

Master's thesis or Project work FS 2023



Versuchsanstalt für Wasserbau, Hydrologie und Glaziologie

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Habitat evaluation of macro-roughness elements at the Töss River

River restoration projects, which are becoming more and more frequent, may involve naturebased solutions such as deadwood structures or nature-oriented boulder bars (Fig. 1) to improve natural habitats by creating ideal ecologic conditions for different species. At the same time, these structures must ensure safety against riverbed and bank erosion, as well as flood risk. The presence of these macro-roughness elements affects the flow dynamics and can lead to unpredictable evolutions, based on geometry, porosity, shape, and flow features. Flume experiments can help to understand trends and behaviours in controlled situations, while field experiments can provide data on real-case situations. For the adequate design of such structures, the consideration of both river restoration and flood risk aspects is crucial.



Fig. 1: Wood placement and nature-oriented boulder bars at the Töss River (photos: V. Neuhaus, IUB Engineering AG)

In this thesis, field experiments are to be conducted in collaboration with IUB Engineering AG to study how macro-roughness elements (deadwood structures vs. nature-oriented boulder bars; Fig. 1) at the Töss River generate heterogeneous flow conditions and improve habitat. The objectives are to (1) measure the flow conditions and scour morphology at two different macro-roughness structures, (2) characterize flow and riverbed heterogeneity to evaluate the habitat conditions, and (3) assess the respective flood risk with simplified calculations. In addition, the structures should be documented using drone images.

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Remarks:	Field experiments; Project language: English 1 student for Master's thesis or up to 2 students for Project work