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Landslide susceptibility and early warning model for shallow landslide in Taiwan

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This study aims to development a regional susceptibility model and warning threshold as well as the establishment of early warning system in order to prevent and reduce the losses caused by rainfall-induced shallow landslides in Taiwan. For the purpose of practical application, Taiwan is divided into nearly 185,000 slope units. The susceptibility and warning threshold of each slope unit were analyzed as basic information for disaster prevention. The geological characteristics, mechanism and the occurrence time of landslides were recorded for more than 900 cases through field investigation and interview of residents in order to discuss the relationship between landslides and rainfall. Logistic regression analysis was performed to evaluate the landslide susceptibility and an I3-R24 rainfall threshold model was proposed for the early warning of landslides. The validations of recent landslide cases show that the model was suitable for the warning of regional shallow landslide and most of the cases can be warned 3 to 6 hours in advanced. We also propose a slope unit area weighted method to establish local rainfall threshold on landslide for vulnerable villages in order to improve the practical application. Validations of the local rainfall threshold also show a good agreement to the occurrence time reported by newspapers. Finally, a web based “Rainfall-induced Landslide Early Warning System” is built and connected to real-time radar rainfall data so that landslide real-time warning can be achieved.

Keywords: landslide, susceptibility analysis, rainfall threshold