



HUMAN VULNERABILITY TO ENVIRONMENTAL CHANGE

People are less and less the helpless victims of “acts of God” and more and more the victims of “acts of man”.

Vulnerability to natural disasters such as cyclones, droughts, floods, and earthquakes has been a feature of the past 30 years as human beings dramatically re-shaped the natural world making themselves less able to cope with extreme events.

Environmental change, which appears to be accelerating, also increases vulnerability in less sudden but, in the end, no less dramatic ways.

Lake Victoria - The fish populations of this Eastern African lake have undergone slow but steady changes since European settlers began using gill nets at the turn of the century. Introductions of alien species, most notably Nile perch, have also played a key role in the decline of indigenous fish stocks. The conversion of wetlands, natural filters and buffers against pollution, for rice, cotton and sugar cane, have added to the lake's woes.

The declining quality of the waters has favoured the water hyacinth weed which has seriously affected water quality and transport on the lake. The net result has been a decline in catches of local fish, a decrease in economic activity at key ports and a rise in diseases such as malaria.

As so often is the case, it is the socially or economically disadvantaged— the poor, the elderly, women and children and the already unwell— who suffer most as a result of environmental change. This is because they have fewer choices such as moving to a safer place, purchasing food during times of drought or shortages, finding alternative sources of fuel if forests are cleared or obtaining health care.

Global warming, caused by the burning of fossil fuels, is expected to increase the rate of change making it increasingly difficult for the most vulnerable groups to adapt and avoid the impacts. It is also likely to increase the intensity and frequency of those natural disasters which are related to climate.

Other examples of where environmental change has made people more vulnerable include:

The Yangtze River - In 1988, China suffered the most severe flood in recorded history. Over 220 million people were affected and economic losses totaled more than US\$ 36 billion. Forest cover was 22 per cent in the river's upper reaches in 1957. Deforestation had reduced this cover to 10 per cent. As a result soil erosion and siltation of the middle and lower reaches of the Yangtze had become so intense that the river, swollen by rains, burst its banks with devastating results.

Climate change, as a result of human-caused emissions from cars, factories and homes, is expected to aggravate an already deteriorating situation over the coming decades.

Himalayas - Over the past half century, there has been an accelerated melting of glaciers and the enlargement of glacial lakes in the region. The risks of such lakes bursting and flooding valleys hundreds of kilometres downstream has intensified.

Human Vulnerability

Peoples' vulnerability to environmental change also depends on where they live. Rising, global, populations are forcing many, often poor, people into more hazardous areas such as steep mountain slopes, which may be prone to mud slides and land slips, and ones close to sources of pollution.

Small island states, for example, can be at a higher risk from environmental change and natural disasters because of factors such as their remoteness, ecological fragility, small internal markets and limited natural resources.

Cities - More than 1 billion urban dwellers, mostly in Africa, Asia and Latin America live in slums in 2002. A billion more people will probably be living in cities by 2010.

They are likely to be absorbed in cities in the developing world where many populations are already exposed to multiple environmental hazards. These include poor sanitation, little or no access to safe and adequate drinking water supplies, and overcrowded living conditions. Poorly designed homes or poorly enforced construction codes make people more vulnerable to disasters such as earthquakes.

The GEO-3 report looks at several ways in which environmental changes are making populations more vulnerable.

A key area is **Health** - Poor environmental quality is directly responsible for some 25 per cent of all preventable ill-health with diarrhoea and acute respiratory infections heading the list.

Environment-related premature death and illness, as a result of factors such as indoor air pollution and poor sanitation, accounts for 18 per cent of the total burden of disease in the developing world.

In the United States, a 10 microgamme per cubic metre rise in fine particles or particulates in the air, produced, from sources such as traffic and industry, a 4 per cent increase in general morbidity, a 6 per cent increase in cardio-pulmonary mortality and an 8 per cent rise in lung cancer morbidity.

Sewage pollution in the sea has triggered a heath crisis of massive proportions. Bathing in polluted seas causes some 250 million cases of gastroenteritis and upper respiratory disease annually costing the world US\$ 1.6 billion, it is estimated.

In Bangladesh, more than 25 per cent of the 4 million tube wells that are the main source of drinking water contain dangerous levels of naturally-occurring arsenic. Nearly 75 million people are vulnerable to arsenic poisoning there putting them at risk of skin cancer, kidney and liver failure, and respiratory problems.

Environmental degradation also carries **economic costs** which in turn can make populations more vulnerable.

In Japan, for example, damage to agricultural crops from low lying ozone formed by air pollution in strong sunlight is estimated to cost US\$ 166.5 million a year in the Kanto region alone.

Disasters, such as hurricanes, may trigger bigger economic losses in richer countries, but the impact on developing countries can be greater. The 1991-1992 drought in Southern Africa caused a 62 per cent decline in the Zimbabwe stock market.

Urban air pollution costs India an estimated US\$1.3 billion annually; loss of productivity as a result of land degradation, US\$ 2.4 billion; deforestation, US\$ 214 million and the health costs of water degradation, US\$ 5.7 billion.

Reducing Human Vulnerability - To date, most responses to human vulnerability have focused on cushioning the impacts of environmental change and natural disasters. Donor countries are often ready to provide food or emergency support in the wake of a flood or famine. Backing projects that will help offset some of the worst impacts of natural disasters has tended to take second place despite this being generally more cost-effective in the long run.

Many natural systems have evolved in response to environmental threats and have a built-in capacity to absorb them. Vegetation stabilizes stream banks, slows run off and prevents erosion. Beaches absorb wave energy and protect coastlines. Trees stabilize soils and can reduce the threat of avalanches.

Restoring or conserving such natural “buffers” is often cheaper and more long lasting than artificial defenses such as sea walls.

Helping vulnerable people to cope, by marshalling existing resources such as clean water, food stores and the like, can help cushion the impacts of disasters. Adapting to threats is also important, particularly given the scientific view that some level of climate change is now inevitable as a result of the emissions that have and will build up in the atmosphere. To do this, nations and vulnerable groups within countries require early warning systems able to forecast potentially hazardous and damaging events and changes well in advance.

Ocean observation buoys, sited in the Pacific Ocean, have been deployed as an early warning system for *El Nino* extreme weather events. By measuring surface sea temperatures, they can help provide an early indication of an *El Nino* 6 to 10 months ahead. Farmers and government officials in countries like Peru meet to decide what crops should be planted on the basis of these forecasts, choosing ones such as rice if growing conditions are likely to be wet.

Cyclone early warning systems have been developed for India and Mauritius. The Famine Early Warning System Network (FEWSNET) has been set up to improve food security for 17 drought-prone African countries.

Assessing and measuring a country’s or local area’s vulnerability is also vital. Some attempts are being made. The South Pacific Applied Geosciences Commission is developing an index, based on 47 indicators, that it is hoped will help planners in developing, small island states in the region to reduce their vulnerability to natural and human-caused disasters. The Environmental Vulnerability Index is being tested in five countries, including Fiji, Samoa and Tuvalu.

GEO-3 concludes that the degree and extent of human vulnerability is increasing and that “there is a growing gap between rapid rates of environmental degradation and the slow pace of social response”.

It also states: “The continuing loss of environmental defences and accelerating global change are increasing threats to human well-being and are putting sustainable development at risk. The evidence suggests that many areas of the world are on trajectories that will lead them into crisis and that little time is left for creating effective responses if deteriorating situations are to be stabilized”.

“Increased investment now in sound environmental management, community preparedness and vulnerability reduction will result in important savings in the future,” says the report.

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