

Tropical Cyclone Risk Mapping Using Remote Sensing and Spatial Analysis: Application to a Coastal Upazila in Bangladesh

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Tropical cyclones are a common and devastating natural disasters for tropical coastal regions globally. The intensity and extent of damage by tropical cyclones are very high. An appropriate mapping approach is essential for producing risk assessments to reduce the impacts of cyclones on people, property and the environment. The present study developed and tested a risk mapping approach for tropical cyclone impacts in Sarankhola Upazila, a 151 km² local government area in coastal Bangladesh. The approach incorporated remote sensing and spatial analysis, field data and multi-criteria evaluation. Fourteen criteria under three risk components: hazard, vulnerability and mitigation capacity were assessed. Thematic raster map layers quantifying the level of risk were prepared for every criteria using Analytical Hierarchy Process (AHP) approach. A weighted overlay technique was used for overlaying standardized criteria maps under each risk components with their weights to produce the individual risk components maps and then finally risk map. Our results indicated that 6% of the study area was located in the very high risk zone, mostly close to the coastal river, with 16 % area as high risk zone and around 28 % area was at moderate risk zone. The area was classified as low and very low hazard zone accounts the 26% and 23%, respectively, mostly towards inland from the coast. Our results were validated by comparison to a map of previous cyclone impacts. Critical assessment of our findings demonstrate the approach may have more widespread applicability for assessing tropical cyclone risks in similar coastal environments for the purposes of disaster planning and management.

Keywords: Tropical cyclone, Vulnerability, Hazard, Remote sensing, Spatial analysis, Analytical hierarchy process