

Downstream floodplain ecosystem response to hydropower intakes and torrential tributaries - *Case study of the Dranse de Ferret (la Fouly)*

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It has been shown that hydropower plants have negative impacts on downstream rivers and floodplains ecosystems throughout sediment load and flow variation. More recent research has shown that water intakes induce rapid changes in the habitat of macroinvertebrates because of flushing events and that they are not able to adapt to these rapid changes. Paradoxically, in some cases, floodplains might gain value in the long-term through those water intakes. Floodplains become then protected and the company must adapt its management to protect the floodplain. In Switzerland, water intakes are predominant, and it is therefore necessary to assess their impacts on downstream floodplains ecosystems. Here, we investigate the long-term effect of water intake on a downstream floodplain ecosystem with 3 lateral torrential tributaries in la Fouly (VS). Photogrammetry is realised using a Structure from Motion (SfM) method over a 5 months period, once a month from June to October, using Ground Control Points (GCP) to avoid deformations and errors in the resulting digital elevation models (DEMs). In addition, 20 different granulometric squares are measured to estimate the rugosity of the floodplain. DEMs are then used to compute and calibrate different scenarios in time using the BASEMENT software, with and without water intakes. As climate change is an important part of water flow and sediment load in alpine glaciated basins, it will be integrated into the modelling. An ecological approach is used, and habitats of macroinvertebrate species are quantified between simulations. Finally, this work should show the dynamic of the habitats for macroinvertebrates in this floodplain in time, including both sediment load from the water intake and from the tributaries. This work is driven in collaboration with AlpiQ, who provide discharge and sediment load measurements.

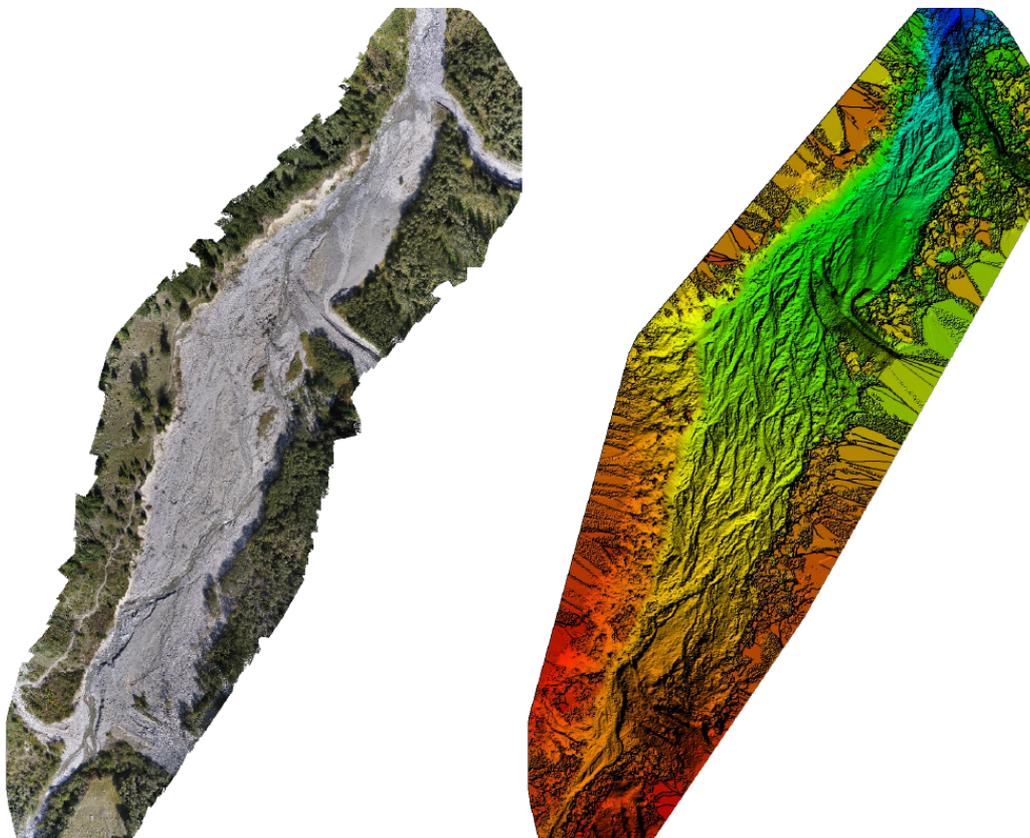


Figure 1: Orthophoto and corresponding digital surface model (DSM) of the floodplain at the end of September 2019. Photos are taken with a drone and data are then processed with the software Pix4D.