ENVIRCON

Inspiring Change, Education, and Awareness

March 25, 2022

University of Western Ontario

Online Conference

Schedule	
Time	**Session**
9:00 am - 9:15 am	**Welcome Address**
9:15 am - 10:15 am	**Graduate Student Talks**
10:15 am - 10:30 am	**Break**
10:30 am - 11:15 am	**Graduate Student Talks**
11:15 am - 11:30 am	**Break**
11:30 am - 12:45 pm	**Panel Discussion:** **Indigenous Perspectives on Sustainability**
12:45 pm - 1:45 pm	**Lunch Break**
1:45 pm – 2:15	**Speed Talks**
2:15 pm – 2:30 pm	**Break**
2:30 pm – 3:00 pm	**Closing Remarks**

Research Conference
March 25, 2022

Panel Discussion:

Panel Discussion:
Indigenous Perspectives on Sustainability

11:30 am – 12:45 pm

Panelists:

Kyle Bobiwash
Director of International Business Development for Resource Fiber, Director of the Regeneration Field Institute (RFI), and founding member of the Regenerative Industry Think Tank (RITT).

Susan Hare
General Motors, Sustainability Strategy Manager

Diana Lewis
Research Geomorphologist, West Coast Region, BC Ministry of Forests Lands Natural Resource Operations and Rural Development

Barbara Moktthewenkwe Wall
Director of International Business Development for Resource Fiber, Director of the Regeneration Field Institute (RFI), and founding member of the Regenerative Industry Think Tank (RITT).

Lewis Williams
Director of International Business Development for Resource Fiber, Director of the Regeneration Field Institute (RFI), and founding member of the Regenerative Industry Think Tank (RITT).

Join us for a discussion with professionals to hear about our panellists' experience of Indigenous perspectives on sustainable practices.

Topics areas to be addressed include:

- Indigeneity & Academia
- Policies & Legislations
- Actions

Graduate Student Talks: Presentation Schedule

Graduate Student Talks 9:15 am – 10:15 am	
Session 1	**Session 2**
In Hot Water: Land Use Change Impacts on Nutrient Inputs and Water Quality in Dog Lake Emma Lanciault	**A Holistic Approach to Mapping Priority Sites for Low-Impact Development** Jillian Booth
Arctic Lake Response to Warming: A Paleolimnological Investigation from the Northwest Territories, Canada Brittany Brasier	**Differences in Wing Morphology and Flight Behaviours in Black-Throated Blue Warblers** Patricia Rokitnicki
Performance Evaluation of Electrocoagulation for the Removal of Nitrates and Ortho Phosphates from Secondary Effluent Wastewater Using Zinc Electrodes Omar Mohamed	**^{17}O-Excess of Grass Phytoliths Across North America Accurately Records Variations in Growing-Season Relative Humidity** Minger Guo
Compressed Air Energy Storage Systems, Socio-Economic Benefits, and Environmental Protection Leila Bakhtiari	**The Fluvial Landscape of the Canadian Rockies** Lara Middleton

Graduate Student Talks 10:30 am – 11:15 am	
Session 1	**Session 2**
The Impact of Climate Change on Long-Term Care Facility Occupants Sara Wollschlaeger	**Reduce, Reuse, Reproduce Colonial Hierarchies: Harm Within the Green Energy Transition** Peyton Campbell
Does Gender Matter in Postharvest Loss Prevention? Sulemana Ansumah Saaka	**Environmental Decline or the Triumph of the Transcendent Mind** Shubhayan Chakrabarti
Evaluating the Long-Term Effectiveness of a Household Food Waste Reduction Intervention Haley Everitt	**The Association Between Household Food Security and Type of Farm Power Used in Land Preparation Among Smallholder Farmers in Semi-Arid Northern Ghana** Evans Batung

*Sessions run concurrently in different zoom breakout rooms.

Speed Talks: Presentation Schedule

Speed Talks 1:45 pm – 2:15 pm	
Session 1	**Session 2**
Coupling of Wastewater Treatment and Microalage Cultivation for Simultaneous Nutrient Recovery: A Review Preet Kamal Kaur	**How Long do Songbirds Fly For?** Jennifer Evans
Investigating Chemoreception and Behavioral Responses of *Tetranychus urticae* Koch to Naturally-based Repellents and Acaricides Kayla Gaudet	**Effects of Elevated Warming on Wheat Yield: A Meta-Analysis** Andrew Cook
Sustainable Transition Pathways in Canadian Concrete Matt Beard	**Reimagining Nature: Territorial Movements** Laura Primeau
Odour Monitoring and Ground Flux Rate Measurements of Landfill Trace Gas Using a Novel Ambient Air Monitoring System at a Municipal Solid Waste Landfill Site in London Ontario Canada Kyle Graat	**Magnifying Lens or Mask? The Impact of Faming on Localization of SDGs in Ghana** Eunice Annan-Aggrey
	Estimation Of Leaf Area Index Using Photosynthetically Active Radiation Measurements from Global Flux Tower Networks Tanisha Sharma
	Investigating the Effects of the Blewit Mushroom *Lepista nuda* on the Community Composition of its Soil Environment Katrina Kukolj

Graduate Student Talk Abstracts
9:15 am - 10:15 am, 10:30 am - 11:15 am

Sulemana Ansumah, University of Western Ontario
Does Gender Matter in Postharvest Loss Prevention?

In smallholder farming communities across Africa, evidence suggests that post-harvest loss (PHL) is one of the crucial but understudied drivers of food insecurity. PHL prevention has the potential of significantly mediating the problem of food insecurity in Africa given that the proportion of food lost during post-harvest activities could feed a significant proportion of the food insecure population in the continent. Although generally PHL in the Global South is driven by poor postharvest handling and lack of infrastructure, what is less understood is the role of gender in mediating PHL outcomes in smallholder farming communities.

Using a cross sectional survey of 1100 smallholder farmers, we examined the association between gender and PHL in semi-arid northern Ghana. Findings showed that women had lower chances of reporting higher PHL compared to men (α=-1.027; $p \leq 0.05$). Other household level factors such as joint decision making, household size, and households that received climate information from external experts, were all significantly associated with lower chances of high PHL. Older farmers also reported lesser likelihood of PHL compared to younger farmers.

These findings demonstrate the need to pay attention to gender in PHL prevention. Given women's longstanding role and deep knowledge of postharvest management in Africa, food policy on PHL needs to leverage women's rich knowledge. Creating participatory learning spaces for both women and men farmers may be a viable way of promoting gendered knowledge transfer for post-harvest loss prevention.

Leila Bakhtiara, University of Western Ontario
Compressed Air Energy Storage Systems, Socio-Economic Benefits, and Environmental Protection

In recent decades, renewable primary resources have attracted more attention and are being considered as a cleaner source of energy; however, fossil fuels have maintained their place as the world's main energy source. Most countries have invested large resources for research in the field of investigating the different types of renewable energy and utilizing them cost-effectively. Since the main renewable sources of energy (wind and solar) are highly variable, researchers are focused on finding reliable and environmentally friendly energy storage systems. A compressed air energy storage technology can be a good option with high economic potential. For instance, adding compressed air energy storage to wind power generation compared to fossil fuel backup power plants decreases greenhouse gas emissions.

To develop environmentally safer and cost-effective compressed air energy storage, a lot of research has been done which led to the proposition of different general categories of compressed air energy storage

including diabatic, adiabatic, isothermal, and isentropic. In the current paper, we will take a look at each of the four mentioned categories and their division into different configurations of compressed air energy storage systems in detail and compare them in terms of their efficiency, compatibility, and safety for the environment.

Evans Batung, University of Western Ontario
The Association Between Household Food Security and Type of Farm Power Used in Land Preparation Among Smallholder Farmers in Semi-Arid Northern Ghana

Climate change is undermining food security in sub–Saharan Africa (SSA) where its impacts are disproportionately felt. Although agricultural mechanization has received attention in SSA over the years as a pathway for improving agricultural productivity, its links with food security among smallholders remain unclear. In this paper we examine the association between household food security and source of farm power for land preparation among smallholders (n=1100). The findings suggest that households that used tractors for land preparation were more likely (OR=1.43, $p \leq 0.05$) to report food security when compared to households using manual tools. We highlight some caveats and policy recommendations.

Jillian Booth, Brock University
A Holistic Approach to Mapping Priority Sites for Low-Impact Development

Urbanization and climate change have increased the levels of stormwater runoff resulting in higher urban flood risk, overflowing sewer systems, and damage to stormwater infrastructure (BenDor, 2018). Recently, low-impact development (LID) has been introduced as an alternative method of stormwater management and flood mitigation. LID uses engineered-as-natural ecosystems such as rain gardens, green roofs, and bioretention basins to return the hydrology of an area back to its pre-developmental condition. Strategic planning of priority sites for LID is essential, as the performance of these stormwater controls rely on infiltration and evapotranspiration and are controlled by site-specific conditions such as hydrologic soil group, infiltration rate, and runoff volume (Kaykhosravi et al., 2019).

The current approaches focus on stormwater management objectives without considering the multiple benefits that can improve the social well-being of the surrounding community (Kaykhosravi et al., 2019). To address this gap, I used a holistic approach to map priority sites of LID for the Prudhommes Landing Development Project, a high-profile project located along the waterfront of Lake Ontario (Town of Lincoln, 2019). A geospatial physically based framework with a multi-criteria decision-making model was used to show that the consideration of social benefits when identifying sites for LID can align options for improving infrastructure with the multiple social objectives of city planning (BenDor, 2018).

The results of this study show that when social benefits are considered the previously identified priority sites for LID implementation based solely on stormwater objectives will change reword. This proposed framework can be used by planners and researchers to evaluate potential trade-offs between conventional and LID stormwater infrastructure and identify optimal solutions for different contexts.

Brittany Brasier, University of Western Ontario
Arctic Lake Response to Warming: A Paleolimnological Investigation from the Northwest Territories, Canada

Arctic lake ecosystems are known to be sensitive to climate fluctuations, as shown in the past few decades with temperatures rising almost twice the rate compared to the rest of the world. Previous studies show that between ~11,000 to 5,000 years ago, a period of strong summer warming called the Holocene Thermal Maximum (HTM) was linked to changes in terrestrial vegetation and lake characteristics. In tundra regions, increased tree cover can lead to higher total organic carbon (TOC) inputs into lakes. TOC is important as it can increase nutrient availability, but decrease light availability, both of which are important for total algal production.

The objective of this research is to determine how primary production in lakes at the northern tree line is responding to warming today in comparison to changes during the HTM, to gain a better understanding of Arctic Lake sensitivity to warming. This is important because increased algal production could make lakes carbon sinks, but also potentially negatively affect water quality. Proxies for algal and diatom production were measured at two Arctic tundra lakes to determine changes in lake production over time. Chlorophyll and its derivatives were measured using visible-near-infrared reflectance spectroscopy (VNIRS) as a proxy for total algal production. Biogenic silica was measured as a proxy for total diatom production. Diatoms are a type of algae characterized by a siliceous cell wall that are an important component of lake primary production. Lake-water TOC was reconstructed using VNIRS to determine if TOC affected lake production. During the HTM, all proxies increased at similar times for both lakes. This suggests that during tree line movement (and warming), increased nutrients associated with terrestrial sources of TOC along with decreased ice cover likely enhanced lake production. In response to recent climate warming, both algal and diatom production increased starting around 1850 AD. However, TOC values remain low, indicating that TOC is not causing the increase in lake production. Instead, rapidly warming temperatures in the Arctic have caused changes in ice cover duration and habitat availability in lake ecosystems, which is likely the driver for increased lake production.

Peyton Campbell, University of Western Ontario
Reduce, Reuse, Reproduce Colonial Hierarchies: Harm Within the Green Energy Transition

The United Nations Intergovernmental Panel on Climate Change (IPCC) has made it clear that in order to maintain 1.5°C of warming and avoid the far more ecologically destructive 2°C or 3°C, humanity must transition away from fossil fuels and towards renewable forms of energy. While transitioning energy production is integral to mitigating climate change, dominant discourse on renewable energy and 'green growth' have largely focused on ways to transition energy production without disrupting current energy consumption practices or the economic growth imperative. Utilizing a feminist epistemological framework, this project will examine the ways that the current transition towards green energy

production replicates existing systems of power and oppression that are imbedded within settler colonial ideology.

Specifically, this project will compare the Canadian Tar Sands with Lithium extraction in the Atacama Salt Flats of Chile to explore how the current transition towards green energy maintains colonial systems of inequality that privileges the consumption habits of settlers over Indigenous land and life. Like the Canadian Tar Sands, the extraction of lithium (a key component of most batteries) in Chile makes visible the mechanisms of colonialism at work within energy production.

Drawing on the work of Sean Parson and Emily Ray, as well as Judith Butler's work on grievability, I argue that both areas of Indigenous land have been deemed 'sacrifice zones' in the maintenance of settler colonial lifestyles. In connecting these two places, this project argues that addressing climate change in all its forms requires centering Indigenous ways of knowing alongside a comprehensive movement towards economic degrowth. In conclusion, by closely examining how current green energy production maintains colonial systems, this project highlights the need to center Indigenous environmental frameworks and social justice within the transition towards renewable energy production and consumption.

Shubhayan Chakrabarti, University of Western Ontario

Environmental Decline or the Triumph of the Transcendent Mind

COVID-19 lockdowns initially challenged the make-belief world of jobs and economic growth – the superstructural realm concocted to confer meaning upon human life. The pandemic is a return of the repressed body or the base. The Marxian binary of superstructure and base corresponds to Cartesian mind and body. In keeping with Descartes's declaration of the mind as human essence in 'Meditations', biocapitalists and denialists have tried to solve climate change courtesy innovation and doubt, respectively. In 'Wasted Lives', Zygmunt Bauman notes that the two facets of modernity are order-building and economic progress, which create redundancy. Order-building manifests in gentrification, a grand display of the mind, leading to displacement and extinction of animals, conservation refugees, flora, and fauna – mirroring the worker's sacrificial body.

This paper argues that environmental decline is rooted in Cartesian dualism where the thinking thing outlasts the body. The thinking thing's infallibility corresponds to the theological hope of salvation where the soul transcends corporeality, enabling the quotidian optimism of "everything will be alright in the end." Dualism is further revealed in the ecomodernist notion of decoupling – an intensification of capitalist activities like urbanization, mining, farming, and forestry in land cordoned off from sensitive nature demarcated for preservation (Grusin, 'After Extinction'). Mental prowess is emphasized by de-extinction aspirations where genes of species artificially manufactured are to reverse extinction by replacing the absence of animals with their likenesses. De-coupling and de-extinction suggest the removal of the material base of nature such that the superstructural realm of human activities is fueled by itself. Opposing voices including the racialization of the environment by the alt-right and the degrowth camp

which looks to accommodate social justice will be explored in this paper. Post-work ideas like downshifting (Frayne, 'The Refusal of Work'), related to degrowth, and their relevance to climate change will also be investigated.

Haley Everitt, University of Western Ontario

Evaluating the Long-Term Effectiveness of a Household Food Waste Reduction Intervention

Changes to the quantity and composition of household food waste during the COVID-19 pandemic may have amplified the environmental, economic, and social implications of wasting food. To halve per capita global food waste by 2030, policies and programs that effectively reduce household food waste generation are needed. This study assessed the impact of the COVID-19 pandemic on household food wasting in the mid-sized Canadian city of London, Ontario. Additionally, a primary aim was to evaluate the long-term effectiveness of the "Reduce Food Waste, Save Money" household food waste reduction intervention by comparing direct measurements of household food waste across 99 study households over two times periods, October 2017, and June 2020.

This study builds upon a previous randomized controlled trial intervention study by undertaking a precise comparison of the quantity and composition of food wasted by the study households for an additional (third) timepoint, during the first wave of the COVID-19 pandemic. While the generation of avoidable food waste remained remarkably stable over time for both treatment (+1.6%) and control (-0.6%) households, there was a significant increase ($p < 0.01$) in the amount of unavoidable food waste generated by all households (+65.5%). This finding suggests that households are likely preparing and consuming more meals at home than they did prior to the outbreak. Additionally, the "Reduce Food Waste, Save Money" intervention was found to have a long-term, sustained impact on avoidable food waste generation in treatment households.

Minger Guo, University of Western Ontario

^{17}O-Excess of Grass Phytoliths Across North America Accurately Records Variations in Growing-Season Relative Humidity

Relative humidity (RH) is a major climate parameter required for the reconstruction of past climatic conditions. It has been challenging, however, to find an accurate proxy for RH in continental environments. Triple oxygen isotopes of fossilized bio-minerals (e.g., plant phytoliths) formed in equilibrium with partially evaporated waters have a high potential for this purpose. The ^{17}O-excess is the small deviation of the d'^{17}O of a sample from the Global Meteoric Water Line. Compared to other parameters, ^{17}O-excess is measurable in minerals and is temperature insensitive. Recent calibration studies in climate chambers have shown a clear relationship between the ^{17}O-excess of leaf phytoliths and controlled RH. This relationship is complicated in natural systems, however, because of climate variations during phytolith formation.

This study analyzed the ^{17}O-excess of stem and leaf phytoliths from naturally grown *Calamovilfa longifolia* grasses. The ^{17}O-excess of the stem phytoliths should be a good approximation of soil water because, as a non-transpiring tissue, water in stems is not fractionated from soil water. In contrast, leaf water is lost via transpiration, which makes the ^{17}O-excess of leaf phytoliths influenced by the RH during transpiration. The difference between the ^{17}O-excess of stem and leaf phytoliths, D^{17}O-excess $_{\text{leaf phytolith- stem phytolith}}$, can be used to estimate growing-season RH. Our preliminary results show that D^{17}O-excess $_{\text{leaf phytolith- stem phytolith}}$ were negatively correlated with summer RH at 8 locations across North America where RH ranged from 46.5 to 73.5% (D^{17}O-excess $_{\text{leaf phytolith- stem phytolith}}$ = 6.4 RH - 491.5, R^2 = 0.9201). These results hold promise that the ^{17}O-excess of phytoliths is a good proxy for regional RH even when RH varies over the growing season in nature

Emma Lanciault, Queen University

In Hot Water: Land Use Change Impacts on Nutrient Inputs and Water Quality in Dog Lake

Lakes in southern Ontario are experiencing unprecedented rates of nutrient loading. The resulting eutrophication is alerting communities of the consequences of intensive land-use changes. A simple change in farming practices can flood these ecosystems with nutrients, mainly nitrogen, phosphorus, and carbon, damaging them in extreme concentrations. Lowered water quality is often credited to the increased availability of limiting growth factors needed for photosynthesis. This phenomenon, commonly known as eutrophication, has gained public attention with the growing number of lake ecosystems in distress. Anthropogenic activities have accelerated the rate and extent of this naturally occurring process via increased loading of limiting nutrients, such as nitrogen and phosphorus, into water systems. This accelerated process has significant implications for water quality, with the consequences of increased nutrient loading, including tainted drinking water supplies, degradation of recreational opportunities, and mass die-offs of aquatic species. In Battersea, Ontario, Dog Lake is one example of the many ecosystems affected by excessive nutrient loading. Reduced water quality coupled with climate change's uncertainty furthers the water quality problem by providing an enjoyable habitat for harmful algae blooms.

As aquatic dead zones become prominent, aquatic species struggle to survive with limited oxygen. Dead zones destroy entire ecosystems, knocking delicate environmental cycles out of balance. With considerable knowledge gaps in the future health and composition of watersheds, restoring water quality needs to be at the front of the environmental crisis.

Lara Middleton, University of Western Ontario

The Fluvial Landscape of the Canadian Rockies

Banff and Jasper National Parks are two of Canada's oldest, and most popular, national parks. The area within the parks has therefore been protected, and development limited, with the overall goal of conservation of the landscape. Protection from direct human impacts makes these landscapes natural laboratories for documenting natural landscape characteristic and long-term changes resulting from

influences such as climate change and glacier retreat. While some aspects of vegetation cover and ecosystems have been well-documented in this context (e.g., Mountain Legacy Project) fluvial landscapes, and the distribution of river types, has received much less attention. River types and characteristics are governed by the topography, geology, local hydroclimate, glacial influence, sediment delivery from steep slopes, river-vegetation interactions, and variability in discharge, all of which may vary within a large watershed, and change over time. Mountain river systems, such as the Athabasca River, which is recognized as a Canadian Heritage River, have a large morphologic diversity. River morphology transitions downstream from glacial headwaters with the differences in hydrology, vegetation, gradient, and sediment supply producing different river types. High-resolution satellite imagery now allows these river systems to be documented in detail across the Canadian Rockies landscape and in relation to the local landscape and eco-climatic conditions.

This research aims to document and analyze the regional distribution of river planforms within Banff and Jasper National Parks in relation to these conditions. Understanding the distribution and characteristics of these river systems will aid in conservation and provide insight into the dominant landscape controls on river planform within the parks and form basis for documenting historical changes. Regional knowledge of the type of river systems will also be important to anticipate their response to future environmental changes.

Omar Mohamed, University of Western Ontario

Performance Evaluation of Electrocoagulation for the Removal of Nitrates and Ortho Phosphates from Secondary Effluent Wastewater Using Zinc Electrodes

Nitrogen (N) and Phosphorus (P) are considered the principal nutrients in our environment as they present in different concentrations. Occurrence of N and P can cause aquatic life disturbance due to eutrophication phenomenon. Electrocoagulation (EC) is an electrochemical technology that depends on charges neutralization to attract and form flocs to float or settle. The main objective of this research is to evaluate the EC as a tertiary treatment using Zinc (Zn) electrodes. The research objectives include: (1) Evaluate the removal of Nitrates using Zn electrode (2) Study the Ortho Phosphates removal rates using Zn electrode. (3) Address the final pH, DO, and Conductivity change through the EC reaction. Zn electrodes usage in EC showed high removal efficiencies for ortho phosphate from synthetic wastewater while low removal rate for nitrates. The EC system's further scaling up, operating conditions optimization, cost reduction and energy recovery, especially in tertiary treatment, should be investigated using authentic secondary process effluent. Other factors should be taken into consideration, including cost and bi-product generation. The cost will include electrodes' capital, electric energy consumption, pH adjustment, mechanical equipment, and sedimentation/flotation tank construction.

The findings in this study show that EC can be considered as an alternative technology for tertiary treatment. EC proves that it possesses high performance towards orthophosphate removal; it also has the potential for other pollutant removals, including micropollutants. Hydrogen gas generated during the process can be harnessed and used as a clean energy source. Therefore, EC can be considered as an alternative technology for tertiary treatment.

Patricia Rokitnicki, University of Western Ontario
Differences in Wing Morphology and Flight Behaviours in Black-throated Blue Warblers

Eighty percent of North American songbirds migrate seasonally between breeding and overwintering grounds. Several factors such as weather conditions, resource availability, sex, and age can affect their migration. This study focuses on how differences in sex and age class can affect wing shape and flight speed in Black-throated Blue Warblers during spring migration. Thirty-six birds were caught at Long Point Bird Observatory in Long Point, Ontario, during their 2021 spring migration. These birds were aged and sexed based on plumage characteristics. The Black-throated Blue Warblers were photographed to assess differences in wing shape between sex and age classes. The birds were then tagged with radio transmitters that emitted a signal detected by Motus towers throughout North America. Radio transmitters use radio telemetry to track a bird's movement; this study followed the remainder of a bird's migration to its breeding grounds. The presentation will focus on how the data collected with radio telemetry in 2021 and previous data collected in 2014 and 2015 was used to calculate flight speeds through inter-tower detections. Further investigation into how differences in wing morphology could influence the estimated flight speeds for the Black-throated Blue Warblers will also be examined. Tracking songbirds throughout their migration at an increased spatial and temporal scale will improve our understanding of migration speed and migratory movement.

Sara Wollschlaeger, University of Western Ontario
The Impact of Climate Change on Long-term Care Facility Occupants

Climate change is causing alterations to the geophysical system; rising global temperatures are causing extreme heat events, wildfires, and changes in infectious agents; sea-level rise and extreme precipitation events are increasing the frequency and intensity of flood events. These climate change impacts have a negative effect on human health, specifically on the most vulnerable populations. Vulnerability is the idea of susceptibility to damage or harm; with respect to climate change, it is a function of exposure, sensitivity, and adaptive capacity. This research explores the exposure and sensitivity of long-term care facility occupants in British Columbia (B.C.), Canada, because of the high proportion of long-term care residents that are sensitive to climate change. The climate change impacts considered were identified as those with the greatest risk to B.C., the potential to result in significant consequences, as well as current events and prevalence in the region over the past decade. The health effects of these primary climate change impacts were identified through a literature review. Both age and health condition are factors of sensitivity, in B.C. 97% of long-term care facility occupants have chronic diseases (including cardiovascular, endocrine, musculoskeletal, neurological, pulmonary, psychiatric, respiratory, and sensory diseases), and 95% are over the age of 65. A number of chronic diseases (e.g., hypertension and dementia) have been identified that are likely to be exacerbated because of climate change, specifically the four most significant and relevant climate change impacts in B.C.: extreme heat, flooding, changes in infectious agents, and wildfires. This research quantifies the proportions of long-term care facility occupants in B.C. with these

chronic diseases, highlighting the importance of building the adaptive capacity of these populations to decrease their vulnerability. Various building design solutions have been explored, confirming the relationship identified in past studies between the built environment, climate change, and occupant health.

Speed Talk Abstracts
1:45 pm - 2:15 pm

Eunice Annan-Aggrey, University of Western Ontario
Magnifying Lens or Mask? The Impact of Framing on Localization of SDGs in Ghana

Experts opine that 'No policy survives unaltered after contact with reality.' This paper examines how the SDGs pledge to 'leave no one behind' looks like after encountering the reality of local governments in Ghana. Given that many of the key services necessary to achieve the SDGs are delivered at the local level, this research used semi-structured interviews with local government officials to analyse how the SDGs commitment to 'leave no one behind' is being reflected in local development policies in Ghana.

Through an analysis of the existing and new policies being prioritized over the first five years of SDGs implementation, including strategies adopted by local governments to reach vulnerable populations, the paper critiques the idea that local governments are indispensable in meeting the needs of vulnerable populations. The SDGs confirm the mandate of the local governments however low awareness of the SDGs does not enable citizens to ascribe credit to local governments for efforts made in SDGs implementation Furthermore, the research examines factors that facilitate or impede the implementation of the SDGs at the local government level.

The research findings suggest that lack of awareness and political coloration taints the magnifying lens of local government for identifying and addressing the most important needs of the vulnerable, resulting in masking of the needs of certain populations. Additionally, weak institutional capacity and limited resources hinder identification and targeting of the most vulnerable. The paper concludes with suggestions to enhance local SDGs implementation for the remaining SDGs timeline.

Matt Beard, Carleton University, Ottawa
Sustainable Transition Pathways in Canadian Concrete

As global trends in economic development and urbanization continue to rise in the coming decades, the demand for concrete is expected to increase dramatically. Two Canadian concrete firms, CarbonCure and Carbicrete, have achieved high profile investments and rapid success by decoupling economic growth from carbon emissions in this industry. Investments from both Amazon's Climate Pledge Fund and Bill Gates' Breakthrough Energy Ventures into concrete carbon utilization in Canada beg the question: why here? What institutional or policy factors contributed to the success of these firms? This article presents a chronology of this question, from the firms' origins in Canadian universities to key contributions made by Innovation, Science and Economic Development (ISED) Canada, among others.

Consistent with the sustainable transitions literature, this paper also examines how conflicting interests, such as the resistance of larger established firms and the countervailing priorities of federal policymakers, delays a possible transition. Lastly, general trends from this transition are drawn so that lessons can be

applied to other industries in Canada. This research finds that early government investment in university STEM research, as well as startups which are unlikely to be profitable in the short term, are essential for firms to eventually reach market competitiveness. Increased federal and provincial investment often fills the gaps where private investors are hesitant to take risks on unproven or capital-intensive technologies, accelerating transitions in carbon intensive industries.

Andrew Cook, University of Western Ontario
Effects of Elevated Warming on Wheat Yield: A Meta-Analysis

Under current trends of population growth, food production must increase up to 70% by 2050 to feed a population exceeding 9 billion people. Any efforts to increase food production will be done in a warming climate with elevated levels of atmospheric CO2, conditions that will alter crop yield and quality. Current research has shown that higher levels of CO2 will decrease protein, zinc, and iron concentrations, exacerbating nutrient deficiencies globally, especially in disadvantaged and marginalized populations.

While we know that crop yield declines with warming, we lack understanding in how nutritional quality is also affected. To address this issue, I used the Web of Science database to compile articles for a meta-analysis on the effects of warming on crop yield, harvest index, and nutritional quality. In total, 50 of the original 4,873 articles returned from the search query were assessed using a random-effects meta-analysis. Compared to control conditions, elevated temperatures saw significant decreases in yield (Kg/Ha, g/m^2), and thousand grain weight, while no significant change was detected in harvest index.

The articles compiled in the database did not return enough data to perform analysis on nutritional quality, emphasizing that our understanding of how the nutritional quality of major crops changes with warming is not well enough investigated. A better understanding of how nutritional quality is impacted by warming will be crucial to provide an adequate and nutritious food supply for the future population.

Jennifer Evans, University of Western Ontario
How Long do Songbirds Fly For?

While it is known that nocturnal migrants generally stop flying before dawn, precise flight durations are lacking. Tracking the flight durations of small nocturnal migratory songbirds is a difficult task. It is possible to use visual counts at daytime stopover sites but, visual confirmation cannot provide path information for those that travel in the dark of night (Newton & Brockie, 2007). Radar studies have found the flight speed of nocturnal migratory birds (Mein & Nebel, 2012) and have identified high-use stopover sites (Buler & Dawson, 2014), but cannot differentiate between individual flight durations. GPS tags can provide individual flight durations however, these tags are too large to affix to a songbird (Thomas et al., 2011). Instead, automated radio telemetry provides the only cost-effective and efficient way to track nocturnal songbird flight durations. Radio tags are small enough to attach to songbirds, differentiate between individual birds and automatically detect birds passing through a towers range.

In my study, the flight duration of nocturnal migratory songbirds will be estimated using Motus automated radio telemetry data of the initial flights of two nocturnal migratory songbirds: Black-throated Blue Warblers and Magnolia Warblers (Sibley, 2016). The study area included Southern Ontario (Appendix A). In the spring of 2014 and 2015, Black-throated Blue Warblers (2014: n = 33; 2015: n = 21) and Magnolia Warblers (2014: n = 32; 2015: n = 69) were trapped with mist nets and tagged by Morbey et al. (2018) at the Long Point Bird Observatory near Old Cut Research Station (42.584°, −80.397°) and immediately released at the same site.

Kayla Gaudet, Acadia University

Investigating Chemoreception and Behavioral Responses of Tetranychus urticae Koch to Naturally-based Repellents and Acaricides

Tetranychus urticae Koch is an agriculture pest with a host range of over 1100 species of plants. T. urticae has developed resistance to a variety of synthetic chemical pesticides due to its high fecundity and short generation time. Plant essential oils have been recognized as a novel natural source of pest control that have a reduced impact to the environment and human health from synthetic pesticide application. The present study focuses on assessing the efficiency of natural-based products developed by a Canadian company.

One of the main products (102) is a natural-based product that is effective to control T. urticae. A novel electrophysiological approach was developed to record the electrophysiological response from T. urticae. Both electrotarsogram technology and behavioural assays were used to identify T. urticae repelling compounds. By using a Gas Chromatogram-Flame Ionization Detector (GC-FID) linked to an electrotarsographic detection (GC-ETD), we have recorded that T. urticae is sensitive to eucalyptol, thymol, and linalool, which are terpenoids commonly found in essential oils. In addition, we have screened volatile organic compounds with different functional groups, and we found that T. urticae is sensitive to a series of carboxylic acids and a series of aldehydes which are typically detected by ionotropic receptors. Finally, the project investigated alternative uses and potential non-target impacts of product 102 for acaracide use. Product 102 was tested as a potential fungicide against Botrytis cinerea Persoon and Cladosporium herbarum Persoon. To investigate potential non-target impacts, acute contact toxicity tests were conducted using 102 on Bombus impatiens Cresson.

Kyle Graat, University of Western Ontario

Odour Monitoring and Ground Flux Rate Measurements of Landfill Trace Gas Using a Novel Ambient Air Monitoring System at a Municipal Solid Waste Landfill Site in London Ontario Canada

A novel combined landfill trace gas odour characterization and ground flux rate measurement system was designed for the tipping area of a Municipal Solid Waste Landfill (MSW) in London Ontario Canada. The system used a combination of Passive Air Sampling (PAS) and metal oxide based electronic ambient air

monitoring technology for hydrogen sulfide and ammonia gas. Validation of the combined technique was performed in laboratory experiments where it was determined that the relationship between PAS and electronic ambient air monitoring to be direct over a prescribed sampling period. Fixed concentration values at intervals of 2 ppm, ranging between 0 ppm to 10 ppm, were generated in an evacuated enclosed chamber for two odorous traces gases: hydrogen sulfide and ammonia gas. Two types of PAS samplers, a radial type, and a cylindrical type, were combined with two Metal Oxide selective gas concentration Sensors (MOS) for both hydrogen sulfide and ammonia gas. The time weighted average concentration values determined by the MOS sensors matched the mass up-take rate for both samplers over the sampled time periods in each gas concentration experiment. Analytical analysis of the PAS samplers based on their respective accumulated masses matched the exposed gas concentrations produced inside the chamber. Combined, the results validated the use of both techniques as a novel ambient odour monitoring system for application in the tipping area of MSW landfills. It was also concluded that MOS sensors can be an effective method for the ambient monitoring landfill derived hydrogen sulfide and ammonia gases.

Preet Kamal Kaur, University of Western Ontario

Coupling of Wastewater Treatment and Microalage Cultivation for Simultaneous Nutrient Recovery: A Review

A large quantity of wastewater generated from urban, industrial, and agricultural activities contains a substantial amount of organic and inorganic compounds, micro-nutrients, toxic chemicals, and heavy metals, which inevitably cause eutrophication when discharged into nearby water bodies, hence posing a serious threat to the health of flora and fauna, and eventually disturbing the ecological balance. To solve this problem, various conventional nutrient removal methods are commonly used across the globe, which offer some disadvantages such as high carbon emissions, high-energy consumption, and low efficiency in meeting nutrient emission standards, making them economically and environmentally infeasible for a longer period. Hence, extensive research is underway to adopt a sustainable approach to treat wastewater effluents, which involves the implementation of microalgae species as a part of wastewater tertiary treatment.

The microalgae with a high growth rate and high carbon-dioxide utilization efficiency can effectively reduce a variety of key nutrients such as phosphorus, nitrogen, and organic carbon present in wastewaters to organic matter to produce algal biomass rich in proteins, lipids, and carbohydrates, which serves as potential feedback for creating high-value bio-products.

This review aims to provide an overview of some microalgae strains used commonly to treat different wastewaters. The article further critically discusses and summarizes the best combinations of predictor variables from a dataset of published research papers using machine-learning analysis to enhance wastewater treatment capability and algal biomass productivity. Moreover, challenges and limitations of this technology are addressed, and finally, suggestions are proposed for the prospects of further research

and development to carry out an efficient coupling of wastewater treatment and microalgae cultivation at pilot scale.

Katarina Kukolj, University of Western Ontario
Investigating the Effects of the Blewit Mushroom Lepista nuda on the Community Composition of its Soil Environment

This study aims to investigate the effects of the edible Blewit mushroom (*Lepista nuda*) on the community composition of its soil environment in coastal regions of Newfoundland, Canada. The goal is to provide background information for potential use of these mushrooms in Newfoundland agriculture as an environmentally friendly biocontrol of root pests and pathogens and potential co-crop. This would involve inoculating soils or manure in agricultural crops with Blewit mycelium, the underground filamentous part of the fungus.

Previous studies on Blewits have discovered their antimicrobial properties in the lab, including an ability to penetrate and consume bacteria, yeasts, and green algae as a nutrient source, and culture extracts have reduced plant pathogenic fungi and bacteria in compost. There have been no field studies to observe how soil and the organisms in it could be changed by growth of Blewit mycelium in the natural environment. Therefore, this study includes sampling soil at various time points from known natural Blewit patches and nearby treatment plots inoculated with Blewit mycelium, in comparison to plots without Blewits. Arthropod, nematode, bacterial and fungal members of the soil community will be identified, and their relative abundance determined by DNA extraction and metabarcoding analyses. Soil and environmental parameters will be measured for further comparison.

These results will tell us if potential crop pests and plant pathogens are significantly reduced by the growth of Blewit mycelium, essential for understanding their potential in the agricultural industry. Biocontrols are a safer alternative because some synthetic chemical pesticides can have detrimental effects on the environment since they can spread beyond the target crop through volatilization and leeching, sometimes negatively affecting wildlife and even human health due to their toxicity and carcinogenic properties.

Laura Primeau, Carleton University
Reimagining Nature: Territorial Movements Beyond the Nature/Culture Divide

This presentation draws on evidence from various social movements in Latin America to illuminate ways in which the study of territorial struggles could benefit from insights from indigenous cosmovisions. In particular, it brings attention to the Nature/Culture divide, a concept developed in pluriversal scholarship to refer to the interruption of relational ontologies in modern western thinking, which was used in the devaluation of ways of living relationally with nature. I will argue that elaborating theoretical frameworks

that incorporate the claim that humans and nature are indivisible opens avenues for thinking about alternative ways to approach some of today's biggest social and environmental challenges.

The convergence of decolonial and environmental movements today offers unprecedented opportunities for imagining new ways of coping with climate change. However, as Leanne R. Simpson argues, the recovery of indigenous knowledges is no simple task and requires the broader transformation of our society's epistemic foundations. By putting in conversation literature on socio-environmental movements and literature inspired by Andean cosmovisions, the presentation and the discussion it will generate are humble steps in that direction.

Tanisha Sharma, McMaster University

Estimation Of Leaf Area Index Using Photosynthetically Active Radiation Measurements from Global Flux Tower Networks

Regional and global climate is widely impacted by vegetation which plays a major role in global physical and biogeochemical processes. The number and photosynthetic capacity of leaves in a forest control primary productivity, water and carbon gas exchange, and the climate (Gonsamo, 2009). Hence, Leaf Area Index (LAI) can be used in attempt to quantify canopy structure with higher values of LAI representing the presence of more leaves. Chen and Black (1992) define LAI as one half of the total leaf area per unit ground area which can be inferred from the proportion of light that makes it through the canopy (τ). Various methods can be used to estimate LAI including direct and indirect methods, however, Rogers et al. (2021) details how challenging it can be to obtain accurate LAI measurements at regular temporal intervals and how it requires either destructive sampling or manual collection of canopy gap fraction measurements at discrete time intervals.

Given that commercial instruments generally rely on the attenuation of light through the vegetation canopy to estimate canopy gap fraction, eddy covariance towers have similar permanently mounted sensors that continuously measure radiation above and below the forest canopy in the photosynthetically active range (PAR) (Rogers et al., 2021). Therefore, LAI can be derived from the transmission (τ) of PAR through the canopy, measured as $\tau = PAR_{below} / PAR_{above}$. Hence, four PAR based methods can be used to obtain continuous LAI data including the Simple Method, Campbell method, Miller integral, and the Lang-Gonsamo method. This study aims to use the Lang-Gonsamo approach, as it eliminates the need for a spherical assumption, to estimate LAI using PAR measurements from global flux tower networks.