Comparative Evaluation of Normal Polygon Geotechnical Deterministic Analysis (NPGDA) and GEOStatistical INterpolation Techniques (Kriging) (GEOSTAINT-K): A Case Study From Kota Kinabalu Area, Sabah, Malaysia

ABSTRACT

A practical application for landslide susceptibility analysis (LSA) based on Normal Polygon Geotechnical Deterministic Analysis (NPGDA) and GEOSTAtistical INterpolation Techniques (Kriging) (GEOSTAINT-K) for the infinite slope model was used to calculate the factor of safety (FOS) and failure probabilities for the area of Kota Kinabalu, Sabah, Malaysia. LSA is defined as quantitative or qualitative assessment of the classification, volume (or area) and spatial distribution of landslides which exist or potentially may occur in an area. In this paper, LSA value can be expressed by a FOS, which is the ratio between the forces that make the slope fail and those that prevent the slope from failing. An geotechnical engineering properties data base has been developed on the basis of a series of parameter maps such as effective cohesion (C'), unit weight of soil (γ), depth of failure surface (Z), height of ground water table (Zw), Zw/Z dimensionless (m), unit weight of water (γw), slope surface inclination (β) and effective angle of shearing resistance (Φ).A total of 367 landslides were identified by aerial photographs and satellite images interpretations, field observation and secondary data resources. The landslide inventory maps were randomly split into a dataset of 256 landslides (70 %) for running the both models and the remaining 110 landslides (30%) was used for validation purpose. For verification purpose, Area Under the Curve (AUC) method were used in the format of GIS (Geographic Information Systems). The verification result showed that LSA-NGDA (88%) performed better than LSA-GEOSTAINT-K (81%) for the study area. The resulting LSA map can be used by local administrator or developers to locate areas prone to landslides, determine the land use suitability area as well as to organize more detailed analysis of the identified "hot spot" areas.