High resolution modelling of N-retention in a restored riparian wetland

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Study objectives

Develop a practical modelling tool (MIKE SHE-Ecolab) for modelling nitrogen retention in wetlands in order to understand the benefits of wetland restoration and for wetland design





Brynemade, Odense River



Stream was remeandered in 2003 – 6 km with 16 meanders

- Channel bed raised by 1 m and cross-sections reduced by 50%
- Water depths measured at transects by Aarhus University
- Groundwater levels in sand aquifer and water quality (2010/11) measured by KU



Modelled flood depths

Wetland inundation on 17/1/2011 (12.5 m)





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Key findings

- The model represents the hydrology and nitrogen processes well although the model indicates higher deep removal rates than the measured rates
- Total N-removal is in the order of 127-150 kg/hectare/year compared with 14 prior to restoration (Typical values of 100-200 kg/hectare/year (source: Hoffmann et al., 2014))
- Nitrogen removal (denitrification) during flooding from the river accounts for most of the removal (75-87%)
- Plant uptake is also of importance and organic peat accumulation accounts for around 13% of total nitrogen retention
- The restoration of the natural groundwater flow also increases the retention time and thereby N-removal in the subsurface

Thank you!

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