

ABSTRACT

Landslide Hazard Zonation Using GIS Techniques in Jeldu Woreda, West Showa Zone, Oromia, Ethiopia**Tilahun Hamza**

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The main objective of the present study was to identify, evaluate and prepare a Landslide Hazard Zonation (LHZ) map of Goro Kebele of Jeldu Woeda, western Showa Zone, Oromia Region, Ethiopia by using a geographic information system (GIS) Techniques. Accordingly, thirty-four landslides have been identified and mapped in the study area. The failure mechanisms of each landslide were defined and their relation with different governing parameters; slope, aspect, land use/cover, lithology, soil material, and elevation were also recognized. Later, the collected data was arranged and prepared into layered spatial GIS database for the preparation of landslide hazard mapping. The governing parameters; aspect, slope and elevation, were calculated from the digital elevation model (DEM) of the area, which was obtained from the 30 m x 30m LANDSAT TM⁸ elevation data set. The lithology map of the area was modified from the general geological map of Ethiopia (1:2,000,000; 1996), while the material deposit and land use/cover maps were processed from Land sat TM satellite using different digital image processing procedures. Springs were also mapped and further analyzed with respect to the location of the landslides.

The aspects classes, slope class, material deposit, elevation, lithology and landuse/cover were also analyzed to find the correlation with the landslide occurrence in the area. Similarly, the analysis of relational characterization was made and the concentration of landslides with respect to elevation range of springs was deduced. In this study, GIS based statistical and probability approach was used to rate the governing parameters and then customized raster calculation was applied to develop the landslide hazard map. Later, validation of this map was made with the actual landslide inventory data.

The resulting landslide hazard map revealed that 12% (5.6km²) of the study area show no hazard, 27% (12.7km²) as low hazard, 31% (14km²) as moderate hazard, 21% (10km²) as high hazard while the rest 8% (3.8km²) as very high hazard. When the thirty-four landslides are considered to validate the landslide hazard map, 92% of them fall either in the high or very high hazard zones, while the 6% fall in medium and only 2% in low hazard zones. This satisfactory agreement confirmed the rationality of the considered governing parameters, their influential weight, the adopted methodology, tools and procedures in developing the landslide hazard map in the study area. Thus, the LHZ map, prepared during present study, may practically be applied for regional planning and designing preventive measures.

Key words: Geographic Information System, Digital Elevation Model, Landslide Hazard Zonation, Validation
