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Problems in determining the amounts of nutrients removed in wetlands created to abate run-off from agricultural fields without using excessively costly measurements [O39]

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Creation of wetlands in the agricultural landscape has in Sweden been identified as a cost-effective way of decreasing nutrient transports to the Baltic Sea. Approximately 3,000 wetlands have been constructed so far in southern Sweden through different subsidy systems. The purpose is that these wetlands should counteract eutrophication by removing nitrogen and phosphorus while simultaneously contributing to increased biodiversity in the landscape.

Continuous automatic (flow or time proportional) water sampling for nitrogen and phosphorus removal measurements were carried out in the inlet and outlet of 7 wetlands during 1.5 to 10 years. Strategic grab sampling, also in the inlet and outlet, was conducted in 14 wetlands during 2 years. Flow was measured only in the outlet in most wetlands. The wetlands were all located in agricultural areas and were chosen to represent wetlands with different nutrient loads from agricultural field run-off.

Large temporal variations in water flows and concentrations complicated the interpretation of data. Analyses of the large dataset, in some cases comprising parallel measurements using different methods, showed that estimations of nutrients removal were, for example, sensitive to if short intensive inflows were adequately captured with the measurements or not. This led in particular to substantial underestimations of phosphorus removal.

This suggests that removal rates or coefficients used in models to estimate the total amounts of nutrients removed from agricultural run-off in large-scale national programs for creating wetlands may be based on field measurements with severe shortcomings. National assessments may therefore have given misleading results and, at least for phosphorus, seriously underestimated the amount of removal that has been obtained. We need to find ways to accurately determine nutrient removal levels of a large amount of wetlands without using too costly measurements so that created wetlands retain their status as a cost-effective way to reduce nutrient transports from agriculture.