



Postgraduate and Postdoctoral Opportunities in Microbial Ecology and Biogeochemistry

The **Ecosystems and Global Change Group** (www.ecosystemchange.com) at Trent University jointly led by Prof Andrew Tanentzap (Canada Research Chair in Climate Change and Northern Ecosystems) and Dr Erik Emilson (Research Scientist, Canadian Forest Service sector of Natural Resources Canada, <https://glfc-wet.github.io>) is recruiting up to 5 funded positions for **Autumn 2023** at the intersect of ecosystem ecology, microbiology, and geochemistry in northern waters and soils.

What we can offer: Our research training environment features some of the most advanced environmental research infrastructure in Canada, including access to a Fourier transform – ion cyclotron resonance mass spectrometer, long-read (Oxford Nanopore) sequencing facility, radioisotope and stable isotope labs, and eddy covariance systems, with extensive support for field research (ATVs, snowmobiles, autonomous surface vessel). As our team partners with government scientists, you will have a unique opportunity to influence environmental policy and make connections outside of academic to bolster your career.

All postgraduate candidates are paid \$22k/year, considerably more than minimum stipends at Trent, and we can offer competitive wages for postdocs (starting \$55k/yr + benefits). Peterborough is one of the most affordable and desirable places to live in Ontario, offering the best of urban (70 mins to Toronto) and rural living all under 30 minutes to the heart of the Kawarthas that boasts endless lakes and forests to explore. Our group supports flexible working arrangements and supports applicants from diverse backgrounds as we strive to build a more equitable, diverse, and inclusive workplace.

1) Postdoctoral researcher – Leakiness of natural climate solutions (2 yrs of initial funding)

Forest management is a pillar of mitigating climate change. But forests lose vast amounts of organic matter into receiving waters that risks offsetting their ability to sequester atmospheric carbon. You will quantify the amount of carbon lost from boreal forests into lakes by establishing two eddy flux covariance towers in northwestern Ontario, Canada. You will trace the flow of carbon seasonally and characterise the biogeochemical drivers and impacts to inform an eventual catchment-level experiment. You will have experience with geospatial modelling and gas exchange measurements.

2) MSc or PhD – Tracing pathogens released into a warming Arctic

When perennially-frozen ground known as permafrost formed millennia ago, it locked away past microorganisms into a deep freeze. Yet many of these microbes can replicate once thawed, even after tens-of-thousands of years. As the Arctic warms nearly four-times faster than the rest of the globe, there is a large risk of novel bacteria and viruses being released into the environment. Working with Indigenous and Health Canada partners, this project will use eDNA approaches to identify novel microbial pathogens released from thawing permafrost and track their movement in the Canadian Arctic. Experience working with genomics data is an asset.

3) MSc or PhD – Salmon rivers under the cumulative effects of climate and forest change

Salmonids depend on clean, productive forested headwaters that under threat from the cumulative effects of climate change, forest management pressures, and associated forest change. This project will investigate the interactive effects of climate change and forest management on basal food webs of forested headwaters of salmonid-bearing rivers. You will explore how microbial community composition, productivity, and function differ along space-for-time gradients of climate change and forest management histories (logging and post-harvest silviculture). You will have access to pre-existing datasets from sites across Canada and the chance to establish additional sites.

4) PhD – The ecological role of chemical diversity under a warming climate

Organic matter consists of thousands of unique molecules of varying origin and composition, but we know little about how this chemical diversity influences biological processes. In this PhD, you will test how ecosystem function varies with the composition of organic matter in freshwaters and soils across a space-for-time gradient of future climate change. You will have experience with some of the following: greenhouse gas measurements, ultra-high-resolution mass spectrometry, microbial ecology, statistical analyses. The outcomes of this research will help improve the predictions of Earth system models and guide management of interventions to protect ecosystem health.

5) PhD – The global pulse of dissolved organic matter

Climate change is occurring unevenly throughout the year with unknown consequences for the large flux of carbon that moves annually through freshwater. This project will leverage existing FT-ICR MS datasets, including monthly measurements from 70 sites worldwide, to analyse seasonality in dissolved organic matter of lakes and identify drivers of their thermal responses. By building models to predict organic matter composition from remote sensing data, you will scale your findings globally. You will have enthusiasm for working with “big data” and statistical modelling.

6) MSc/PhD – Your own project!

We are interested in working with applicants motivated to develop their own research project in the areas described above and on our websites. Reach out with your ideas!

How to apply: Please email Andrew Tanentzap (atanentzap@trentu.ca) with a CV and a description of what you hope to get out of working with us, how your research interests are a good fit to our group, and how your past experiences make you suitable for the independent and often challenging nature of research. Positions will remain open until they are filled.