

Landslide Vulnerability Assessment in Context with Indian Himalayan

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Abstract : Landslide vulnerability is considered as the crucial parameter for the assessment of landslide risk. The term vulnerability defined as the damage or degree of elements at risk of different dimensions, i.e., physical, social, economic, and environmental dimensions. Himalaya region is very prone to multi-hazard such as floods, forest fires, earthquakes, and landslides. With the increases in fatalities rates, loss of infrastructure, and economy due to landslide in the Himalaya region, leads to the assessment of vulnerability. In this study, a methodology to measure the combination of vulnerability dimension, i.e., social vulnerability, physical vulnerability, and environmental vulnerability in one framework. A combined result of these vulnerabilities has rarely been carried out. But no such approach was applied in the Indian Scenario. The methodology was applied in an area of east Sikkim Himalaya, India. The physical vulnerability comprises of building footprint layer extracted from remote sensing data and Google Earth imaginary. The social vulnerability was assessed by using population density based on land use. The land use map was derived from a high-resolution satellite image, and for environment vulnerability assessment NDVI, forest, agriculture land, distance from the river were assessed from remote sensing and DEM. The classes of social vulnerability, physical vulnerability, and environment vulnerability were normalized at the scale of 0 (no loss) to 1 (loss) to get the homogenous dataset. Then the Multi-Criteria Analysis (MCA) was used to assign individual weights to each dimension and then integrate it into one frame. The final vulnerability was further classified into four classes from very low to very high.

Keywords : landslide, multi-criteria analysis, MCA, physical vulnerability, social vulnerability

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