CASE STUDY

RESILIENT ECOSYSTEMS, HEALTHY COMMUNITIES: HUMAN HEALTH AND SUSTAINABLE ECOSYSTEMS AFTER THE DECEMBER 2004 TSUNAMI

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Human health and wellbeing are closely linked to the health and resilience of ecosystems. When natural disasters occur in situations where natural resources have been severely degraded, it is much more difficult for communities to recover and for people to re-establish their lives. By examining lessons from the December 2004 tsunami, it is possible to identify the important role healthy coastal and marine ecosystems played in buffering immediate impacts and protecting human lives, and the longer-term benefits gained for human health and livelihoods from sustainable use of natural resources (see Bowen et al., this issue). Whilst the role resilient ecosystems played in reducing the severe humanitarian impacts of such a powerful phenomenon should not be exaggerated (especially in Sumatra, Indonesia where wave height and force was very high; see Keim et al., this issue), the potential of healthy ecosystems to hasten the recovery of communities is clearly evident.

COASTAL LIVELIHOODS

Many diverse livelihoods dependent on coastal and marine resources were disrupted by the tsunami, including lagoon, estuary and marine fisheries; agriculture and agro-forestry (i.e. coconut, cinnamon, orchards); and other natural resource-based livelihoods. In Sri Lanka for instance, the two worst-affected sectors (tourism and fisheries) saw approximately 200,000 people lose their jobs in the immediate aftermath of the tsunami (Ministry of Environment and Natural Resources of Sri Lanka [MENR] and United Nations Environment Programme [UNEP], 2005). The future sustainability of these and other coastal communities depends not only on how severely they were impacted by the tsunami in terms of loss or damage to assets and resources, but also the state of resources prior to the tsunami.

Many of the coastal and marine ecosystems that livelihoods rely upon, such as mangroves, dunes, coastal wetlands, beach barriers, lagoonal basin estuaries, coral reefs and marine fisheries, were already degraded prior to the tsunami. It is estimated that regional fish stocks were depleted to 10–30 percent of levels that existed prior to the expansion of fishing in the 1970s (World Fish Centre, 2005). Coral reefs had been severely degraded from the impacts of over-fishing, coral mining, and coral-bleaching episodes. Mangrove forests had also been extensively cleared throughout the region for construction, establishment of shrimp farms (for international export markets), and other activities.

HEALTHY ECOSYSTEMS

Apart from sustaining livelihoods and generating income, these ecosystems also provide important ecosystem services, such as coastal protection, prevention of saltwater intrusion, buffering against storms, and are a source of construction materials. There were many media stories early after the tsunami stating that healthy and intact ecosystems (i.e., mangroves, coral reefs, complex coastal vegetation, and dune systems) protected and buffered people from the impacts of the waves. These stories were later confirmed in Sri Lanka by detailed environmental-impact studies undertaken by local universities.

Studies found that where extensive stands of mangroves were present, they played a positive role in buffering inland areas from the tsunami by reducing the energy of the incoming waves and directing tsunami waters into a network of creeks and channels (MENR and UNEP, 2005). Less-complex coastal ecosystems, such as casuarinas stands, proved less resilient. Vegetated coastal sand dunes completely stopped the tsunami at Yala and Bundala National Parks in southeast Sri Lanka (MENR and UNEP, 2005). The situation was starkly different in Aceh, where the physical landscape was so dramatically transformed by the impact of the waves. Healthy reefs off the coast of northwest Aceh, for instance, did not mitigate damage on the land, with inundation distance determined largely by wave height and coastal morphology (Baird et al., 2005). Mangroves along the Acehanese coast also proved ineffective in buffering inland communities.

Less dramatic but equally important is the role played by healthy ecosystems in sustaining lives through the recovery phase until livelihoods are re-established, as a diverse and healthy resource base provides greater options for households. In situations where the main source of livelihoods has been lost, such as tourism or fisheries, households have temporarily turned to other activities such as cottage industries (e.g., coir making, basket

weaving). Those households wholly reliant on a single resource have proven to be less resilient than others in situations where that resource has been severely damaged. Diversifying livelihoods, creating jobs and income-generating opportunities for both men and women, and enhancing the resource base will help contribute to building resilience to future extreme events.

NEED FOR SUSTAINABILITY

Broader-scale development pressures and processes, such as tourism development, demographic shifts, urbanization, and relocation to avoid conflict, had contributed to putting a large proportion of the population at risk to such a disaster. Reconstruction efforts need not only to respond to the damage caused but also need to address the underlying causes of pressure on coastal and marine resources and promote sustainable resource use if communities are to be resilient to future environmental shocks. There is much evidence to indicate that capacity in the fisheries sector, particularly in Sri Lanka to catch fish, may have been increased as a result of post-tsunami assistance. There has particularly been an increase in the number of small craft, as well as distribution of inappropriate nets and gear. This approach of increasing capacity and putting pressure on an already strained resource, if not modified in the medium term, is setting the region up for another crisis—an ecological and food-security crisis. Sustainable alternatives to fishing need to be created.

Reflecting the above broader-scale development processes, pressure on freshwater resources was high in coastal areas prior to the tsunami—freshwater is often limited and subject to competing uses. In the dry zone of southern Sri Lanka, some communities were already reliant on water trucking. Whilst obviously important to drinking and domestic purposes, freshwater is also important to livelihoods: vegetation, household gardens, and irrigation. Although land for reconstruction is scarce, it is important that due attention be given to the re-establishment of home gardens and sustainable options for water supply and sanitation (WSS) to ensure the longer-term health of communities. The quick deployment of health and rescue teams, and the priority given to emergency WSS, helped avert secondary morbidities and mortalities (especially from infections and malnutrition). Averting longer-term health implications of this disaster can be achieved through continued attention to sustainable WSS.

CONCLUSIONS

Disasters such as the 2004 tsunami destroy years if not decades of development; they wipe out positive achievements, such as poverty reduction gains, but also allow a reconsideration of negative development processes, such as unsustainable resource use. There is an opportunity accompanying the large influx of aid for destructive development patterns to be addressed. However, this opportunity is in danger of being missed if important social, ecological, and economic sustainability considerations are not integrated into humanitarian assistance and longer-term reconstruction efforts.

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