

EDITORIAL

The real impact of the 2004 tsunami

Kartik Shanker

*Centre for Ecological Sciences, Indian Institute of Science, Bangalore, India, and
Ashoka Trust for Research in Ecology and the Environment, Bangalore, India
Email: kshanker@ces.iisc.ernet.in*

Though nearly two years have passed since the 2004 tsunami, there is still little clarity on its long term environmental impacts. This is largely because attention has been focused largely on its direct physical impacts. What areas were inundated? What beaches were washed away? What reefs were damaged or uplifted? How has the topography changed? Assessments of the impacts on wildlife and their habitats largely focused on similar parameters (Kaul and Menon, 2006a, 2006b). Similarly, reports on marine turtles have looked at impacts on nesting beaches (Hamann *et al.*, 2006). These reports definitely provide a useful compilation of the short term impacts of the tsunami itself. Studies of sociological impacts have also documented fairly thoroughly loss of lives and livelihoods, damage to houses and boats, etc.

Subsequent to studies of physical impacts, many commentators have spoken of the tsunami of assistance, the tsunami of non-government organizations, the tsunami of developmental aid and organizations, and not the least, the tsunami of sweeping change in a community unable to resist it. Which of these will have the most impact on the coast and its environment? I do not pretend to have the answer.

With regard to the environment, for example, there has already been a great deal of discussion about the issue of bioshields. The Tamil Nadu Forest Department has initiated large scale planting of *Casuarina* along the coast. This has been undertaken without a careful analysis of whether such plantations are indeed beneficial in the long term for coastal sustainability. Elsewhere, *Casuarina* plantations on the coast have been cited as a major cause of beach habitat loss (Pandav, 2005). Thus, what beaches were not washed away by the tsunami may well be washed away by responses to it. Coastal features such as sand dunes

which may be critical to coastal integrity have been given scant attention, and used for reconstruction or plantations.

Similarly, fish stocks may not have been directly affected by the wave, but may be affected by rehabilitation. Post-tsunami, many boats have been replaced and the proportion of mechanized and motorized boats may actually increase. Given that the fisheries and marine habitats were already detrimentally affected by bottom trawling, these actions may further aggravate both ecological and livelihood issues on the coast.

The rehabilitation of affected communities offers another case. Fishing communities have long occupied the shore, and have often resisted attempts to use the land for development. In the name of safety and coastal vulnerability, housing projects for rehabilitation have been planned at a distance from the sea. There are fears in the community that by moving them away from the sea, the land is actually being opened up for 'invasion' by the government and private sector.

There is another issue here. Environmental and socio-ecological issues on the coast clearly preceded the tsunami. It is against this background trend that one must assess the impacts of the tsunami and responses to it. Many tsunami reports did, for example, find that violation of the Coastal Regulation Zone (CRZ) notification norms resulted in loss of both property and life (Kaul and Menon, 2000a, b). However, this seems far from adequate in addressing the fact that the impacts of the tsunami reach far beyond the wave itself, both in environmental and sociological terms.

Following their relief assistance, the United Nations system developed a Post-Tsunami Recovery Framework to aid the Government of

India in its post-tsunami rehabilitation and reconstruction efforts (UN, 2006). Since environment sustainability is a critical component of the framework, the UNDP launched the 'Post-Tsunami Environment Initiative' (<http://www.ptei-india.org>), a project jointly executed by the Nature Conservation Foundation (NCF), Mysore, the Ashoka Trust for Research in Ecology and the Environment (ATREE), Bangalore and the Citizen, consumer and civic Action Group (CAG), Chennai. This complements other projects in the region by local and international agencies. This project aims to understand coastal vulnerability and resilience in the face of such natural disasters within the Indian context, establish participatory monitoring systems, critically analyse developmental policy, and develop management models for key sites along the coast.

As mentioned, coastal issues have to be viewed in the context of processes that preceded the tsunami. In July 2004, the Ministry of Environment and Forests (MoEF) set up an Expert Committee headed by Professor M.S. Swaminathan to carry out a comprehensive review of the CRZ Notification. Its mission was to enable the MoEF to base its coastal regulations on strong scientific principles and to devise regulations that would meet the urgent need for coastal conservation and development / livelihood needs. The Committee submitted its report in February 2005, a month after the tsunami (MOEF, 2005). Clearly, there are deficiencies with the CRZ and with the overall design and implementation of coastal area

management in the country. While the general principles outlined by the Swaminathan Committee are commendable, the actual planning and implementation of an enhanced management regime go far beyond the report (Sridhar *et al.* 2006).

Sridhar *et al.* (2006) outline the steps that need to be taken in order to implement an improved coastal management regime. Principally, they recommend the need for a clear timeframe for implementation, a state-wise review of the CRZ notification including current violations and loopholes, major public consultations/workshops to facilitate a participatory process for developing changes to legislation, and incorporation of hazard and risk management in the overall coastal management mechanism with adequate flexibility to account for specific cases.

Future research and detailed review based on primary and secondary biological, legal and sociological information is required to guide policy changes, accompanied with monitoring along the coast. Detailed geo-referenced maps need to be prepared for the entire coast to facilitate a GIS-based approach to coastal management. This should be in the public domain and in user-friendly formats along with all other CRZ related information to encourage widespread regulation of the law. Coastal conservation and management, both within and outside the context of the tsunami, needs to take into account a full range of issues if it is to be successful in the long term.

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