GIS-based landslide susceptibility zonation mapping along the Muzaffarabad-Chakoti road in western Himalayan region of Pakistan

Muhammad Farooq, Muhammad Qasim, Abdul Mateen, Mohammad Tariq, Umair Bin Nisar and Amjad Bukhari

Department of Earth Sciences, COMSATS Institute of Information Technology, Abbottabad

Landslides, and slope failure are one of the natural phenomena that are witnessed in the Himalayan region of Pakistan, causing threat to infrastructure, agriculture lands and settlements. Landslides and roadside slopes failure frequently disturb road construction activities in Himalayan region. Therefore, it is necessary to produce comprehensive landslide hazards susceptibility zonation mapping for an effective disaster management and future planning & development activities in the Azad Jammu and Kashmir region. In this study, we choose a 55-Km road-section along Muzaffarabad-Chakoti road in Jhelum river valley of Azad Jammu and Kashmir area which is a strategic road link to India. Landslides frequently occur in moonsoon rainy season every year and road services are disconnected for several days. There are several concepts, methodology and techniques have been reported for landslide susceptibility zonation mapping. In this study area, we apply weight-of-evidence statistical approach to generate landslide susceptibility zonation in a small watershed area along the Muzaffarabad-Chakoti road in the Himalayan mountain terrain. The various fundamental parameters responsible for landslide occurrence are: slope, aspect, land use, lithology, drainage density and (proximity to road, fault and stream). Relevant thematic layer maps representing various causal factors that affect landslide occurrence have been prepared using Geographic Information System (GIS) techniques. A total 159 landslides of different types and various dimensions have been identified in the study area, which have covered a total of 947 Km^2 areas. A landslide susceptibility zonation map was generated by superimposing landslide inventory map with various parameters contributing to landslide occurrence. The landslide susceptibility zonation maps were divided in four segments, low, moderate, high and very high susceptibility zone. Landslide susceptibility zonation maps are essential tool for an effective disaster management, and future planning and development activities in the Himalayan region.