

## **FUTURE DIRECTIONS FOR POST-TSUNAMI COASTAL ZONE MANAGEMENT IN SRI LANKA**

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On December 26, 2004, the great Indian Ocean tsunami forced the waterline at the shore in about two-third of Sri Lanka to move several hundred metres inland causing death as well as damage to property at a scale the country has never seen before. The enormity of the tragedy clearly underscores the need to incorporate the protection against natural hazards into the existing integrated coastal zone management (ICZM) strategy of Sri Lanka whilst formulating a broad framework of policy decisions with regard to the post-tsunami coastal land use. The present paper outlines the essential elements of such a management strategy for Sri Lanka's coastal zone.

First of all, we must realize that it is neither economically feasible to neutralize the potential damage due to tsunami totally through engineering interventions such as building of giant seawalls, nor is it socially acceptable to exclude people and buildings entirely from the damage prone areas. Therefore, a key attribute of any action plan should obviously be a balanced management approach that can achieve a compromise between the above two competing factors after giving due consideration to hazard risks and likely damages, as well as the severity and the likely frequency of recurrence of such events. In this context, the Sri Lanka ICZM Programme with necessary revisions is a good tool because it can control development patterns, and combine coastal natural hazards mitigation with natural resource conservation.

Clearly, protection against coastal natural hazards was not considered as a major issue two decades back, and therefore, has not been fully addressed in the Sri Lanka ICZM programme launched in 1990 or in its subsequent revisions. However, now that the vulnerability of the low lying coastal lands in Sri Lanka to the extreme geological as well as meteorological happenings in the Indian Ocean around the country is abundantly clear, the present ICZM Plan must be updated to encompass protection against coastal natural hazards as a priority area of management.

Sri Lanka's coastline faces the threat of flooding due to two sources: tsunami as well as storm surges. Storm surges, although not potentially as destructive as a major tsunami, can be comparatively more frequent. Clearly, the risk of tsunami or storm surges can be mitigated most effectively by avoiding or minimizing the exposure of people and property through good land use planning (Clark, 2001). Development should be prevented in high-hazard areas wherever possible; where development cannot be prevented, land use intensity, building value, and occupancy level should be kept to a minimum. Alternatively, new developments can be clustered on site areas where risks are the lowest.

The structures that must be sited in damage prone areas should be designed to be able to withstand the surge forces due to tsunami run-up, and with provision for emergency evacuation; structures that are already sited in high risk areas must be modified and strengthened adequately.

We also need to review what activities or infrastructure should be there on the coastal belt as well as what need not necessarily be there, in other words, the conforming and non-conforming uses of the coast (Kamphuis, 2000).

Planting of groves of trees and preservation of coastal habitat that provide natural protection to wave attack, flooding and erosion, such as mangroves, are vital too. An added benefit of such conservation may stem from the fact that many tourists coming to Sri Lanka are becoming more interested in nature and physical activities such as hiking, biking, birding, boating and fishing rather than just sunbathing on the beach.

Furthermore, an inspection of the devastation in the affected parts of the coastline around the country revealed that the extent of tsunami damage is not uniform: some areas suffered more damage, some less, and in certain other parts of the coastline there is no damage at all. Therefore, a detailed assessment of the onshore distance within which significant damage has been caused by the recent tsunami may provide some helpful guidance to identify, among other things, high-hazard as well as low-hazard site areas for post-tsunami coastal land use planning. Such field data should be supplemented with further inundation data from mathematical simulation of other possible scenarios. In other words, inundation maps indicating the extent of the coastal strip that would be affected by tsunami run-up, preferably for different recurrence intervals, ought to be prepared. Accordingly, the Peradeniya University Civil Engineering Department carried out a field survey to map the extent of tsunami inundation in the affected parts of the coastline. As it is difficult to make such inundation measurements at each and every kilometre along the coastline, the primary objective of the field survey was to verify the reliability of the tsunami inundation data that could be obtained from satellite images, for example, ESRI vector data. Fortunately, the inundation measurements at almost all the selected locations were found to match well with those derived from the ESRI data. Therefore, it appears that the inundation and damage shown on ESRI satellite images are sufficiently reliable to prepare a preliminary tsunami inundation map for the country. The results of the survey are discussed in detail in the paper.

#### REFERENCES

- Clark, J. R. (2001). *Coastal Zone Management Handbook*, Lewis Publishers, New York.
- Kamphuis, J. W. (2000). *Introduction to Coastal Engineering and Management*, World Scientific, Singapore.