

How not to be an EDP

Julian Caldecott, Environmental Consultant

BEING DISPLACED FROM home, and from the resources of family, community and livelihood, is among the worst disasters that can happen to a human. Stress, poor nutrition, unfamiliar dangers, unrecognized opportunities, and the attentions of predatory strangers all add up to dramatically higher mortality rates among displaced people. This calamity can occur for several reasons, notably: armed conflict and its associated coercion, intimidation, mutilation, massacre and the sowing of mines and unexploded ordnance; and environmental disasters such as volcanoes, earthquakes, tsunamis, storms, landslides and droughts. These events can make it impossible for people to stay where they are, and those who survive the immediate calamity must become 'displaced persons' — refugees if they cross national borders in their flight, internally displaced persons (IDPs) if they flee warfare within their own country, or environmentally displaced persons (EDPs) if they are driven away by the failure of their own environments.

Everyone on Earth has always been at random risk of becoming an EDP, since local climates change, essential ecosystems can be destroyed, and seismic events can strike without warning. These 'background' risks we just have to accept, managing them as best we can by accumulating useful wealth (such as food stores) for use in emergencies, setting rules (such as restricted access rights) for the use of ecosystems, and avoiding obviously precarious locations (such as the slopes of active volcanoes — although here the temptations of high soil fertility may make it hard to sustain). It is clear, though, that the world is becoming an increasingly hazardous place, with the consequences of global climate change coinciding with an unprecedented abundance of people living in places where environmental calamity may be statistically unavoidable over time.

In particular, although the details are still debated, it is widely feared that very large areas of settled land where agriculture is already marginal due to low or erratic rainfall may become uninhabitable. It is also feared that rising sea levels and an increasing frequency and intensity of storms may make it hard to live in the world's coastal zones, which are now the most densely settled areas in history. In these circumstances, while the root causes are addressed by other (but probably slow-acting) mechanisms of international cooperation, it is essential to explore the frontiers of disaster risk management. For not all calamities are equal, and many can be survived if wise measures are taken in advance.

We should therefore ask: by what means can we strengthen the capacity of people and their communities to anticipate, plan for, manage the impacts of, and recover from disasters, so that survival and well-being can be made greater than would otherwise be the case? In particular, an ecologist would ask: can the nature of the ecosystems in which people live contribute either to risk or to security, and if so how? And how can the balance be shifted in our favour?

The great tsunami of December 2004 provided a major impulse to these enquiries. It impacted the coastal zones of countries all around the Indian Ocean, and it is wise to ask if coastal ecosystems had a role in mitigating these impacts. Answers are mixed, however, because it is hard to separate out the influences of pre-tsunami damage and the variation in tsunami scale caused by distance from the earthquake epicentre and other factors such as the shape of the seabed. The fact is that coastal ecosystems have evolved to absorb wave energy and trap mud and sand, but can also be overwhelmed by events as extreme as that of a tsunami close to the epicentre of a powerful earthquake. All that can be concluded at present is that these coastal ecosystems cannot necessarily protect against rare, overwhelming events, but they certainly can help protect against lesser, more common environmental shocks, while also supporting mass livelihoods through ecological productivity. Research since the tsunami has deepened understanding of these matters, leading to the idea that the wholesale restoration of coastal ecosystems is justified for many reasons.

Meanwhile, the tsunami precipitated at least three other realizations:

1. That disasters generate immense amounts of debris, some of it toxic, which needs to be relocated, stored, separated and otherwise processed in ways that minimize further environmental damage and health risks
2. That reconstruction after a disaster is politically charged, with decisions made under great pressure, and can cause additional environmental harm both because new building activity may be located in sensitive areas, and also because the demand for timber, rock and sand may fall upon protected areas or resource reserves that are already depleted or vulnerable
3. These ideas lead to the third realization, which is that environmental expertise is needed from the very beginning of the local, national and international response to disaster, and should not be added on later, when key decisions have already been made.

The best way to deliver environmental expertise immediately after a disaster is for it to be present already in the disaster-affected population, meaning that environmental education should be integral to all aspects of disaster preparedness. This helps increase local people's understanding of their own environment and how to use it in their own interests. Hence it is a key necessity, both in ecosystem restoration for disaster risk reduction and livelihood sustainability, and in disaster preparedness.

Interventions should respond to this conclusion, seeking to impose neither ecosystem restoration nor disaster preparedness, but rather to empower, encourage and enable people and communities to take informed decisions in favour of both. But the education needed to allow all members of a community to make informed

decisions about their own development and security, and to put those decisions into effect, can only be achieved through a long process of participatory research, dialogue, debate and experimentation. This is a dilemma for those concerned about reducing disaster risk, since there is so much to do, it can only be done slowly, and there is so little time to do it in.

Nevertheless, there are strong hints available to guide us in our actions, and the tropical coastal ecosystems known as mangroves are of particular interest. These are extraordinarily productive, since they live in areas where the mixing of nutrients from sea and land supports vast numbers of breeding and maturing fish, molluscs, holothurians and crustaceans. The result is that these swamp forests can yield an annual harvest per hectare of 100 kilograms of fish, 20 of shrimp, 15 of crabmeat, 200 of mollusc and 40 kilograms of sea cucumber.¹ More than 70 other uses for mangrove products have been documented worldwide, ranging from palm sugar and honey to tannin and water-resistant poles.² For these reasons, mangroves help support the livelihoods of millions of coastal dwellers.

Mangroves are also physically sturdy and complex, with stilt roots and other structures that help to absorb wave energy. Healthy mangrove ecosystems play an important role in moderating the action of wind-generated waves, and thus are important in limiting both coastal erosion and storm damage.³ There is plenty of evidence for this, from anecdotal observation and measurement of storm impacts, empirical measurement of wave forces and effects, and modelling of fluid dynamics. There is a wealth of observation of coastal impacts from waves and storms in areas with and without mangroves. Following the great tsunami, many observations suggest that areas protected by mangroves suffered less severe impacts, although this protection was most apparent in areas where the tsunami waves were only 5-10 metres high. In these places, wave energy was largely absorbed and dissipated where natural lagoons, mangroves and beach dune systems had survived decades of logging and sand mining.

In the context of such a massive assault as occurred on 26 December 2004, one may think that little can be done. Yet this is a

very rare kind of event. Much more frequent are the fierce storms and wave surges that are building on a steadily-rising sea level, one that is in turn bringing far more people within range of a disturbed ocean. In these circumstances, and considering that by December 2004 mangrove cover in the twelve countries most affected by the tsunami was well below half of its original extent, restoring coastal ecosystems makes a lot of sense. Now the quest is for effective ways to put back mangrove-protected landscapes that are inhabited and used by millions of people. Many international organizations and government agencies realized this at the same time, and since the tsunami, millions of mangrove propagules have been planted along the region's shorelines.

This is not always successful, though, since mangroves need care and attention. They need to be planted in the right places: for example the pioneer *Avicennia*, the mature-stand *Rhizophora* and the landward *Callophyllum* all have different needs. They can be washed away if not protected from strong currents, or covered by sand, or die of sun-bake if left unshaded when too young, and predators such as crabs can kill them. Seedlings need to be grown in protected nurseries for some months before being planted in their ecologically-correct locations, and above all, post-planting community care is needed for maximum seedling survival and full establishment. In other words, local people are needed as active partners, not just as hirelings for public works, and they need to know and care about what they are being asked to do.

The aim now is to put together a process that can be rolled out around the Indian Ocean, one that is based on educational empowerment, community organization and ecological knowledge. In this, people will plant and care for mangroves and other coastal ecosystems in the knowledge that they generate food, cash and jobs, as well as environmental security. This concept is motivating post-tsunami restoration efforts in Indonesia, Sri Lanka and the Maldives, in which partners such as UNEP, Wetlands International, IUCN and the respective national governments are deeply involved. These are small and early steps, but they are important ones in helping people avoid the fate of becoming EDPs in an increasingly hazardous world.



Photo: Nyoman Suryadiputra

Mangroves (*Rhizophora mucronata*) planted as an environmental security measure at Pemalang, Central Java