B15

A Study on Debris Flow Capture Capacity due to the Arrangement of Sabo Dam.

○Namgyun KIM, Hajime NAKAGAWA, Kenji KAWAIKE, Hao ZHANG

Debris flows are widely recognized as one of the dominant geomorphic processes in mountainous terrain. Debris flows are very dangerous phenomena throughout the world. Debris flows consist of a fully saturated mixture of water, mud, sand, soil, rock and air that initiated high on the slope of hill and travel several kilometers under the influence of gravity. They can cause serious damage of lives and properties. Therefore, the understanding of behavior of debris flow is important in order to manage the sediment disasters in the river basin.

Countermeasures designed to mitigate the debris flow disasters can be classified as structural and non-structural measures. Structural measures include sabo dams, guide levees and training channels, while non-structural measures include warning systems, proper land use in the areas, the reinforcement of houses and evacuation systems etc. Structures such as roads, railways and houses can be vulnerable to debris flows due to their geographical conditions.

To prevent or mitigate debris flow disaster, many efforts are devoted by the scientific and engineering communities to design of proper device able to capture the debris flow volume. Sabo dams are one of the effective structural countermeasures for debris flow control. Sabo dams can effectively store the debris flow as long as there is an adequate storage capacity. However, Sabo dam loses such storage capacity, the sabo dam can no capture the sediment to mitigate the debris flow any more.

In fact, there are a lot of kinds of dams such as closed-type, grid-type, slit-type etc. In closed-type sabo dam, it is difficult to prevent from losing its capturing capacity unless continuously removing sediment. On the other hand, open-type dams may keep their trapping capacity without removing the sediment. To evaluate the effectiveness of sabo dams against debris flow, it is necessary to investigate the debris flow capturing process upstream of sabo dam, in order to mitigate the debris flow disasters.

In recent studies, experimental and numerical works have been performed for definition of general design criteria of sabo dams. Nevertheless, there are few studies discussing the arrangement of sabo dams. Depending on the conditions of arrangement of sabo dams could affect the capturing capacity of sabo dam.

The objective of this study is to improve the sediment capturing capacity by the arrangement of close-type sabo dams. The numerical simulations and experiments have been carried out to investigate the debris flow deposition volume of a series of sabo dams.

A numerical model is developed to reproduce the debris flow deposition process upstream of sabo dams. The constitutive equations of Takahashi et al.(1997) is chosen for the study on deposition process upstream of a sabo dam. The erosion process of deposited sediment upstream of a sabo dam by a normal scale flood flow is investigated by using a one-dimensional reverbed erosion model under unsaturated bed condition.

This paper describes briefly methodological approach for improving the mitigative effectiveness of a series of sabo dams against debris flow. It is hoped that this study will help to determine the combination criteria of arrangement of sabo dam.