Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Versuchsanstalt für Wasserbau,
Hydrologie und Glaziologie

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Master's Thesis HS 2022

Coupled modelling of 2D hydrodynamics with seed dispersal and recruitment processes in an Alpine floodplain

Riparian vegetation provides important ecosystem services and is a key indicator of the status of river hydro-morphological processes. Several riparian plant species are nowadays endangered because of the degradation of river ecosystems worldwide, as a results of the exploitation of river resources. River floodplains, which host a disproportionally amount of biodiversity and habitat types, are thus crucial objectives of restoration measures across Switzerland and the European Union.

The modeling and quantification of the dynamics of seed dispersal is fundamental to understand vegetation distribution and establishment in floodplains. Such processes are often linked to river hydro-morphodynamic processes, as seeds of many riparian species are transported along the river by water and deposited on shorelines as the water level recedes.

Fig. 1: Floodpain vegetation at Moesa river, Graubünden, Switzerland (Source: Sabine F.)

In this thesis, we propose to apply and further develop a model for vegetation recruitment coupled with a 2D hydro-morphodynamic model (BASEMENT) to explore the main factors influencing seed dispersal and establishment in the floodplain of the Moesa river, Switzerland (see Fig. 1). A large available database of presence/absence of key plant species in the study site will be used to calibrate/validate the model. The project will be conducted in collaboration with Dr. Sabine Fink from WSL, Birmensdorf. An affinity for numerical simulations, data analysis, and some scripting skills are expected from the candidate.

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Remarks: Only for Master's Thesis;
Thesis and correspondence in English