Empirical Modelling of Landslide Susceptibility in Kullu District Using Frequency Ratio and GIS Integration

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Abstract

The Kullu district in Himachal Pradesh is prone to landslides because of its steep slopes and complex geological features. This study employs the Frequency Ratio (FR) model to generate a landslide susceptibility map using a geospatial and data-driven approach. A landslide inventory of 428 documented events was compiled, and ten Landslide Conditioning Factors (LCFs) were utilized to assess spatial correlations with landslide occurrence. The FR values were calculated for each LCF class, and weighted raster overlays were generated in a GIS environment to produce the final susceptibility map. Model validation was conducted using ROC which is having a value of 0.738., indicating good predictive capability. The resulting map effectively delineates high-risk zones and can be a valuable tool for regional planning, disaster risk reduction, and sustainable development in the Himalayan region.

Keywords

DEM (Digital Elevation Model), Frequency Ratio, GIS, Landslide Conditioning Factors, Remote Sensing.