

PhD project abstract

Hydrochemical and biogeochemical functioning of two-stage ditches in Sweden

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Combating eutrophication requires decisive mitigation measures aimed at reducing agricultural losses of nitrogen (N) and phosphorus (P) from field sources to aquatic systems. The need will become critical in the future as increased flashiness, expected from changing climate and growing food demand, will further accelerate N and P pollution. This project will advance the knowledge of processes governing nutrient retention in agricultural streams in Sweden by focusing on two-stage ditches (SD) which are new type of mitigation measure aimed at increasing water retention and reducing losses of nutrients and sediments. We will show how hydrochemical and biogeochemical processes affect SDs' capacity to retain water, N, P and particles and how proper placement, design and management of SDs can enhance their ecosystem functions (self-purification, erosion and flood prevention). We will investigate these processes in field with both low- and high-frequency water quality monitoring, coupled with quantification of denitrification rate and P sorption capacity in sediments as well as measurements of sedimentation rate. We hypothesize that SDs provide improved environmental function compared to traditional trapezoidal ditches that are primarily designed to remove excess water from drained agricultural fields.