Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Versuchsanstalt für Wasserbau,
Hydrologie und Glaziologie

Head: Prof. Dr. Robert Boes
Supervision: Dr. Davide Vanzo
Dr. Francesco Caponi

Master's or Project Thesis
HS 2021

Co-evolution of riparian vegetation and fluvial landforms in the Maggia valley

Riparian vegetation and fluvial landforms are strongly interconnected by feedback mechanisms between plants, flow and sediment transport. Plants can promote the creation of fluvial landforms such as bars on river floodplains by modifying the flow structure and mediating the rate of sediment transport. In turn, plant growth and mortality depend upon the flow discharge, groundwater depth, and microclimatic conditions. The study of these feedbacks allows interpreting floodplain structure and dynamics, as well as supporting river management decisions in restoration projects.

Fig. 1: Maggia River, Canton Ticino

The use of numerical models that include such feedbacks is rapidly growing in both the scientific and practitioners' communities. The goal of this work is to reproduce the interactions between riparian vegetation and fluvial landforms in a braided river system by applying a new modelling framework based on the software BASEMENT. The case study will be a 2 km long reach of the Maggia river (Figure 1), for which a large amount of data and a computational mesh are already available in the context of a monitoring program conducted by Canton Ticino. Depending on the specific objectives, the student(s) will be able to (i) apply the 2D version of BASEMENT with mobile bed, (ii) use a state-of-the-art vegetation model integrated in BASEMENT to simulate vegetation dynamics, (iii) analyze aerial images and flow records and (iv) participate to field activities on site. This project requires an affinity for numerical simulations and data analysis. General scripting skills are helpful. The prior attendance of the course River Morphodynamic Modelling is a prerequisite.

Contact: Dr. Davide Vanzo
HIA C 51
vanzo@vaw.baug.ethz.ch

Remarks: Correspondence and report in English; 2 students for Project or 1 student for Master thesis