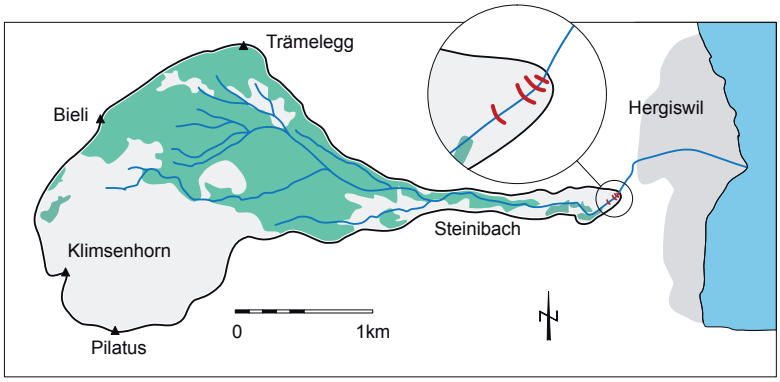
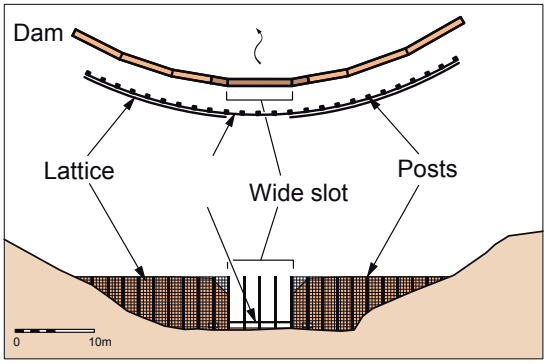
ETH zürich

# Floating Wood and Sediment Retention on the Steinibach River in Hergiswil




The location of the check dam system in the watershed of the Steinibach River, upstream from the town of Hergiswil.




Design of the optimized wood rack.

Overview of the modeled sediment and wood retention with the optimized system after a 300-year flood event.

Detailed view of the modeled wood rack just after the peak flow of an extreme flood event.

It was determined that an existing system of 3 check dams did not provide the town of Hergiswil with sufficient protection from floods that bring high floating wood and sediment loads on the Steinibach River. To optimize and adapt the system to achieve all protection goals, a physical model at a 1:35 scale was developed. The scale factors that were used are based on the Froude number, thus taking into account similarities only between the inertia and gravity forces of the model verses the prototype.

The optimized solution uses the 2 upper check dams for sediment capture (with the middle dam being heightened by 1.5 m), thus freeing the lower dam for floating wood retention. A wood rack was built 3 m upstream from the dam, consisting of vertical metal posts at 2 m intervals. To capture the first branches, stems, and trunks at the beginning of an event, thus quickly building an impenetrable wall of wood for further retention, a cross-beam was added to the center of the rack, and lattices on the sides. The extremely wide rack allows for the spreading of the wood load, which reduces concentrated stack-up and physical loading. This helps to reduce the backwater created by the rack. If the backwater were allowed to become too large, the wood would float and circulate behind the rack and have many chances to flow through the rack.

The lower dam itself also had to be adapted: a slot of 8 m width was built into the center of the dam. This reduces the backwater effects of the dam, as well as spreads the flow concentration such that not just one section of the rack experiences heavy flow and wood loading.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