

Sediment yields during typhoon events in Taiwan

*Chi-Wen Chen^{1,2}, Takashi Oguchi¹, Yuichi S. Hayakawa¹, Hitoshi Saito^{1,3}, Hongey Chen^{2,4}, Guan-Wei Lin⁵, Lun-Wei Wei^{4,6}

1. Center for Spatial Information Science, The University of Tokyo, 2. National Science and Technology Center for Disaster Reduction, 3. College of Economics, Kanto Gakuin University, 4. Department of Geosciences, National Taiwan University, 5. Department of Earth Sciences, National Cheng Kung University, 6. Disaster Prevention Technology Research Center, Sinotech Engineering Consultants, Inc.

Debris sourced from landslides will result in environmental problems such as increased sediment discharge in rivers. This study analyzed the sediment discharge of 17 main rivers in Taiwan during 14 typhoon events that caused landslides. The measured suspended sediment and water discharge, collected from hydrometric stations of the Water Resources Agency of Taiwan, were used to establish rating-curve relationships. Then sediment discharge during typhoon events were estimated using the rating-curve method and the measured data of daily water discharge. Positive correlations between sediment discharge and rainfall conditions for each river indicate that sediment discharge increased when there is a greater amount of rainfall or a higher intensity rainfall during a typhoon event. In addition, the amount of sediment discharge during a typhoon event is mainly controlled by the total amount of rainfall, not peak rainfall. Differences in the correlation equations among the rivers suggest that the catchments with larger areas produce more sediment. Catchments with relatively low sediment discharge in a normal condition show more distinct increases in sediment discharge in response to the increase in rainfall. The positive correlation between the average sediment discharge and the average area of landslides during typhoon events indicates that when larger landslides are caused by heavier rainfall during a typhoon event, more loose materials from the latest pre-existing landslide debris are flushed into rivers resulting in higher sediment discharge. The high proportion of large landslides in Taiwan contribute significantly to the high annual sediment yield of the world top class, in spite of the small area of Taiwan.

Keywords: sediment discharge, river, catchment, rainfall, landslides