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Landslide physical vulnerability assessment using susceptibility map with hazard level-based rainfalls: a case study to Busan, Korea

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Most of landslide and debris flow take place during rainy season (June-September) in Korea. It is well known that rainfall is one of the most significant triggering factors in Korea. The mountainous area is composed of about 70%, which is a terrain where slope disaster can occur frequently. In addition, there is a great exposure to slope disaster due to rapid urbanization. The main objective of this paper is to assess landslide physical vulnerability using susceptibility map with hazard level-based rainfalls for urban area in Busan, Korea. Firstly, we computed rainfall thresholds for different hazard levels by using a quantile-regression method based on 258 landslide occurrence data from 1999 to 2019. Secondly, the combined landslide susceptibility map was developed according to hazard level-based rainfalls using both physical-based model and statistical-based model. To assess the vulnerability, source area were extracted from landslide high potential area based on the combined susceptibility map. The extracted source area is used to evaluate the propagation of debris flow. Affected building of debris flow was calculated using propagation results of debris flow. Physical vulnerability assessment was carried out using the affected building of debris flow from the analysis of the propagation of debris flow. Finally, vulnerability index (0 to 1) were categorized and evaluated by the degree of damage of the building. The proposed techniques can sufficiently contribute to protect of human casualties, property loss and also diminish the risk from landslides.

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