

PRESIDENTIAL ADDRESS

Climate Change and Natural Disasters: How Healthy Ecosystems Can Help Disaster Risk Reduction

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Background

Climate change is the single most over-arching, global level threat we are facing today. In the last two decades of 20th Century, accelerated anthropogenic activities contributed to alarmingly elevate the atmospheric concentrations of greenhouse gases. This enhanced the radioactive forcing of the Earth's surface and thus perturbed its heat radiation balance.

Global warming and its resultant climate change is, therefore, affecting world weather patterns, altering ecosystems, damaging human-well being, destroying livelihoods and undermining sustainable development. All this is resulting in terrifying economic impacts.

Effects of climate change on natural disasters

A disaster is the occurrence of an extreme hazard event that impacts on vulnerable communities causing substantial damage, disruption and possible casualties, and leaving the affected communities unable to function normally without outside assistance.

Climate change is increasing the frequency of natural disasters. On average, from 1970, there has been a four-fold annual increase in natural disasters. It is estimated that during the last few decades, an average of 250 million people have been affected each year. Natural disasters kill one million people around the world each decade, and leave millions more homeless each year. In 2004 alone, natural disasters impacted the lives of about 140 million people. Economic damages from natural disasters have tripled in the past 30 years— rising from \$40 billion in the 1960s to \$120 billion in the 1980s (USAID, 2000).

Ninety six percent of all deaths from natural disasters occur in developing countries. One billion people are living in the world's unplanned shanty towns and 40 of the 50 fastest growing cities are located in earthquake zones. Another 10 million people live under constant threat of floods.

Risk factors of disasters are increasing: more people are living in vulnerable areas, such as low lying coastal areas, steep hillsides, flood plains, near cliffs, or in forested areas on the outskirts of cities. Environmental degradation is reducing the capacity of ecosystems to meet the needs of people for food and other products, and to protect them from hazards. Thus, reducing the risks that vulnerable people are exposed to has now becoming critical.

Disaster risk reduction and ecosystems

Disaster risk reduction is an important but often unrecognised and undervalued service provided by healthy ecosystems. Healthy or fully-functioning ecosystems can buffer the impacts of natural hazards, while providing livelihood benefits and products to local populations. Ecosystem management is central to building resilience of communities and nations under the Hyogo Framework for Action, the outcome of World Conference on Disaster Reduction, Hyogo, Japan, in 2005.

Why ecosystems are important for disaster risk reduction

- Healthy ecosystems can provide cost-effective natural buffers against hazard events and the impacts of climate change. According to the World Bank (2004), investments in preventive measures, including in maintaining healthy ecosystems, is seven-fold more cost effective than the costs incurred by disasters.
- Healthy and diverse ecosystems are more robust to extreme weather events. Even if they get disturbed and destructed their ability to revert back to the original position remain high.
- Adaptive capacities of ecosystems to absorb sudden shifts in climatic, geological or biological components are a key feature increasing disaster resilience.

- Ecosystem degradation, on the other hand, intensifies the impact of natural disasters. It affects natural processes, and increases vulnerability.

The following examples, from different parts of the world indicate the value of healthy ecosystems in mitigating the adverse impacts of natural disasters.

a. Coastal ecosystems

Mangroves

The benefits of mangroves for shoreline protection and storm damage control have been estimated several thousands of dollars per km² in Sri Lanka and Malaysia. According to a study in southern Sri Lanka, effective mitigation from tsunami waves have been shown possible via healthy coastal ecosystems which had reduced the energy of tsunamis. A Vietnam Red Cross mangrove planting programme to provide protection to coastal inhabitants from typhoons and storms costed an average US\$ 0.13 million a year (1994 to 2001), and reduced the annual cost of dyke maintenance by US\$ 7.1 million.

Coral reefs

The value of coral reefs, including coastal protection and flood attenuation, has been estimated to be thousands of dollars per km² in Indonesia and close to a million dollars in the Philippines. In Sri Lanka, costs and damages arising from the degradation of coastal wetlands amounts to several thousands of dollars per hectare.

b. Inland wetlands

Wetlands function as natural sponges that trap and slowly release surface water. Ecological flood control works with nature in order to enhance soil conservation, increase natural water retention capacities, and uses the ability of wetlands and floodplains to alleviate flood impacts in a number of ways.

In Poland, the temporary storage of water entering a floodplain has proven to reduce flood risks. In USA, floodplain reconnection and conservation have reduced the occurrence and intensity of floods significantly. Flood mitigation services by Luznice floodplain in Czech Republic are valued at over US\$11,800/ha/yr.

c. Forest ecosystems

Forests which acts as natural covers, can reduce the level of immediate rainfall run-off, help prevent soil erosion, help ensure slope stability and regulate stream flow. Primary or unmodified forests are reported to be generally more resilient, stable and adaptive, in disaster risk reduction. In Switzerland, avalanche prevention of protection forests is valued at up to US\$170,000/ha/yr in areas adjacent to high-value assets. Yet another study using data from 56 countries conclude that native forests have reduced the intensity and nature of damage from floods. On the other hand, studies carried out in Central Africa, china and India show that deforestation contribute to environmental degradation and affect the frequency and intensity of natural disasters including land slides and floods.

Conclusions

Healthy ecosystems contribute positively to environmental resilience against natural disasters and mitigate impacts of climate change. They often provide a cost-effective way of regulating hazards since they act as renewable and dynamic natural barriers. Therefore, investments in sustainable ecosystem and environmental management can offer sustainable solutions to reduce disaster risk.