Bank erosion processes within check-dam sequences

In many mountain streams, it is necessary to stabilize the river bed by means of transverse structures for flood protection reasons. At the same time, longitudinal connectivity should be maintained or restored, meaning that fish and other aquatic species should be enabled to migrate upstream. Nowadays a variety of transverse structures are being built: Block ramps, artificial step-pool sequences, check-dam sequences and others. In many cases, it is also required to protect the river banks between transverse structures from erosion and the subsequent bypassing and collapse of the structures. However, these bank protection measures are usually very technical, expensive, and offer little ecological value. Thus, the question arises whether bank protection can be minimized or even omitted completely if the transverse structures are sufficiently founded laterally. To answer this question, bank erosion processes between the transverse structures must be investigated.
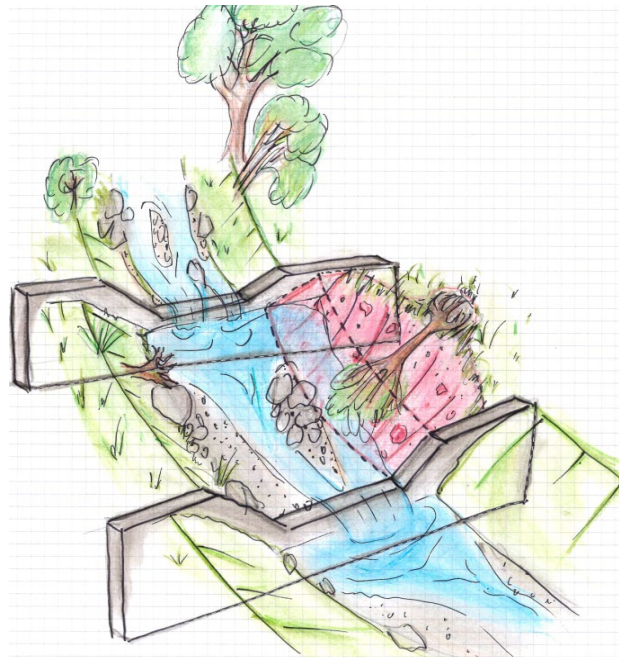

Fig. 1: Bank erosion within a check-dam sequence. Source: Emch+Berger

The aim of this thesis is to experimentally investigate bank erosion processes between transverse structures (Fig. 1). The student will perform experiments in a laboratory flume in the VAW laboratory in order to quantify the development of bank erosion. If an upper limit of bank erosion lateral extent can be found, future check dams can be designed with a base wide enough to account for lateral erosion. Thus, less (or none) bank protection is needed between the transverse structures and the ecological impairment of rivers can be minimized while still ensuring flood protection and longitudinal connectivity.

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Remarks: Hydraulic laboratory experiments
Project language: English or German
1 student for Master's Thesis