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The Characteristics of Landslides in Shihmen, Dajia and Kaoping Watershed in Taiwan

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The landslide volume, usually evaluated by black-box analysis regression formula, is important information on watershed management. The factor of regression formula, including the rainfall, landslide area (A_L) and landslide depth. Landslide was ascertained a large-scale inventory obtained trough air-photo-interpretation (API) and local field surveys. Adoption of empirical relation to link landslide area and volume allowed estimating the total volume of landslide material in the Shihmen Watershed. Analysis of the spatial relation between landslides and geological setting revealed that slope failures are most abundant where soft and weak rocks outcrop, and where bedding is disorganized. The study uses 5m$\times$5m Digital Elevation Model (DEM) of the landslides in Shihmen Watershed before and after Typhoon Aere in 2004 to calculate the terrain change and discuss the relation of landslide area, landslide form with landslide depth. According to the result, the relation between landslide area and landslide depth is positive correlation, i.e., the landslide depth increase as the landslide area increase. However, some landslides in field survey along the county road no.113 in Taoyuan County is not similar relation, the research is that the geological characteristics and the soil depth in the hillslope are the main reasons.

The scale invariant of landslides have a power-law magnitude frequency distribution in Taiwan. This study made the frequency-area statistics of landslides of Dajia and Kaoping Watershed. Dajia Watershed contains 2,326 landslides in western of Taiwan. The noncumulative frequency-area distribution of these landslides correlates well with a negative power-law relation with exponent -1.8, over the range $0.007\text{km}^2 < A_L <$

0.95km^2. Kaoping watershed contains 3,689 landslides in southern of Taiwan. These landslides also correlate well with a negative power-law relation with exponent -2.0, over the range 0.004km^2 $< A_L <$ 0.52km^2. Finally, discussion of the relation between landslide form and landslide depth, the study analyzed the rectangular, triangle and inverse-triangle landslide form cases. The result shows that the gravity, road development and scour in the hillslope toe along the river are the main driving force to construct the landslide form. The model hilly regions can be relatively stable under the present environmental conditions, and landslides are mainly triggered by human activities that have only a local impact on slope stability. Consequently, landslides could be caused by human actions, and the number of landslides decreases with landslide area.