

Response of River Morphology and Aquatic Habitat to Debris-Flow Event

The effects of climate change can include intense precipitation and extensive wildfires, both preferable conditions for landslides or post-fire debris flows. The resulting sediment inputs to rivers and related channel response (Fig. 1) can affect infrastructure and aquatic habitat, up- and downstream of the impact site. The goal of this project is to study the effect of morphological changes on aquatic habitat due to a post-fire debris flow that happened in a steep mountain stream in the Upper Colorado River Basin, USA.



Fig. 1: Moesa river diversion due to debris-flow after heavy precipitation in the Valle Mesolcina in June 2024 (©swisstopo)

In this project, a numerical 2D morphodynamic model of the situation will be set up with the BASEMENT software. For the calibration of the model, pre- and post-event field survey data, such as bed topography and sediment composition, are available. Further, streamflow data for spring snowmelt and summer monsoon events are available which can be considered to reproduce the channel response during the calibration period. Based on the calibrated model, aquatic habitat conditions will be assessed, thereby extending the study by further hydrological scenarios.

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Remarks: Research-oriented thesis, can only be distributed once;
Skills in numerical modelling required;
External co-supervision by Prof. Belize Lane from Utah State University and Utah Water Research Laboratory;
Thesis should be written in English