Assessing the impact of best management practices on surface water quality in small agricultural fields

Agriculture is a major contributor of nutrient loads to surface water bodies in the form of Nitrogen and Phosphorus causing serious concern for fresh and marine water quality. Farmers are encouraged to employ best management practices (BMPs) to reduce nutrient fluxes along pathways from field to stream in agricultural catchments. These BMPs have different impacts on the nutrient fluxes in various areas based on farm characteristics (soil type, slope, farming practice, climatic variables such as rainfall, temperature, etc). The BMPs may also influence each other or neutralise the impact of one. On the other hand, the impact of same practices might be very different in catchment-scale compared to farm-scale.

Therefore, developing tailored management practices that correspond to unique characteristics of each catchment is necessary both in terms of environmental conservation and economic benefits. This is of high importance considering the more frequent extreme weather events that would increase nutrients flushing down the rivers.

Monitoring station

Streamflow-catchment outlet
Photo: Katarina Kyllmar

This research intends to develop the understanding of the impact of non-structural BMPs coupled with environmental variables and climate data in selected small agricultural farms (farm-scale). The study will use currently available long-term water quality data in Swedish agricultural catchment monitoring schemes, and climate data from Meteorological and Hydrological Institute (SMHI) to develop trend response models.

This specific study is part of the work "Analysis of soil and water monitoring data and effects of agricultural management practices" by "Agricultural Water Management Group" at the Department of Soil and Environment. The research will contribute to understanding the links between water quality leaving agricultural farms (Observationsfält på åkermark) and associated agriculturally dominated catchments (typområden på jordbruksmark), and to evaluate effectiveness of non-structural BMPs in various scales.

The candidate should ideally have interest and experience in statistical analyses and modelling techniques, basic skills in the use of GIS, and feels comfortable to work with big data. Field trips to evaluate drainage system in the farms might be expected.

The project is planned to start in January 2022 for a 30-credit MSc thesis in Environmental Science.

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