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# Coasts and Coastal People Scenarios of Change and Responses



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## **Definition of a Tsunami Safe Boundary for Sri Lanka: A Case Study in the Coastal Zone of Galle, Matara and Hambantota Districts.**

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A huge tsunami, generated by an earthquake with a magnitude of 9.0 on the Richter scale occurred, at 00:58:53 (UTC), on 26<sup>th</sup> December 2004 in the depths of the Indian Ocean off the west coast on western Sumatra at 3.307° N and 95.947° E. Being the fourth largest earthquake in the world since 1900, it generated a tsunami that devastated the coastal areas of Indonesia, Sri Lanka, India, Thailand, Malaysia, Maldives, Somalia and Kenya, killing more than 2, 25,000 people. This was the first occurrence of a tsunami which hit Sri Lanka in the last 100 years and therefore was not anticipated.

The south-western and the eastern coasts of Sri Lanka are the most populated regions in the country. Major cities have evolved around numerous natural harbours, and hundreds of fishing villages were located along the shores. The tropical sea beaches were also a traditional tourist attraction, with a well developed infrastructure. As existing government legislation bears no regulations on coastal constructions with respect to a tsunami safe boundary, the coastal line consisted of hundreds of unplanned settlements. Most of these centers were heavily damaged by tsunami, causing a great loss of human lives.

It is now felt that the country should enforce a regulation procedure to control the unplanned developments in the coastal zone. It is also emphasized that a tsunami vulnerable zone should be defined and all permanent constructions should be moved inland beyond this zone. Various proposals for the demarcation of this zone are forwarded. Most of the proposed boundaries demarcate a fixed horizontal distance from the shoreline. However the findings of the survey described below suggest that such definition would be inappropriate.

The International Water Management Institute (IWMI), in its tsunami relief efforts in Sri Lanka, is carrying out a Rapid Needs Assessment Project for Hambantota district in Sri Lanka. As part of this exercise, a Tsunami Affected Boundary Line (TABL) mapping was carried out in this district. Analysis of the elevations of the area bounded by this line, showed that 72% of the tsunami affected area lies below 6m elevation from the Mean Sea Level (MSL). Based on this observation, it was hypothesized that the maximum run-up of the given event in Sri Lanka is about 6m MSL. A hundred and thirty eight (138) km of additional TABL mapping along the coastal zone of Galle and Matara districts were carried out to test this hypothesis.

The results indicated that the suggested maximum run-up height is in good agreement with the measured values. Based on these observations, the paper describes criteria to develop a tsunami safe boundary along the coast, depending on the elevation and horizontal distance from the shore line. A tsunami safe boundary map for the coastal zone of Sri Lanka is produced with this method. Finally, the paper discusses the various other factors (e.g. magnitude of tsunami, coastal geomorphology, etc) that should be taken in to account to further modify this boundary.