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Integration of Deviation and Dip Angle Concepts using GIS in Landslide Hazard Zonation Maps of Sri Lanka

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ABSTRACT

Many techniques have been proposed for landslide hazard zonation (LHZ) mapping. Those can be generally divided into two groups: direct or semi-direct hazard mapping. In direct mapping, the degree of hazard is determined by the mapping expert, and in indirect mapping, either statistical or deterministic models are used to predict landslide prone areas based on information obtained from the inter-relation between landscape factors and the landslide distribution. With the introduction of GIS, in particular, indirect methods made substantial improvements due to its capacity to handle and analyze data with high spatial variability.

In the context of Sri Lanka, LHZ maps are prepared using a model developed based on the analysis of more than thousand major landslides which occurred during a five-year period from mid 1989 to mid 1995. For the zonation maps based on this model, field data are collected considering six major factors and the corresponding weight maps are prepared manually. GIS is only used finally as an overlaying and reclassifying tool. In this workflow, a very laborious effort is needed for the preparation of geology weight maps, especially when complex terrain conditions and large amount of data are involved. One of the reasons is that, unlike all other factors where basic mapping units are areas, the geology map consists of two major parts: lithological units as areas but structural geological measurements as lines or points.

In this paper, an approach is discussed by which GIS capabilities can be used efficiently to integrate the influence of structural measurements such as strike or dip directions and dip angles for the preparation of geology weight maps which is an essential part of the LHZ model used in Sri Lanka.