



## An Establishment of Rainfall-induced Soil Erosion Index for the Slope Land in Watershed

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With more and more concentrated extreme rainfall events as a result of climate change, in Taiwan, mass cover soil erosion occurred frequently and led to sediment related disasters in high intensity precipiton region during typhoons or torrential rain storms. These disasters cause a severely lost to the property, public construction and even the casualty of the resident in the affected areas. Therefore, we collected soil losses by using field investigation data from the upstream of watershed where near specific rivers to explore the soil erosion caused by heavy rainfall under different natural environment. Soil losses induced by rainfall and runoff were obtained from the long-term soil depth measurement of erosion plots, which were established in the field, used to estimate the total volume of soil erosion. Furthermore, the soil erosion index was obtained by referring to natural environment of erosion test plots and the Universal Soil Loss Equation (USLE). All data collected from field were used to compare with the one obtained from laboratory test recommended by the Technical Regulation for Soil and Water Conservation in Taiwan. With MATLAB as a modeling platform, evaluation model for soil erodibility factors was obtained by golden section search method, considering factors contributing to the soil erosion; such as degree of slope, soil texture, slope aspect, the distance far away from water system, topography elevation, and normalized difference vegetation index (NDVI).

The distribution map of soil erosion index was developed by this project and used to estimate the rainfall-induced soil losses from erosion plots have been established in the study area since 2008. All results indicated that soil erodibility increases with accumulated rainfall amount regardless of soil characteristics measured in the field. Under the same accumulated rainfall amount, the volume of soil erosion also increases with the degree of slope and soil permeability, but decreases with the shear strength of top soil within 30 cm and the coverage of vegetation. The slope plays more important role than the soil permeability on soil erosion. However, soil losses are not proportional to the hardness of top soil or subsurface soil. The empirical formula integrated with soil erosion index map for evaluating soil erodibility obtained from optimal numerical search method can be used to estimate the soil losses induced by rainfall and runoff erosion on slope land in Taiwan.

Keywords: Erosion Test Plot, Soil Erosion, Optimal Numerical Search, Universal Soil Loss Equation.