Maximizing carbon capture for One Climate in a warming world

Supervisor: Prof Andrew Tanentzap, Canada Research Chair in Climate Change and Northern Ecosystems (www.ecosystemchange.com, @ecochangegroup)

This project aims to understand how climate change is shifting the molecular composition of dissolved organic matter and its persistence as a carbon pool.

Dissolved organic matter (DOM) is one of the largest and most reactive pools of carbon on Earth, making it an important lever in efforts to mitigate climate change. Whether DOM persists in the environment rather than as atmospheric carbon is determined by its composition and interactions with microorganisms. DOM consists of tens of thousands of unique molecules of varying origin and composition. This variety of molecules has been termed “chemodiversity” to mirror the term biodiversity. Despite widespread surveys of DOM in waters and soils enabled by technological advances over the past 30 years, there has been no systematic attempt to ask how changes in chemodiversity associated with climate warming will impact nature and human wellbeing.

In this project, the student will join a diverse team of researchers from multiple academic institutions and government partners to undertake field, laboratory, and computational work related to DOM biogeochemistry and climate change. The field work will involve collecting DOM and greenhouse gas fluxes from lakes and their surrounding soils along a space-for-time gradient of future climate change. In the lab, the student will work at the Trent Water Quality Centre to analyse samples on one of the most advanced mass spectrometers in the world. Samples will also be used to measure microbial functioning, at Trent's state-of-the-art long-read sequencing facility, and microbial biomass with flow cytometry, and the student will be trained in these techniques. Throughout the project, the student will be trained in data analysis (bioinformatics, chemoinformatics) and receive opportunities to specialise their project in these areas based on their interests.