

GEOG 3991
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Assignment 3
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Regional Impacts of Climate Change
Section A: Critical Reflections

Topic 1: From Impacts to Adaption: Canada in a Changing Climate

After reviewing the climate and physical geography of British Columbia, it is essential to discuss how each of the regions will adjust to a changing environment. At the time of this article, my town of 100 Mile House BC was dealing with the Mountain Pine Beetle epidemic. There was a rush to harvest the beetle-kill timber before it rotted to maintain a portion of its economic value (Walker and Sydneysmith 2008). Many local furniture stores promoted products with blue-tinged, beetle-kill wood, hoping to recoup losses. The tree mortality rate left our forests tinder-dry, eventually leading to the horrific fire season of 2017-2018. Having been a resident of 100 Mile House for the past 23 years, I have witnessed the increased winter temperatures and decreased snowfall reported in the article. Subsequently, this summer the District of 100 Mile House was forced to switch its drinking water source from the surface to groundwater wells to secure an adequate water supply for the population (See Figure 1).



Notice to Residents

February 2019

Re: Water Mineralization ("Hardness")

You may have noticed some recent changes to the "hardness" of your water. This is related to the District's new water source and water treatment plant.

In 2018, the District, in close consultation with Interior Health and TRUE Engineering, switched water sources and installed a new water treatment plant. Previously, we used surface water from Bridge Creek, but now we are using ground water as our municipal water source. Using ground water means you are now experiencing more mineralization ("hard water") than before.

Switching to ground water has created a sustainable water source for the District that meets Health Canada's water quality guidelines. Many options were considered, and the ground water source and water treatment plant were selected as an efficient, economic, and environmentally conscious option. You can read a full explanation from our engineers about the need to move to ground water on our website at: www.100milehouse.com under "Public Notices".

With these changes, "hard water" is the new reality. We can understand the issues associated with mineralization but hope you can keep in mind the broader picture of long-term water supply, water quality and sustainability for our community. The following page has some tips for addressing "hard water."

Hardness is not related to safety. There are no health concerns with consuming it.

In closing, our water source and supply are key to providing continued service to our residents for many years to come. The District is confident our engineers and consultants have provided the best long-term solution to water supply and safety at an affordable cost to our residents.

Sincerely,

Mayor & Council
District of 100 Mile House

Figure 1 (Dist 100 Mile House, 2019)

It is interesting to apply past geologic events to present-day climate change, indicating that abrupt changes in the global climate are imminent (Walker and Sydneysmith 2008). Warming has happened before, when, toward the end of the last glaciation (approx. 12 500 years ago), BC's climate warmed by 5°C over only a century or two (Hebda and Whitlock, 1997; Walker and Pellatt, 2003). I feel this is valuable information regarding the unpredictability of climate change in BC. According to Walker and Sydneysmith, severe, sustained droughts occurred more frequently in previous centuries than over the past few decades and would, therefore, be expected to

happen in the future irrespective of climate change (Walker and Sydneysmith 2008).

Thus, any region in British Columbia should prepare for climate adaptation.

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Topic 2: Case study 4: Pacific Salmon and Climate Change

The effect of climate change on Pacific Salmon will impact the First Peoples who depend on fish for nutrition and economic livelihood. It is important to note how decreased snowpack will affect more than the summer water supply. According to the case study, warmer river temperatures and decreased streamflow will cause the salmon to burn energy faster, be more susceptible to infections, die from exhaustion, and have reduced ability to spawn (NRCAN, 2009). This article introduces dimensions of cultural tension between commercial fisheries and First Nations groups. Reduced salmon numbers affect the economies for both groups, but the First Nations depend on salmon for food, culture, and livelihood; many don't have an alternative income. Knowing how

vital the salmon is for the future of diverse economies, a collaboration of stakeholders is essential to ensuring the survival of salmon supply. Slowing global warming will help maintain water supply for salmon and other fish species, and adaptation strategies need to be implemented for First Nations groups to accommodate decreasing salmon numbers, which is a startling revelation of how altering one species can affect local, global economies, and social welfare.

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Topic 3: British Columbia's Sea Dyke Guidelines

Sea-level rise is of utmost concern in British Columbia's coastal urban centres. Bornhold and Thompson state that analysis of regional vertical land motion (due to tectonics, glacial rebound, sediment loading, and other factors) and global projections of sea level rise produced new estimates of future changes (Bornhold, 2008; Thomson et al., 2008). I find the proposals in the article extremely proactive, especially the guidelines for sea dykes in the years 2050, 2100, and 2200, with provisions for regional sea level rises of 0.5 m, 1 m and 2 m, respectively (Andrey 2014). However, preventive measures take only infrastructure and property into consideration. The Topic 2 video, *Thriving Insects, Threatened Birds* indicates that shorebirds will be affected by raised dykes. Sea level rise will reduce tidal flats in areas where dykes hold back the sea (KN2002). The video also refers to the fact that in Southern BC, sea-level rise

counteracts plate subduction, and the shores are steep, so the current situation is not urgent. While the case study on sea dyke guidelines is necessary, I feel that stakeholders should confer about the shorebirds in places like Delta, British Columbia. According to the video, shorebird numbers have decreased dramatically, which may cause an imbalance in the shoreline ecosystem of Southern BC (KN2002). The article and the video remind us how important it is to consider all aspects of climate change mitigation plans.

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Section B: Essay: *Diversity in Change*

As the climate in British Columbia changes, residents may need to reconsider where they call home and evaluate how global warming affects their potential choice. Climate change may influence these choices more than it has in the past. For example, considering life on BC's South Coast now brings new risks of flooding, while living in the Interior holds threats of drought and fire. People must now debate these changes with regards to economic livelihood, health, and social impact. Furthermore, they will need to examine short- and long-term consequences of climate change on the location they choose. An area once desirable may now be detrimental.

Economics often dominates the reasons people choose to live in certain areas. Dickson states that a critical determinant of adaptive capacity is household wealth, and wealthier families will be able to afford more choices when the environment changes around them (Dickson 2014). Moreover, families need to maintain income after relocating. For example, if a family considers moving to the BC Interior, they should research how climate change is already affecting the area. For the past two years, the Cariboo region of the Interior has been experiencing extreme wildfire dangers and flooding. In 2017, the towns of 100 Mile House and Williams Lake were evacuated for two weeks in July, causing losses to all financial sectors. Global warming has increased pest infestations like the Mountain Pine Beetle, affecting employment for the local mills and logging companies. There may be future limitations on logging practices to reduce carbon emissions resulting from the clear-cutting of old-growth forests and slash burning (Jones 2019). People will take this into account when considering a shift to the interior; they need a job to survive. Migration based on economic reasons depends on the rate of climate change. For example, some climate impacts, such as rising sea levels or desertification, are slow and progressive, while others such as floods, monsoons, hurricanes, and cyclones happen suddenly (Dickson 2014). A gradual change like many years of drought-induced crop failure would prompt a relocation over time, while a Tsunami in Tofino would require an immediate move to a safer location.

Changing our habits to reduce carbon emissions is an affirmative act. For example, public transit encourages a more green lifestyle while reducing emissions to

provide cleaner city air. Unfortunately, not everyone can afford to live in a “green city” so they migrate to rural areas. Although remote locations may not have industrial emissions, there are other serious health considerations. The 2017-2018 forest fires in the BC Interior severely reduced air quality, affecting many people with lung conditions: “Our province’s vulnerability to forest wildfires has a major impact on the air we all breathe and has serious public-health implications” (Crawford 2019). Climate change has exacerbated arid conditions in the interior, and therefore susceptibility to fire. Warmer winter temperatures have not killed invasive pests such as the Mountain Pine Beetle, causing tree mortality and tinder-dry forests. People who are not sensitive to air quality might stay in a fire-hazard area, tolerating the stress of possible evacuation every summer, while others may consider relocation to a stable locale, especially if the threat of displacement causes them stress and decreased quality of life.

Health is often a driving force when people choose relocation to maintain a comfortable standard of living. Each region in British Columbia faces threats from climate change, such as extreme temperature and weather events, air quality, food, and water security, increased diseases, and ozone depletion. Urban, rural, coastal, and northern communities have unique attributes that make them vulnerable to health impacts in different ways (Lemmen et al. 2014). If people demand a particular standard of lifestyle, climate change may be a factor in their choice of residence, and individuals also have varying levels of vulnerability to environmental conditions. Take, for example, the Inuit and residents of remote northern communities, where climate change poses unique health challenges due to impacts on traditional food sources and diets, their dependence on the land, reliance on reasonably predictable and stable weather

patterns, and cultural impacts (Furgal et al. 2010). Climate change may cause stress and social implications in addition to dietary health concerns for Inuit wanting to maintain their geographical connection. The Inuit would find it extremely difficult to relocate from their Arctic location and displacement would mean giving up their heritage, sacred lands, and culture.

Whether climate change forces a migration for economic or health reasons, the social impact may be the most robust adjustment. According to Adger, limits to adaptation are endogenous to society and hinge on ethics, knowledge, and attitudes regarding risk and culture (Adger et al. 2008). Consider a small family farm that has existed for several generations, but now the climate has caused repeated crop failures and financial distress. This family may not want to give up the family business; they have no choice but to relocate and seek an alternative income. Despite attaining improved health or financial status, displacement causes psychological stress, especially when it means abandoning customs and traditions.

While climate change affects weather patterns and ecosystems, the most intricate impact is on human life. Whether considering a short-term event like an extreme storm, or longer-term eventual sea level rise, humans must choose where to live in the face of a changing climate. They must investigate the health implications of remaining in a city with poor air quality, versus the financial uncertainty of moving to a greener urban centre. What will life be like, and will it be possible to adapt to social changes? The

copious dimensions of the effect of climate change on humans are directly related to the individual or group being affected.

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