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# Coastal Vulnerability Index and Its Projection for Odisha Coast, East Coast of India

**Authors :** Bishnupriya Sahoo, Prasad K. Bhaskaran

**Abstract :** Tropical cyclone is one among the worst natural hazards that results in a trail of destruction causing enormous damage to life, property, and coastal infrastructures. In a global perspective, the Indian Ocean is considered as one of the cyclone prone basins in the world. Specifically, the frequency of cyclogenesis in the Bay of Bengal is higher compared to the Arabian Sea. Out of the four maritime states in the East coast of India, Odisha is highly susceptible to tropical cyclone landfall. Historical records clearly decipher the fact that the frequency of cyclones have reduced in this basin. However, in the recent decades, the intensity and size of tropical cyclones have increased. This is a matter of concern as the risk and vulnerability level of Odisha coast exposed to high wind speed and gusts during cyclone landfall have increased. In this context, there is a need to assess and evaluate the severity of coastal risk, area of exposure under risk, and associated vulnerability with a higher dimension in a multi-risk perspective. Changing climate can result in the emergence of a new hazard and vulnerability over a region with differential spatial and socio-economic impact. Hence there is a need to have coastal vulnerability projections in a changing climate scenario. With this motivation, the present study attempts to estimate the destructiveness of tropical cyclones based on Power Dissipation Index (PDI) for those cyclones that made landfall along Odisha coast that exhibits an increasing trend based on historical data. The study also covers the futuristic scenarios of integral coastal vulnerability based on the trends in PDI for the Odisha coast. This study considers 11 essential and important parameters; the cyclone intensity, storm surge, onshore inundation, mean tidal range, continental shelf slope, topo-graphic elevation onshore, rate of shoreline change, maximum wave height, relative sea level rise, rainfall distribution, and coastal geomorphology. The study signifies that over a decadal scale, the coastal vulnerability index (CVI) depends largely on the incremental change in variables such as cyclone intensity, storm surge, and associated inundation. In addition, the study also performs a critical analysis on the modulation of PDI on storm surge and inundation characteristics for the entire coastal belt of Odisha State. Interestingly, the study brings to light that a linear correlation exists between the storm-tide with PDI. The trend analysis of PDI and its projection for coastal Odisha have direct practical applications in effective coastal zone management and vulnerability assessment.

**Keywords :** Bay of Bengal, coastal vulnerability index, power dissipation index, tropical cyclone
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