

# WDCAG 2020 ABSTRACTS

## PAPER PRESENTATIONS

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Adebayo, Hafsat A. and Johnston, Tom, "An evaluation of Alberta's Intermunicipal Collaborative Framework (ICF) initiative relative to wildfire."

University of Lethbridge

Part 17.2 of Alberta's Municipal Government Act (2020) contains a provision for a cross-jurisdictional planning instrument called an Intermunicipal Collaborative Framework (ICF). More specifically, the Act requires all municipalities, other than those belonging to one of the Province's Growth Management Boards, which share a common boundary with at least one other municipality to develop an ICF with each other. The stated purpose of an ICF is "to specify what and how services are funded and delivered" in collaboration with adjoining municipalities. According to the provincial government, the "Frameworks are intended to: (a) provide for integrated and strategic planning, delivery and funding of intermunicipal services; (b) allocate scarce resources efficiently in providing local services; (c) ensure municipalities contribute funding to services that benefit their residents. The purpose of the research reported on in this paper was to assess the efficacy of completed ICFs relative to managing wildfire across three distinct domains, namely mitigation, emergency response, and post-event recovery. The evidence used was derived from a content analysis of 35 ICFs completed up to December 31, 2019, an on-line survey to which over 100 municipal officials responded, and a follow-up set of key-informant interviews. Preliminary analysis of the data suggests improved levels of formal cooperation among municipalities across a range of area, a development that is consistent with the goals of the ICF initiative. The data also indicate that many municipalities have also taken the opportunity enabled by the ICF process to better coordinate municipal responses across jurisdictions relative to wildfire.

Key words: Wildfire; Collaboration; Inter-municipal; Intermunicipal Collaboration Framework (ICF)

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Anderson, Delia D. and Clements, David R., "Ecohydrology of wetland areas in Blaauw Eco Forest, British Columbia."

Trinity Western University

Wetland ecosystems are essential for the servicing of surrounding environments, functioning as buffer zones, water purifiers, nutrient storage areas, and unique habitat for many organisms. Blaauw Eco Forest contains a variety of wetland ecosystems including a natural spring, brook, swamp, and bog area. Through the use of surface and subsurface water measurements, the hydrology of wetland areas within the forest was investigated. Subsurface waters were studied via monitoring wells located throughout the study area. Water table height and pH measurements were collected from these sites. Surface waters were studied *in situ* and pH measurements were collected. Interpolated maps were created as visual representations of the hydrologic dynamics. In increasingly bog-like areas that included indicators such as sphagnum moss (*Sphagnum palustre*), various ericaceous shrubs, and the absence of large trees,

the subsurface pH reached levels as low as 3.5. However, surface waters remained much higher and typically sat around 6 in all areas. In addition to the hydrological data, the location of sphagnum moss was collected to compare to water table and pH. Although the bog area did not fit all the parameters of a bog ecosystem, the presence of low subsurface water pH and well-established sphagnum moss hummocks suggests it may be within a transitional period or zone.

Key words: hydrology; wetland; bog; sphagnum moss

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Barrett, Jordan, "Remediation or toxic dumping? The environmental justice case of Shawnigan Lake, BC."

University of Northern British Columbia

In 2013, a small rural community was rocked with the announcement of the approval of a contamination soil 'remediation' plant to be opened within the community of Shawnigan Lake. The next six years would prove that this approval and operation of the site was an oversight in government processes, as many problems arose from the site. In this paper I will argue that while legal, the approval of the remediation facility was unethical and that issues that arose from the site should have been foreseen by the government and steps should have been taken to protect the residents of the community. I also describe how the public activism by the residents played a large role in the eventual revocation of the operational permit. I will then use this information to frame what happened in Shawnigan Lake with several environmental justice lenses to demonstrate, that while unconventional what occurred in Shawnigan Lake was an environmental injustice.

Key words: environmental justice, toxic dumping, activism

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Betkus, Georgia, Freeman, Shannon and Hanlon, Neil, "Comparing in-person and videoconferencing consultations within a geriatric outreach program in northern British Columbia."

University of Northern British Columbia

As Canada's population continues to age, there is a growing need to provide health services that support the needs of older adults. The Geriatric Outreach Program in northern British Columbia aims to support the needs of older adults by improving access to specialist geriatric care for older adults through in-person and videoconferencing consultations with geriatric specialists. However, it is not known how this service affects the care of older adults, or how the outcomes of the two different consultation methods compare. This work examines the Geriatric Outreach Program using retrospective chart reviews of a cross section of patients (N = 95) who accessed the program during the 2017/2018 fiscal year. SPSS analysis revealed that patients seen through videoconferencing (n = 62/95) were similar in age and gender distribution to those seen in-person (n = 33/95). Outcomes did differ between consultation methods with videoconferencing resulting in more new diagnoses ( $p = .002$ ), medication changes ( $p = .009$ ), requests for further testing ( $p = .003$ ) and requests for follow-up ( $p = .026$ ) than in-person consultations. This presentation will detail the results of this work as well as discuss next steps.

Key words: older adults; videoconferencing; geriatrics; consultations

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Brandoli, Aaron and Viaud, Gilles, "Good City principles: A case study of Mission Hill Neighbourhood."

Thompson Rivers University

I will be discussing the change over time within Mission Hill neighbourhood in Vernon British Columbia. Our goal is to understand the effects of spatial partitioning and physical separation of urban land uses by using a neighbourhood case study. Using extensive research of relevant literature of good city principles, statistical data analysis of 2006 and 2016 census Canada information and a behavioural analysis conducted through three separate walk-throughs of field observations at various times of day for understanding the complex nature of the different human and environmental layers that characterize this neighbourhood.

The research conducted for the literature review highlights four key approaches including the sustainable city, smart growth city, age-friendly city, and livable city. Although these approaches vary in style and context, we discover that access to means of transportation and mobility, walkability, access to various types, costs, and quality of dwellings, physical and social environment, and perceptions of safety are integral to establishing good city principles and is the focus of our research. Further, we suggest that the orientation of the neighbourhood to amenities such as hospitals, schools and urban centres influence neighbourhood stability and development that also attribute to neighbourhood density and demographic structure, future land zoning and development, and perceptions of safety. Also, we suggest that topographic limitations are natural barriers that may contribute to the lack of usage sustainable modes of transportation within Mission Hill.

We discuss five policy recommendations that tie into the current demographic trends and observations which adhere to the good city principles that address the future needs of the neighbourhood.

Key words: Planning; Good-City Principles, urban analysis

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Chan, Andrew, "Singapore: A model for sustainable development?"

University of Victoria

Over the years, Singapore has transformed itself from a small trading port into one of the most highly developed and wealthiest cities in the world. Rapid growth often comes with many challenges, such as pollution, environmental degradation, and serious traffic congestion, among other issues. Despite this, Singapore has taken a sustainable approach to its development in the past several decades, in areas such as land use, transportation, water management, waste management, and renewable energy. All of this has shown the world that it is possible to develop cities economically, while maintaining sustainability. In the coming years, the world's urban areas will experience significant growth. Could Singapore serve as a development model for rapidly growing cities in Asia and around the world? This presentation will look at Singapore's sustainability initiatives, and how it could be applied in other cities.

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Cramer, Scott, “The integration of geothermal energy into the Province of British Columbia: Sources, risks and potential.”

Thompson Rivers University

This paper argues that the exponential geothermal resources in British Columbia are being under-utilized, and by increased government support and a transition into a green economy, it will result in a dramatic increase in a sustainable, clean energy that can power the whole province. The paper examines what geothermal is, its components in transitioning it into electricity, and the reason why British Columbia is an excellent source of this type of energy. Moreover, the paper illustrates that the development of geothermal energy can provide almost all of British Columbia’s electricity needs, and that certain areas around the west coast can be exploited to produce clean, high performing electricity that is predictable and is suitable for integration into the existing provincial grid.

Key words: renewable energy; climate change; geothermal; sustainability; green economy

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Edwards, Alysha C., “Mapping Indigenous Knowledge on the land: Culturally appropriate methods for and by Takla First Nation.”

Ts’kw’aylaxw First Nation, University of Northern British Columbia

For decades, Takla First Nation has been collecting and managing land use and cultural data with the intent of identifying and protecting areas of cultural significance within the territory. More recently now, part of this program involves exporting this cultural data into one accessible location. While the collection and organization of this data can be valuable in asserting Aboriginal rights, title, and interest, the mapping of Indigenous knowledge on the land is significant in contributing to cultural continuity and knowledge transmission. In describing the work being done within the Takla Nation lands and culture department, this presentation will describe the significance of mapping Indigenous knowledge on the landscape beyond the interests of title and rights. In moving towards methodologies that recognize the significance of Indigenous knowledge and by taking a culturally appropriate approach to data management and collection for and by Takla Nation, this presentation will outline the interconnection between identity, culture, and the land. By sharing my work with Takla Nation, I hope to be able to discuss how and why research and data collection is conducted in collaboration with Aboriginal peoples in the context of the general movement towards decolonizing academic research.

Key words: Culture; Indigenous knowledge; decolonization; cultural appropriation

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Egunyu, Felicitas<sup>1</sup>, Reed, Maureen G.<sup>2</sup>, Sinclair, A. John<sup>3</sup>, Parkins, John R.<sup>4</sup> and Robson, James P.<sup>2</sup>, “Public engagement in forest governance in Canada: Whose values are being represented anyway?”

<sup>1</sup>University of Saskatchewan & BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development, <sup>2</sup>University of Saskatchewan, <sup>3</sup>University of Manitoba, <sup>4</sup>University of Alberta

Researchers and advocates have long argued that on-going engagement by broad segments of the public can help make forests and forest-based communities more sustainable and decisions more enduring. In Canada, public engagement in sustainable forest management (SFM) has primarily taken one of two approaches – advisory forums through forest-sector advisory committees (FACs) and direct decision-making authority through community forest boards (CFBs). The purpose of this paper is to

compare these two approaches by focusing on who participates and the values participants bring to their deliberations. We conducted a national survey of FACs and CFBs, involving 402 participants. Results showed that both models favoured well-educated, Caucasian men and fell short on the representation of women and Indigenous peoples. Additionally, despite different levels of authority in relation to forest management decisions, participants in CFBs and FACs shared similar forest values. Hence, we conclude neither model of forest governance encourages participation from a diverse public. Our findings suggest the need to find new ways of recruiting diverse participants and to investigate more deeply whether local and extra-local pressures and power dynamics shape these processes. Such information can inform the establishment of more robust institutions for decision making in support of SFM.

Key words: community forestry; forest advisory committees; values; representation; sustainable forest management

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Fisher, Sayge, "Tidal energy prospects – West coast BC."

Thompson Rivers University

The intent of this research is to determine the viability of bringing tidal turbine and wave energy technologies to the remote communities along the West coast of BC, that do not have access to the grid. This research not only addresses the prospects of renewable energies and their power potential but also how they can foster innovation within these communities and improve quality of life. Indices such as access to education, healthcare, ecological health and economic growth will all be discussed in the context of the potential benefits of integrating renewable energy converters within communities. Floating tidal turbines and oscillating water column energy converters can function as community owned sources of electrical generation that can also provide a clean alternative to unsustainable fuel sources. Most remote communities are deeply culturally and economically embedded within their environments, therefore ecological measures such as water quality gauges, and air quality gauges can be integrated within existing models to enhance the efficiency of current ecological health monitors. Current means of power generation off-grid remain dominated by diesel generators and wood burning, these methods are unsustainable and create massive amounts of PM2.5 pollution that puts the local residents and the airshed at risk. This proposal does not address the possibility of connecting this renewable power to the grid but rather how this technology could be utilized to replace unsustainable off-grid power generation in BC's coastal communities.

Key words: renewable energy; rural development; ecological health

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Gerrand, Sam, Chasmer, Laura, Aspinall, Jesse and Hopkinson, Chris, "Burn depth mapping in Waterton Park: Integrating field measurement, multispectral LiDAR, and danger trees.

University of Lethbridge

Despite ecological importance to soil function and carbon cycling, little is known about how organic soils burn. In 2017, the Kenow wildfire burned 38% of Waterton Park; the study site is within this large burned area along the riparian edge of a seasonal stream north of Cameron Lake. We use field and LiDAR data to (a) quantify the spatial distribution of organic soil loss within an old growth lodgepole pine stand; and (b) we assess the utility of fire severity, topographical influences, and distributions of dangerous trees to predict burn depth within the study area. Burn depth was measured with the adventitious root method (n=313) and danger trees were assessed based on the Wildlife/Danger Tree

Assessors Course. Airborne multispectral LiDAR were collected in July, 2018 and used to produce a 1m resolution DEM as well as an Active Normalized Burn Ratio (ANBR) based on first and single returns at 1064nm and 1550nm (10-15 returns per m<sup>2</sup>). Results indicate an average burn depth of 0.16m (stdev.= 0.13m) with a maximum value of 1.05m in close proximity to an eroded perennial stream bank. ANBR correlated with burn depth which may support the predictive ability of post-fire multispectral LiDAR to quantify burn severity. Current field activities suggest soil moisture and bulk density may support antecedent hydrological conditions as a more accurate burn depth predictor. We suggest that collection of soil carbon measurements will allow total belowground carbon loss quantification, an important measurement required for improved emissions modelling and impacts on local community health.

Key words: burn depth; LiDAR; Active Normalized Burn Ratio; danger trees

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Gordon, Megan and Halseth, Greg, "Achieving a just transition for forestry workers, families, and communities in northern British Columbia."

University of Northern British Columbia

Economic restructuring and the move to a low-carbon economy has consequences for resource-dependent workers, families, and communities. The resource sector itself is also vulnerable to the ground-level effects of climate change, acting as a driver of transition. Given the recent pace of change in the resource sector, the idea of a 'just transition' has been introduced as a way to respond to and mitigate socio-economic issues during times of transition, while still enabling environmental action. In British Columbia, for example, the forest sector is in the midst of a downturn with the majority of mill closures and layoffs concentrated in northern communities. The impacts of the downturn have exacerbated historic boom and bust vulnerabilities in these areas. These present circumstances offer a unique opportunity to better understand the extent of impacts and the priorities of forestry-dependent workers, families, and communities. The proposed research seeks to investigate how these groups define a just transition, view the role of government, and perceive the importance of the move to a low-carbon economy. Using a case study methodology, qualitative findings from interviews and focus groups in Quesnel, BC will help develop policy recommendations, identify lessons for other resource sectors, and contribute to the just transition knowledge base. The goal of this research is to contribute to the larger discussion on resource sector transition and to uncover ideas on how to build a more optimistic future for those who depend on it.

Key words: Resource sector; forestry; just transition; low-carbon economy; northern communities

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Hanrahan, Maura and Dosu, Benjamin, "Water access in rural Ghana: Highlighting the experiences of people with disabilities."

University of Lethbridge

Rural water security in Ghana is limited, especially for people with disabilities. Access to potable water was declared a human right by the United Nations in 2010 and Sustainable Development Goals aim at improved access globally. The current development paradigm also endorses inclusivity in development interventions, posing a challenge to countries in the Global South, including Ghana. We used a mainly qualitative approach which employed in-depth interviews in three Ghanaian villages as well as interviews with leaders at the local, district, and national levels. We identified the barriers to water access experienced by local residents, highlighting those of people with disabilities. These were socio-

cultural barriers such as the longstanding stigma associated with disabilities in rural Ghana; technical and structural barriers such as physical distance to water collection sites, and economic barriers, specifically water costs linked to poverty. Inadequate policy responses to these issues at local, district and regional levels constitute another barrier for people with disabilities. We argue that understanding these previously unresearched barriers is important for policy decisions in rural water management. Accordingly, we recommend that decision-makers at all levels proactively include people with disabilities so their water policy development better responds to their water access needs.

Key words: water access; water access barriers; water security; rural Ghana; people with disabilities

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Hawkins, Blake<sup>1</sup>, Fregoli, Clio<sup>2</sup> and McInroy, Lauren<sup>3</sup>, “Reducing the gap to helpful information: The YouthHelp.net knowledge translation project.”

<sup>1</sup>University of British Columbia, <sup>2</sup>University of Toronto, <sup>3</sup>Ohio State University

Health geography and public health literature has documented for over 20 years about the barriers experienced by LGBTQ2S youth accessing health services. Barriers include a lack of LGBTQ2S-friendly health services, anticipating risk when asking health questions specific to LGBTQ2S youth, and potentially being identified as LGBTQ2S when not ready to embrace your sexual identity. Although the Internet has been a longstanding social space for LGBTQ2S youth, there are still challenges with finding helpful health information in virtual spaces. Common concerns about virtual spaces include misinformation, understanding the medical jargon, and keeping the reader engaged. Based on this previous research, a knowledge-to-action approach was taken to create a LGBTQ2S youth resource called Youthhelp.net to provide relevant, engaging, and relatable information to reduce geographical barriers. This paper describes the rationale and ongoing development of Youthhelp.net and the potential role it may have in decreasing geographical barriers to care for LGBTQ2S youth. Creating an online health intervention like Youthhelp.net, has the potential to increase health outcomes for younger LGBTQ2S people who otherwise may lack access or knowledge about helpful health information. Furthermore, it demonstrates that there is significant potential for online health interventions to help reduce barriers to care and promote health literacy.

Key words: health geography; accessing health information; sexual health; geographies of sexuality

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Kieta, Kristen, Owens, Phil and Petticrew, Ellen, “Determining sources of sediment in response to land cover change in the Nechako River Basin.”

University of Northern British Columbia

To determine the naturally occurring landscape features and land use practices that are contributing sediment to a river and its tributaries, sediment tracing or ‘fingerprinting’ techniques are a useful tool. The Nechako River Basin (NRB) is a large (47,200 km<sup>2</sup>), regulated basin in central British Columbia, Canada. The Nechako River is ecologically and culturally important because it supports chinook and sockeye salmon, and the endangered Nechako white sturgeon. These species are experiencing population declines and one potential cause is excess sediment being stored in spawning gravels. Additionally, the NRB has experienced significant land cover change from increased forestry and agriculture, the mountain pine beetle epidemic, and numerous wildfires in 2018. These disturbances can

lead to increased sediment delivery to waterbodies. The objectives of this research are (i) to determine the spatial and temporal scale of the impact of the wildfires by using polycyclic aromatic hydrocarbons (PAHs) as tracers, and (ii) to use compound specific stable isotopes (CSSIs) to determine, on a fine scale, the sources of sediment in an agriculturally dominated sub-watershed. In response to the wildfires, source and sediment samples were collected from November 2018 to November 2019 and were analyzed for PAHs. Samples within the agricultural subwatershed were collected in fall 2019, and included soils from cropped fields, forested areas, riparian areas, banks, as well as resuspended sediments, and these were analysed for CSSIs. This work aims to determine the utility of these new tracers in the NRB as standalone fingerprints or in combination with more common methods.

Key words: sediment fingerprinting; wildfire; agriculture; watershed management, sediment tracers

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Larsen, Aaron, "Discovering old worlds: Conceptualizing space and place in the witch trials of Zug, Switzerland through archival source mapping."

University of Northern British Columbia

The shrinking of distances paired with the paradigm shift toward state building and national consolidation in the modern period has changed the way that humans understand and rationalize space, place, and the world. However, this shift comes at a cost to the historian in our understanding of how people in the pre-modern period interacted with the places in which they lived. This presentation will explore the concept of Archival Source Mapping, in which location data is found in archival sources, and then extrapolated into a geographic setting. When applied to pre-modern sources, the worldviews of our subjects become clear as the boundaries of their realities become tangible. This presentation will explore the theoretical framework that will be applied to my forthcoming research on the 1737-1738 witch trials in Zug, Switzerland, with the aim of understanding how life at a religious borderland affected the trials. This theory and the related research are designed to provide insight into the boundaries of a woman's world in the eighteenth century, bringing their world to life through records of their deaths. This research was first presented at the Qualicum History Conference in January 2020 and will be presented with revisions.

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Mehta, Michael, "Renewable energy and the storage dilemma."

Thompson Rivers University

One of the challenges associated with deploying renewable energy on a large-scale is the intermittent nature of many of these energy sources. Flexibility is required to accommodate grid integration of solar and wind energy in particular, and a variety of approaches including demand-side management, interconnection to adjacent markets, and energy storage are being used to address these challenges. This paper explores energy storage technologies including different kinds of batteries, flywheels, fuel cells, compressed air, pumped storage, and other novel technologies.

Key words: energy; storage; renewable energy

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Moffat, Ben, “What’s in a name? There’s history and pride but also the ridicule of 12 year-olds on cross-Canada road trips: The story of The Gas City.”

Medicine Hat College

The Gas City. Medicine Hat, Alberta uses and encourages that toponym because of one aspect of its local Geography – the vast pool of natural gas that underlies the region. Most importantly the name represents pride residents have in the 100-year history of the City holding the rights to exploit that gas (and petroleum) for the perceived benefit of the resources’ owners: the citizens.

While nearly all Canadian municipal utilities are owned and operated by private corporate entities, Medicine Hat owns its own. This paper tells the early story of the City’s public utility and how Medicine Hat harnessed local supplies of natural gas, acquired regional mineral rights and used these to attract and encourage local economic development and maintain relatively low domestic costs. How, ultimately, the City built public utilities that have remained in the public trust since their inception.

Key words: toponymy; public utilities; natural gas; mineral rights

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Morgan, Christopher and Wright, Pamela, “Building a conservation sandwich: Systematic conservation planning in Tsay Keh Dene Territory.”

University of Northern British Columbia

Systematic Conservation Planning (SCP) asserts that the practice of protecting lands should be considered on a broad scale and be holistic in nature. Available areas of land with conservation potential should be examined critically for whether they fit into a larger ecological network – either as a link between existing protected areas, or as an area that is ecologically significant on its own. It is this proactive, rather than reactive mindset that sets it apart from historical protected areas creation. This research project is an application of SCP principles and tools for a specific geography – the Tsay Keh Dene Nation Territory in northcentral British Columbia, Canada.

Working with Tsay Keh Dene Nation staff, we will gather a set of conservation features including umbrella species, significant ecosystem characteristics, and land facet diversity and rarity, among others, for inclusion in a geospatial analysis. In turn, each of these features will have goals and targets identified for them based off ecological best practices. Upon review of the existing network of protected areas in the region, we will use Marxan-ILP software in order to prioritize lands for conservation. Additionally, this effort will explore climate change impacts on conservation, comparing which lands are most worth conserving today versus 30 and 60 years from now. Finally, this work will explore the bridging of Indigenous Knowledge (also known as Traditional Ecological Knowledge) into the SCP framework, a discipline rooted in Western Science.

Key words: conservation; planning; climate; indigenous; GIS

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Naqvi, Kim, “Introducing regional geography through a simple news media cartogram.”

Thompson Rivers University

Regional geography can be a difficult topic to teach, largely because of its breadth. This presentation evaluates the benefits and challenges of a simple cartogram assignment designed to introduce regional

depth and breadth, and concepts of representation. A common introductory exercise in regional geography is having students create a sketch map, which reveals their mental map. Adding a formal assignment of creating a cartogram based on information-media is potentially a means of evaluating the origins of one's mental map, and of introducing the range of factors creating regional identity. The exercise might also set a more open agenda for designing tailored course content. However, experimenting with cartograms can be a complex assignment for both geography and non-geography students, and for instructors. This presentation examines the experience with one such assignment over several years, and evaluates the preparation needed for working with thematic maps and concepts of representation, and taking advantage of its pedagogical potential.

Key words: regional geography; pedagogy; representation; thematic maps

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Townshend, Ivan, "Brown Calgary: Visible minority segregation and income inequality in Calgary, 1996 to 2016."

University of Lethbridge

Calgary is one of Canada's most unequal cities. The paper explores the changing patterns and intensities of visible minority segregation in Calgary over the past two decades. Building on conceptual/theoretical approaches of the "Divided City" and rising income inequalities, the paper proposes a method to decompose the Dissimilarity Index to isolate the segregation effects according to intra-urban regions of income gaining, income stable, and income declining regions. Findings show increasing visible minority segregation and that the spatial pattern of visible minorities is becoming complex as they comprise a larger share of the metropolitan population. Results point to dramatic decreases in the segregation contribution from income gaining and income stable regions, suggesting visible minorities are being displaced from such areas. Conversely there has been rising contribution from income declining regions, and also from newer suburban areas on the periphery. The paper makes an empirical contribution to understanding the segregation of one of the most vulnerable groups in the divided city. It develops a novel method for decomposing or partitioning the segregation effects, and a method for investigation some of the associations between visible minorities and geography of changing incomes in the increasingly unequal or divided city.

Key words: segregation; income inequality; social change; vulnerable populations; visible minorities

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Waldichuk, Tom, "The pros and cons of the diffusion of solar panels on farmland in Japan."

Thompson Rivers University

In recent years, abandoned farmland has increased rapidly in Japan while food self-sufficiency has decreased. Photovoltaic solar panels have continued to be assembled on much of this land. The sale of electricity produced by these panels is a source of income for mostly aging farmland owners. This revenue can also be reinvested into agriculture. The purpose of this presentation is to examine the recent history and pros and cons of solar panel diffusion on farmland in Japan. Do solar panels help to sustain agriculture? This research is based primarily on a literature review and landscape observations. The spread of solar panels has increased rapidly since 2012 when a feed in tariff program was introduced to increase the monetary rate of return for generating electricity, and since 2013 when the

Japanese government gave permission to temporarily build solar panels on farmland. The newest type of panels are spaced out above fields to allow productive farmland to be cultivated. However, some panels on abandoned farmland are not spaced out, which prevents it from ever being cultivated. The principal conclusion is that solar panels can be used to provide an extra source of income for farmland owners, who otherwise would not be cultivating that land. However, the reduced productivity of higher quality farmland under solar panels can be a threat to agricultural sustainability.

Key words: Japan; farmland; abandonment; solar panels

## POSTER PRESENTATIONS

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Ali, Faran, "Climate change impacts on erosion rates and suspended sediment dynamics in a high mountainous drainage basin."

University of Northern British Columbia

Climate change has a potential of severely impacting erosion patterns and suspended sediment dynamics in high mountainous drainage basins. This study presents preliminary findings of climate change implications on the spatial patterns of erosion rates and suspended sediment yields in the upper Indus River basin located in the Karakoram-Himalayas. A set of distinct future climate shift scenarios in the basin were established by analysing historic climate data. The baseline patterns of suspended sediment yields were determined by a spatially distributed modelling framework which is based upon coupling spatial erosion rates and sediment delivery ratios. After calibrating the model for baseline conditions, the hydroclimatological parameters were varied for predicting future climate scenarios. The initial results show a complex patterns of recent climate trends in the upper Indus River basin exhibiting nonlinear change in erosion rates with changing precipitation evenly distributed throughout the years. No significant increase or decrease was noted in the annual erosion rates with variation in winter precipitation. Future trends suggest increasing erosion rates till the 2050s and a flattening trend thereafter. These results are helpful in gaining a better understanding of future climate change impacts on erosion rates and suspended sediments dynamics in the Karakoram-Himalaya region and other high mountainous drainage basins of the world.

Key words: Indus River; Karakoram-Himalaya; climate change; erosion rates; suspended sediment

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Amongin, Sandra and Andrews, Nathan, "Livelihoods of exclusion: Ghana's hydrocarbon industry and women's lives."

University of Northern British Columbia

Oil and gas discovery in Ghana since 2007 has attracted the interest of many international and local actors, including transnational corporations. Contrary to the expected benefits of oil to broad-based development, the industry has perpetuated exclusion and poverty in communities in the neighbourhood of extractive activities. In particular, the globalised environment, which underscores the industry, has shaped the governance and benefit sharing mechanisms to exclude a wide range of local citizens, particularly women, from the actual gains of the industry. This experience is worsened by other ramifications such as water pollution, dwindling fish stock and over population due to the growth of migrant workers in booming oil towns. This paper utilizes a feminist political ecology framing to examine the gendered disparities in the sharing of benefits. In particular, the paper relies on data from fieldwork conducted in Ghana in 2019 to explore how the power and agency of varying stakeholders result in differentiated impacts of the hydrocarbon industry on communities. Considering that the gendered impacts of mainstream economies remain poorly understood, this paper contributes to the existing scholarship on both the outcomes of Ghana's hydrocarbon industry and feminist political ecology theorizing.

Key words: oil; governance; women; benefits; impacts

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Bellamy, Keegan<sup>1</sup>, Che, Yueyi<sup>2</sup>, Hoiem, Josie<sup>2</sup>, Johansen, Natalie<sup>3</sup>, Rand, Colby<sup>4</sup> and Reahl, Jocelyn<sup>5</sup>, “Be dating constraints on the deglaciation history of the Juneau Icefield.”

<sup>1</sup>University of Northern British Columbia, <sup>2</sup>University of California, Berkeley, <sup>3</sup>Pacific Lutheran University, <sup>4</sup>University of Maine, <sup>5</sup>Wellesley College

Understanding how glaciers responded to climate forcing during the Last Glacial Maximum (LGM) and its subsequent deglaciation provides insight to how today’s glaciers will respond to an increasingly warming climate. While detailed reconstructions of mountain glacier change during the post-LGM deglaciation exist around the globe, deglaciation histories from high northern latitudes are relatively sparse due to complete coverage of continental ice in such regions. Fortunately, Alaska was only partially glaciated during the LGM, making Alaska one of the few high latitude regions with detailed geomorphic records of mountain glacier extent and retreat during the LGM and subsequent deglaciation. However, post-LGM deglaciation is poorly constrained in Southeastern Alaska. We contribute to this gap with new estimates of glacier elevation change on the Juneau Icefield (SE Alaska and NW British Columbia) using cosmogenic <sup>10</sup>Be minimum exposure dating. We compare these <sup>10</sup>Be dates with the post-LGM deglaciation timescale to constrain the rate and timing of SE Alaskan glacier thinning in response to post-LGM climate forcing. These results not only contribute to filling the spatial gap in Alaska’s last deglaciation history, but they also provide insight into how temperate glaciers will respond to present-day climate forcing.

Key words: deglaciation; climate forcing; northern latitudes

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Bialobzyski, Emma, Ross, Mackenzie and Stacey, Brad, “Patch isolation: A case study of Kopjes in the Serengeti.”

University of Victoria

In our project, we look to examine patch dynamics, specifically patch isolation, in northern Tanzania. The aim of our study is to determine the effects of spatial heterogeneity on species in the northern region of the country. Using a broad landscape ecology approach, we will examine the effects of spatial heterogeneity and patch isolation on a variety of species. This research is particularly relevant today in the era of global climate change, as ecosystems react to drought, as well as precipitation, and temperature shifts. In northern Tanzania, safari tourism is of utmost importance for local livelihoods. Therefore, understanding patch dynamics is important for future planning and areas for protection. A geographical perspective on ecosystem pattern and process will be crucial in planning for this uncertain decade ahead.

Key words: patch isolation; spatial heterogeneity; habitat fragmentation; Tanzania

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Bourque, Charlie and Burton, Phil, "Glacier change in the central Coast Mountains of British Columbia (1985-2018)."

University of Northern British Columbia

Changes in glacier linear extent are presented based on analysis of data from the Landsat Thematic Mapper (TM) and Landsat Enhanced Thematic Mapper (ETM+), and aerial photography from the historical air photos collection of the BC government. A linear glacier retreat analysis was carried with the Glacier Termini Tracking (GTT) ArcGIS toolbox on eleven glaciers located in the Central Coast Mountain, British Columbia, from 1985 to 2018. The eleven glaciers shrank considerably since the end of the Little Ice Age (approximately 1900), exposing large areas of land readily available for plant colonization. Glacier retreat of six alpine glaciers within the study area between 1985 and 2018 was also measured as the loss in central glacier length. The mean linear retreat was 290m and varied from 160m to 450m. On average, the glaciers lost 42.5% of length compared to their Little Ice Age Maximum length, with a mean retreat of 10.5% for the period 1985-2018. No significant increase in glacier retreat was observed between 1985 and 2015. Observed levels of glacier retreat for the period 2015-2018 were as great as those observed for the 1985-1995, 1995-2005 and 2005-2015 periods. The glacier retreat rate of 42.5% over the last century is comparable to rates reported by others for this area. The annual rate (m/yr) determined by the GTT varied greatly inter-annually and among glaciers. The results from the GTT suggest that the resolution from the Landsat TM and ETM+ (30m) is too coarse to provide accurate annual changes in glacier terminus position.

Key words: glacier recession; Coast Mountain Range; glacier termini tracking; Landsat

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Constable, Christine and Hanna, Erica, "Landscape legacies: Lodgepole pine forests of Jasper National Park."

University of Victoria

The lodgepole pine forests of Jasper National Park have been of concern lately due to recent outbreaks of the mountain pine beetle (*Dendroctonus ponderosae*). The insect, native to western North America, attacks and kills a range of pine tree species, many of which make up the boreal forests of Jasper National Park. The size and frequency of these outbreaks is concerning, as suitable habitat for the beetle has expanded past historical boundaries and the ecological integrity of the forests has been severely impacted. This project looks at the patterns of the contemporary landscape of Jasper National Park and focuses on its historical and spatial contingencies in relation to the pine beetle. We attempt to explain the distribution of the infestation through paleoecological and biogeographical lenses in a study of environmental history: the landscape legacy of the lodgepole pine forests of Jasper National Park.

Key words: landscape legacies; mountain pine beetle; Jasper National Park; lodgepole pine

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Cook, Natalie, "GIS analysis of association of water ways to *Daphne laureola* distribution patterns in Metro Vancouver, BC."

Trinity Western University

Invasive species are of major concern in the Lower Mainland of British Columbia. Native to Britain, Spurge-laurel, *Daphne laureola*, is a rapid-growing perennial plant that poses human health concerns. This highly adaptable plant contains toxins throughout its external surface area and berries which can cause skin irritations if touched and are poisonous if ingested by humans or pets. Due to the dangerous aspect of this plant, it is important to discover the parameters that influence its distribution. In this study, the dispersal pattern of Spurge-laurel was analyzed to assess whether there is a spatial correlation between occurrences and waterways in the Metro Vancouver Regional District (MVRD) area. Stream data from ArcGIS's Online database and invasive plant site points of *Daphne laureola* from the Invasive Alien Plant Program (IAPP) were included on the map. A buffer of 30m and the plant site points were intersected to display how many plants were in close proximity to a stream. The results showed that there were over 250 Spurge Laurel plant sitings within the MVRD. The results also showed whether there was positive or negative correlation of the distribution of *Daphne laureola* to stream systems. This study magnifies the necessity for awareness of the adaptive capabilities that dangerous invasive species possess. The changing climate allows for locational range shift for plants, allowing more invasive plants from different climates to thrive. This project can be used as a stepping-stone into analyzing the spatial changes that climate change poses on invasive species.

Key words: GIS; *Daphne laureola*; invasive species; dispersal patterns; water ways

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Danyluk, Avery M., "University green spaces and fear: The TRU Horticulture Garden and gendered perceptions of safety."

Thompson Rivers University

Numerous studies have been conducted on the relationship between public green spaces and perceptions of safety. However, few have explored how these spaces can generate fear in public gardens. Using a phenomenological and mixed methods approach, this paper examines how environmental factors in the Thompson Rivers University Horticulture Garden induces feelings of fear and impacts the spatial behavior of female students. Qualitative observations with support from existing literature were used as the primary methods of research employed in this study. Through my personal experiences in the garden, I concluded that physical attributes such as the garden's thick bushes, overhanging trees and low hanging canopies on the grounds were identified as potential areas of danger as they incited the greatest levels of fear. Based on a study of various environmental cues, these areas were also more likely to stimulate perceptions of danger in female students more than male. Time of day and lighting also influenced levels of fear. Areas that were poorly lit or slightly unkempt, women were more likely than men to demonstrate patterns of avoidance behavior. While attributes associated with stimulating fear exist in the garden, certain elements of campus green spaces can also contribute to a positive image of the university. This presentation offers suggestions to improve the overall image of the garden, reduce perceptions of fear and increase feelings of safety.

Key words: Fear; environmental cues; gender; perception; spatial behavior

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Enns, Sara Wray, "Effects of new road development on remote northern communities: A case study of the Inuvik – Tuktoyaktuk road."

University of Northern British Columbia

In 2017 an all season road opened up between Inuvik and Tuktoyaktuk in the North West Territories (NWT). This road provides a case study into the effects of new road development on socio-economic outcomes in the Canadian North.

The Inuvik-Tuktoyaktuk road is a unique example of community driven infrastructure development. Though touted as a road to resources, the road was not built in a context that was required by external resource developers, nor was it an imposition from federal authorities. Instead it represented a project that the communities of Inuvik and Tuktoyaktuk advocated for over the course of 30 years.

Now that the road is operational, questions of its socio-economic impact and the need for growing community capacity will to be explored. As the NWT government looks to construct more roads, the Inuvik-Tuktoyaktuk case will provide important insights into ways communities can control and benefit from major infrastructure projects as well as the potential negative effects and challenges of this development on these communities.

The touted economic effects of the road opening are varied, and in some cases surprising. These effects include increased food security and decreased food and fuel prices, unexpected tourism flows, and the uncertain potential for the road to facilitate resource development.

Key words: Arctic development; road development; food security; tourism flows; resource development

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Fleck, Zach, "Examining intercultural relationships at a small Canadian university."

University of Northern British Columbia

Internationalization of higher education is a stated goal of most higher education institutions (HEIs). Increased international student mobility ostensibly increases intercultural learning outcomes for those involved, but distinct challenges exist for certain international student groups. Financially strapped HEIs often employ an instrumental approach in recruiting international students, especially from growing markets such as China. Chinese students are thought to arrive at a disadvantage due to this 'commodification' and show a tendency to 'self-segregate' relative to other international student groups in English-speaking environments. So far, research has interpreted this problem through an institutional lens, implying that strategies facilitating adaptation to the host environment are the sole solution. Currently, there is a lack of research considering Chinese student populations as a resource for 'internationalization at home' strategies. HEIs are already looking to how internationalization strategies might create intercultural learning outcomes for domestic students. With the high density of Chinese students on Canadian university campuses, research into how Chinese student populations could factor into 'internationalization at home' strategies is lacking. The aim of this research is to examine Chinese and domestic student's approaches to forming intercultural relationships through a case study of the University of Northern British Columbia, Prince George, BC, Canada. The anticipated findings of this



research are intended to inform a more balanced and informed internationalization strategy at HEIs. This research is part of the Global & International Studies Capstone Course (INTS490) led by Dr. Tristan Pearce.

Keywords: Internationalization of higher education; China; international students; intercultural relationships; intercultural learning

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Flisikowski, Sarah<sup>1,2</sup>, Pearce, Tristan<sup>2</sup> and Fawcett, David<sup>2</sup>, “Polar bear co-management in a changing climate.”

<sup>1</sup>Queen’s University, <sup>2</sup>University of Northern British Columbia

Polar bears are a species of significance to Inuit culturally, spiritually, economically, and for subsistence. This makes including Inuit traditional knowledge of polar bear under changing climatic conditions of great importance to the adaptive co-management of polar bears. Inuit across the Canadian Arctic have outlined how they would like polar bear to be monitored and actions to ensure that Inuit and their knowledge are included in polar bear co-management. The aim of this research is to document polar bear co-management in the Canadian Arctic, including the mobilization of Inuit traditional knowledge in decision-making. This aim will be achieved through three objectives: (1) functionally describe polar bear co-management across the Canadian Arctic; (2) systematically review literature about Inuit traditional knowledge of polar bear and assess its usability for co-management; and (3) discuss how Inuit traditional knowledge is generated and transmitted through a case study of *Nunamin Illihakvia: Nurturing Capacity Across the Arctic*.

Key words: polar bear; Inuit; climate change; co-management; traditional knowledge

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Gamroth, Brady and Arciniega, Emilia, “Canada’s new and improved Impact Assessment Act.”

The King’s University

The federal Impact Assessment Act replaced the Canadian Environmental Assessment Act, 2012 in July 2019. This new legislation has included several new features such as climate change, gender analysis and regional assessment. It identifies key new features and assesses them using five principles: Transparency, Indigenous Participation, Public Engagement, Evidence-based, and Efficiency. These principles, given by the Government of Canada, are said to have guided the creation of the new act. We will examine each of the major changes in Canada’s impact assessment process and qualify them against each of the five principles. This will allow us to determine if the new act is, in fact, an improvement from the last environmental legislation.

Key words: Impact Assessment Act; Canadian Environmental Assessment Act; federal EIA; policy analysis

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Gordon, Megan and Halseth, Greg, "Achieving a just transition for forestry workers, families, and communities in northern British Columbia."

University of Northern British Columbia

Economic restructuring and the move to a low-carbon economy has consequences for resource-dependent workers, families, and communities. The resource sector itself is also vulnerable to the ground-level effects of climate change, acting as a driver of transition. Given the recent pace of change in the resource sector, the idea of a 'just transition' has been introduced as a way to respond to and mitigate socio-economic issues during times of transition, while still enabling environmental action. In British Columbia, for example, the forest sector is in the midst of a downturn with the majority of mill closures and layoffs concentrated in northern communities. The impacts of the downturn have exacerbated historic boom and bust vulnerabilities in these areas. These present circumstances offer a unique opportunity to better understand the extent of impacts and the priorities of forestry-dependent workers, families, and communities. The proposed research seeks to investigate how these groups define a just transition, view the role of government, and perceive the importance of the move to a low-carbon economy. Using a case study methodology, qualitative findings from interviews and focus groups in Quesnel, BC will help develop policy recommendations, identify lessons for other resource sectors, and contribute to the just transition knowledge base. The goal of this research is to contribute to the larger discussion on resource sector transition and to uncover ideas on how to build a more optimistic future for those who depend on it.

Key words: resource sector; forestry; just transition; low-carbon economy; northern communities

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Keast, Marina and Waldichuk, Tom, "A walk home from Thompson Rivers University: A women's perspective."

Thompson Rivers University

This geographic research is conducted from a women's perspective to study perceptions of fear on a university campus. This project's objective was to look at certain areas on the Thompson Rivers University campus and the walk back to Arrowstone Drive. Some of the variables explored in this paper were how certain locations portrayed either a more or less safe environment for a woman while walking home. The methods that were used involved observing women's patterns from afar and seeing which locations on campus were avoided and how the route pattern changed depending on the time of day. Other methods used were taking data found on the TRU campus and comparing it to other university campuses to figure out where female students felt safest as well as where they felt unsafe. Overall, the results showed that female students tend to feel the most unsafe when walking alone at night on poorly lit walkways, parking lots, and small alley-ways between buildings.

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Morgan, Christopher and Wright, Pamela, "Building a conservation sandwich: Systematic conservation planning in Tsay Keh Dene Territory."

University of Northern British Columbia

Systematic Conservation Planning (SCP) asserts that the practice of protecting lands should be considered on a broad scale and be holistic in nature. Available areas of land with conservation potential should be examined critically for whether they fit into a larger ecological network – either as a link between existing protected areas, or as an area that is ecologically significant on its own. It is this proactive, rather than reactive mindset that sets it apart from historical protected areas creation. This research project is an application of SCP principles and tools for a specific geography – the Tsay Keh Dene Nation Territory in northcentral British Columbia, Canada.

Working with Tsay Keh Dene Nation staff, we will gather a set of conservation features including umbrella species, significant ecosystem characteristics, and land facet diversity and rarity, among others, for inclusion in a geospatial analysis. In turn, each of these features will have goals and targets identified for them based off ecological best practices. Upon review of the existing network of protected areas in the region, we will use Marxan-ILP software in order to prioritize lands for conservation. Additionally, this effort will explore climate change impacts on conservation, comparing which lands are most worth conserving today versus 30 and 60 years from now. Finally, this work will explore the bridging of Indigenous Knowledge (also known as Traditional Ecological Knowledge) into the SCP framework, a discipline rooted in Western Science.

Key words: conservation; planning; climate; indigenous; GIS

Morris, Jeremy<sup>1</sup>, Coxson, Darwyn<sup>1</sup>, Dery, Stephen<sup>1</sup> and Yin, Jun<sup>2</sup>, "Determining the influence of spring snowmelt on wetlands of Ancient Forests/Chun T'oh Whudujut Provincial Park."

<sup>1</sup>University of Northern British Columbia, <sup>2</sup>BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development

Wetlands are landscape areas which are saturated for extended periods resulting in the development of hydric soils and hydrophytic plant assemblages. Commonly wetlands are known to support a diversity of plant and animal life, however they also provide several ecohydrological services including carbon and contaminant sequestration and flood mitigation. Within the Robson Valley, wetlands occupy lowland areas surrounding the Fraser River. The region receives up to 1240 mm of precipitation annually, 800 mm of which can fall as snow in the high elevations making snowmelt the primary driver of the hydrological cycle. Research shows that annual snowpacks have decreased over the last century, and will continue to do so as climate change progresses and winter precipitation more commonly occurs as rain. It is therefore necessary to investigate the importance of seasonal snowmelt for wetland hydrological systems within the Robson Valley. Groundwater and surface water levels, combined with geochemical tracers are used to investigate snowmelt influence on the hydrology of a wetland complex within Ancient Forest/Chun T'oh Whudujut Provincial Park. End member mixing analysis of geochemical tracer data from rain, snowmelt/surface water, and shallow groundwater samples is used to determine the proportion of snowmelt derived water in inundation waters and shallow groundwater within the

wetland complex. Water level data from the piezometers, in tandem with the DEM will allow for mapping of the water table through the year to determine how responsive the water system is to snowmelt compared to rain events or groundwater inflow.

Key words: wetland hydrology; geochemistry; stable Isotopes; Inland Temperate Rainforest; Robson Valley

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Powrie, Tay and Pypker, Thomas, "Response of river discharge due to forest disturbance."

Thompson Rivers University

In this research project, we analyzed the effects of forest disturbance on the discharge of six fourth order rivers within Interior British Columbia (Chilcotin, Chilko, Mesilinka, Nation, Osilinka, and Spius). The changing climate (i.e., unpredictable precipitation patterns and fluctuating temperatures), anthropogenic landscape disturbances (i.e., industrial forestry practices, mines) and stochastic natural disturbances (i.e., landslides, forest fires) all have differing effects that may result in a shift in the magnitude and timing of discharge in rivers. The objectives of this project were to understand if there are shifting trends amongst the watersheds within interior BC and if shifts in discharge can be associated to non-climatic events.

To assess changes over time we used frequency analyses to understand trends in discharge, then, we applied modified Double Mass Curves to understand if shifts in discharge could be attributed to forest disturbance when removing the effects of climate. The rivers within the same principle drainage area showed similar trends in discharge magnitude and timing when analyzed with frequency analyses and 50% of rivers, not associated by principle drainage area, portrayed shifts in discharge not attributed to climate when analyzed with modified Double Mass Curves. Understanding which land use and/or landscape disturbances may be the cause of shifts in discharge can build on the knowledge used to manage watersheds to protect integral ecosystems and water utilization.

Key words: hydrology; watershed management; climate change; land use

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Robinson, Patrick, "Wildfire fuel mapping using LiDAR."

University of Northern British Columbia

My research is focused on investigating how to better inform forest fuel treatment aimed at mitigating the negative impacts of wildfire. It is about identifying climate adaptation strategies in a way that is informed by and aligned with local First Nations traditional knowledge and values. I am working with the Xaxli'p First Nation in their survival territory now known as the fountain valley, near Lillooet BC. I'm using Aerial Laser Scanner / LiDAR remote sensing data to develop an improved technique for converting physical forest and landscape structural characteristics into forest fuel parameters that can be universally applied to inform fuel type classifications. In addition, I hope to contribute valuable information that can promote historical Xaxli'p land management regime characteristics and ecosystem restoration. The goal is to use the LiDAR to provide an improved spatial understanding of forest fuel load on the landscape and to enhance the current methodology for creating the fuel inputs used operationally for wildfire modelling and simulation tools. By enabling the spatial description of Xaxli'p

land management values and better informing the ways in which wildfire will interact with the forest fuels in the Xaxli'p survival territory, fuel treatment opportunities that align with both the restoration and maintenance of Xaxli'p values and the reduction of catastrophic wildfire risk can be more easily identified.

Key words: forestry; wildfire: wildland fuels; LiDAR; First Nations

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Rouse, Paul, "The changing Canadian Christian identity."

University of Northern British Columbia

There is a changing internal identity within Eastern Orthodox Christianity in Canada. Ethnic identity has been a large factor in the creation of Eastern Orthodox Christian communities keeping them homogenous, cohesive and exclusive. This ethnocentricity has started to lose traction within the recent decades, opening the doors to Eastern Orthodox Christian churches across Canada to newcomers. Using an analysis of literature from sources this poster will compare the situation within Eastern Orthodox Christianity with other Christian groups. Eastern Orthodox Christianity, or simply Orthodox Christianity, in Canada is an unlikely topic to be raised in common conversation or in academia and it easily overlooked. However, it remains a central part of over half a million Canadian's lives. As a result of different demographic factors ethnocentric Christian churches are finding their parishes de-populated in recent generations. These factors are a consequence of an increasingly globalized and secular socio-economic world. As the ethnocentric communities lose their new generations through a failure to pass on their language and culture, more English-speaking services are being held literally and metaphorically opening the doors to include more of Canadian society.

Key words: Christian Orthodoxy, Canada, geography, ethnicity, migration

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Schocat, Charmain, "The importance of space in decolonizing knowledge."

University of Northern British Columbia

The last few decades of academic research have seen a remarkable amount of change in the ways research is conducted with indigenous communities, especially in North America. For instance, many areas within the social sciences have acknowledged the colonial influence of their disciplines and have actively sought to challenge old methodologies which placed Western ways of knowing above indigenous knowledge. The discipline of geography with its emphasis on the importance of place has arguably contributed a great deal to this methodological shift. Concepts such as spatial significance and place as being integral to cultural identity have directly influenced research approaches that seek more collaborative engagement with communities and that de-center the colonial perspective. Through a literary analysis of academic literature on the topic of de-colonization in research, I seek to address how place and identity have become an integral part of this process. Important questions I have tried to answer include how these concepts directly tie into themes of de-colonization, self-determination, and the engaged scholarship that addresses the gap between Indigenous knowledge and the dominant colonial knowledge framework. By drawing connections between the concepts of place, identity and

indigenous- and community-based research, one may be able to see the role that geographical research has played in the development of a more open and collaborative methodology.

Key words: Indigenous communities, place, identity, geography, de-colonization

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Smart, Jessica<sup>1</sup>, Pearce, Tristan<sup>1</sup> and Pettit-Wade<sup>2</sup>, "Climate change impacts on Arctic char (*Salvelinus alpinus*) and implications for Inuit subsistence."

<sup>1</sup>University of Northern British Columbia, <sup>2</sup>University of Windsor

Climate change impacts have already been documented in Arctic marine ecosystems. Current studies of change in arctic marine systems have provided a short-term view of ecosystem connectivity when compared with Inuit knowledge which has not been as well documented in the literature. Recent changes in the movement ecology and health of fish harvests highlight the need to better understand the underlying drivers of ecosystem change and implications for Inuit subsistence. Inuit in Ulukhaktok, NT have identified a need to better understand the changes in key subsistence marine species, particularly, Arctic char (*Salvelinus alpinus*). This work aims to document Inuit knowledge and observations of Arctic char (*Salvelinus alpinus*) in the context of changing climatic conditions in Ulukhaktok. Specific objectives include: (1) document Inuit knowledge and observations of Arctic char movement ecology and health; (2) identify current exposure-sensitivities affecting Inuit-Arctic char interactions; and (3) characterize the adaptive strategies employed to manage these conditions. Data will be collected through semi-structured interviews using open-ended questions and in the preferred language of the participant. Key knowledge holders, including elders and avid fishers, will be the primary interview participants. Concurrently, quantitative data on individual fish movement patterns will be collected using telemetry. The expected results are intended to improve our understanding of the dynamics of movement ecology and the health of Arctic char and provide valuable information for the co-management of a significant species for Inuit food security.

Key words: traditional knowledge; climate change; Inuvialuit; Beaufort Sea; Arctic

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Smith, Bertrand, "Going backwards with technology – wet-printed wood maps."

University of Victoria

Anecdotally, ridgeline maps seem to have had a small explosion in popularity in online data-graphics and mapping communities, with tutorials being written and shared to encourage others to partake. Seeing a similarity between the laterally flowing lines of the maps, and the similarly flowing grain of wood, I figured the two would make an aesthetic pairing. Wood maps are not a new idea, but they are generally laser cut, and I have neither the skill nor the equipment to accomplish that, nor did I think it would be the right look on the wood. What I do have instead is a mostly functional darkroom of my own, the skills to experiment in it. These maps are the culmination of ridgeline elevation maps, printing digital negatives from a computer; fine wood finishing, and coating the wood with a silver-gelatin emulsion and then developing it like conventional darkroom paper. None of these components are unique on their own, digital negatives and but the four of these together are new. Further, the data original data and

the software used to get the base ridgeline map is all open source, nothing proprietary until you get to the graphic design of the map, in which case it is all operator preference.

Key words: ridgeline; cartography; art; geomatics; open source

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Toews, Emily, "Incorporating renewable energy sources and green material into residential dwellings to maximize energy efficiency."

Thompson Rivers University

With global temperatures rising, climate change growing more prominent, and the concern of lower energy security, the incorporation of green technologies has never been more important. While large scale change in green technology is *important/highlighted in media*, small scale, localized change can make a large difference. The incorporation of energy efficient building materials and renewable energy are being explored more in residential building sites. Looking into the benefits of each suggested efficient material, we see that there are many viable ways to incorporate renewable energy systems for small scale, residential use. Some of the variables explored in this paper are infrastructural design, sustainable consumption, and energy efficient technologies. These are further analyzed through outlining the regulations and standards set within BC to look at the environmental and economic cost-benefits of sustainable development/consumption within individual homes. Although cost is a major hurdle for many homeowners, the benefits outweigh the reservations. By conducting this analysis, we find that a mass switch by individuals can have a huge effect on the global movement towards sustainable development. The main conclusion of this report suggests that fossil fuel use can be limited by developing more residential homes with green technologies, efficient power systems, and the addition of renewable energy use.

Key words: renewable energy; efficiency; green materials; residential buildings; regulation

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