



Section C

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Assessment of the exposure of Sri Lanka to tsunamis generated at the Sunda Trench

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Sri Lanka is potentially exposed to tsunamis generated in two undersea subduction zones, Sunda and the Makran Fault. As both zones are located thousands of kilometres away, it is evident that Sri Lanka is exposed to far field tsunamis as opposed to near field tsunamis. The 2004 Indian Ocean Tsunami and the other tsunamis for which alerts were issued in Sri Lanka were generated in the Sunda Trench, and in this study, attention was focused on the assessment of the exposure of Sri Lanka to potential tsunami events generated in the Sunda Trench. Under such circumstances, an early warning system would play a vital role in mitigating the adverse impacts of tsunamis and such a system could be developed effectively by an assessment of the exposure of the country to potential tsunami events generated in the subduction zones. Computer simulation of tsunami propagation based on mathematical modeling techniques was used for this purpose and the tsunami wave height in the coastal waters was considered to assess the level of exposure. The mathematical model MOST (Method of Splitting Tsunamis) together with its interface ComMIT, developed by the National Oceanic and Atmospheric Administration (NOAA) was used for the computer simulations. Although it is capable of simulating deep water and shallow water propagation of tsunamis as well as overland inundation, in this study, the simulations were carried out only to assess the tsunami wave characteristics in the nearshore region, mainly due to the absence of required bathymetric and topographic information. The potential tsunami events generated by earthquakes of magnitudes (M_w) of 7.5, 8.0, 8.5, 8.8 and 9.1 in five selected segments of the Sunda Trench were considered in the simulations. The tsunami wave characteristics (maximum height) in the coastal waters were considered to assess the level of exposure. Locations in coastal waters in the vicinity of Trincomalee, Galle, and Colombo were considered to assess the tsunami wave characteristics. Altogether 78 simulations were carried out and the level of exposure was classified as 'High' for maximum wave heights greater than 2 m, 'Moderate' for heights between 0.5 m to 2 m and 'Low' for heights less than 0.5 m, based on previous studies and the experiences associated with the Indian Ocean Tsunami in 2004. A significant variation of the maximum tsunami wave height and associated levels of exposure, with respect to the earthquake magnitude as well as the segment (location) of generation is evident from the results. The western coastal areas (Colombo) are relatively sheltered, although 'High' levels of exposure are evident in the southern areas (Galle). Even on the eastern coastline (Trincomalee), a significant variation of the level of exposure is evident with the segment of generation of tsunamis. In view of these circumstances, the assessment of the exposure needs to be based on a larger number of simulations covering a wide range of locations and magnitudes of potential earthquake scenarios and associated tsunami events.

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