

Summer 2023 Sustainability Scholars Program Internship Opportunity

The UBC Sustainability Initiative (USI) is pleased to offer current UBC graduate students the opportunity to work on funded sustainability internship projects. Successful candidates work under the mentorship of a partner organization, and are immersed in real world learning where they can apply their research skills and contribute to advancing sustainability across the region.

- Visit the [Sustainability Scholars Program website](#) to learn [how the program works](#) and to [apply](#).
- Be sure to review the application guide on the Apply page to confirm your eligibility before applying.

Applications close at midnight on Sunday January 29, 2023.

Project title: Slope Stability Assessment of the West Side of Capilano Reservoir

Project Background & Overview:

Metro Vancouver provides clean, safe drinking water for 2.7 million residents in the Lower Mainland. This includes acquiring and maintaining supply, as well as treating, testing and delivering water. Metro Vancouver uses a system of restricted water supply areas (WSAs), dams, treatment facilities, reservoirs, pump stations and water mains. Upgrades are constantly being made to the water system to maintain the quality and reliability of clean drinking water to the region.

The Capilano, Seymour and Coquitlam WSAs provide drinking water for Metro Vancouver. The Capilano WSA provides drinking water for approximately one third of Metro Vancouver residents. From 2018-2021, areas of the South Coast and part of the interior of the province experienced an outbreak of a native defoliating moth, the western hemlock looper moth (IDL). This moth has an outbreak cycle every 11 to 15 years in the coastal forests of BC. The Capilano WSA, in particular, experienced a large outbreak of IDL, resulting in severe tree mortality concentrated in the southern portion of the WSA around the steep slopes of Capilano Reservoir. Antecedent conditions for IDL outbreaks are successive hot dry summers, which are expected to increase in duration and severity as a result of climate change in our region. The western hemlock-dominated forests in the WSA's are susceptible to future outbreaks of this species; Metro Vancouver would like to increase resilience in our forests to reduce mortality from IDL and other pests.

Studies have also shown that intensity of rainfall events along the South Coast are predicted to increase, due to the impacts of climate change. Metro Vancouver is concerned that increased storm intensity, combined with the loss of vegetation on steep slopes directly adjacent to the reservoir could result in more frequent and larger landslides and turbidity events in the reservoir.

A key goal of managing Metro Vancouver's WSAs is to maintain healthy, functioning ecosystems in order to provide clean drinking water for its residents. Thus, it is imperative that management strategies aim to protect the drinking water quality by assessing the potential for landslide events that could impact source water quality.

Project description

This study will assist land managers in understanding the potential threat to water quality in the near, medium, and long term associated with vegetation loss in severely impacted IDL defoliation areas. Previous studies in the Coquitlam WSA in the early 2000s indicated a low potential threat as understory vegetation was quick to take hold, lessening landslide and erosion potential. However, the section of the Capilano WSA affected in the recent outbreak is on steeper slopes, and tree mortality was more significant. Climate change predictions for more severe rainfall events are also concerning and adding a new variable into management of tree loss from the recent outbreak.

Long-term planning for the prevention or mitigation of turbidity events is imperative for water managers to ensure an uninterrupted supply of quality drinking water supply to an ever-growing population. Study outcomes include the development of slope stability maps using a variety of data: LiDAR, terrain stability mapping, surficial material mapping, and mortality polygons. Of particular interest will be prioritizing areas highly susceptible to increased landslide potential as a result of IDL infestation tree mortality (vegetation and root stability loss) over the near term (1 to 2 yrs), mid-term (2 to 5 years) and long term (5+ years). With climate change expected to deliver more frequent antecedent conditions for IDL outbreak and also to deliver larger and more frequent landslides to this area of the BC Coast, Metro Vancouver is interested in how those two factors will interact and any insights from recent studies that may assist in land management within the WSAs.

Project scope

We are seeking a Scholar to undertake a preliminary literature review on IDL outbreak history, trends and future outbreak conditions in the Pacific Northwest. The Scholar will also undertake a preliminary literature review of the geology and geomorphology of the Capilano watershed area. Metro Vancouver will provide the scholar with data gathered on the history of IDL outbreaks and landslides in the WSAs along with past reports and studies. Once familiar with the topic, the Scholar will research the impacts of climate change in this area, current trends and recent research on looper outbreaks and pair this information with climate change models for this area to infer future Hemlock looper activity and landslide activity. The scholar will develop slope stability maps in areas with severe tree mortality on the West side of the Capilano Reservoir; using data provided by Metro Vancouver, and site visits to perform ground-truthing.

Questions we want to answer:

1. Given what we know about climate change and tree mortality caused by IDL in the Capilano WSA, will landslide risk in this area increase due to this impact (Short to long term)?
2. Will natural regeneration provide adequate recovery in any or all areas? If we want to increase resiliency in the watersheds, what actions can we take to mitigate climate change impacts to vegetation (i.e., alternate species or planting techniques)?
3. What existing research is available on the effects of pathogen or insect mortality on slope stability in similar forests?

Resources provided will include:

- 2018 and earlier LiDARn 2022 LiDAR data (pending),
- Detailed Terrain Stability Mapping (5-Class),
- Terrain (Surficial Materials) Mapping,
- Mortality polygons, defoliation polygons– BA Blackwell reports 2020, 2021,
- Matthias Jakob paper (Projected Climate Change Effects On Landslides In Metro Vancouver Watersheds 2019). Given the assumptions in the paper (increased frequency and size of shallow

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landslides with climate change), landslide frequency and magnitude may increase with climate change alone.

- Cordilleran Geoscience reports on West side Capilano 2020 and earlier
- Various student papers on landslide, slope stability and forest health in the watersheds (Kitchens, etc)
- Historic weather and hydrometric data (various stations: Capilano-based)
- Ecological inventory information from the early 90's
- UVic and MV Research on 2000's looper outbreak in Coquitlam

Project will require three to five field visits (total of 3-5 days) to ground truth data and results (24-40 hrs). This fieldwork will serve to refine key areas of slope instability on the West side of Capilano, and erosion. The scholar will be accompanied by knowledgeable MV staff on these field visits, who will provide safety training while working within the restricted access WSA. The scholar will require field gear including sturdy boots with ankle support, rain gear and must have the ability to walk/hike on uneven terrain and up steep slopes. Access to some areas is by boat so comfort riding in small watercraft is preferred.

The remainder of the project effort will be through desktop exercise analyzing the data provided, the field data collected and the variables created (210- 226 hrs). The Scholar should leave time in the schedule to develop a short presentation for the MV project sponsors.

Deliverables

- A final report containing a summary of the work completed. Slope stability assessment summary report, landslide and surface erosion susceptibility maps highlighting key areas of slope instability and surface erosion.
- A final report for the online public-facing [Scholars Project Library](#).
- Presentation on project findings
- All data, written and geospatial data files in a format suitable to Metro Vancouver.

Time Commitment

- This project will take 250 hours to complete
- This project must be completed between May 1 to August 15, 2023
- The Scholar is to complete hours between 9 am and 5 pm, Monday to Friday, approximately 17 to 20 hours per week.

Required/preferred Skills and Background

- Excellent research and writing skills
- Demonstrated interest in sustainability
- Familiarity with research methodologies
- Strong analytical skills
- Ability to work independently
- Deadline oriented
- Project management and organizational skills
- Strong technical and drafting skills
- Demonstrated experience in ARC GIS products and LIDAR
- GIS training or experience.
- Experience reading and interpreting LIDAR
- Fieldwork experience; comfortable working in steep, uneven terrain

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Additional project requirements.

- The Scholar will need to provide their own PPE/field gear for field work, including sturdy boots with ankle support, and rain gear and must have the ability to walk/hike on uneven terrain and up steep slopes.
- Access to a vehicle or car share for the field work would be an asset (but isn't mandatory). If the Scholar uses their own vehicle/car share reasonable mileage costs for the field work will be reimbursed through the project mentor.

Applications close **midnight Sunday January 29, 2023**

Apply here: [Click here to apply](#)

Contact Karen Taylor at sustainability.scholars@ubc.ca if you have questions

Useful Resources

We are holding a special **resume preparation workshop for prospective Scholars** on January 23, 2023. [Click here for details and to register.](#)

Below are some links to useful resources to help you with your resume and cover letter (there are many more online). Some of these resources also provide information on preparing for your interview.

<https://students.ubc.ca/career/career-resources/resumes-cover-letters-curricula-vitae>

<https://www.grad.ubc.ca/current-students/graduate-pathways-success>

<https://www.grad.ubc.ca/cover-letter-cv-resume-templates-ubc-career-services>