Combine bivariate statistics analysis and multivariate statistics analysis to assess landslide susceptibility in Chen-Yu-Lan watershed, Nantou, Taiwan.

Thi To Ngan Nguyen (1) and Cheng-Chien Liu (2)

(1) PhD student, Department of Earth Science, National Cheng-Kung University, Tainan, Taiwan (nttnganeduvn@yahoo.com),
(2) Professor, Department of Earth Science, National Cheng-Kung University, Tainan, Taiwan

How landslides occurred and which factors triggered and sped up landslide occurrences were usually asked by researchers in the past decades. Many investigations carried out in many places in the world to finding out methods that predict and prevent damages from landslides phenomena. Chen-Yu-Lan River watershed is reputed as a 'hot pot' of landslide researches in Taiwan by its complicated geological structures with the significant tectonic fault systems and steeply mountainous terrain. Beside annual high precipitation concentration and the abrupt slopes, some natural disaster, as typhoons (Sinlaku-2008, Kalmaegi-2008, and Marakot-2009) and earthquake (Chi-Chi earthquake-1999) are also the triggered factors cause landslides with serious damages in this place.

This research expresses the quantitative approaches to generate landslide susceptible map for Chen-Yu-Lan watershed, a mountainous area in the central Taiwan. Landslide inventories data, which were detected from the Formosat-2 imageries for eight years from 2004 to 2011, were applied to carry out landslide susceptibility mapping. Bivariate statistics analysis and multivariate statistics analysis would be applied to calculate susceptible index of landslides. The weights of parameters were computed based on landslide data for eight years from 2004 to 2011. To validate effective levels of factors to landslide occurrences, this method built some multivariate algorithms and compared these results with real landslide occurrences. Besides this method, the historical data of landslides were also used to assess and classify landslide susceptibility levels. From long-term landslide data, relation between landslide susceptibility levels and landslide repetition was assigned. The results demonstrated differently effective levels of potential factors, such as, slope gradient, drainage density, lithology and land use to landslide phenomena. The results also showed logical relationship between weights and characteristics of factors' classes. Depending on these results be able to help planning managers localize the high risk areas of landslide or safely areas by building and human activities.