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Nutrient pollution in Dutch streams is falling, but further reductions needed

Nutrient pollution in The Netherlands is falling as a result of national and EU policies, new research has shown. However, many waters still routinely fail to meet environmental quality standards. The study, which focused on the headwaters of 167 rivers where agricultural fertilisers are the main cause of pollution, showed that up to 76% of these did not meet water quality standards.

Nutrient pollution can have devastating effects on aquatic wildlife, with biodiversity dropping sharply in the face of toxic algal blooms and low levels of dissolved oxygen. Much of this pollution is the result of agricultural fertilisers, with large amounts leaching from fields.

The Netherlands is particularly affected by this issue, as large parts of the country are intensively farmed. In recognition of the problem, the Dutch Manure Law was enforced in 1986, and in 1991 the European Nitrates Directive[1] was adopted by the European institutions before being transposed into Member State law. This resulted in measures including a ban on applying fertilisers outside the growing season and maximum limit of 170 kg of nitrogen applied per hectare per year.

To assess the efficacy of such policies, it is important to monitor whether real progress is being made towards pollution reduction. For this study, researchers used data from monitoring stations in the headwaters, or source regions, of 167 rivers where agriculture was the main cause of nutrient pollution. At the headwater stage, the waterways are still streams and ditches.

Concentrations of phosphorus and nitrogen between 2007 and 2010 were then used to assess whether water quality complied with environmental quality standards (EQSs) set in the implementation process of the Water Framework Directive (WFD)[2] in The Netherlands.

The results show that only 38% of stations met nitrogen EQSs in 2007, and this figure reached a maximum of 61% in 2009. Forty-three per cent of stations met EQSs for phosphorus in 2010, compared with 55% in 2007. Overall, the percentage of monitoring stations that met both nitrogen and phosphorus EQSs ranged from only 24% in 2007 to 39% in 2009. The variation between years reflects the impact that weather can have on concentrations, the researchers say, and highlights the importance of basing any management decisions on several years of data.

The Dutch EQSs for nutrients are based on summer averages, however, this may underestimate the extent of the problem, say the researchers. In winter, when net rainfall (rainfall minus evaporation) is higher, more nutrients leach from the fields. Conversely, rivers and streams are mainly fed by deep groundwater in summer, which results in less leaching. Indeed, measurements taken for this research show that both nitrogen and phosphorus levels were higher in the winter.

The fact that up to 76% of the streams and ditches did not meet water quality standards demonstrates that further efforts are needed to reduce nutrient pollution, the authors conclude.

However, in another stage of the research, they also examined trends over at least 10 years (starting on or before 2000) for 87 of the monitoring stations. This analysis showed that 76% of these stations showed significant improvements for nitrogen, which dropped by 0.55 mg per litre on average per decade.

For phosphorus, 52% of stations showed a significant decrease in concentrations, although they also rose significantly at 13% of locations. The average trend for phosphorus was a reduction of 0.02 mg per litre per decade. This shows that, although there remains much work to be done to secure compliance with the WFD, policies to reduce pollution are having a valuable impact, the researchers conclude.

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