



Geo-spatial technology based landslide vulnerability assessment and zonation in Sikkim Himalayas in India

L.P.Sharma¹, Nilanchal Patel², M.K.Ghose³ and P. Debnath⁴

¹National Informatics Centre, Sikkim, India

²Department of Remote Sensing, Birla Institute of Technology Mesra, Ranchi, India

³Department of Computer Science, Sikkim Manipal Institute of Technology, Mazitar, Sikkim, India

⁴College of Agriculture Engineering and Post Harvest Technology, Ranipool, Sikkim, India

Email: lp.sharma@nic.in

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Abstract: The research presented in this paper employs a simple yet straightforward deterministic technique that is based on the rationale that the landslide vulnerability of an area would be determined by the aggregation of the landslide densities of the various causative factors present therein. The landslide density of a causative factor is computed as the ratio of the frequency of the landslides to the area covered by the causative factor. In the present study, the thematic layers for fourteen important causative factors that were further sub-divided into a total of 39 sub-categories were collected and intersected in the GIS environment that resulted in the division of study area into a number of spatial units. The landslide inventory layer prepared through the satellite map and the field survey was also intersected in the spatial data set. Landslide density was then computed for each of the sub-categories of the landslide causative parameters. Landslide Information Value (LSIV) for each individual spatial unit was determined by summing up of the landslide densities of the different causative factors present in individual spatial unit. The LSIVs determined for the various spatial units of the entire study area were grouped into five zones of landslide vulnerability based on natural breaks (Jenks) technique. The research was carried out in the Rumtek-Samdung Study area in the Central Himalayas located in the Sikkim state in India. The zonation map prepared through this technique showed significant amount of agreement with the field occurrences of landslides that is further ascertained by the prevalence of a Vulnerability Assessment Accuracy of 80%.

Keywords: Landslides, Vulnerability, Zonation, GIS, Causative Parameters, Landslide Density.