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A GIS -based method to evaluate factors controlling landslides along the East-West Highway (Gerik – Jeli), Malaysia

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The present work aims to utilize remote sensing and GIS to assess the contribution of every predisposing factors on landslides to broaden our knowledge in assigning weights for those factors, in order to construct a potential landslide hazard map along the East West highway (Gerik –Jeli) area.

In order to achieve this, landslide locations map of the study area was prepared from the interpretation of aerial photographs and field surveys, and a spatial database for causative landslide factors was constructed from topographic, geological, soil and precipitation maps. Then, ten thematic maps for the factors that influence landslides occurrences have been produced from spatial data base. The lineaments map was extracted from Landsat 7 ETM+ image. DEM , slope, aspect and elevation thematic maps were calculated from the topographic database. Lithology, fault map, and bedding map were extracted from the geology database . Soil map was produced from laboratory analysis of fifteen soil samples. The rain fall zones map was prepared using data collected from three rain fall stations. These thematic maps were then overlaid with landslide locations map using ArcGIS 9.2 software, and the contribution of each causative factor to landslide was evaluated by calculating the number of pixels forming the scarps fell into the various classes of the maps of the factors. The results obtained from the analysis showed that factors acted differently and for every factor, only some of the classes were considered to have marked importance. It was found that slope ranges from 20º to 40º played a very important role in the concentration of the landslides processes. While from the eight aspect classes the landslides showed highly prevalence toward W, E, NW and SE. In the case of lineaments density, the most dominant landslide frequency was located in the lineament density ranges from 0.505 km/sq km to 1.516 km/sq km. On the other hand, the highest landslide concentration was in the drainage density of 3.505 km/sq km. Comparing the orientation of strata to the slope showed that Landslides occur when the strata has inclination in the same direction with slope direction. In conclusion, it was possible with this method to demonstrate that, for each landslide causative factor considered, only some of the classes had a high influence, whereas others had a less important influence. With the results obtained from this GIS methodology, the weights can be assigned objectively according to the importance of each factor on contributing the landsliding process.

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