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Can different trends in Nitrogen and Phosphorus concentrations in Danish streams be explained by the different management measures applied?

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A comprehensive national monitoring program established in 1990 has provided a large dataset for analyzing trends in Nitrogen (N) and Phosphorus (P) in Danish streams.
At the same time, a suite of different management measures have been implemented in order to reduce the N and P enrichment of surface waters. These measures range from nationwide general measures to catchment specific measures including restoration of wetlands, reinstalling lakes, improved sewage treatment etc.
Results from analyzing the trends in N and P from all the streams, were linked to different measures applied within groups or individual catchments.
A first example, - N and P concentrations in river Odense were both reduced by around 60% during the period 1990-2013. This reduction was driven by a combined result from catchment specific improved sewage treatment and reestablished wetlands enhancing N and P retention in the catchment. However, general national measures reducing the nitrogen surplus in agriculture was the main driver for most of the observed reduction in N concentrations in the stream.
In contrary, no effect of a reduction in N-surplus in agricultural was observed in river Bjørnsholm. This is due to a catchment specific large proportion of nitrate enriched ‘old’ ground waters entering this stream. In most other Danish catchment reduction of nitrate in deeper non-oxic ground water ensures a significant reduction of nitrate leaching from agricultural land. The lack of N reduction in river Bjørnsholm called for the implementation of other management measures in the catchment. Thus, re-establishment of a large lake resulted in an increased N retention in surface waters and an overall 50% reduction in N concentration in the stream. However, a large increase in P concentrations was temporarily observed in the river during the first years following the reestablishment of the lake. This phenomenon can be ascribed to an increase in P-mobilisation from the lake sediments that were formerly arable fields. During the latest years concentrations of P in the river again parallel the levels observed prior to the reestablishment of the lake.