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On the Rainfall Induced Shallow and Deep-seated Landslide Hazard in Central Taiwan

Keh-Jian Shou
National Chung-Hsing University, Dept. of Civil Engineering, Taichung, Taiwan, Province of China
(kjshou@dragon.nchu.edu.tw)

Due to active tectonic activity, the rock formations are young and highly fractured in Taiwan area. The dynamic changing of river morphology makes the highly weathered formations or colluviums prone to landslide and debris flow. In addition, due to the impact of 1999 Chi-Chi earthquake, the hazards of landslides and debris flows were significantly increased. For the past decade, the effect of climate change is significant and creates more and more extreme weather events. The change of rainfall behavior significantly changes the landslide behavior, which makes the large-scale landslides, like the Shiaolin landslide, possible. Therefore, it is necessary to develop the new technologies for large-scale landslide investigation, monitoring, analysis, early warning, etc.

Since the landslide hazards are mainly induced by heavy rainfall, due to climate change and the subsequent extreme weather events, the probability of large-scale landslides is also increased. Focusing on the slate formation area in the upstreams of the Tachia River, Wu River, and Chuoshui River, this project studied the behavior and hazard of shallow and deep-seated landslides. This study adopts the SHALSTAB model with the consideration of slope angle to classify the landslides, and then established the landslide susceptibility models based on the classified landslide inventories. Different types of susceptibility models in different catchment scales were tested, in which the control factors were analyzed and discussed. This study also employs rainfall frequency analysis together with the atmospheric general circulation model (AGCM) downscaling estimation to predict the extreme rainfalls in the future. Such that the future hazard of the shallow and deep-seated landslide in the study area can be predicted. The results of predictive analysis can be applied for risk prevention and management in the study area.