

## MEMORANDUM TO THE PRESIDENT

**From:** Thomas Homer-Dixon

**Subject:** Environmental Scarcities and Civil Violence

The New York Times, Sunday, April 9, 2000. *“Bolivia Calls An Emergency After Protest Over Water”*: Bolivia’s president declared a state of emergency today, fueling a week of widening unrest that left three people dead in fresh clashes between police and demonstrators. The move came after a week of protests over rising water rates, unemployment and other economic difficulties plaguing the Andean country of eight million people.

### PROBLEM

Recent research shows that scarcities of vital environmental resources—especially of cropland, fresh water, and forests—help cause violence in many parts of the world. These *environmental scarcities* rarely cause wars among countries, but they do generate severe social stresses inside countries, stimulating sub-national insurgencies, ethnic clashes, and urban unrest. This internal or *civil* violence particularly affects poor countries, because they tend to be far more dependent on environmental resources and far less able to buffer themselves from the social crises that environmental scarcities cause. This kind of violence may affect poor countries most, but policy makers and citizens in the industrialized world ignore it at their peril. It can harm rich countries’ national interests by threatening their trade and economic relations, entangling them in complex humanitarian emergencies, provoking distress migrations, and destabilizing pivotal countries in the developing world.

## BACKGROUND

Environmental scarcities have often spurred violence in the past. In coming decades the incidence of such violence will probably rise sharply as scarcities of

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cropland, fresh water, and forests worsen in many poor countries. Scarcity's role, however, will often be obscure and indirect: it interacts with political, economic, and other factors to generate harsh social effects—from worsening poverty and massive migrations to deeper cleavages among ethnic groups and weakened states—that in turn help produce violence. Analysts often interpret these social effects as the conflict's principal causes, thus overlooking scarcity's influence as an underlying stress. Some examples:

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- In South Africa, severe land, water, and fuelwood scarcities in the former black homelands have helped drive millions of poor blacks into squatter settlements around the major cities. The settlements are often constructed on the worst urban land, in depressions prone to flooding, on hillsides vulnerable to slides, or near heavily polluting industries. Scarcities of land, water, and fuelwood in these settlements provoke inter-ethnic rivalries and violent feuds among settlement warlords and their followers. This strife jeopardizes the country's transition to democratic stability and prosperity.
- In the state of Bihar, India, skewed land distribution has combined with rapid population growth and significant soil degradation to produce some of the country's most crippling shortages of cropland. As a result, the last three decades have seen vicious conflicts between marginal farmers and landless laborers, on one side, and middle and upper caste farmers who still own relatively abundant land, on the other. The cycle of violence has polarized Bihar's society and progressively weakened its institutions, from its court system and universities to its financial and agricultural bureaucracies. As the second most populous state in the country, Bihar's chronic political crisis reverberates in the national capital, New Delhi, and has contributed to instability in the country's governing coalition.

- In Pakistan, shortages and maldistribution of good land, water, and forests in the countryside have encouraged millions of the rural poor to migrate into major cities, such as Karachi and Hyderabad. The conjunction of this in-migration with high fertility rates is causing city populations to grow at an astonishing 4 to 5 percent a year, producing fierce competition—and often violence—among ethnic groups over land, basic services, and political and economic power. This turmoil exacts a huge toll on an already struggling national economy.
- In the mid-1990s in Chiapas, Mexico, Zapatista insurgents rose against land scarcity and insecure land tenure caused by ancient inequalities in land distribution, by rapid population growth among groups with the least land, and by changes in laws governing land access. The insurgency rocked Mexico to the core, helped trigger a peso crisis, and reminded the world that Mexico remains—despite the pretenses of the country's economic elites—a poor and profoundly unstable developing country.

### *The Critical Role of Environmental Resources*

It is easy for the billion-odd people living in rich countries to forget that the well being of about half of the world's population of 6 billion remains directly tied to local natural resources. Sixty to seventy percent of the world's poor people live in rural areas, and most depend on agriculture for their main income; a large majority of these people are smallholder farmers, including many who are semi-subsistence (which means they survive mainly by eating what they grow). Over 40 percent of people on the planet—some 2.4 billion—use fuelwood, charcoal, straw, or cow dung as their main source of energy; 50 to 60 percent rely on these biomass fuels for at least some of their primary energy needs. Over 1.2 billion people lack access to clean drinking water; many are forced to walk far to get what water they can find.

The cropland, forests, and water supplies that underpin the livelihoods of these billions are renewable. Unlike non-renewable resources such as oil and iron ore, renewables are replenished over time by natural processes. In most cases, if used prudently, they should sustain an adequate standard of living indefinitely. Unfortunately, in many regions where people rely on renewables, they are being depleted or degraded faster than they are being renewed. From Gaza to the

Philippines to Honduras, the evidence is stark: aquifers are being overdrawn and salinized, coastal fisheries are disappearing, and steep uplands have been stripped of their forests leaving their thin soils to erode into the sea.

This environmental scarcity helps generate chronic, diffuse, subnational violence—exactly the kind of violence that bedevils conventional military institutions. Around the world, we see conventional armies pinned down and often utterly impotent in the face of interethnic violence or attacks by ragtag bands of lightly armed guerrillas and insurgents. As yet, environmental scarcity is not a major factor behind most of these conflicts. But we can expect it to become a more powerful influence in coming decades because of larger populations and higher per capita resource consumption rates.

Currently, the human population is growing by about 1.3 percent a year on a base of just over 6 billion. This figure peaked at about 2.1 percent between 1965 and 1970 and has fallen since then. In recent years, fertility rates have dropped surprisingly fast in most poor countries; women are having, on average, significantly fewer children. But it is wildly premature to declare, as some commentators have, that the problem of the population explosion is behind us. The

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largest cohorts of girls ever born have yet to reach their reproductive years, which ensures tremendous momentum behind global population growth. So even under the most optimistic projections, the planet's population will expand by almost a third, or by about two billion people, by 2025.

Real economic product per capita is also currently rising by about 1.0 percent a year. Combined with global population growth, Earth's total economic product is therefore increasing by about 2.3 percent annually. With a doubling time of around thirty years, today's global product of about \$30 trillion should exceed \$50 trillion in today's dollars by 2025.

Real economic product per capita is also currently rising by about 1.0 percent a year. Combined with global population growth, Earth's total economic product is therefore increasing by about 2.3 percent annually. With a doubling time of around thirty years, today's global product of about \$30 trillion should exceed \$50 trillion in today's dollars by 2025.

A large component of this two-thirds growth will be achieved through yet higher consumption of the planet's natural resources. We will see a further decline in the total area of high-quality cropland, along with the widespread loss of remaining virgin forests. We will also see continued degradation and deple-

tion of rivers, aquifers, and other water resources, and the further impoverishment of wild fisheries.

Regional scarcities of renewable resources are already affecting large populations in poor countries. But during the last decade, global environmental problems, especially climate change and stratospheric ozone depletion, have received more attention in the popular media in the industrialized world. The social and economic impacts of these global atmospheric problems, in particular of climate change, may eventually be very large, but these impacts will probably not be decisively clear until well into this century. And climate change is most likely to have a major effect on societies, not by acting as an isolated environmental pressure, but by interacting with other long-present resource pressures, such as degraded cropland and stressed water supplies. While global atmospheric problems are important, policy makers, the media, and the public in rich countries should focus more of their attention on regional environmental scarcities of cropland, water, and forests in poor countries.

### *Sources of Environmental Scarcity*

Environmental scarcity is caused by the degradation and depletion of renewable resources (say, a specific tract of cropland), the increased demand for these resources, and/or their unequal distribution. Population growth and increased per capita resource consumption can cause depletion and degradation, which can in turn produce a decrease in total resource *supply* or, in other words, a decrease in the size of the total resource “pie.” But population growth and changes in consumption behavior can also cause greater scarcity by boosting the *demand* for a resource. So if a rapidly growing population depends on a fixed amount of cropland, the amount of cropland per person—the size of each person’s slice of the resource pie—falls inexorably. In many countries, resource availability is being squeezed by both these supply and demand pressures.

Scarcity is also often caused by a severe imbalance in the distribution of wealth and power that results in some groups in a society getting disproportionately large slices of the resource pie, while others get slices that are too small to sustain their livelihoods. Such unequal distribution—or *structural* scarcity—is a key factor in virtually every case where scarcity contributes to conflict. Often the imbalance is deeply rooted in institutions and class and ethnic relations inherit-

ed from the colonial period. Often it is sustained and reinforced by international economic relations that trap developing countries into dependence on a few raw material exports. It can also be reinforced by heavy external debts that encourage countries to use their most productive environmental resources—such as their best croplands and forests—to generate hard currency rather than to support the poorest segments of their populations.

In the past, analysts and policy makers have usually addressed these three sources of scarcity independently. But new research shows that supply, demand, and structural scarcities interact and reinforce each other in extraordinarily pernicious ways. Two kinds of interaction are particularly important: *resource capture* and *ecological marginalization*.

Resource capture occurs when powerful groups within a society recognize that a key resource is becoming more scarce (due to both supply and demand pressures) and use their power to shift in their favor the regime governing resource access. This shift imposes severe structural scarcities on weaker groups. In Chiapas, for instance, worsening land scarcities, in part caused by rapid population growth, encouraged powerful land owners and ranchers to exploit weaknesses in the state's land laws in order to seize lands from campesinos and indigenous farmers. Gradually these peasants were forced deeper into the state's lowland rain forest, further away from the state's economic heartland, and further into poverty.

In the Jordan River Basin, Israel's critical dependence on groundwater flowing out of the West Bank—a dependence made acute by a rising Israeli population and salinizing aquifers along the Mediterranean coast—encouraged Israel to restrict groundwater withdrawals on the West Bank during the occupation. These restrictions were far more severe for Palestinians than for Israeli settlers. They contributed to the rapid decline in Palestinian agriculture in the region, to the dependence of Palestinians on day-labor within Israel and, ultimately, to rising frustrations in the Palestinian community.

Ecological marginalization occurs when grave inequality in resource distribution joins with rapid population growth to drive resource-poor people into ecologically marginal areas, such as upland hillsides, areas at risk of desertification, and tropical rainforests. Higher population densities in these vulnerable

areas, along with a lack of the capital and knowledge needed to protect local resources, causes local resource depletion, poverty, and eventually further migration, often to cities.

Ecological marginalization affects hundreds of millions of people around the world, across a wide range of geographies and economic and political systems. We see the same process in the Himalayas, Indonesia, Central America, Brazil, India, China, and the Sahel. For example, in the Philippines an extreme imbalance in cropland distribution between landowners and peasants combined with high population growth rates to force large numbers of the landless poor into interior hilly regions of the archipelago. There, the migrants used slash and burn agriculture to clear land for crops. As more millions arrived from the lowlands, new land became hard to find; and as population densities on the steep slopes increased, erosion, landslides, and flash floods became critical. During the 1970s and 1980s, the resulting poverty drove many peasants into the arms of the communist New People's Army insurgency that had a stranglehold on upland regions. Poverty also drove countless others into wretched squatter settlements in cities like Manila.

### *Links to Civil Violence*

Expanding populations, land degradation, and drought spurred the rise of the Sendero Luminoso guerrillas in the southern highlands of Peru. Scarcity-induced resource capture by Moors in Mauritania ignited violence over water and cropland in the Senegal River basin, producing tens of thousands of refugees. In Haiti, forest and soil loss have worsened a persistent economic crisis that generates strife and periodic waves of boat people. And land shortages in Bangladesh, exacerbated by fast population growth, have prompted millions of people to migrate to India—an influx that has, in turn, caused ethnic strife in the state of Assam.

Close study of such cases shows that severe environmental scarcity can restrict local food production, aggravate poverty of marginal groups, spur large migrations, enrich elites that capture resources, deepen divisions among social groups, and undermine a state's moral authority and capacity to govern. Marginal groups that directly depend on renewable resources find themselves trapped in a vise between rising scarcity on one side and institutional and policy failures on the other. These long-term, tectonic stresses can slowly tear apart a

poor society's social fabric, causing chronic popular unrest and violence by boosting grievances and changing the balance of power among contending social groups and the state.

So environmental scarcity is mainly an *indirect* cause of violence, and this violence is mainly *internal* to countries. It is not the type of violence that analysts commonly assume will occur when critical resources are scarce—that is, “resource wars” among countries, in which scarcity directly stimulates one country to try to seize the resources of another. Nevertheless, while this internal violence may not be as conspicuous or dramatic as wars among countries, it can have broad implications. The changing nature of the international system—heightened economic interdependence, easier long-distance travel, and increased access to arms—makes previously insignificant regions of interest to policy makers. Crises in small countries, such as Haiti, often create serious foreign policy difficulties for developed countries, and large and significant countries—including Pakistan, China, India, and Indonesia—are not immune to the severe stresses environmental scarcity generates. Major civil violence within states can affect external trade relations, cause refugee flows, and produce humanitarian disasters that call upon the military and financial resources of developed countries and international organizations. Countries destabilized by civil violence often fragment as they become enfeebled and as peripheral regions are seized by renegade authorities and warlords. Their regimes might avoid fragmentation by becoming more authoritarian, intolerant of opposition, and militarized; they might also try to divert attention from domestic grievances by threatening neighboring states.

Environmental scarcity is never a sole or sufficient cause of such crises; it always joins with other economic, political, and social factors to produce its effects. In the Filipino case, for example, the lack of clear property rights in upland areas encouraged migration into these regions and discouraged migrants from conserving the land once they arrived. And President Marcos's corrupt and authoritarian leadership reduced regime legitimacy and closed off options for democratic action by aggrieved groups. Contextual factors like these are often critical, but policy makers must realize that they cannot either adequately understand or respond to many important cases of civil violence around the world—like the Filipino insurgency or the chronic instability in Haiti—if they do not take into account the independent causal role of environmental scarcity.

### *The Limits of Adaptation*

Skeptics often respond that environmental scarcity rarely contributes to conflict, because human societies show great capacity to adapt to resource scarcity, especially through market mechanisms. When a resource becomes scarce, its price increases, which encourages conservation, substitution, and technological innovation. Scarcity also encourages institutional adaptations, such as changes in property rights, that raise incentives to conserve and innovate and that reduce the hardship scarcity produces.

It is true that scarcity often stimulates useful technological and social changes. Yet a society's ability to adapt to rising scarcity depends on the relationship between its requirement for ingenuity to respond to this scarcity and its supply of ingenuity. (*Ingenuity*, as used here, consists of ideas for new technologies and new and reformed institutions.) Societies in which requirement outstrips supply face an *ingenuity gap*; they will be unable to adapt adequately to environmental scarcity and will, consequently, be vulnerable to scarcity's harsh social effects, including economic dislocation, migrations, social cleavages, state weakening, and—ultimately—violence.

In the next decades, population growth, rising average resource demand, and persistent inequalities in resource access ensure that scarcities will affect many environmentally sensitive regions with unprecedented severity, speed, and scale. Ingenuity requirements will therefore rise rapidly. But this situation need not lead to crisis, since, by changing prices and incentives, scarcity often does stimulate a flow of ingenuity sufficient to meet the rising need.

But there are several reasons why this beneficial response may not occur in some poor societies. The prerequisites for effective adaptation to scarcity often do not exist: states are weak, bureaucracies incompetent, judicial systems corrupt, research centers underfunded, and property rights unclear. Markets often do not work well: prices in most developing countries—especially for water, forests, and other common resources—do not adjust to reflect accurately rising scarcity, and therefore incentives for entrepreneurs are inadequate. Low levels of education, technological capacity, and financial capital also depress the supply of ingenuity. Finally, environmental scarcity can actually undermine the ability of developing societies to generate social and technical solutions to scarcity. Under certain cir-

cumstances, scarcity mobilizes narrow coalitions and powerful elites to block the institutional reforms that could reduce the scarcity's broader social impact.

Positive economic, social, and technological responses to environmental scarcity are therefore not guaranteed. Some societies will adapt well, others will not. In coming decades, worsening environmental scarcities in many regions will

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further exaggerate the world's already gaping differentials between rich and poor societies and between the powerful and weak people within those societies. The world's wealthy regions should not

assume that they will be able to wall themselves off from turmoil in societies that do not adapt well to scarcity. We are living cheek by jowl on this planet now. We are all next door neighbors.

## RECOMMENDATIONS

We are passing through a moment in history when political and economic events are fluid and social structures are more malleable than they have been for decades. This situation provides opportunities for reform of our economic, political, and social systems, but it also presents dangers. Many of the choices we make during the next years—even small ones—will have large consequences far into the future. And the future is sometimes not as distant as it seems: well over one third of the people currently alive will still be alive in 2050. The children around us today will live with the consequences of the decisions we make today.

Each case of environmentally induced conflict is complex and unique: each has a specific ecosystem, history, culture, economy, set of actors, and set of power relations among these actors. Policy tools available in one case will not be available in another, for wholly idiosyncratic reasons. Successful policy intervention therefore requires customization based on a careful analysis of the character of the specific case and of the policy tools available in that case.

Yet it is possible to make four general points about policy interventions in this area. First, there is no single solution or “magic bullet” that will always break the links between environmental scarcity and violence. The causal systems in question encompass huge numbers of interacting variables; interventions must therefore operate at many points to capitalize on these systems’ natural synergies. Policy makers need to implement a broad and integrated set of responses at the international, regional, national, and community levels.

Second, early intervention is generally better than late intervention. If policy makers wait till widespread violence has broken out, it will probably be too intractable, too complex, and too charged with emotion to resolve. In addition, environmental scarcity tends to produce diffuse and subnational violence of a kind that our conventional military institutions do not, in general, handle well. Policy makers should therefore emphasize proactive interventions that break the early links in the causal chains described here.

Third, policy responses do not have to be capital-intensive: They can be simultaneously effective and relatively inexpensive. Examples include greater support for non-governmental organizations that are rehabilitating local environmental resources and for research on crops that can grow with eroded soil and polluted water.

Fourth and finally, effective policy interventions will not necessarily be unique or special. The analysis above simply presents another set of reasons for a range of interventions—from selective debt relief to enhancement of indigenous technical capacity—that many experts have long believed necessary to produce humane and rapid economic development in poor countries around the world.

In line with these general points, the following six specific actions are proposed:

- As an aid to policymaking, the U.S. administration should seek to develop the internal capacity, within the State Department or intelligence agencies, to track severe environmental and demographic stresses in the developing world and to predict their negative social outcomes, including violence. Within relevant arms of the Executive branch, especially the State Department, financial and other incentives should be introduced to encourage officials to develop expertise and policy on matters relating to environmental security.

- To cope with the additional 2 billion people that will be added to the developing world's population over the next two decades, at a time when these countries' natural resources are under unprecedented stress, the United States should substantially and immediately increase funding to the Consultative Groups on International Agricultural Research (CGIAR) system of agricultural research institutes. The aim should be to reverse the decline in the growth of grain yields in high-intensity agriculture in East and Southeast Asia and to develop crops that can grow in nutrient-depleted soils and water-scarce regions.
- The United States should undertake a major research and policy effort to reform the current system of national income accounts to incorporate the costs of depletion and degradation of our environment. In the short term, leaders of many poor countries see a trade-off between economic growth and environmental protection, and this encourages overuse and degradation of environmental resources. U.S. foreign and aid policies must emphasize that the real trade-off is between short-term unsustainable prosperity and long-term growth potential. This is an answer to the common argument from poor countries that rich countries are using environmental issues to deny them the opportunity to grow: It's in the developing world's self-interest to prevent environmental decline.
- The United States should use its influence with the governments of rich countries, commercial banks, and international financial institutions (IFIs) to reduce the debt burden on poor countries. Developing nations under pressure from banks and lending agencies to pay their foreign debts often use their best lands to grow cash crops for export, which can force large numbers of poor people into marginal and fragile environmental regions. In addition, the stabilization and structural adjustment policies of IFIs, while often essential, must be designed and implemented with environmental consequences in mind. The United States should urge IFIs to recognize that their currency and adjustment policies can have immense effects on the environment; and these institutions need accounting methods that better measure the environmental costs of economic activities in poor countries.

- American development aid should be targeted to build poor countries' technical capacity in environmental management. It is cost-effective for the United States to provide funds for the training of environmental experts in the developing world, including hydrologists, soil and agricultural scientists, foresters, demographers, energy-systems engineers, and fisheries specialists. The emphasis must be on adequately equipping and staffing research and teaching centres in poor countries so that the "brain drain" to rich countries can be stemmed. Networks of such centres established across national boundaries should stimulate wider co-operation among a region's countries.
- The United States should work with other rich countries to coordinate efforts to fund the development and diffusion of environmentally benign technologies for use in poor countries. These technologies include water-conserving irrigation systems and better water purification systems; alternative cooking methods that conserve fuelwood; and aquaculture that does not require destruction of coastal wetlands. Many of these technologies are best developed indigenously in poor countries, using the technical capacity that must be expanded there, but research enterprises in rich countries can help too (and they should be given the financial incentives to do so).