

Rehabilitation of an eutrophicated and regulated river.

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Introduction.

Along with the regulation of Lake Børsvann in 1914 the water flow have been heavily reduced in the river Børselva. The water was taken to a power plant outside the catchment area. During the years and along with the increased farming activity the river has developed into a eutrophic river overgrown with water plants.

The paper presented will give information about the project, ideas behind it and how we were able to succeed with rehabilitation of the river system to achieve environmentally sound watercourse maintenance trough various types of restoration measures combined with a new flow regime and a reduced nutrient input.



The problems raised and connected to Børselva are of general interest for the future handling of regulated rivers and at the same time be able to take care of the natural values of the river and its neighborhood. The project has received funding from: The national Research Board, Norwegian Water Resources and Energy Administration, Local Authorities and Electricity Board and Research grants from NIVA.

Problems

Three main reasons were seen as the background for the problems in Børselva:

- Erosion in a tributary created siltation problems and sediment was trapped in the river.
- The high input of nutrients and organic material created eutrophication problems.
- The reduction of water flow.

Siltation

The input of silt was ended when rehabilitation was carried through in a tributary.

Eutrophication

The main reason for the eutrophic situation is the high input of nutrients over a long period from the agricultural activity along the river. The whole river was drastically changed and nearly 70% of the river bed was covered with water plants. This is supported by the input of fine sediments and reduced water fluctuations/floods connected to the regulation.

Water quality

Results from a physico-chemical monitoring program described the water quality in the river as bad or very bad according to our national standards. The picture given was supported by results from biological studies (stream vegetation and benthic fauna). To attack the different sources of pollution an intense monitoring program was set up to describe all the sources along the river (22 stations). Results indicated that 80 % of the nutrients and organic material was connected to the farming activity and the system is heavily overloaded with nutrients and organic matter.

In 1986, the owner had to develop a flow regime for the river to ensure satisfactory quality in the watercourse. Together with the flow limitations given by the national authority there was an instruction to conduct a clearing of the watercourse and to reduce the nutrient load, to restore the free passage and to improve the watercourse's self-purification properties. A project running for 5 + 5 years was started late in 1997/98 to fulfill these limitations set by the government.