An application of neural network model for landslide susceptibility classification on Pahang area, Malaysia

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The aim of this study is to evaluate the landslide susceptibility at Pahang area, Malaysia, using a Geographic Information System (GIS) and remote sensing data. Landslide inventory map was prepared for the study area by identifying the landslide locations from the interpretation of aerial photographs, satellite images and from field surveys. Topographical and geological data and satellite images were collected, processed, and constructed into a spatial database using GIS and image processing. The factors chosen that influence landslide occurrence were: topographic slope, topographic aspect, plan curvature and distance to drainage, all from the topographic database; lithology and distance to fault, taken from the geologic database; land cover from TM satellite images; and the vegetation index value from Landsat satellite images. These factors were used in an artificial neural network to prepare the landslide susceptibility map. In addition, each factor's weight was determined by the back-propagation training method. Then the landslide susceptibility indices were calculated using the trained back-propagation weights, and the landslide susceptibility map was prepared in GIS. Landslide locations from the inventory which were not used during the training of the ANNs were used to validate the results of the landslide susceptibility map and the receiver operating characteristics (ROC) graphs were drawn for validation purpose. The area under the curve (AUC) results showed about 87% accuracy. For conclusion, the validation results showed sufficient agreement between the susceptibility map and the existing data on landslide areas.