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Landslide Hazard Zonation in Kolur Region Using Bayes' Theorem-ANP Hybrid Model

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Abstract

Identifying the factors affecting landslides occurrence in an area and zoning its hazard is one of the basic measures to achieve solutions to control this phenomenon and reduce its environmental hazards. The aim of this study was to determine the areas sensitive to the possibility of landslides occurrence in the Kolur region (Khalkhal County). In this regard, 9 factors affecting the landslides occurrence in the region including lithology, elevation, slope, slope direction, land use, faults, road construction, drainage network and precipitation were identified and used. Then, to determine the vulnerable areas, the hybrid models of conditional probabilities (Bayes' theorem) and network analysis process (ANP) were used. As for landslides occurrence, the results showed that about 28.69% and 25.40% of the study area had a very high risk, about 21.57% of the study area had a moderate risk, and finally about 14.21 and 13.10% of the study area had a low and a very low risk, respectively. Therefore, 65% of the Kolur region had a high and a very high risk of landslides. The main reason was due to the high slope and the presence of marl calcareous formations. According to the obtained results and the relationship between the area of hazardous zones and the percentage of landslide with R2 more than 0.93, the accuracy of landslide hazard zoning map in the study area was confirmed at a good level. Therefore, the results of the combined Bayes' theorem-ANP model were suitable for landslide risk zoning in this type of areas, and the resulting map can be used as a valuable tool in environmental planning and reducing landslide occurrence costs.

Keywords: Environmental Hazards, Landslide, Bayes' Theorem, ANP, Kolur

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