

DEVELOPMENT AND PLANNING OF CONCEPTUAL RIVER REVITALIZATION PROJECTS IN THE REGION OF OBERHASLI

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CONTEXT

According to the Swiss environmental legislation, the company KWO needs to develop ecological measures in the Oberhasli region for the extension of their power plants.

This project concerns the revitalization of the Aarebinnenkanal.

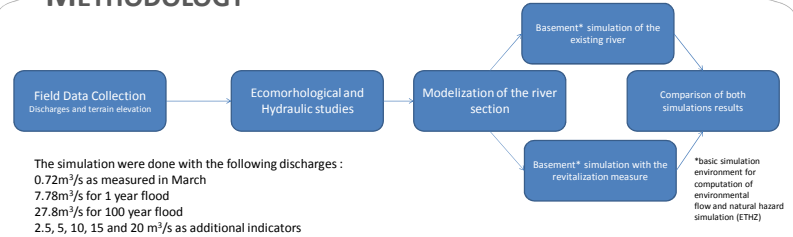


Near to the Aare river, the river flows into the Brienzer lake. Its quality is influenced by the proximity of a military airport and agricultural lands, which are possible sources of chemical pollution. This study is focused on the circled area.

OBJECTIVES

The aim of this project is to plan ecological measures to improve the state of the channel, especially to make it suitable for fish. The chosen method is to create a model of the actual section of the channel where the revitalization measures will take place, in order to run a simulation of different possible measures, and evaluate the improvements compared to the initial state.

METHODOLOGY



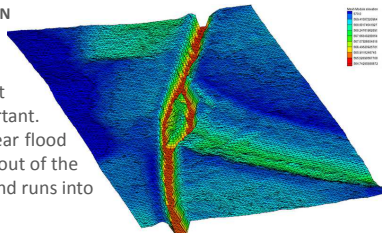
RESULTS

CURRENT SITUATION

The water quality is good but measures should be performed after the fertilization season. The section is quite natural except some problems of waste and clogging.

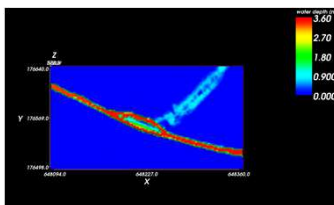
SIMULATION

The 1-year flood is not very important. The 100-year flood overflows out of the riverbed and runs into the forest.



Mesh used to simulate the current situation

Traction force is not important, hence there is no need to stabilize the shores.



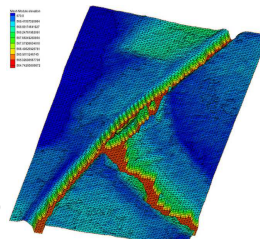
100-year flood simulation of the existing river

REVITALIZATION MEASURE

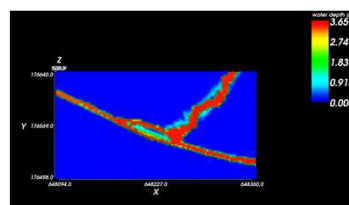
The proposition of revitalization is to dig a part of the forest. With varying elevations in the new river section, a broader range of water depths and velocities will be created. That will create more habitats and permits spawning and juvenile fish life will be possible.

SIMULATION

The 1-year flood remains in the same state. The 100-year flood overflows out of the new river section, so the forest acts as a floodplain.



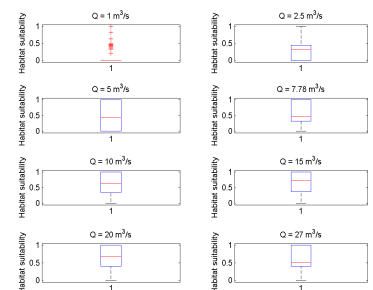
Mesh used to simulate the revitalization measure



100-year flood simulation with the revitalization measure

HABITAT SUITABILITY FOR FISH

The brown trout is the main species in this river. There was no fish observed in the section during the collection of data in Mid-March and mid-April. Depth and velocities were not optimal for juvenile fishes and spawning even if adults can swim up to the section. The suitability is evaluated according to the results of the simulation



Habitat suitability grades - velocity, spawning (0: worst grade 1: best grade)

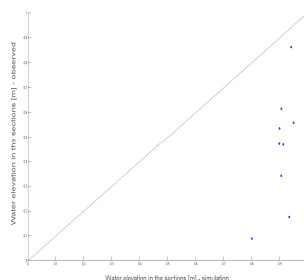
According to the simulation results, the measure does not improve significantly the suitability of the section for the brown trout with respect to the parameter water depth and velocity variabilities.

CONCLUSION

RELIABILITY OF THE RESULTS

Due to some errors of the program used to create the mesh and to the corrections made, the results of the simulations are not entirely trustable. In fact, the simulation results in less water depth variability, probably due to a smoother topography than in reality.

Hence our results are probably too pessimistic compared to the existing situation in this river section.



Modelization quality analysis with respect to the water depth reproducibility

PROPOSITIONS

Fishes do not reach this section of the river. Connectivity to the lake must be improved in order to make this revitalization measure efficient. However, the solution proposed is a good start to improve the ecological state of the river:

- Dig a channel into the forest
 - with varying depth
 - with meanders
 - add stones to improve friction
- Monitor the quantity of chemicals in the river
- No floodplain to create as the forest acts as one

