ME 05 Optimisation of the spatial arrangement of Dutch fen meadows for multifunctional use: knowledge base development and participatory decision support

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Context / Social problem

Reed marshes are used around the world for waste water purification, tertiary treatment of treated sewage and filtering nutrients from eutrophic surface water. Artificial reed marshes (helophyte filter) are designed to maximise the contact between the flowing water and the biological filter consisting of sediment, helophytes (e.g. reed) and micro-organisms. In the fen meadow areas, ditches, banks and marsh fragments can fulfil a comparable function because the surface water in these polders often contains high concentrations of nutrients (N and P). These fen mire fringes may also be able to absorb large quantities of carbon. Eutrophic reedbeds have a high net primary production and much of this accumulates in the soil.

What do we know/not know?

Nutrient retention and carbon sequestration depend heavily on water level fluctuations and the relative importance of various elements in the water, nutrient and carbon balances. The specific distribution between these elements probably differs considerably from polder to polder. It is therefore unclear how important banks and littoral zones and their spatial configuration could be, and exactly what the influence will be of predicted climate changes. Climate change will probably lead to greater fluctuation in water levels rather like those in historical regimes: more fluctuation, higher winter levels and lower summer levels. Such fluctuations in levels are also desirable from a nature conservation perspective. The rate at which nutrient retention and carbon fixation can take place, however, also depends on the length and amount of shoreline, the spatial configuration of the water body in the polder, how the water is routed through the polder and the amount and quality of the water.

What is being studied?

It is still unclear what the optimal ditch pattern for retention and carbon fixation will be. Because it is not easy to set up experimental trial polders at field scale, the present research will collect empirical data on several parameters, as a multivariate problem, for a large number of polders in the Dutch fen meadow areas. Once the polders have been selected, carbon fixation will be measured in situ on a small scale.

What are the results

The project is still in the start-up phase. Agreements have been made with most of the water boards. During the course of the summer the polders will be identified and the initial set of data collected in an iterative process with the water boards. Database development, GIS and balance modelling (with input from annual balances from Duflow, SOBEK or comparable document) will run concurrently. The outcome will be of primary importance for water managers, but the Netherlands Environmental Assessment Agency (MNP) has also expressed interest in national assessments. Collaboration is being sought with potential interested parties.