



A field investigation of the effect of fine sediment concentration on suspended bed material load

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The estimation of sediment transport rate has been an important issue for river planning and management. Landslide and debris flow occur frequently in the watershed in Taiwan due to the weak geology and frequent earthquakes. For example, the Chi-Chi Earthquake (Richter scale of 7.3) occurred in central Taiwan in 1999 caused a total landslide area of more than 100 km². It was the second-deadliest quake in recorded history in Taiwan.

In this study, four sets of field experiments (3 typhoons and one large rain storm) were conducted during typhoon seasons of 2012 and 2013 to collect the hydraulic and sediment data at the Tzu-Chiang Bridge of the lower Cho-Shui River after the river incision. The main objectives of this study are to increase our understanding of the variations of the sediment transport characteristics, and to evaluate the suitability of the commonly used sediment transport equations for the lower Cho-Shui River after the Chi-Chi Earthquake. After comparing with the field data collected by Tsang's during 2006-2007, it was found that the concentration of wash load plays an important role in the sediment-laden flow. High concentration of fine sediment tends to damp the turbulence of the flow, and to reduce the uniformities of both the velocity and sediment concentration (bed material load) profiles.

In addition, commonly used suspended load sediment transport equations in general under-predicted the sediment load for the lower Cho-Shui River. With consideration of the effect of concentration of fine sediment on the suspended bed material load, Chiu et al.'s (2000) equation was modified and gave more reasonable sediment discharge estimations.

Reference

Chiu, C. L., Jin, W., and Chen, Y.C., 2000, Mathematical models of distribution of sediment concentration, *J. Hydraulic Eng.*, ASCE, 126(1), 16-23.