transfers of ever-larger supplies from rural areas to cities for omnivore consumption—perpetually threaten to turn ecosystem people into ecological refugees. When serious environmental disruptions occur (including droughts, storms, and floods), ecosystem people often become impoverished ecological refugees, while omnivores have the economic flexibility to simply buy their foods and resources from elsewhere.

This crucial geography also relates to the overall vulnerability of the poor and marginal in many places. Ecosystem people often have substantial survival mechanisms—but these mechanisms are sometimes tragically overwhelmed by expansions of the market economy that reduce access to traditional food supplies and storage. The curtailment of forest access, the enclosure of common-grazing lands, and the diversion of water into irrigation schemes all disrupt access to traditional food supplies. Traditional non-commercial methods of food storage are also often superceded by modern commercial arrangements. In good times, farmers are happy to sell their crops rather than store them, but when disaster strikes, the poor often lack the means to buy suddenly scarce foods.

Each of the three ecological-situation categories obviously entails very different human consequences and perspectives on the process. But policymakers who address sustainable development must bear in mind that they nearly always come to the negotiating table as omnivores, and as such they bring developed-economy and urban assumptions to bear on problems that are at odds with rural societies. Urban definitions of sustainable development are frequently less than helpful, especially when urban aesthetic criteria view the environment as something pristine that needs "protection" from rural inhabitants. Such mindsets frequently fail to recognize the complexity of rural social arrangements or the ecological contexts of local residents. And these difficulties are compounded by urban stereotypes of peasants as backward and incapable of using resources "rationally"— i.e., in a short-term, commercial way (Scott, 1998). In the hands of journalists like Kaplan (1994, 2000), these arguments are all too frequently extended to suggest that rural populations are the source of numerous security threats to Northern omnivores.

Figure 2. Human Transformation of the Land, Late 1990s

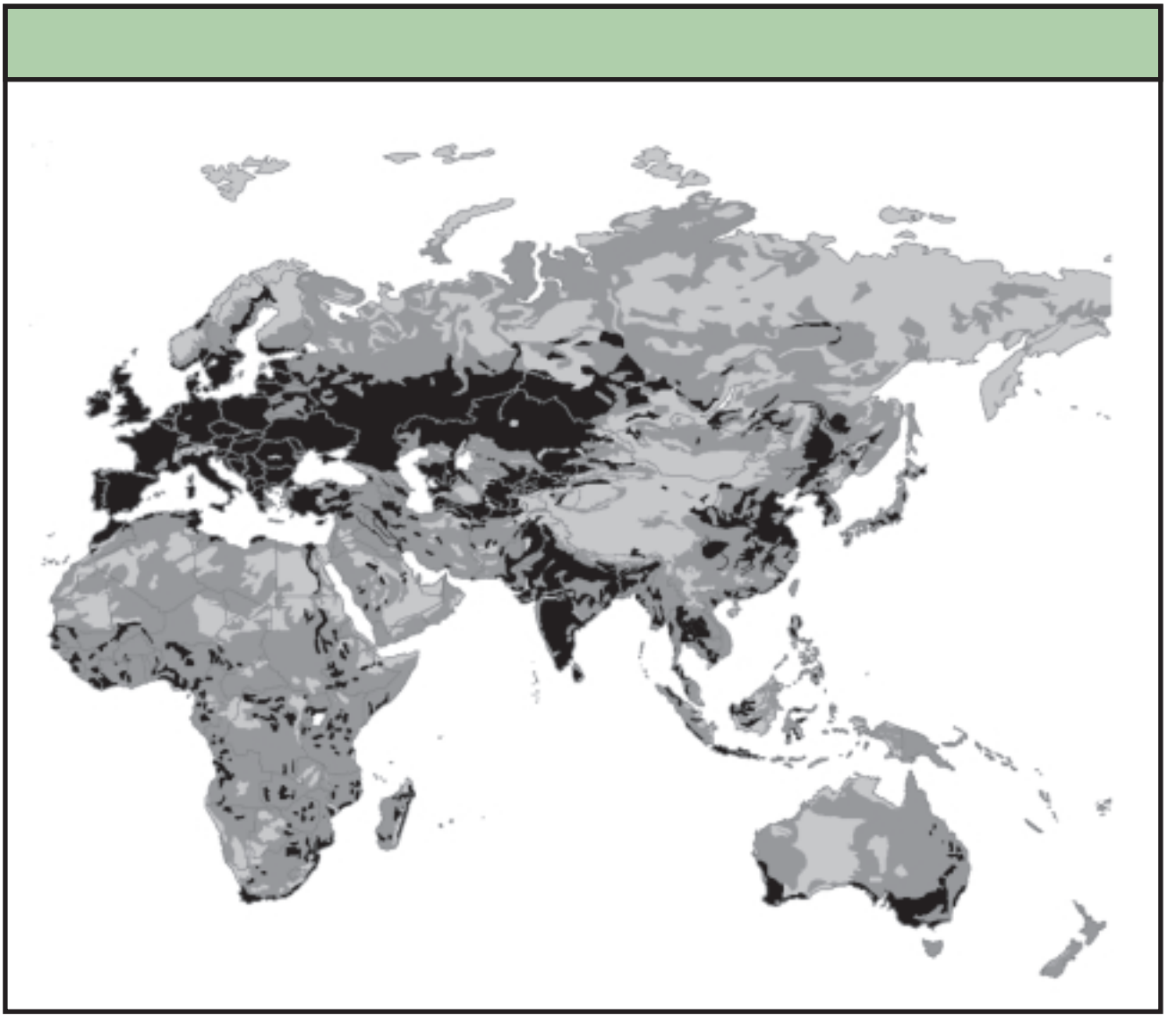


Source: Environmental Systems Research Institute via AAAS Atlas (2002), p. 72-73.

Policy Implications

In his recent book *The Ingenuity Gap*, Homer-Dixon (2000) tries to escape the intellectual limitations of thinking about these matters within conventional international relations formulations. Homer-Dixon notes the repeated collapse of environmental security discussions into debates between optimists and pessimists, cornucopians and neo-Malthusians; and he recognizes the pointlessness of these oppositions for both the environment and policy advice. Instead, his recent focus on the "ingenuity gap" in both developed and developing countries suggests that the largest problems humanity faces are those related to our frequent inability to think creatively and in a timely and contextualized manner. Homer-Dixon argues that we need to frame policy problems so that proposed solutions emphasize adaptability and social as well as technical innovation. And he concludes that environment in terms of security—or environment as a simple cause of conflict—are inadequate frameworks for the task at hand. Homer-Dixon himself has applied ingenuity to think anew about development and environment in ways that practically tackle human difficulties while being sensitive to local circumstances as well as the growing interconnections of the global economy.

Likewise, Baechler (1999) insists that questions of vulnerability and security must be considered together. He also argues that innovation and conflict-resolution require both detailed political work and the provision of options to marginalized populations. But his analysis does not conclude that solutions will necessarily come from increased state capacity. Indeed, in quite a number of the cases that Baechler has analyzed, the zealous



attempts of states to remake their rural areas in the process of development has aggravated conflict rather than facilitated useful social innovation. This realization is an important corrective to the simple assumption that further modernization and development is the answer.

In stark contrast, Klare (2001) points to the dangers of war over resources, but he offers few political ideas for escaping from this potential mess. Helping marginal populations adapt to environmental change will require political ingenuity. Large measures of ingenuity will also be required to reduce unsustainable elite consumption as well as to formulate wise policies that constrain how resource extraction, pollution, and atmospheric change disrupt rural ecologies. Above all, we should prioritize the kind of technologies and structures that will minimize resource use in the medium- and long-term future over "end-of-the-pipe" regulations that focus on emissions.

How the Wuppertal Institute in Germany formulates these terms is especially suggestive (Sachs, Loske, & Linz, 1998). Wuppertal researchers point to the distant Southern consequences of Northern consumption—such as mining wastes, deforestation, and displaced peasant farmers—as the key to global sustainable development. Reducing the total material throughput in the economy, they argue, is the key to (a) reducing total ecological damage, while simultaneously (b) supporting economically benign modes of trade that will improve the prospects for the poorest Southern populations. Poverty reduction thus depends on restricting those exports that have caused the worst environmental destruction.

Solar and wind energy are perhaps best emblematic of recent innovative suggestions that emphasize how ecological flows connect with human security. Once

produced and installed, these technologies minimize the flow of material through ecosystems. Wind and sun provide the energy. No fuels have to be transported. No pollution alters the atmosphere. They can be installed close to where power is needed, thus reducing the materials needed to move energy. Consumers get electricity and warm water, but do so without importing oil from distant lands in a process that frequently disrupts local ecologies and social systems. When combined with intelligent building design that minimizes energy requirements, solar and wind energy offer tremendous potential for practical reductions in greenhouse gas emissions. Smart buildings and appropriate architecture can, when designed carefully, both reduce energy costs and pollution as well as provide comfortable working environments that enhance productivity.

But these technical difficulties seem trivial in comparison to the political and administrative hurdles that face ecologically friendly design, as the great difficulties that face innovative urban architects in many countries attest (Brugman, 2001). To create sustainable communities—communities that do not environmentally harm distant places—policy innovation must extend to local governments and building codes. A sustainable-development policy that also attempts to enhance human security demands innovative design and policies to minimize the ecological impact of new buildings and transportation systems. These areas are not where most security analysts focus their attention when thinking about environment, but such ingenuity will have large human security payoffs for many people.

Rethinking Ecology and Security

Northern consumption, its consequences for Southern human security, and the shift in focus from environment to ecology are now fundamental to rethinking environmental security. The cumulative results of omniverous consumption are literally remaking parts of the global biosphere in ways that might cause all sorts of unforeseen disruptions. Ecological systems are already adapting to the rise in global temperature in the last few decades; and they are doing so in ways that are site-specific (Walther et al., 2002).

While omnivores are in part protected from these disruptions by their abilities to use purchasing power in the global economy to switch supply sources, ecosystem people frequently do not have that option. Many more of them may be turned into environmental refugees in the coming decades—not because of any local shortages of resources, but as a consequence of the disruptions caused both directly and indirectly by omniverous consumption. Environmental security thinking must focus explicitly on these ecological interconnections as a key component of both (a) environmental disruptions, and (b) wars over control of resource exports. Indeed, environmental security needs to take ecology much more seriously. While nation-states may provide administrative and legal structures within which policy is formulated and administered, such spatial categories do not even come close to capturing the flows of energy and materials through our lives. Thinking ecologically—specifically, understanding security as the assurance of relatively undisturbed ecological systems in all parts of the biosphere—requires that researchers and policymakers (a) even more drastically reframe conventional categories of security, and (b) integrate the question of whom is secured into their analyses. Only then can the contexts of environmental insecurity be treated with the seriousness they deserve.

Notes

[1] Kaldor defines these "new wars" as wars related "to the underside of globalization, to inequality whether caused by free trade or the collapse of authoritarian state sectors." She cites Bosnia, Kosovo, and many African wars as examples.

[2] GECHS is also a core project of the International Human Dimensions Program on Global Environmental Change and publishes an information bulletin titled *AVISO*, which reports on policy and scholarly research. The project is on-line at http://gechs.org

[3] See also Dalby (2002).

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