

1. Abstract topic

Development of a new and more differentiated nitrogen retention mapping to reduce nitrate leaching with a more targeted and cost-efficient N-mitigation strategy.

The current nitrogen regulation in Denmark does not consider the large variation in N-retention within catchments leading to nutrient losses and unfavorable agriculture practices. The retention within a catchment can vary from <20% to 100% due to differences in drain transport, hydrological and geochemical conditions. The current retention mapping does not consider the differentiation in N-retention in the upper meters of the root-zone, because the processes in this zone isn't fully understood yet. Having to meet the reduction requirements within catchments with a high average retention will be associated with large economic consequences as lack of knowledge regarding spatial variation in N retention and spatio-temporal distributed drain flow fraction often means a general over-implementation of mitigation measures.

The purpose of the retention mapping is to achieve a cost-effective aquatic environment effort through an increased targeting of the N-mitigation strategy by knowledge of more detailed N-retention in the root zone and to distinguish the drain fraction.

The core of the project is 1) to further develop the Ejlskov redox probe to map the redox zone in the root zone, 2) use geophysical mapping methods to map the spatial geology and water saturation profile with drainage geometry to develop hydrological models that describe water level dynamics and drainage runoff, 3) develop an operational and scalable model for mapping spatially differentiated N-retention classes within catchments, and 4) demonstrate the environmental and economic effects of a differentiated targeted mitigation measure effort with field and drainage mitigation measures.

The project will develop an operational model tool for differentiating N-retention classes within catchments to achieve a more environmentally efficient and cost-effective mitigation strategy. With the new highly detailed N-retention map, it will be possible to demonstrate the economic and environmental costs of various mitigation measures, both field measures and end off drainage measures, by considering the large variation in N-retention within the catchments.