Forest Ecosystems and Environmental Restoration – Professor Sean Thomas

Openings: 2-3 MScF or PhD, with a preference for the latter in the following project areas:

- *Biochar and environmental restoration.* Biochar (pyrolyzed organic material used as a soil amendment) has considerable promise for used in restoration of degraded and contaminated soils such as mine tailings and industrial brownfields, as well as in urban forestry applications. Ongoing and planned projects include work on development of biochar-based seed coatings, enhancing biochars for use in use in restoration applications.
- *Greenhouse gas fluxes in heavily impacted forest systems, and remediation thereof.* Current research is quantifying greenhouse gas fluxes on log landings and skid trails in managed forests, and analogous sites in urban areas, and on mitigating greenhouse gas flux "hotspots" in these areas.
- *Greenhouse gas fluxes in live and dead trees.* Ongoing and planned research is examining methane flux patterns in live and dead trees, including methane balance of foliage, woody tissues, and woody debris.
- *Spatial ecology of temperate forest systems, and tropical-temperate comparative studies*. This work makes use of a temperate forest "mega-plot" encompassing a 13.5-ha area in old-growth areas at Haliburton Forest in central Ontario with ~50,000 mapped trees. The main motivations for the project are to understand the role of aquatic-terrestrial margins on forest diversity and dynamics, to examine relationships between soil factors and tree distributions and growth patterns, and as basis for parameterization and testing of individual-based forest simulation models. We are also specifically examining spatial variation in soil greenhouse gas fluxes. The plot has been established in collaboration with the Smithsonsian ForestGEO plot network (https://forestgeo.si.edu/) and is being used in large-scale comparative studies of temperate vs. tropical forests.
- *Enhancing biodiversity and ecosystem function urban "living infrastructure"*. Ongoing projects are examining ecosystem processes in green roofs, with a focus on enhancing native species biodiversity and improving energy balance and greenhouse gas flux patterns. This work is being conducted in part in collaboration with the GRITlab research group (https://grit.daniels.utoronto.ca/).

Contact: Prof. Sean Thomas, sc.thomas@utoronto.ca.