Slopeland utilizable limitation classification using landslide inventory

Shu Fen Tsai (1) and Chao Yuan Lin (2)

(1) PhD Student, Department of Soil and Water Conservation, National Chung Hsing University, Taiwan, R.O.C.
(lindafenshi@gmail.com), (2) Professor, Department of Soil and Water Conservation, National Chung Hsing University,
Taiwan, R.O.C. (yuanlin@dragon.nchu.edu.tw)

In 1976, "Slopeland Conservation and Utilization Act" was promulgated as well as the criteria for slopeland utilization limitation classification (SULC) i.e. average slope, effective soil depth, degree of soil erosion, and parent rock became standardized. Due to the development areas on slope land steadily increased and the extreme rainfall events occurred frequently, the areas affected by landslides also increased year by year. According to the act, the land which damaged by disaster must be categorized to the conservation land and required rehabilitation. Nevertheless, the large-scale disaster on slope land and the limitation of SWCB officers are the constraint of field investigation. Therefore, how to establish the ongoing inspective procedure of post-disaster SULC using remote sensing was essential.

A-Li-Shan, Ai-Liao, and Tai-Ma-Li Watershed were selected to be case studies in this project. The spatial data from big data i.e. Digital Elevation Model (DEM), soil map, and satellite images integrated with Geographic Information Systems (GIS) were applied to post-disaster SULC. The collapse and deposition area which delineated by vegetation recovery rate was established landslide inventory of cadastral unit combined with watershed unit. The results were verified with field survey and the accuracy was 97%. The landslide inventory could be an effective reference for sediment disaster investigation and a practical evidence for judgement to expropriation. Finally, the results showed that the ongoing inspective procedure of post-disaster SULC was practicable.

From the four criteria, the average slope was the major factor. It was found that the non-uniform slopes, especially derived from cadastral units, often produce significant slope difference and lead to errors of average slope evaluation. Therefore, the Grid-based DEM slope derivation has been recommended as the standard method to calculate the average slope. Others criteria were previously required to classify the farm land tax. However, as a result of environmental change and advancements in farm machinery, it seems that those criteria were further inappropriate criteria for agricultural land. In conclusion, soil and water conservation works, which were enhanced to disaster prevention under climate change, should reconsider the SULC criteria. The average slope from DEM derivation and the sediment disaster from landslide inventory were suggested and adequate for SULC.