



## **Water quality assessment using soil data and land use information in the Noordelijke Friese Wouden region**

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A cooperation of 800 farmers in the 60,000 ha region of the Noordelijke Friese Wouden (NFW) in the north of The Netherlands aims to develop a sustainable form of agriculture, using innovative management systems to reduce nutrient losses to the environment. The NFW-cooperation wants to be collectively responsible for creating a healthy environment (clean soil, water and air) and maintaining the typical small-scale landscape with tree-rows and high ecological values. This paper focuses on the surface water quality in the NFW region in relation to land use. The actual water quality in the region is described by combining historical monitoring data and using a regional system analysis. The NFW region has clay, sand and peat soils and three typical water systems: free draining sandy soils; polders where water levels are regulated by pumping out water or water inlet; and an intermediate region where water levels and water flows are regulated using weirs. Water flow and sources of nutrients are quantified, based on measurements and model calculations. The dynamic process model STONE is used to calculate the nitrogen(N) and phosphorous(P) losses from different forms of land use to the surface and ground water. STONE uses detailed spatial information of soils like soil type, soil physical and chemical characteristics; combined with hydrological information and land use. Large spatial differences exist in estimated NO<sub>3</sub>-concentrations in groundwater and N and P losses to surface water between sand, peat and clay soils. However, the contribution of nutrient losses from agriculture to the surface water quality is hard to quantify because of large unknown amounts of inlet and outlet water, and the corresponding nutrients in this water.

The NFW-region has to comply with the goals of EU Water Framework Directive for water quality. Water quality has to be monitored in the surface water. Knowledge of

soil type and the hydrological system can help to develop sound monitoring systems on the regional scale. We will present different methods to monitor the nutrient status of the surface water, closely linked with the ecological criteria of a good water quality in the region. Finally, some suggestions how to improve water quality by farm management will be given.