

Application of an evidential belief function model in landslide susceptibility mapping

ABSTRACT

The objective of this paper is to exploit the potential application of an evidential belief function model to landslide susceptibility mapping at Kuala Lumpur city and surrounding areas using geographic information system (GIS). At first, a landslide inventory map was prepared using aerial photographs, high resolution satellite images and field survey. A total 220 landslides were mapped and an inventory map was prepared. Then the landslide inventory was randomly split into a testing dataset 70% (153 landslides) and remaining 30% (67 landslides) data was used for validation purpose. Fourteen landslide conditioning factors such as slope, aspect, curvature, altitude, surface roughness, lithology, distance from faults, ndvi (normalized difference vegetation index), land cover, distance from drainage, distance from road, spi (stream power index), soil type, precipitation, were used as thematic layers in the analysis. The DempsteróShafer theory of evidence model was applied to prepare the landslide susceptibility maps. The validation of the resultant susceptibility maps were performed using receiver operating characteristics (ROC) and area under the curve (AUC). The validation results show that the area under the curve for the evidential belief function (the belief map) model is 0.82 (82%) with prediction accuracy 0.75 (75%). The results of this study indicated that the EBF model can be effectively used in preparation of landslide susceptibility maps.

Keyword: Landslide susceptibility; EBF model; GIS; Malaysia; Remote sensing; Kuala Lumpur