Land Sliding Susceptibility Mapping of Hazara Region, Pakistan

Abdullah Khan[1], Saud Anwar[1*], Shaban[1], Bakhtiar Ahmad[1], and Syed Tanvir Shah[1]

[1]*Department of Geology Abdul Wali Khan University, Pakistan*

[*]*Email:saudanwar522@gmail.com*

The aim of this study is to carry out a detailed landslide susceptibility mapping using weighted overlay method in the Hazara Region, Pakistan. For this purpose, multiple datasets including slope, elevation, drainage density, lithological, soil, aspect ratio, active fault map, and land use/land cover (LULC) maps, are utilized to identify and assess various areas prone to landslide hazard. The Digital elevation model (DEM) is used to generate slope and aspect ratio maps, providing insights into terrain level characteristics crucial for landslide susceptibility assessment. The steeper slopes and specific aspects are marked as the most significant factors affecting and initiating the landslide occurrence. Similarly, the drainage density, calculated from hydrological data, is analyzed to identify areas with high water content, which are known to aggravate landslide risk. Moreover, lithological and soil type maps are integrated to identify zones that are characterized by weakly consolidated sediments and soil types marked by low cohesion and high permeability. Furthermore, the active fault map is compiled for the region from literature studies to identify structural weaknesses that may serve as preferential pathways for landslides. The LULC maps are analyzed to assess the impact of human driven activities on landslide. The intersection of these geospatial datasets by weighted overlay method in ArcGIS resulted in the hierarchical development of a susceptibility classes map for the region. The study area is categorized into low, medium, and high-class zones, delineating areas with differential degrees of landslide risk. The results of this study provide valuable insights for land use planning, disaster risk reduction, and informed decisive process to mitigate the impact of landslides in Hazara and similar mountainous regions.