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Characteristics of Landslide Dam Failure by Practicing an Original Scale Field Experiment in Landow Creek, Huisun Experimental Forest, Taiwan

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This research built two artificial landslide dams, an original scale field experiment, in Landow creek, Huisun experimental forest on November 7th 2012. The purposes are to discuss characteristics of landslide dam failure, such as variations of velocity, development of the breach, and alteration of topography. We present four CCDs at upstream and downstream sides of two artificial landslide dams and used the Unmanned Aerial Vehicle (UAV) for monitoring and recording the processes of landslide dam failures. Besides, six water level sensors set up at upstream, and downstream sides of dams to identify inflow and outflow water level and determine the flow discharge; then, applying image judgments technique to determine the flow velocity and direction. Moreover, 3D LiDar scanner used to analyze the river morphology before and after the experiment. Landslide dam failure proceeds with three steps, pipping, turning into retrogressive erosion, and overtopping; however, overtopping dominates the most phenomenon in this experiment. During the impoundment filling, the downstream slope of landslide dam tends to steep as the retrogressive erosion occurs. After dam failure, the impoundment filled with sedimentary deposits; in addition, the original downstream main channel develops into many new flow paths and becomes braided river morphology. The momentary velocity of dam outbreak was nearly three times the inflow velocity; then the momentary discharge from the first failed dam to second dam was over more than 50 times the inflow discharge. The sediment concentration was inversely proportional to time at both upstream and downstream side due to the armor layer decreased. There are two outburst breaches processes, V and U types. The breaches development of two dams were both from V to U type, and vertical degradation to horizontal extension. The first breach dimension and the impoundment volume are both smaller than the second dam; hence we assumed that the breach dimension and impoundment volume have a significant correlation. The research results could provide better analyzing landslide dam hazards.