Nutrient levels on the decline in many Estonian rivers

A new study has analysed the impact of industrial and agricultural changes on nutrients in Estonian rivers. The results indicated that there were significant reductions in nitrogen in one third of the sites, significant reductions in phosphorus in a quarter of sites and significant reductions in both nutrients in nearly a tenth of sites.

High levels of nutrients, such as nitrogen and phosphorus, and subsequent eutrophication in coastal waters is a major concern of the Baltic Sea Action plan\(^1\), which has set reduction targets in nutrients to be met by 2021. In the last 15-20 years Estonia has experienced a number of changes which affect nutrient levels in rivers that feed into the Baltic Sea. A fall in agricultural production has reduced fertiliser use, the amount of arable land and the amount of livestock. Wastewater treatment plants have also become more effective.

The study, partly supported by the EU under the SCENES\(^2\) project, analysed the effects of these large-scale changes on nutrient concentrations in Estonian rivers that feed into the Baltic Sea to help identify possible options for controlling pollution. These could be useful in implementing river basin plans within the Water Framework Directive\(^3\).

Using data from the last 15-20 years, the study identified trends in the concentrations of nitrogen and phosphorus for 53 sampling sites on 40 rivers and streams. The results indicated that the concentration of nitrogen had decreased significantly at 18 of the sites, which included locations with a high share of agricultural land as well as locations with forests and wetlands. These reductions are thought to be due to decreases in agricultural land and fertilisers, increases in abandoned land and better farm management practices. Four sites experienced an increase in nitrogen which was thought to be due to a general increase in winter runoff, causing more nitrogen to be washed into the rivers.

There was a slightly different picture for phosphorus concentrations with a decrease at 13 sites and an increase at seven sites, but similarly, there was no clear pattern of land type. The researchers suggested the decrease could be explained by improvements in wastewater treatment in the larger cities, but also a decline in rural populations and better handling of manure and fertilisers. However, ineffective water treatment in smaller settlements could be the cause of phosphorous increases at the seven sites, along with the higher number of households and industries connected to the sewerage systems and insufficient maintenance of drainage systems.

The study indicated that the impacts of nutrients on water quality varied widely. The researchers suggest there is still a need for ‘eco-engineering’ solutions to improve the retention and removal of nutrients in the soil and groundwater. For example, the natural processes of removing nitrogen and phosphorus could be improved using artificial wetlands and detention ponds to prevent the nutrients from reaching the rivers.

2. SCENES: Water Scenarios for Europe and for Neighbouring States was supported by the European Commission under the Sixth Framework Programme. See: [www.environment.fi/syke/scenes](http://www.environment.fi/syke/scenes)


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Theme(s): Water

**LIFE combating eutrophication risk linked with farming and small municipalities**

The LIFE programme has played an important role in implementing actions at a local and river basin scale, to help reduce the eutrophication of Europe’s rivers. The LIFE Estwaste project for example, demonstrated cost-effective and sustainable solutions for wastewater purification using vegetation filters in Estonian small municipalities. Aside from their efficient use of natural resources, this method is potentially cheaper than conventional chemical wastewater purification systems – a factor that makes it particularly attractive to small rural municipalities. Meanwhile, the LIFE AGWAPLAN project showed how stakeholder involvement and support for good farming practices, combined with new integrated advisory services have tackled agri-eutrophication in Danish watercourses. Results from pilot farms showed reductions of N and P leaching from nutrients.