

## Postdoctoral research project

# GROUNDWATER MODELLING FOR SUPPORTING SUSTAINABLE WATER MANAGEMENT TO AVOID WATER USAGE CONFLICT IN LANORAIE PEATLAND (QUEBEC, CANADA)

Over the past 70 years, the Lanoraie peatland complex, located northeast of Montreal, Canada, has undergone significant transformations, including peat drainage, groundwater pumping for irrigation, and the encroachment of woody vegetation. These changes have intensified conflicts among competing water uses, namely, drinking water supply, agricultural irrigation, and wetland conservation. Climate change, particularly the increasing frequency of summer droughts, has further exacerbated these tensions, and evidence suggests that the region has reached, or is approaching, its hydrological carrying capacity. Challenges to address the growing water use conflicts in the Lanoraie region arise from limited hydrological data, from complex interactions between surface flow, groundwater flow and peatland flow, and from the absence of knowledge about critical thresholds, control points, and system inertia. These issues are further compounded by uncertainties related to future agricultural and climate scenarios.

The aim of this postdoc project is **to advance knowledge on water resource use and land conservation in Lanoraie, while providing a hydrogeological modelling framework applicable to similar contexts of peatland located in cold and humid climates**. This framework may take the form of a modelling chain or a fully coupled model and must quantify water availability for all uses. The project aims to 1) characterize and quantify hydrological and hydrogeological dynamics involving streams, peatlands, and the underlying sand aquifer, 2) assess the impacts of vegetation changes, water use, and climate variability on streamflow and groundwater levels, and evaluate the potential of nature-based solutions to mitigate these effects, and 3) identify hydrological indicators and control points to determine when water use becomes unsustainable. Developed in the collaborative environment of the research Chair in water and land conservation, this research will produce transferable knowledge to inform sustainable water governance in wetlands experiencing water use conflicts.

**PREREQUISITE** PhD in hydrological sciences or a related field; strong computational and modeling skills with prior experience in groundwater modeling in complex environments; demonstrated ability to publish original research in international journals; and an interest in student supervision. Proficiency in French is an asset but not required.

**OUTCOMES** The project aims for the publication of at least three peer-reviewed papers, participation in conferences, collaboration with a dynamic and high-profile research team, and the development of a professional network across academia, industry, and stakeholder communities.

**SALARY** 70 000\$/year

**DURATION** Two years, full time, starting as soon as possible in 2025

**SUPERVISORS** **Marie Larocque**, groundwater specialist and professor at the Department of Earth and atmospheric sciences UQAM (Montreal, Canada) ([larocque.marie@uqam.ca](mailto:larocque.marie@uqam.ca)); and **Emmanuel Dubois**, groundwater specialist and grant-funded researcher at the Department of Earth and atmospheric sciences UQAM ([dubois.emmanuel@uqam.ca](mailto:dubois.emmanuel@uqam.ca))

**APPLICATION BY EMAIL INCLUDING :** 1) Motivation letter, 2) Full CV, 3) BSc, MSc, and PhD transcripts, 4) Contact details for two references, 5) Selection of max. 3 authored papers with short presentation of the scientific contribution and role in the writing process.

