

# **INTERGRATION OF FACTOR OF SAFETY CONCEPT INTO LANDSLIDE HAZARD ZONATION MAPPING- A CASE STUDY, KEGALLE**

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In Sri Lanka, Landslides are attracting increasing attention especially within the central highland as the most frequent and major disaster. This is mainly due to human intervention into previously virgin areas as a result of higher demand of land with rising population. In 1991 landslide hazard zonation (LHZ) was introduced by National Building Research Organisation (NBRO) with a view to identifying the most vulnerable areas prone to landslides. This landslide hazard zonation method was purely based on qualitative rating of six major terrain factors for landsliding. The ratings have been developed on the basis of about 1200 landslide data collected from Badulla and Nuwaraeliya districts.

Under the present study, an area from Kegalle district was selected and an attempt was made to develop factor of safety maps for two different seepage conditions, dry and fully saturated, using a deterministic slope stability analysis method. Shallow translational infinite slope model was used due to its simplicity and since the area composed of thin soil cover underlain by bedrock. Disturbed soil samples from fourteen selected locations at different depths were collected from the study area representing all the landslide hazard categories in LHZ of Kegalle area. Particle size distribution analysis was done in order to classify the soil type and direct shear test was carried out to determine the shear strength parameters of the soil. ArcGIS software kit was used to prepare continuous surfaces and raster layers for the parameters in factor of safety equation for shallow translational infinite slope under dry slope condition and with seepage (worst case) conditions. Factor of Safety (FOS) map was developed using raster calculator in ArcGIS/ArcMap10. The developed FOS map was compared with the conventional landslide hazard maps prepared by NBRO in order to validate the applicability of this deterministic method to the selected study area.

For the study area, the output, especially the FOS map prepared for seepage condition indicates many similarities with the landslide hazard zonation categories prepared by NBRO. For the comparison, thirty random points (30) were selected from both the maps and compared. It indicates 77% of the randomly selected locations are completely agreed showing the same hazard zones in conventional LHZ and FOS maps with seepage conditions.

Therefore, based on this analysis, it is reasonable to take that factor of safety concept is a quantitative and practical analysis approach for comparing and improving the accuracy of conventional landslide hazard zones in small areas. Additionally, it could be used as an alternative tool for identification of landslide hazards if conventional landslide hazard maps are not available. The results of this method can be further improved by collecting more reliable data which are strongly influence for slope instabilities. However, reliability of the method is better checked through more research in different terrains is recommended.