Generating Landslide Susceptibility Map using Airborne Lidar Derived Parameters and Geological Mapping Factors for Canada Hill, Miri, Sarawak

E Muol[1]* and G T Noweg[2]

[1] Jabatan Mineral dan Geosains Malaysia Sarawak, Jalan Wan Abdul Rahman Kenyalang Park, 93658 Kuching, Sarawak, Malaysia
[2] Institute of Biodiversity and Environmental Conservation,Universiti Malaysia Sarawak, 94300 Kota Samarahan, Sarawak, Malaysi
Email: edwardm@jmg.gov.my

Abstract. Landslide Susceptibility Mapping using GIS software and remote sensing data have been conducted in several location involving geological and geomorphological sensitive at Canada Hill, Miri. The previous researcher has conducted quantitative analyses using different statistical methods with different parameters in the same study area. The mapping of landslides using high-resolution Airborne LiDAR data is a valuable effort. All of this play important role, in the analysis and development of landslide susceptibility map. High-resolution Airborne LiDAR data has the ability to penetrate thick forest cover and produce Digital Terrain Model. Using Digital Terrain Model, the landslide parameter can be generated and extracted. The main objective of this study was to produce landslide susceptibility map using the Probability Frequency Ratio Model method. This study involved the delineating of causative factors from Digital Terrain Model generated by Airborne LiDAR data as well as the data collected from the field. Apart from parameters derived from LiDAR, parameters from filed and site investigation were included into the mapping process. This study was different from the previous studies in the same area in terms of various analytical approaches and samples used. The results of the landslide susceptibility map were verified via randomly selected landslides samples using two different methods. The landslide susceptibility map produced is more refined and is able to predict more effectively compared to the existing map. The landslide susceptibility map produced in this study could be used for land use planning and management by decision makers and land use planners.
Keywords: LiDAR, landslide susceptibility map, digital terrain model, probability frequency ratio, geology

1. Introduction

Sarawak has recorded numerous tragedies due to this geological hazard. Since the occurrence of landslides in Punda Ruan, Simunjan which killed 16 longhouse inhabitants, the Sarawak government and Department of Mineral and Geosciences Malaysia has seriously monitored the areas with risk of landslide. Canada Hill, which stretches 8 km striking northeast-southwest and formed the backbone of Miri City is a prominent landslide risk area. In the span of 5 years since 2009, a total of four (4) was reported in Miri City with two (2) fatalities and damages to infrastructures [1,2,3].