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# Monitoring runoff and nutrient transport in the coastal zone of a Danish lowland river

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Denmark has a very long coastline compared to its total area, and therefore large parts of the lower river reaches are influenced by tidal and coastal backwater effects. This situation makes it impossible to gauge the water discharge and nutrient loadings to many fjords and marine inland waters when utilizing traditional methods. Consequently, only 50 percent of the country is covered with gauging stations even though more than 400 gauging stations are established. We are today using models to estimate the total water runoff and nutrient loadings to coastal waters from ungauged areas (See Windolf et al., 2011). One major problem relates, however, to the calibration of the modeling system as we are lacking data from the lower ungauged part of Danish river systems.
In order to investigate the possibilities of improving the Danish gauging network and to test the models used for simulation of runoff and nutrient load estimation in else ungauged areas, a new monitoring station was established in the summer of 2011 in the River Skjern very close to the outlet in Ringkjøbing Fjord at the west coast of Jutland, Denmark. The new monitoring station covers a 393 km2 ungauged area.
The hydraulic conditions at this new gauging station are affected by tidal and backwater effects and the nutrient transport may be influenced by stratified flow conditions. The catchment area to the new gauging is 2550 km2. The velocity distribution is measured in the profile by both horizontal and vertical multi cell Doppler sensors. Conductivity, turbidity and water temperature is measured by sensors in 2 levels, near the channel bed and in the upper part of the depth profile. Time integrated water samples are also collected in 2 depth levels as composite samples with every a 2 hour interval, together with simple grab samples. All water samples are analyzed for total nitrogen, nitrate, ammonium, total phosphorous, and phosphate. The wind speed and direction is registered at the station.
The monitoring data is used to investigate if stratified flow conditions exist in the lower part of Danish rivers influenced by backwater effects. . Moreover, we investigate the dynamics of nutrient concentrations and concentrations of suspended sediment l during different flow and storm event conditions A water and nutrient balance for the ungauged area will be calculated from the first year monitoring results and compared with the national modeling system for runoff and nutrient modeling in order to analyze and validate the hydrology and nutrient fluxes in the lower part of Danish river systems.

References

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