Landslide susceptibility assessment of the Cameron Highlands, Pahang, Malaysia area based on Combined Spatial Analysis Model – Frequency Ratio and Logistic Regression

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Abstract: Landslides are the natural phenomena related to the mass wasting process and frequently observed in hilly and mountainous area. It can result in enormous casualties and huge economic losses. New methodology in assessing this kind of geohazard is required to effectively identify the potential of landslide occurrence in particular area. Thus, local authority will benefit a better understanding of landslide hazard within their vicinity and to make a rational decision in land-use planning and slope management. The identification of areas where landslides are likely to occur is important for the reduction of potential damage.

This research was carried out at selected 275 km² of Cameron Highlands, in Pahang area. Cameron Highlands is one of the tourist hotspots in Malaysia. It is located at elevation ranging from 1,100 m to 1,600 m above sea level. Agricultural activity is among the largest contributor to the local economy. Poorly planned agricultural activity and development had contributed to the instability of the slope. Due to the complexity of many interrelated processes, the stability of a particular slope is difficult to determine and failure is generally impossible to predict with any degree of accuracy. A comprehensive field mapping and GIS-based spatial analysis can be applied to propagate understanding of landslide prone area.

The main objective of the research is to develop a landslide susceptibility map for Cameron Highlands area based on a combined spatial analysis method; the Frequency Ratio (FR) and Logistic Regression (LR) method. The reason of proposing various models was to tackle the disadvantage of the expert opinion and to reduce uncertainty in the final landslide susceptibility map. The use of advanced and modern geospatial technologies, known as light detection and ranging (LiDAR) for landslide inventory mapping, generating LiDAR-derived landslide causal factor maps and analyzing landslide susceptibility would enhance the quality of the susceptibility map. The LiDAR data was captured during the data collection campaign in 2014-2015 by Department of Mineral and Geoscience Malaysia through Slope Hazard and Risk Mapping (PBRC) Project.

Keywords: Landslide, susceptibility map, frequency ratio, logistic regression, Cameron Highlands