Managing environmental degradation and natural disasters: an overview

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A disaster is said to occur when an extreme event coincides with a vulnerable situation — surpassing a society's ability to control or survive the consequences. Not every crisis is a disaster Natural crises — fires, floods, earthquakes, and drought — have always been part of the natural cycle; virtually all parts of the world have been at risk from them. But accelerated changes in demographic and economic trends have disturbed the balance between ecosystems, increasing the risk of human suffering, death, and destruction. Rapid population growth increases pressures on natural resources and the natural environment, and raises the consequent risks associated with human activities.

Disasters can be sudden or slow in onset. Sudden-onset disasters such as floods, fires, and earthquakes can destroy a country's infrastructure and commercial, industrial, and housing stock, leaving populations homeless and disrupting the country's productive base. Major disasters not only damage capital assets but are bound to have long-term effects on the economy. In a slow-onset disaster such as drought, the problems created by a scarcity of water are compounded by such long-standing problems as deforestation, rural poverty, soil erosion, and inefficient land-use and tenure patterns. Civil wars may be similar to slow-onset disasters in their impact on population movements. Refugees fleeing war in their own countries can put extraordinary pressures on the countries receiving them, threatening the sustainability of their hosts' natural resource base and severely disrupting the economy and social order

There is some evidence of causal links between environmental degradation and vulnerability to disaster. Natural disasters are often caused at least partly by the same kind of tampering with the natural environment that concerns ecologists — and their impact on that environment is no less devastating. For example, the worldwide incidence per decade of extreme weather events — defined as events such as typhoons, hurricanes, floods, and drought, that cause more than, say, 20 deaths — has increased about 50 percent on average each decade between 1900 and 1990, accelerating significantly since 1950 (OFDA 1990).

The damage caused by extreme weather events has also escalated — increasing faster than population growth. Beginning with the 1950s (when comprehensive records began to be kept), deaths associated with these events have increased 50 percent each decade, whereas the corresponding population growth rate was only 20 percent Economic costs per decade have also increased dramatically: from about US$400 billion in 1950-59 to 90 times that value in 1980-89.

This may to some extent reflect improved observation and reporting of weather as well as increasing economic and population growth. But it is hard to ignore the apparent correlation between the frequency and severity of such natural disasters and growing local and global environmental degradation, especially in the

second half of the twentieth century. It is also clear that developing countries are far more vulnerable than developed countries to both catastrophic events and deterioration of the environment.

Why are developing countries so vulnerable to disasters? As a result of poverty and population growth, the continual, uncontrolled alteration of environmental systems weakens the resistance of many countries to natural hazards. Vulnerability and poverty go hand in hand, and it is not easy to find quick fixes for them. Low agricultural output in depressed economic conditions forces farmers to increase the burden on agricultural resources and hence the likelihood of drought, floods, and landslides. Rangelands are heavily overgrazed and forest lands severely degraded by overexploitation and neglect. Acute shortages of firewood have accelerated the rate of deforestation, which, together with destruction of the vegetative cover on natural pastures, has increased the threat of floods and the deterioration and desertification of previously fertile land Similarly, rapid population growth, especially in urban areas, has overburdened public services and natural resources. Many urban settlers are poor and cannot afford properly serviced homesites. They have become a great threat to the natural environment of cities Landless squatters concentrate in fragile, often marginal areas, increasing the cost and magnitude of natural crises

How environmental degradation intensifies disasters

One disaster often leads to another· high windstorms are followed by floods and landslides, floods by drought, and drought by pest epidemics and famines. Such chains of disaster result partly from the tendency of natural disasters to debilitate the environment; they are aided in this by some human activities. The same cycle results whether the cause of degradation is natural or springs from human effort. But environmental degradation intensifies the effects of disaster

Floods are generally considered to be fast-onset disasters, but their root cause may be partly a history of progressive environmental degradation. Floods are generally triggered not by exaggerated rainfall but by the silting up of rivers, the reduced absorptive capacity of soil, flawed infrastructure planning, and inadequate maintenance of existing facilities. Uncontrolled deforestation, which contributes heavily to soil erosion and water runoff, sets the stage for flash floods and landslides.

Similarly, the unrestrained felling of trees and grazing of livestock that often accompany rapid population growth accelerate the degradation and increase desertification of overgrazed arid and semiarid ranges. In urban areas, poor planning, inappropriate design, faulty construction, inadequate maintenance, and squatter settlements on disaster-prone land all contribute to both environmental degradation and increased vulnerability to catastrophic events

In many developing countries, overcrowding, congestion, poverty, unemployment, and inadequate infrastructure and services further weaken urban resistance to natural hazards. As a result of inadequate policies, accumulated garbage and human waste often turn a flooded area into an open, overflowing sewer

Extensive development on high-risk sites, combined with deforestation and the dumping of solid wastes in rivers and canals, increases susceptibility to the landslides that often follow floods. Clogged drains are worse than no drains at all in flood-prone areas — and silted-up drains or riverbeds exacerbate a flood's impact on precarious soil. The geology and climate of some areas contribute to the prevalence of landslides. The warm, wet climate of the Caribbean, for example, makes it susceptible to landslides. In China, limited knowledge about landslide identification and prevention led to excavations on and the reactivation of ancient landslides. Numerous landslides occurred during the construction of the Baocheng railway (1954-57).

Drought is often attributed to nature's capriciousness — the uncontrollable, unpredictable lack of rain — but experts now question this association. Drought-induced famine has occurred in North Africa, with desertification of the Sahel, yet no evidence exists that rainfall levels in the past 100 years have declined there, in the Sahara (to its south), or in the Middle East. The Caribbean pseudodroughts in the midst of tropical rainfall reinforce the popular association of rainfall and drought. But lack of groundwater — not rainwater — appears to be the central cause of drought

In Haiti, deforestation has reduced the soil's capacity to absorb water. Despite steady rainfall, waters run off the razed hillsides and offer little benefit to crops. To all intents and pur-

poses, the effect is that of a drought, despite normal rainfall. Even in flat areas — such as rice paddies in the Philippines — pseudodrought has been traced to deforestation through traditional slash-and-burn agriculture. Overgrazing, overcultivation, and the inappropriate use of mechanized agricultural methods also contribute to the cycle of erosion and drought. The U.S. "dust bowls" in the 1930s came about after the prairies of the Great Plains were transformed into wheat farms In the Soviet Union, the substitution of cereal crops for the natural groundcover of the Central Asian steppes in the 1950s led to desertification and drought in the mid-1960s. In the Sahel, overgrazing, deforestation, and overcultivation reduced the amount of topsoil and compacted what soil remained, leading to the rapid superficial runoff of waters that the soil barely absorbs. Whether torrential runoffs are considered floods or not, when waters slide over topsoil without penetrating it, the effect is drought or pseudodrought.

Deforestation leads to drought both directly and indirectly. In Nepal, the lack of firewood has led farmers to burn cow dung for cooking fuel, reducing the amount of available fertilizer and thus reducing the fertility of the agricultural land — increasing erosion even in areas far removed from forested areas. Continuation of the present trend may create a semi-desert ecology in the hilly region.

Asia Ram (1987) writes of how environmental degradation, especially deforestation, has fed drought in India:

> On bare slopes, rainfall is no longer held back to soak into the land and replenish the water table. Instead it steams off rapidly into rivers and back to the sea. Paradoxically, India is one of the wettest countries in the world...yet people still go without water.

Sometimes introducing a water supply system to semiarid lands causes environmental degradation because herds grow more rapidly and destroy the local vegetation that helps maintain topsoil.

One disaster often leads to another. The risk of a naturally ignited fire becoming an uncontrollable disaster is viewed increasingly as a function of the degradation of the forest environment. Forest areas are particularly susceptible to wildfire, a quick-onset form of disaster that may be set off by a volcano, lightning, or human carelessness. Furthermore, uncontrolled fires cause extensive environmental damage, altering ecosystems, increasing the potential for erosion and water runoff, and thus increasing a region's vulnerability to other hazards. The rapid destruction of forests by uncontrolled conflagration has been known, for example, to spark virus epidemics that outlive deforestation. Poor people clear lands illegally for farming, using slash-and-burn techniques that denude forests and escalate the risk of fire. Even settling in a wooded area increases the damage wildfires may cause. Uncontrolled fires can cause significant losses of life and economic resources; their catastrophic consequences cannot be discounted or ignored.

Earthquakes are natural, but the amount of damage they cause is largely a function of development decisions. The growth of cities — particularly the rapid expansion of slums and squatter settlements, where vulnerability is highest — has increased the cost and magnitude of earthquake disasters. Significant losses are often the result of inadequate design, poor building techniques, poorly supervised construction, and the effects of poverty — often compounded by years of neglected maintenance and reduced public and private investment. Physical and social preventive measures can save many lives, the main goal of hazard reduction. Some of the mechanisms available to reduce losses from and vulnerability to earthquakes are fiscal incentives (or disincentives) and the prevention of construction on vulnerable sites through land-use planning and the enforcement of reasonable zoning regulations. The challenge is to manage development, not constrain it

Disaster prevention and mitigation

Both disasters and environmental degradation threaten human and natural habitats, but disasters are often seen as motors of natural change quite beyond human control — which is not true. Prevention does not mean halting such trigger events as earthquakes and cyclones but rather minimizing their impact on our environment

Disaster experts often say there is no such thing as a natural hazard — that a disaster is not a physical happening but a communal event, the result mainly of human actions In other words, catastrophes could not exist without social

actions and human decisions. Floods, landslides, wildfires, earthquakes, drought, and other so-called natural disaster agents have social consequences only because of individual and community activities before, during, and after an extreme event. Social action or inaction — allowing dense populations on a floodplain or allowing poor or unenforced building codes in earthquake zones, delaying evacuation from flood or fire areas, allowing the degradation of natural resources — is as likely as a natural event to cause casualties, property and economic losses, and the disruption of everyday life.

What this implies is the need for proactive measures, not passive reaction Rather than wait for a disaster to occur, countries and communities must take appropriate action beforehand. It may be impossible to prevent the earth from shaking, but we can discourage or forbid human settlements on unstable sites. We can encourage farming practices that will not degrade the land, thereby decreasing the risk of floods and landslides and reducing the incidence of drought Planning fiscal incentives, and control of land use can be major instruments for disaster mitigation. Public policies and programs can reduce social vulnerability. Making disaster prevention and mitigation integral parts of development requires action.

Recent years have brought increased awareness of the need to reduce vulnerability to natural disasters by limiting the harmful effects on the environment of economic activities. In developing countries, losses from disasters impose a significant burden on governments, institutions, and human communities. Policies and projects that strengthen local capabilities to reduce losses can only strengthen development and sustainable growth.

Recognizing the important relationship between disasters and environmental degradation, the Bank has increasingly supported prevention and mitigation programs to reduce the vulnerability of disaster-prone countries to natural hazards. These programs address the need for important changes in policies and priorities, particularly to limit economic development's contribution to environmental deterioration and ecological crisis. For example, the Bank has funded projects to improve local disaster planning and prevention capabilities (in Rio de Janeiro), to help improve disaster preparedness, mitigate the risk of natural hazards (in China and Nepal), control floods and reduce the impact of landslides (in Bolivia), and increase the ability of forest resources to survive wildfires (in China). Such projects are described in the case studies to be found in this volume.