

New Collaborative Project on Legacies of Agricultural Pollutants (LEAP): Three PhD students and one postdoc at The University of Waterloo

Human activities have greatly accelerated the nitrogen (N) and phosphorus (P) cycles, with excess N and P leaching into surface and groundwaters, causing problems of eutrophication, aquatic toxicity and drinking water contamination. To counter these effects, agricultural best management practices (BMPs) have been widely implemented to minimize agricultural impacts on water quality, but such practices have yielded limited success, with significant lag times between changes in agricultural practices and measurable improvements in water quality. Recent research indicates that the aforementioned time lags may arise due to legacy stores of nutrients that have accumulated in rural landscapes over decades of fertilizer application and agricultural intensification. **The goal of the LEAP project is to provide a unified framework that incorporates agricultural legacies and time lags into adaptive management strategies to protect water resources under changing climate and land use.**

The PhD students and postdoc will be key members of a team working to a) Identify key controls on the accumulation and mobilization of agricultural N and P legacies, and predict time lags between implementation of BMPs and water quality improvements, as a function of climate, land cover, land use, and land management; b) Assess the outcomes of alternative management strategies by performing cost-benefit analyses within a hydro-economic modelling framework that explicitly represents nutrient legacies; c) Develop a Bayesian Belief Network (BBN) framework to evaluate uncertainties in both biophysical and hydroeconomic modelling of nutrient legacies, and their implications for nutrient risk management; d) Create an agroecosystem typology – based on the individual EU and Canadian exemplar sites– that links the biophysical and socioeconomic drivers of NPS pollution to water quality impacts; e) Inform adaptive agro-environmental water management practices that target mitigation of water quality impacts of N and P legacies by assessing trade-offs between short and long-term costs, benefits and risks.

The PhD students and the postdoc will focus primarily on the Great Lakes watersheds, and work with PhD students and postdocs in Sweden (Stockholm University), Denmark (University of Copenhagen) and Portugal (University of Coimbra) who will explore similar questions in their countries.

Applicants must have specialization in biogeochemistry, hydrology, earth sciences, environmental engineering or a related field. For further information regarding these positions or to submit an application, please contact:

[Nandita Basu](#)

Department of Earth and Environmental Sciences

University of Waterloo

nandita.basu@uwaterloo.ca

Closing date: Applications will be reviewed as they are received. The positions will remain open until filled.

We thank all applicants for their interest; however, only those individuals selected for an interview will be contacted.