

ASSESSMENT OF MULTIDIMENSIONAL VULNERABILITY AND HUMAN ADAPTIVE RESPONSES FROM RECURRENT EXPOSURE TO NATURAL HAZARDS - CASE OF COASTAL DISTRICTS OF WEST BENGAL, INDIA

Abstract

Developing countries continue to reel under the impact of hydro meteorological disasters which have been aggravated by climate change. Tropical cyclone and flood act as catastrophic natural calamities which cause great losses to lives, livelihood, and immense damage to property, natural environment every year around the world. This study attempts to characterize the hazard, assess the vulnerability of the exposed communities and evaluate the adaptive responses of these communities in the face of such recurrent hazards.

First, the susceptible zones of the coastal region of West Bengal, exposed to cyclones and floods, were identified based on comparative evaluation of three prevalently used models (namely, AHP, SE and SVM). The individual dimensions of vulnerability were computed based on a new aggregator function proposed in the study. The multidimensional vulnerability of the region was represented using a multi-objective framework. Pareto optimality conditions were used iteratively to obtain multiple tiers of vulnerability, where each tier represented Blocks (smallest rural administrative unit of the region) having comparable vulnerability. To assess the adaptive responses of the exposed communities of the study area, the spatial transformations in Land Use Land Cover (LULC) between the time span of 2002 – 2014 were recorded and analyzed. The study also used socio-economic data and semi-structured interviews to associate the influencing factors of these LULC changes. However, these responses were not homogenous across the region. The Blocks in proximity to tidal influenced areas and the Blocks under the influence of the urban areas revealed a dichotomy in the nature of transformations. It was observed that the adaptive responses were related to the livelihood and economic opportunities of the communities of the region.

This study can provide general insight into the overall vulnerability scenario of a region with specific inputs regarding the nature of vulnerability. This information can help in allocation of resources both for preventive and curative purposes related to disaster mitigation. The study also identifies the need to control the transformation of farmland. Moreover, environmental pollution (salinity intrusion, loss of top soil etc.) accompanying such transformations needs to be regulated by the State through imposition of remediation taxes.

Keywords: Tropical Cyclone, Flood, Multidimensional vulnerability, Multi-objective framework, Pareto optimality, Adaptive response, LULC transitions;