

First Name: Hannah

Last Name: O'Neil

Student ID: T00238227 Start Date of Project: 20/05/2024 (DD/MMM/YYYY)

Please complete all sections of this application form.

1. FACULTY MENTORS INFORMATION

1.1 Who is your Primary Faculty Mentor? Lyn Baldwin

1.2 Who is your Secondary Faculty Mentor? Robin Westland

NOTE: Your Primary and Secondary Faculty Mentors must each complete a Faculty Mentor Support Form. Forms can be found under the attachments tab within your TRU Romeo UREAP application and on the TRU UREAP webpage under information and Forms for Faculty Mentors..

2. PROJECT DESCRIPTION

2.1 Provide an abstract of your proposed research: (maximum 1500 characters)

In urban landscapes, gardens are sites of complex co-creation by plants and gardeners that have the capacity to serve as ecological refugia. However, the capacity of a garden to provide habitat for species adversely impacted by urbanization depends, at least in part, on their botanical composition. A garden's botanical composition is often influenced by its physical and climatic characteristics, as well as the opinions and attitudes of its gardener. My proposed research will investigate the complex social, cultural, and ecological reality present in the urban gardens of Kamloops. Through on-site interviews with gardeners, I will assess a cross-section of Kamloops' gardens for their biodiversity, pollinator-friendliness, and historical geographic diversity. In order to understand the differences in these facets of diversity among urban gardens, I will use both quantitative and qualitative approaches. Each garden's diversity will be correlated with specific site factors, to quantitatively assess the value of these factors in predicting garden diversity. To compliment this quantitative approach, I will also qualitatively assess each interview to gain insight into the relationship that exists between the plants and their gardener. This mixed-method approach is being utilised to showcase that urban gardens are complex and cannot be neatly explained by one sole predictor variable.

2.2 Provide a brief literature review for your proposed research: (maximum 3500 characters)

Despite the cultural view of plants as simply "living objects" (Lawrence, 2021, p. 631), their complex lives are gaining more recognition (Lawrence, 2021). Plants have unique interactions with time, space, and humans, at various social, cultural, and economic levels (Lawrence, 2021). The urban garden is a place where these meanings are negotiated as researchers seek to understand the social and cultural value of urban gardens. Gardens are created in social contexts that influence their form and function (Haase & Gaeva, 2023; Ginn, 2017). Gardens are created from human desire, the lived realities of plants, and historical, political, and social norms and practices (Ginn, 2017). This interplay between plants, human

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society and culture, and gardeners must be considered when studying urban gardens. In Graduate Studies arid environments like Kamloops where most horticultural plants require summer irrigation to survive, gardens are especially dependant on gardeners' intentions (Avolio et al., 2019). According to Avolio et al. (2019) gardens primarily contain deliberately cultivated plants, and with a globalized horticultural trade, gardeners can select species from diverse regions of the world. This intention and attention are compounded by the effects climate change, suggesting that developing a deeper understanding of urban gardens is vital (Vega et al., 2020). With around 56.6% of the world's population currently living in cities, and a prediction that 68% of the world's population will reside in urban environments by 2050, understanding urban gardens is essential (Tauenböck et al., 2022; UN Habitat. 2022). Urbanisation changes the concentration and type of plants present in an area, as well as their participation in ecosystem processes like pollination (Harrison & Winfree, 2015). Given the important role of urban gardens in ecosystems, developing an understanding of their botanical composition is important to understand future environmental change. Cities generally display a decrease in native plant species, and an increase in non-native plant species compared to non-urban areas (McKinney, 2006). However, cities can be centres of high plant biodiversity (Avolio et al., 2019). The composition of plants in urban gardens is generally not well understood, but they are a key contributor to urban biodiversity (Loram et al., 2008).

Less well understood are the sociocultural dynamics of urban gardens; many studies, such as that by Loram et al. (2008), focus on a quantitative understanding of the plants present. Recently, there has been a shift in the field to study the role that humans play in urban gardens (Vega et al., 2020). Lawrence (2021) states that understanding plants can be done by examining the individual relationships and interactions they have with their human caretakers. Examining these small-scale relationships gives us the opportunity to understand broader ecological impacts of people's lifestyles in urban areas (Lawrence, 2021). Vega et al. (2021) found that encouraging the relationship between people and plants through community engagement, art, and citizen science had positive ecological and social impacts. To encourage connection between people and plants, art can be used to educate and increase people's appreciation for the beauty and importance of urban vegetation (Vega et al. 2021).

2.3 What is the hypothesis or research question for your proposed research? Include any specific objectives: (maximum 500 characters)

"How do three measures of diversity vary between urban gardens in Kamloops?" "What are the themes of the plant-gardener relationships occurring in Kamloops gardens?"

The goal of this project is to develop an understanding of three measures of diversity in urban gardens in Kamloops and engage gardeners in an open-ended discussion about their gardens to gain a preliminary understanding of the plant-gardener relationships occurring in Kamloops gardens.

2.4 Provide a description of the research methodology/methodologies and analysis that you intend to employ in completing this research: (maximum 1500 characters)

I will recruit volunteers through TRU's communication channels, selecting 30 gardens (Loram et al., 2008). I will create a species list for each garden, including species aerial extent, following the methods used by Battel (2019). I will conduct an interview with each gardener with the prompt "tell me about your garden." Each gardener will be asked for a plant from their garden that is significant to them, which will be pressed as herbarium specimens and drawn as botanical illustrations. The ratio of pollinator-

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friendly to pollinator-neutral plants will be determined using Battel's (2019) bee-friendly plant genera list. Floristic origin will be determined by assigning each species' origin to one of the world's floristic provinces (Liu et al., 2023). Each garden will be assessed for its overall plant diversity, bee-friendly plant diversity, and floristic origin. Three quantitative variables will be chosen for each garden. I will use linear regression to determine these variables' effectiveness in predicting diversity patterns. Interviews will be analysed to identify themes that will be displayed in the research outcomes. I will maintain reflective notes about how visiting gardens, preparing specimens, and illustrating shaped my understanding of Kamloops gardens. Using the specimens, illustrations, and interview quotes, I will create an art exhibit showcasing relationships between plants and gardeners. I will also create a website with a virtual version of this exhibit.

2.5 Provide a description of how your research will significantly impact your field of study:

(maximum 1500 characters)

Gardens represent unique sites where nature-culture collide; given that we are in the Anthropocene, they serve as a microcosm for humans 'gardening' the world (Vega et al., 2021; Harrison & Winfree, 2015). Studying these interactions at a small scale allows us to understand the larger repercussions of our lifestyles and actions (Lawrence, 2022). Gardens also represent unique ways for many to contribute in a hands-on way to their local biodiversity (Vega et al., 2021). As there is currently a lack of understanding about urban gardens in general, especially in terms of their social, cultural, and subjective realities, this research aims to contribute to this understanding (Loram et al., 2008; Haase & Gaeva, 2023; Lawrence, 2022). The creation of species lists and analysis of diversity measures will provide a broader understanding of the qualitative side of urban gardens in Kamloops. Utilizing a mixed method approach that combines qualitative and quantitative methodology will highlight the importance of mixed method, interdisciplinary research to develop a holistic understanding of gardens.

2.6 Describe your plans to disseminate your research findings: (maximum 500 characters)

I will present my findings will at the 2025 TRU Undergraduate Research and Innovation Conference. The herbarium specimens, botanical illustrations, photos, and quotes collected from participants will be showcased on a website. An exhibition of this material will be held in Fall 2024 with the goal of community engagement. The flora of an area is maintained by the actions of humans, so this exhibition will celebrate and encourage people's relationships with plants.

2.7 List the references that you have citied throughout your research proposal observing the appropriate citation style for your discipline: (maximum 3500 characters)

Avolio, M., Pataki, D. E., Jenerette, G. D., Pincetl, S., Clarke, L. W., Cavender-Bares, J., Gillespie, T. W., Hobbie, S. E., Larson, K. L., McCarthy, H. R., & Trammell, T. L. E. (2020). Urban plant diversity in Los

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Angeles, California: Species and functional type turnover in cultivated landscapes. PLANTS, PEOPLE, PLANET, 2(2), 144–156. https://doi.org/10.1002/ppp3.10067

Battel, A. C. (2019). "Bee city": Using citizen science to monitor pollinator abundance in cultivated and uncultivated green spaces in Kamloops, BC. TRU Undergraduate Thesis. https://tru.arcabc.ca/islandora/object/tru:5099/datastream/PDF/download

Cubino, J. P., Subirós, J. V., & Lozano, C. B. (2014). Examining floristic boundaries between garden types at the global scale. Investigaciones Geográficas, 61, 71–86. https://www.researchgate.net/publication/263584037_Examining_floristic_boundaries_between_garde n_types_at_the_global_scale

Ellis, E. C. (2015). Ecology in an anthropogenic biosphere. Ecological Monographs, 85(3), 287–331. https://doi.org/10.1890/14-2274.1

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Haase, D., & Gaeva, D. (2023). Allotments for all? Social–environmental values of urban gardens for gardeners and the public in cities: The example of Berlin, Germany. People and Nature, 5(4), 1207–1219. https://doi.org/10.1002/pan3.10488

Harrison, T., & Winfree, R. (2015). Urban drivers of plant-pollinator interactions. Functional Ecology, 29(7), 879–888. https://doi.org/10.1111/1365-2435.12486

Kendal, D., Williams, N., & Williams, K. (2011). A cultivated environment: Exploring the global distribution of plants in gardens, parks and streetscapes. Urban Ecosystems, 15, 1–16. https://doi.org/10.1007/s11252-011-0215-2

Kueffer, C. (2020). Plant sciences for the Anthropocene: What can we learn from research in urban areas? PLANTS, PEOPLE, PLANET, 2(4), 286–289. https://doi.org/10.1002/ppp3.10124

Lawrence, A. M. (2022). Listening to plants: Conversations between critical plant studies and vegetal geography. Progress in Human Geography, 46(2), 629–651. https://doi.org/10.1177/03091325211062167

Liu, Y., Xu, X., Dimitrov, D., Pellissier, L., Borregaard, M. K., Shrestha, N., Su, X., Luo, A., Zimmermann, N. E., Rahbek, C., & Wang, Z. (2023). An updated floristic map of the world. Nature Communications, 14(1), Article 1. https://doi.org/10.1038/s41467-023-38375-y

Loram, A., Thompson, K., Warren, P. H., & Gaston, K. J. (2008). Urban domestic gardens (XII): The richness and composition of the flora in five UK cities. Journal of Vegetation Science, 19(3), 321–330. https://doi.org/10.3170/2007-8-18373

McKinney, M. L. (2006). Urbanization as a major cause of biotic homogenization. Biological Conservation, 127(3), 247–260. https://doi.org/10.1016/j.biocon.2005.09.005

Taubenböck, H., Droin, A., Standfuß, I., Dosch, F., Sander, N., Milbert, A., Eichfuss, S., & Wurm, M. (2022). To be, or not to be 'urban'? A multi-modal method for the differentiated measurement of the degree of urbanization. Computers, Environment and Urban Systems, 95, 101830. https://doi.org/10.1016/j.compenvurbsys.2022.101830

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Graduate Studies

Vega, K. A., Schläpfer-Miller, J., & Kueffer, C. (2021). Discovering the wild side of urban plants through public engagement. Plants, People, Planet, 3(4), 389–401. https://doi.org/10.1002/ppp3.10191

UN Habitat. (2022). World Cities Report 2022. https://unhabitat.org/wcr/

3. PROJECT TIMELINE WITH BENCHMARKS

3.1 Provide a timeline for your project that includes key benchmarks: (maximum 1000 characters)

Februrary - April:
- submit ethics application (this will happen prior to the UREAP funded project)
May:
-Send out sign-up form
-Contact participants and schedule interviews
June:
-Conduct field work
-Press and mount herbarium specimens
-Complete botanical illustrations
July
-Conduct field work
-Press and mount herbarium specimens
-Complete botanical illustrations
August
-Create website
-Conduct analysis
September:
-Write up final report

NOTE: Please refer to the UREAP Help Guide for a project timeline example. Students must demonstrate a willingness to engage in 12 weeks or equivalent of sustained research per the Terms of Reference.

4. OPERATING GRANT BUDGET PROPOSAL



4.1 The UREAP award offers up to \$1000 toward direct research expenses. These expenses Graduet Studies must be preapproved by the UREAP committee in the adjudication phase. Use the provided template under the Attachments tab in the TRU Romeo UREAP application to complete your budget proposal. Copy amount from the TOTAL AMOUNT line of the budget here. Total Amount: \$ 1,000.00

4.2 Additional budget information: (maximum 500 characters)

Additional costs for the project above the \$1000 from the UREAP will be covered by my supervisor's professional development money.

5. CONTRIBUTION TO ACADEMIC/PROFESSIONAL GOALS

5.1 Describe how this project will contribute to your academic and/or professional goals:

(maximum 1000 characters)

Ultimately my goal is to work and do research at the intersection of geography and biology, to understand and mitigate human impacts on the environment. I want to do research that has positive environmental impacts in my community. This project will give me experience working at this biologygeography interface, gaining practical experience utilizing mixed-methodology. I plan to pursue graduate studies in this area, so engaging in this research will allow me to develop key skills like troubleshooting methodology and design, and conducting field work. Having this research experience will aid in my application to graduate school. Because of my work as a research ambassador, I have become familiar with the research process, and conducting this research project will allow for practical implementation of this knowledge.

NOTE: Include your role in conceiving of the project, your role in the implementation of the project, and your overall academic objectives – explaining how this project will help to advance those objectives.