



Vulnerability Mapping of the Indian Coast

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The coastal areas are assuming greater importance in recent years, owing to increasing human population, urbanization, accelerated developmental activities and are areas prone to severe natural hazards/ disasters. While it is agreed that no human interference is possible to control such an event but precautionary measures can minimize loss of life and property to a large extent. In view of the growing threats of flooding and sea level rise, it is vital to study the vulnerability of the coastal settlements of India for better governance and decision making. An effort has been made to map the coastal vulnerable zones of different magnitude using GIS and Remote Sensing techniques. Various factors: shoreline changes, bathymetry and slope, derived from digital elevation model have been integrated with wave height, wind speed, direction and mean annual SLR.

The method adopted here is based on a worst-case scenario involving i) 1 in 100 year flood level, ii) estimation of shoreline change using the USGS model and iii) creating a composite hazard line. The resultant vulnerable zones of different magnitude- very high, high, moderate and low have been overlaid with digitized parcels of cadastral maps on a 1:4000 scale. With this overlay we classified the buildings and properties for their vulnerability to natural hazards such as cyclonic storms which could result in flooding of rivers and sea water inundation, very precisely. A few case studies have been considered along the Indian east coast: i) Puri and ii) Chennai and west coast: i) Gulf of Kutchch and the ii) Gulf of Cambay.

For example, along the Chennai coast, we have estimated that a major portion of the North Chennai coast is prone to coastal hazards. The study estimated that the inundation level of 1 in 100 flood level would reach an elevation of 3.33m above MSL on the landward side, reaching upto a distance of 6km at many places in the North Chennai region. The results of shoreline change analysis indicate, after 100 years, the region north of Chennai harbour will suffer erosion up to a distance of 872 m (@ 8.72 m yr⁻¹) and southern region would accrete to a distance of 492m (@ 4.92m yr⁻¹) from the present shoreline. It is observed that an elevated narrow stretch of coastal landmass (4+ m contour elevation above MSL) located in North Chennai acts as a protective barrier to the hinterland, which has a lower elevation. According to the estimated erosion statistics, this elevated landmass would erode after 100 years, leaving a major part of the North Chennai region inundated during storm surges. Based on the results, the northern part of Chennai, which is already threatened by severe erosion, will be affected by SLR in the near future. Total areal extent of inland area which might be submerged underwater due to 1 in 100 year flood event is 55.23 km².