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Susceptibility Assessment of Small, Shallow and Clustered Landslide in Malipo, southwest China

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Abstract: Susceptibility assessment of landslides over a large area depends on the basic spatial unit of mapping, each unit is assumed to have unique assessment value, so the division of mapping unit is directly related to the evaluation rate, grid cell or slope unit are usually be used in many researches. Grid cell divide the study region into regular squares of predefined size, each cell is assigned a value of influence factor. Slope unit based on hydrology divides the region by ridge and valley lines, which is more related to geological environment and it is hard to identify the subbasin boundary. Both units are used in this study for the assessment of small shallow and clustered landslides in vegetated slopes in Malipo, southwest China. Google earth map on February 7, 2019 was used to interpret the landslides. ArcGIS 10.2 software was used to produce landslide inventory map and obtained 1435 landslides in the study area; most frequent landslide areas are in the range of 62m² to 900m². Field survey was carried out to verify uncertain factors and measure moisture soil content. Soil moisture content (SMC) map was obtained by Kriging Interpolation methods based on the field measured soil moisture content of 48 sample points. Information value (IV) model was used to generate landslide susceptibility assessment map and improved information value (IIV) model was used to determine whether the mapping unit with or without landslide. Seven factors, including slope angle, slope aspect, elevation, normalized difference vegetation Index (NDVI), Soil Moisture Content (SMC), distance to river and road were used as landslide influence factors. The Area under curve (AUC) values of the slope unit IIV, IV and grid cell were 0.814, 0.802 and 0.702 respectively for success rate. For prediction rate, the AUC values of the slope unit and grid cell were 0.803(IIV), 0.790(IV) and 0.699 respectively. Slope unit is more suitable than grid cell for assessing susceptibility of Small, Shallow and Cluster Landslide (Fig.1). Improved information value model can increase the accuracy of susceptibility assessment model for this characteristic landslide.

Keywords: Landslide susceptibility assessment; Slope unit; Grid cell; Information value

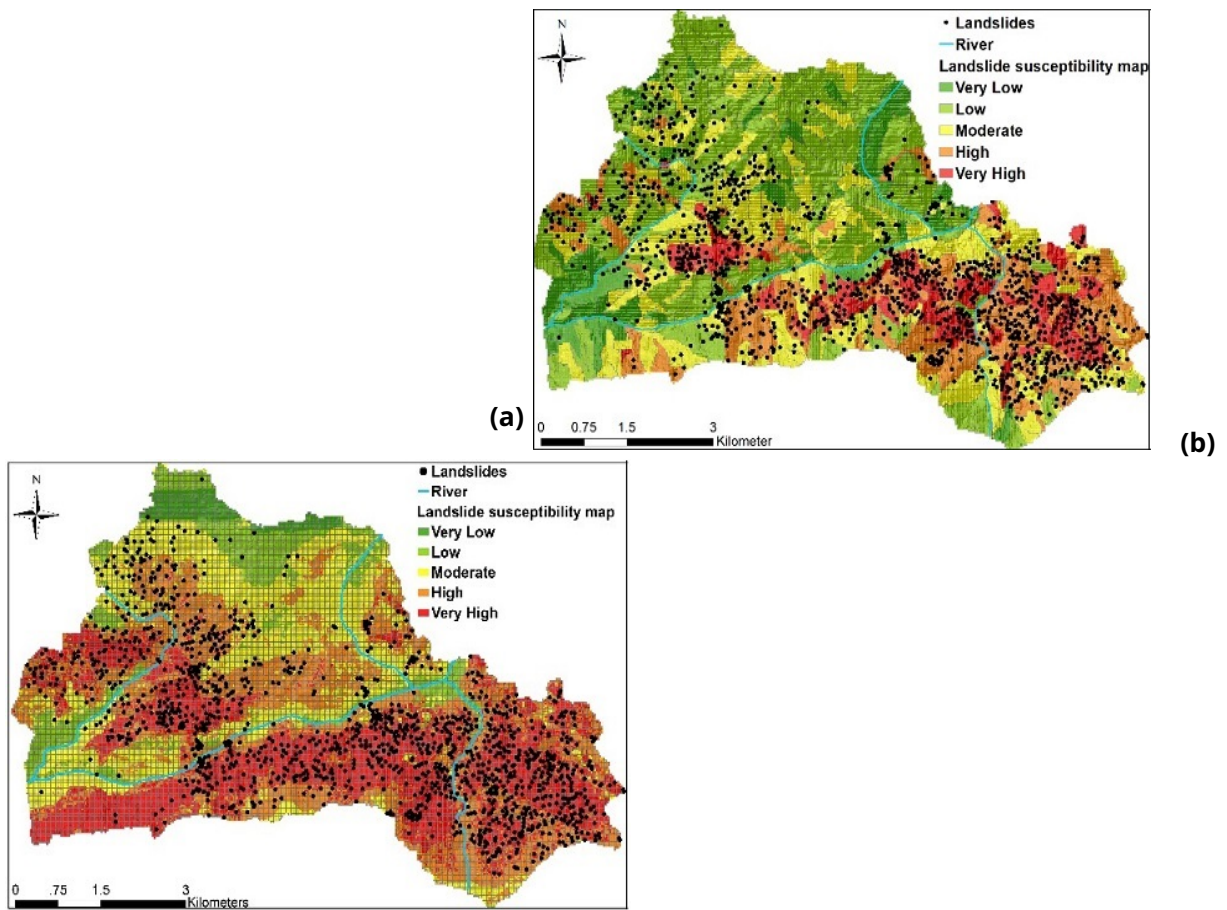


Figure 1 Landslide susceptibility maps (a) Slope unit-based and (b) Grid cell-based