Geospatial Approaches to Modell the Landslide Risk: A case study for Kegalle District-Sri Lanka

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Landslides have become a frequent natural hazard and pressing severe environmental issues in Sri Lanka. The upward trend in high-intensity rainfall events, growing population, expansion of plantation, and lifelines increased the landslide risk of the country. Though developed countries adopted in risk assessment based management, conversely, developing countries rely on conventional landslide hazard assessment based risk management. Therefore, this study is attempted to develop a standardized landslide risk assessment framework, combining susceptibility and vulnerability. In the experimental design, landslide susceptibility was determined by nine landslide causative factors, and fourteen factors were used to assess the vulnerability. Factors were standardized and analyzed to model the susceptibility and vulnerability by using multi-criteria evaluation (SMCE) and Entropy method respectively adopting Geospatial modeling. Spatial distribution of susceptibility and vulnerability were used to obtain the spatial distribution of risk and standardize to generate a landslide risk map. Analyses indicate high susceptible and vulnerable areas not demonstrated a high level of risk individually. However, a combination of them creates a high level of risk. The risk was classified into six classes, such as highest, high, moderate, low, lowest, and no risk. The highest-risk and high-risk zones of the area show 257 Km2 (15%) and 21 % (350 Km2) of the total land area, respectively. Moderately risk zones take part 27 % (446 Km2). However, 22 % (375 km2) of land area categorized as low or lowest risk and 15% (255 Km2) under the no-risk. The study concluded that the developed framework is transparent and easy to update periodically by the local authorities. Hence, public policymakers can use the findings of this study for their planning. In contrast, the developed method is useful for decision-makers' for spatial and civil protection planning on the possible future development of plantation within the region.

Keywords: Entropy method, Geospatial model, Hazard, Landslide, Risk, Vulnerability

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