Sveriges lantbruksuniversitet
Swedish University of Agricultural Sciences

Department of Soil and Environment

MSc project on measuring greenhouse gases in agricultural streams with low-cost sensors

Credits: 30 credits or 60 credits
Level: Master
Subject: Environmental Science or Soil Sciences
Start: January 2026 or as agreed

Background

Human activities such as agriculture have altered the quality of water in streams and rivers worldwide. In Sweden, many rivers have become greener and browner over the past century due to the use of fertilizers and the plowing of agricultural land, which have led to increased concentrations of nutrients and dissolved organic matter in the river.

Nowadays, we understand that this pollution not only affects aquatic ecosystems but also leads to the production and emission of greenhouse gases (GHGs) to the atmosphere, contributing to global warming. Yet, the role of streams and rivers in this process remains poorly understood, mainly because current measurement methods are time- and resource-intensive, providing only sporadic observations and limiting our ability to monitor GHG dynamics continuously.

In this project, we will explore how agricultural streams produce GHGs. Building on recent advances in low-cost sensor technology, we will build and test simple, high-frequency instruments to measure dissolved GHGs in freshwater systems. We will apply these instruments in local agricultural landscapes and use the collected data to study the factors that control GHG production. The work will combine hands-on field experiments with data analysis and modelling, offering a unique opportunity to learn about environmental monitoring, sensor development, and climate-related freshwater research.

Project aims

Build simple sensor-based instruments to measure GHG emissions in streams. Test and calibrate the prototype under field conditions in agricultural streams. Collect and analyze high-frequency data on GHG concentrations and environmental drivers. Apply statistical and machine-learning tools to identify key factors controlling GHG production and emission. To improve our understanding of riverine GHG emissions in agricultural landscapes.

Required knowledge: Interest in hands-on experimental work and field data collection. Basic experience in R or Python.

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