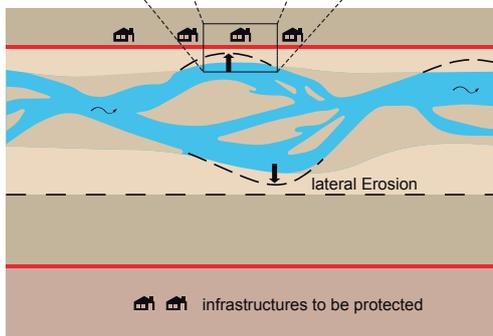


## Self Widening by Lateral Erosion in Gravel Bed Rivers



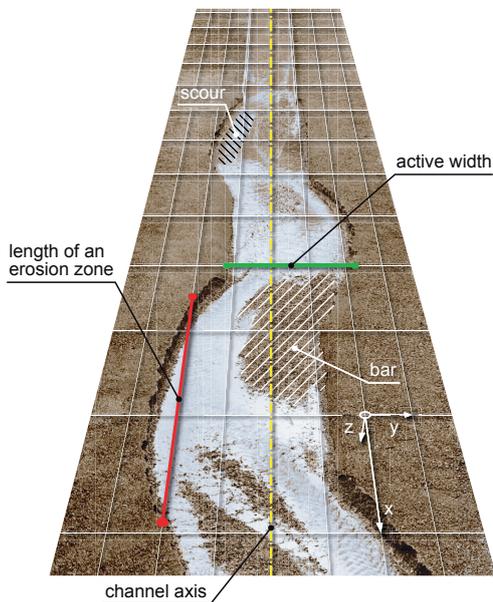
### Introduction

The flood events which have occurred in recent years have shown that rivers need to be given more space. An effective river restoration measure to guarantee protection against floods and to improve river ecosystems is river widening.

Removing existing bank protection works allows lateral erosion and consequently widening of a regulated river stretch. However, lateral erosion must not progress unchecked because urban areas and infrastructures are often situated close to rivers (Figure 1).

The aim of this project is to investigate the temporal and spatial evolution of lateral erosion in gravel bed rivers by means of hydraulic experiments. Furthermore, effective bank protection measures will be developed and tested in order to prevent erosion damage along the widened stretches.

The experiments will be conducted in a concrete flume 28.5 m long and 3.2 m wide at the Laboratory of Hydraulics, Hydrology and Glaciology (VAW) of the Swiss Federal Institute of Technology (ETH) in Zurich. The results of these hydraulic simulations will be compared with available prototype data from measurements of lateral erosion events on different rivers in Switzerland.



### Lateral erosion in gravel bed rivers

In this project the influence of relevant parameters, i.e. flow discharge, riverbed slope, sediment supply, grain size distribution and initial river width will be studied. These parameters will be systematically varied in order to describe the evolution of lateral erosion over time and space by means of empirical relations derived from the parameters under consideration.

Bed topography will be regularly surveyed to document and to quantify the lateral erosion as well as its short and long term effects on morphology (scouring processes, formation of bars, slope changes) and on sediment balance (Figure 2).

### Bank protection measures

Before the lateral erosion reaches sensitive areas and infrastructures which need to be protected, the erosion must be stopped. Therefore, effective measurements have to be investigated in order to control the evolution of lateral erosion.

In this PhD-study so called sleeping protection measures will be developed and investigated. The focus is on simple and low-priced bank protection works, which are passive as long as the river does not reach them by lateral erosion. Once the river reaches them, they become effective.

Keywords: lateral erosion, river self widening, bed load transport, flume study, field data, flood protection, river restoration

