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Changes of watershed environment after a multi-landslide event: A case study of Laiser Creek in Taiwan

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Laiser Creek is the tributary of the Linbien where locate in southern Taiwan. The watershed area is 44 km2 and elevation is between 5∼29,00m. Typhoon Morakot brought extreme precipitation to lash Taiwan in August, 2009 and triggered numerous flood and landslide hazards in southern Taiwan. The maximum 24 hours rainfall was 796mm and 3 days rainfall was over 1,100mm in Laiser Creek that led 120 houses damaged and the landslide ratio (landslide area/ total area of watershed) increased from 1% to 8.5%. Typhoon Morakot has changed the characteristics of the watershed therefore this study discussed the changes since 2009 (before typhoon Morakot). We analyzed 6 DEMs which are 2009 (before typhoon Morakot), 2010 (after typhoon Morakot), 2011 (after typhoon Fanapi), 2013(July and October), and 2014, respectively. The aim of this study is to analyze the change of watershed after a catastrophic multi-landslide event, and investigate the change process associated with the rainfall events in recent years.

The results show that (1) geomorphic change before and after typhoon Morakot in Laiser watershed where the maximum landslide depth is larger than 45m and the sediment is deposited in the channel that induces the river bed to raise 5∼30m after typhoon Morakot, it is a huge change for Laiser Creek.

(2) The cross sections analysis of different periods show that the downstream river bed was raised for 13m after typhoon Morakot (2010.3), and the typhoon Fanapi led the river bed to raise 3m again (2011.10). Afterward, the elevation of river bed was varied between 5m that included the effect on dredging tasks. (3) The river width in the downstream has been expanded from 40m to 120m. (4) The elevation of river bed in upstream cross section (5K+0) has been raised for 28m after typhoon Morakot, which was higher than downstream. But variation of river bed elevation is more stable but the river bank got backward year by year. The vegetation recovery, flow discharge, and mitigations would be discussed in this paper, too.