



Bedrock incision after the construction of dams and uplift by the Chi-chi Earthquake

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After the Chi-Chi Earthquake in 1999, dislocation of the Chelungpu Fault caused many rivers suddenly uplifted in central Taiwan, which led to significant erosion downstream the uplift zone. In addition, the construction of dams caused serious scour at downstream reaches due to the lack of sediment supply. Under the influence of natural uplift and dam construction, sediment transport is limited and the bedrock incision at the downstream reaches is significant. This study used aerial photographs, satellite imagery, and cross-section data to investigate changes of river morphology of the Daan River, Daja River and Zhuoshui River. Results show that the Daan River was suddenly uplifted by 10 m and formed the knickpoint after the earthquake. The knickpoint moved upstream year by year and caused the incision of the river channel. It is found that the incision is nearly 20 meters from 1999 to 2011. However, cutting rate slowed down in recent years due to the river widening. The Chi-Chi Weir in Zhuoshui River is less affected by the uplift. However, the structure trapped sediment and caused serious incision. The downcutting is approximately 20 m since 1999. In addition to being affected by the uplift, the Daja River also has a dam and the maximum depth of cut downstream the dam from 1999 to 2014 is 10 meters. It should be noted that the effect of earthquake lifting can reach a new natural balance in the future, but the impact of artificial structures is difficult to recover.

Key word: River uplift, Bedrock incision, River morphology, Chi-chi earthquake, Dam effect