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Nitrogen concentrations and losses from agricultural streams in the Nordic and Baltic countries

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Assessment of long-term trends is one of the key objectives in most national water quality monitoring programmes. It is for example essential that we know how long it can take to detect the response in agricultural streams to changes in agriculture and implemented measures, because such information is needed to allow environmental authorities and decision and policy makers to establish realistic goals. Thus, long-term monitoring data is the key to cover future management needs and demands such as implementation of various EU-Directives (e.g., WFD, the Nitrates Directive).
This paper in a uniform fashion examines the levels and temporal trends of nitrogen concentrations and losses in streams draining agricultural catchment areas in the Nordic and Baltic countries. 35 catchments (range 0.1-33km2) in Norway (9), Denmark (5), Sweden (8), Finland (4), Estonia (3), Latvia (3) and Lithuania (3) were selected for the study. Most of these catchments are part of national water quality monitoring programmes and initially selected to represent the major crops, soil types and climatic conditions in each country. The longest time series where 23 years (1988-2010) while the shortest one was 10 years (2002-2011). The reasons for these identified trends and no-trends will be discussed during the oral presentation in relation to land use, agricultural management and implementation of mitigation measures. Furthermore, the difference in mean level concentrations and losses will be discussed in relation to differences in climate, land use and agricultural management

Overall the results show that agricultural catchments in the Nordic and Baltic countries exhibit different levels of nitrogen concentrations and losses, with a large interannual variability in all catchments. For example, the overall range in annual long-term mean TN losses was 6-102 kg N ha-1. Nearly one third of the investigated agricultural catchments showed statistically significant downward trends in nitrogen losses or concentrations. The most decreasing trends are prominent in Denmark and Sweden, whereas a few increasing tendencies were found in the Baltic countries. Evidently, a majority of the ‘best’ monitored small agricultural catchments in the Nordic/Baltic region do not show any significant improvement in nitrogen water quality. This could at first sight be regarded as evidence of a great failure of the implementation of mitigation measures in the various countries. But as pointed out by many authors, there is normally a time-lag between the implemented measures and when we can detect improvement in our agricultural streams; some authors have shown time-lags effects of decades and beyond.
Nonetheless, our results indicate that targeted strategies over time towards reduced nitrogen losses from agricultural land (as in the case of Denmark and Sweden) may significantly improve nitrogen surface water quality in small agricultural streams.