

LANDSLIDE SUSCEPTIBILITY MODELING AND MONITORING USING GEOSPATIAL TECHNOLOGY, NORTHERN PAKISTAN.

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Abstract

The northern Pakistan is attributed with rough terrain, active seismicity, monsoon rains, and therefore, hosts to variety of geohazards. Among the geohazards, landslides are the most frequent hazard with devastating impacts on economy and society. However, for most of the northern areas in Pakistan, landslide susceptibility maps are not available, which can be used for landslide hazard mitigation. This study aims to generate a remote sensing based landslide inventory, analyzing their spatial distribution and develop landslide susceptibility map. The landslide inventory was developed through the visual image classification of remote sensing derived SPOT-5 images (spatial resolution 2.5 m), supported with field observations. Landslide causative factors including slope, aspect, land cover, geology, proximity to road, proximity to fault line and proximity to stream network were analyzed to evaluate their influence on the spatial distribution of landslides. Terrain slope, aspect and stream network were computed from the ASTER Digital Elevation Model, with 30-meter spatial resolution. Land cover map was developed from the SPOT-5 satellite image. The developed landslide inventory map was compared with the landslide causative factors, to evaluate their impact on the spatial distribution of landslides. The derived correlations were used in the Weights of Evidence Modelling and Analytical Hierarchical Model to developed landslide susceptibility maps. The terrain slope, geological formations and distance from the fault were observed to have significant impact on the spatial distribution of landslides. The developed susceptibility maps were subsequently verified in the field. Monitoring of the 2005 Kashmir earthquake induced landslides through the temporal images (2005-2014) shows that majority of the earthquake-induced landslides are stabilized now. One of the active landslide in Muzaffarabad is monitored using the fixed optical camera. The acquired temporal photos shall be subsequently correlated, to identify and evaluate the surface displacement and assist in the early warning of the slope failures. The developed landslide susceptibility maps and monitoring activities shall assist the cornered agencies for mitigating the devastating impacts of landslides.