We took videos of channel experiments in Ujigawa Hydraulic Laboratory focusing on sediment transportation in steep mountainous area. We conducted experiment in a rectangular straight channel with 7 cm width, 2 m length, and variable slope. We set crosspiece roughness on the channel bed.

Please feel free to use the video to explain the debris flows and bed load in mountainous areas, and the effects of installing various sabo dams, or erosion control dams against debris flows.

bed load: Experiment showing bed load with a slope of 5 degrees is taken from the downstream of the channel. You can see the sediment moving near the river bed.

bed load side view: Experiment showing bed load with a slope of 5 degrees is taken from the side of the channel.　Sediment is moving near the riverbed by rolling, sliding, and jumping as bed load.

bed load top view: Experiment showing bed load with a slope of 5 degrees is taken from the top view. You can see the similar bed load behavior when visiting mountainous rivers in normal conditions.

no sediment transport: Although the slope is 5 degrees, water discharge rate was decreased comparing to the video titled “bed load”. Therefore, flow depth and flow velocity became smaller and tractive force was smaller than critical tractive force, and no sediment movement occurred. The video is taken from above and from the side.

closed dam sediment: Experiment showing debris flow with a slope of 18 degrees. Closed type sabo dam set on the channel downstream. Compared to bed load, you can see the sediment is distributed at a high concentration from the bottom to the surface of the flow and flow velocity is high. Sediment is trapped upstream of the sabo dam.

closed dam sediment_WDrunoff: Experiment showing debris flow with a slope of 18 degrees. Here, we also supplied woody debris from the upstream. Closed type sabo dam set on the channel downstream. You can see woody debris(WD) concentrated to the front of the debris flow. In this case, WD was once captured, but most of it flowed down in the subsequent flow. Sediment was trapped upstream of the sabo dam. Because WD has a lower specific gravity and floats on the flow surface, the behavior shown in this video often occurs such as WD temporary captured and flowed away from closed type sabo dams.

closed dam sediment_WDtrapped: Experiment showing debris flow with a slope of 18 degrees. Here, we also supplied woody debris from the upstream. Closed type sabo dam set on the channel downstream. You can see woody debris(WD) concentrated to the front of the debris flow. In this case, WD moving downstream of sabo dam was less compared to "Closed dam sediment_WDrunoff". Sediment and most of WD was trapped upstream of the sabo dam. Depending on the process of occurrence and movement of WD in mountainous area, sometimes WD might be captured with closed type sabo dams.

grid open dam only small sediment: Experiment showing debris flow with a slope of 18 degrees. Open grid type sabo dam set on the channel downstream. The video is taken from upstream of sabo dam. Grid type sabo dam is expected to work by large boulders and woody debris (WD) concentrated in debris flow frontal part blocking the gaps between the steel pipes. However, in this case, debris flow is only consisting with small sediment, blocking didn't occur and sediment flowed out between the pipes from the sabo dam.

grid open dam sediment WD: Experiment showing debris flow with a slope of 18 degrees. Here, we also supplied woody debris(WD) from the upstream. Open grid type sabo dam set on the channel downstream. The video is taken from the upstream side of the dam. WD is concentrated at the front of the debris flow, blocking the steel pipes and also trapping small sediment.

grid open dam with WD side view_2: Experiment showing debris flow with a slope of 18 degrees. Here, we also supplied woody debris(WD) from the upstream. Open grid type sabo dam set on the channel downstream. The video is taken from the side of the channel. WD is

concentrated at the front of the debris flow, blocking the steel pipes and also trapping small sediment.

grid open dam with WD and boulder side view: Experiment showing debris flow with a slope of 18 degrees. Here, we also supplied woody debris(WD) and white large stones imitating boulders from the upstream. Open grid type sabo dam set on the channel downstream. The video is taken from the side of the channel. WD and boulders are concentrated at the front of the debris flow, blocking the steel pipes and also trapping small sediment.

debris flow breaker with WD: Experiment showing debris flow with a slope of 18 degrees. Here, we also supplied woody debris(WD) from the upstream. Debris flow breaker screen dam, one of countermeasures against debris flow, set on the channel downstream. The video is taken from the side of the channel. Debris flow breaker's screens are the drain board shaped steel pipes when set on sites. When debris flow reaches the breaker, segregates sediments and water, sediment and WD stop, and you can see the water flowing out from the bottom of the breaker.

debris flow breaker with WD_front: Experiment showing debris flow with a slope of 18 degrees. Here, we also supplied woody debris(WD) from the upstream. Debris flow breaker screen dam, one of countermeasures against debris flow, set on the channel downstream. The video is taken from the downstream of the channel. Debris flow breaker's screens are the drain board shaped steel pipes when set on sites. When debris flow reaches the breaker, segregates sediments and water, sediment and WD stop, and you can see the water flowing out from the bottom of the breaker.