

THE 25th DECEMBER, 2004 TSUNAMI RUN-UP AND INUNDATION AND THEIR RELATIONSHIP WITH GEOMORPHOLOGY IN TAMIL NADU, INDIA

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Abstract

The Asian tsunami that devastated the southeast coast of India originated consequent to a massive earthquake off the west coast of northern Sumatra (3.267° N; 95.821° E) with a magnitude of 9.0 at 00:58:53 (UTC) (06:28:53 IST) on 26th December, 2004. The earthquake the fourth largest since 1900 and largest since the Alaskan Earthquake in 1964, produced a destructive tsunami that caused colossal damage to the countries in the region. In India, Andaman and Nicobar Islands were not only affected by the tsunami but also by the eventful earthquake and over hundred aftershocks that rocked the region. The tsunami reached the southeast coast of Indian mainland in about two hours (03:10 UTC; 08:45: IST).

The run-up and inundation of the tsunami are determined in the coastal belt of Tamil Nadu coast. The run-up ranges from 1 to 10 m and inundation varies between 50 to 2000 m. Higher run-up and inundation are recorded in the southern part and in the areas peneplained by riverine action. The intensity of the tsunami is more in areas with shallow near-shore bathymetry and flat onshore topography. The presence of offshore shoals, deeper near-shore bathymetry and elevated onshore topography with dune ridges lead to less tsunami inundation. The data collected shows high variation in the run-up and inundation within short distances and is related to the geomorphology of the coast particularly the presence of well developed dune ridge system with two sets of longitudinal dune ridges in the northern part of the area. The fore dune ridge rises to a height of 2 to 3 m and the back dune ridge located 300 to 500 m from the shoreline rise upto 12 m. The presence of the back dune ridge prevented the inundation of the villages located to the west but the fishing hamlets located on fore dune ridge did not escape the fury of the tsunami and inflicted damage to the hamlets. In terms of deposition and erosion of tsunami sediments, deposition is more in the southern part and erosion appears to be dominant in the northern part. The study shows that the geomorphology of the coast has been smoothed by the tsunami making it more vulnerable to future tsunami and storm surge events.