

Biomanipulation and water quality changes of Lake Ülemiste (Tallinn, Estonia)

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Lake Ülemiste (975 ha) is a shallow (mean depth 3,4 m) eutrophic lake, which has been the main reservoir of drinking water for Tallinn since the 14th century. The water level is controlled by a Water Treatment Plant. The catchment area of the lake has been enlarged from 70 km² to 1865 km² and it extracts water from three river systems by a complex interlinkage of reservoirs and canals. The lake water is turbid, with its phytoplankton assemblage containing mainly cyanobacteria. The main problem is high phytoplankton biomass, which increases the cost of water treatment. The main aim of a biomanipulation (BM) project was to reduce the chemical and energy costs of treatment caused by high phytoplankton biomass in the water.

Before biomanipulation, in vegetation periods of 2000-2003, the content of total phosphorus (TP) exceeded 60 µg/l, Secchi depth stayed below 90 cm and average phytoplankton biomass was 16 mg/l. The estimated fish biomass exceeded 250 kg/ha.

In 2004-2008 as much as 187 kg/ha of fish was removed. After the fish removal, TP decreased more than 30%, phytoplankton biomass decreased from 16 to 7 mg/l and Chl-a from 32 to 22 µg/l. The average Secchi depth during the vegetation period dipped as much as 20 cm. Clearwater period in spring elongated for 3 to 4 weeks compared with that before BM. The share of filamentous forms in the composition of cyanobacteria has decreased, instead of them more colonial forms of pikoplankton have appeared. BM did not affect remarkably neither the abundance nor biomass of zooplankton. Unfortunately, the main aim of the BM project is not yet achieved as the cost of purification has not fallen notably.