INTEGRATING INDIGENOUS SUSTAINABLILTY VALUES INTO HOUSING ON RESERVE

By

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A THESIS SUBMITTED IN PARTIAL FULFILLMENT

OF THE REQUIREMENTS FOR THE DEGREE OF

BACHELOR OF INTERDISCIPLINARY STUDIES

We accept this thesis as conforming to the required standards:

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ABSTRACT

As part of the Interdisciplinary Studies program, I have created a thesis on traditional environmental sustainability and ways we can practice stewardship in the housing system on reserves. Given that ecological sustainability is also vital for sustainable culture, health, and spirituality, it is becoming a priority for many nations. I am going to put the argument forward to start implementing sustainable values into reserve homes in modern ways to help heal mother earth, but also to improve our connections to her as we modify or tear down these literal colonial structures to make room for more awareness of the environment within our homes.

I examine the current state of housing in Indigenous communities, examine current usage of sustainable building practices, and explain how a larger adoption of sustainable building practices will both combat housing problems and help live better in tune to traditional teachings. The housing problems on reserves continues to be a major issue with no clear solution; I believe this needs to be addressed with more creative ideas to increase the well being of Indigenous peoples.

This paper shows that other options are possible for hosing in BC that can provide a better relationship with the earth and can be done using the natural and human resources within the community.

ACKNOWLEDGEMENTS

I would like to thank all the professors, elders, coworkers and friends who helped me understand the importance of our traditional teachings and helped guide me to better see problems from both world views. As I have worked and studied in Nlaka'pamux, Syilx, and Secwepemc territory I have had countless teachers and role models who's stories and wisdom I have kept with me and helped to shape the opinions I have portrayed in this work.

I thank my supervisor Dr. Lisa Cooke for her support and encouragement both in the classroom and on my research. I am also grateful for the support of Dr. Tracy Penny Light and Dr. Sereana Naepi for teaching me proper research practices, while also valuing and encouraging me to share my own ideas and opinions.

Lastly, I am so thankful for the love and support of my parents, Ken and Darlene, my partner Jack, and all the friends and family who have helped encourage me through my education journey.

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INTRODUCTION

"In Indian country, ecological and cultural restoration are intimately entwined and vital to the health and well-being of Native American communities" (Nelson, 2008). Indigenous people have shared values, spiritual connections and cultural stories embedded in Mother Earth. Protecting our mother means protecting the umbilical cord that binds us to her as an intimate link. As explained in Elsey (2013), First Nations peoples in British Columbia are enfolded into the landscape creating this holistic view of unity with the land as extension of oneself or ones' family. Elsey also uses the term storyscape to demonstrate the poetics of folklore and memories being embedded into spaces on the territory. Sustainable practices are becoming more and more of a priority for nations as it is understood nderstanding that ecological sustainability is vital for sustainable culture, health, spirituality, and basic survival. I am going to put the argument forward to start implementing sustainable values into reserve homes in modern ways to help heal mother earth, but also to improve our connections to her as we modify or tear down these literal colonial structures to make room for more awareness of the environment within our homes.

The housing in Indigenous communities has been recognized as unsuitable, with CBC news articles such as "First Nations housing in dire need of overhaul" outlining the widespread housing shortages and substandard living conditions that are only getting worse (Stastna, 2011). Even celebrity home renovator Mike Holmes has acknowledged that what is going on is unacceptable and worked on some community pilot projects. He says the solution is simply to "stop building crap". The use of materials that can better withstand mold or fire, or using unconventional materials such as shipping containers, are worth the investment of creating quality homes rather than just trying to cover up problems with quick fixes. He also

notes that having community members work on the projects creates a sense of pride and encourages even greater care of the houses (Davison, 2011).

In this thesis, I aim to address these problems and find a solution that considers both the problem of insufficient housing, the need to create homes that encourage a more culturally appropriate lifestyle, and serve as an example of sustainability. I examine the current state of housing in Indigenous communities in Canada and discuss some of the problems that might be prevalent (ie. overcrowding and the potential health risks it could cause, reasons why the historical implementation of colonial style homes clashed with the Indigenous lifestyle and environmental conditions, etc.). From there I examine current usage of sustainable building practices in communities both on and off reserve and the feasibility, environmental benefits, and impact on citizen well-being these technologies could have if they were to be implemented in more indigenous communities. In order to address the complexities of problems in the Indigenous housing system, we need to be using more creative ideas to help increase the wellbeing ofIndigenous peoples. When tackling the obstacles people on reserve face, it makes the most sense to start with making sure they have a solid home. As can be seen above, the complexity of the issue lends itself to an interdisciplinary approach. In order to create a good picture of reserve homes, it seems necessary to discuss not only statistics and building techniques, but the histories and policies that lead to them and the effects it has had on individual's well beings. Home isn't one thing, it is something people have emotional or even spiritual connections to and it is important that is addressed.

JIGGING IN BOTH WORLDS METHODOLOGY

Situating Myself in My Research

I believe that sharing the story of my journey will help provide context into the experiences and mindsets that I have brought into my research, and that have resulted in my using "jigging in both worlds" as the perfect metaphor for the methodology I utilized. As stated in Cameron et al. (2014), situating oneself in the context of the research is an inherent part of the process when using an Indigenous research method.

Currently I am in my fourth year at TRU in the Interdisciplinary Studies program. Throughout this program I have developed a more holistic view of academia and the need to integrate all views of a complex problem to create better solutions. I have a passion for improving communities and want to accomplish this through a career in community planning. My goal, once I get my Bachelor's degree, is to get into the Community and Regional Planning program at UBC with a concentration in Indigenous Community Planning.

Despite my Métis heritage, growing up I was more immersed in a Pan-Indigenous community as I spent a lot of time at the Nicola Valley Institute of Technology and with members of Merritt's surrounding bands. Although my home culture was also influenced by the values instilled by my mother's Ukrainian and English grandparents, I started learning how to "walk in two worlds" from a young age. I completed my Associate of Arts degree at NVIT and really learned how to view academia and the world from both Western and Indigenous ways of knowing. Almost every class I took incorporated Indigenous stories, or opportunities to study Indigenous issues.

Since then, I have been on the board of my local Métis society, been involved in an Indigenous economic development summit, and worked with both local bands and Community Futures of Central Interior First Nations.

My ideas for my thesis were heavily inspired by two sources. The first is a video lecture by Waziyatawin, *Regenerating the Roots of Indigeneity: Resurgence & Resilience in Troubling Times* (2016). She speaks about the process of building a home made of earth and the importance of powering down in the face of today's problems. My second inspiration is a book called *Original Instructions: Indigenous Teachings for a Sustainable Future*, which talks about reconnecting to our eco-spiritual values and using re-emerging Indigenous knowledge to create a more sustainable future by adapting and utilizing the lessons and practices of our past.

I think these two sources communicate something really important. I believe it is vital to look at the wisdom of our ancestors and the scientific advancements of today and find a way to create better communities and better homes in harmony with Mother Earth, and maybe even in better harmony with each other.

The Process of Integrating Different Methods/Methodologies

In my work, I do not want to just grow and heal myself; I want to write something that can be a tool to help other people grow and heal as well. I think that by adding to the ever-growing body of Indigenous research, we are creating a powerful shift greater than the individual nuggets of knowledge. Drawson, Toombs, & Mushquash (2012) compared articles incorporating Indigenous research methods and found the greatest distinction of Indigenous-focused research is that it "cannot only reveal knowledge, but also decolonize, rebalance power, and provide healing" (p.12). My thesis has these desires at its core. The goal is to inspire healing: healing of people, of ecosystems, of myself in the process, and to inspire this healing using materials and methods that go beyond the Western ways of knowing. Given

more time and resources, I would have liked to utilize the Community-Based Participatory Research Approach or get some hands on practice testing out these building practices and evaluating there appropriateness, but for the purposes of this project I wanted work weave two knowledge systems together to envision a better solution for our people.

I want to integrate stories and wisdom that have been shared and recorded by Indigenous knowledge-keepers with Western research and utilize a Two-Eyed Seeing approach. This approach aims "to see from one eye the strengths of Indigenous ways of knowing, and to see from the other eye with the strengths of Western Ways of Knowing, and to use both of these eyes together" (Bartlett, Marshall, & Marshall, 2012, p.355). This two-eyed seeing has also been referred to as walking/dancing in both worlds, or shapeshifting (Hunt, 2013). Several scholars have created more formalized process frameworks for decolonizing research (see Bartlett, et al., 2007 & Smith, 2004); however, as my thesis did not involve interviews or in-depth case studies, I used a more informal method for engaging with my research. Most importantly, I wanted to create something that could be of use for me in providing knowledge and skills for future endeavors, and for challenging my own way of knowledge. I sought to fight the daily struggle "to reclaim and regenerate one's relational, place-based existence by challenging the ongoing, destructive forces of colonization," a method used in academia to challenge the conventions of higher research and help make room for future Indigenous research, and to contribute actual, practical information that someone in the field or looking to make a change in community could utilize (Corntassel, 2012, p. 88). My focus was on mindset, intent, and utilizing different kinds of knowledge to create a more decolonized piece. I wanted to make sure my end recommendation supported Alfred's (2009) objectives for Indigenous resurgence, including increasing presence on the

land and restoring land-based practices, increasing traditional diets, increasing traditional knowledge transmission, strengthening familial activities and restoring community social systems, and implementing sustainable land-based economies. I believe my ideas can contribute to all these objectives directly or through community collaboration on a project.

Nelson (2008) suggests that "the metaphoric mind is the first foundation of native science" (p.6). Hunt (2013) explains how many Indigenous scholars have used stories, art, and metaphor as important ways to transmit knowledge, and how these have become generally accepted in scholarly work when used in the right contexts. Patterson-Naepi's (2018) use of "masi methodology" as a navigational metaphor was influential in how I wanted to approach my topic. Masi making is a woman's artform that involves multiple women working together to create the intricate bark cloth that holds knowledge, which is how she wanted to use this important cultural practice as a grounding point in her research and created a beautiful thesis piece that intertwined her work with the metaphorical research journey. I knew it was important to keep Mother Earth at the core of my research. Healing Mother Earth will heal communities; connecting with, protecting, living in harmony with, and relearning from our mother needed to be a constant theme throughout my paper. However, while our metaphorical mother is reflected in my paper, it is not the central metaphor I want to employ in my work.

In Hunt's (2014) article on ontologies, she describes the dance she has to perform, a subtle dance between two worlds to synthesize her dichotomous roles of Indigenous and scholar in a way that integrates the ethics of both groups and can be heard as legitimate while embodying both roles. The way she used this dancing metaphor made me think of my own experience of dance, in particular, the dance of the Métis People, the Red River Jig. The Jig

embodies what I want my research to achieve. The Red River Jig is a hybrid of powwow footwork and Scottish dancing. Some rules of powwow are copied, as well; as with Grass dancing, footwork done on one foot must be copied on the other. However, the steps are done in tune to the fiddle music. The fiddle has no set beats and will switch between "low" and "high" sections at uneven, and seemingly random, intervals. A traditional jig step is done during the "high" section, and fancy steps are executed during the "low" section. The Jig seamlessly blends conventions of Western and Indigenous dance, with aspects of one or the other showing through at different times, creating something unique that recognizes merits of both traditions but incorporates them into something new that does not confine itself to the expected. While doing the Jig, which admittedly is not my strong suit, dancers are never quite certain when the fiddle will change from high to low (in most cases) and thus must stay in tune with what is happening in the music, listen for hints that a change is about to happen, and stay adaptable enough to suddenly switch to where the music takes them. The Jig also brought communities together. It is an activity that requires energy and brings positivity, and once was an opportunity for people to spend time together. It was also an inclusive activity: though the Jig is unquestionably Métis, elders say that when dances were held, First Nations and settlers alike would show up and take up the dance.

The Jig is how I want to focus my thinking; my hopes are to appropriately mix teachings and conventions to develop a body of research that at times may lean more heavily on Western research or Indigenous knowledge, but that blends seamlessly into something that is an interweaving of concepts, creating something beautiful that feels right. As I jig, and focus on planting my foot down into the Earth, I want to make sure that my footsteps are imprinted into our Mother with both intention and an open flexibility.

Once I became confident in the metaphor and formatting I wanted to use in my work, I also wanted to undertake a self-examination of the language I use. Wording can have subtle contexts or unintentionally continue colonial discourse. Language choice can also be a significant part of decolonizing research. Of course, research and academia that use Indigenous languages are ideal in that re-searching for knowledge we have lost. As stated by Battiste (2018), unique knowledge systems are imbedded in Indigenous languages which "hold many of the requiring awareness of the science of ecology and the environment, as well as sustainable economic development through knowledges and creative traditional arts and crafts" (p. 124). Though my research will be done in English, it is important to recognize that worldview is greatly affected by the language used, and I will never have the same understanding of a place's teachings as a native speaker from that place. However, I still wanted to be conscious of the language I used. Bartlett et al. (2007) demonstrate the importance of choosing words carefully in their work on decolonizing diabetes research. Western terms for health are avoided to create a more holistic understanding of the well-being of participants and communities. Using this example, I want to make sure that my words are chosen carefully and to consider how they may shift the reader's mindset into a more colonial thinking pattern.

Historically, people have gone into Indigenous communities and stolen their knowledge, or had prescribed recommendations based on one idea, and not on community need. The purpose of the 'Jigging in Both Worlds' methodology I bring into my work is to make sure I am doing work that utilizes all available knowledge to create something that can be of actual use to Indigenous communities. When using Indigenous knowledge or engaging in any way with traditional practices it is important it is done "in a good way" and grounding

myself in this methodology made sure I had good intentions in what I write. It is important that I utilize the recorded wisdom of elders and knowledge keepers in a way that carries out their original intent, not in an exploitative way.

LITERATURE REVIEW

Historical Context of Reserve Housing

Much of the housing on First Nations reservations is in poor condition (Assembly of First Nations, 2013). There needs to be a change for Indigenous people to grow up and live in an environment where they can thrive. This literature review section will discuss the historical context of reserve housing and their implications to emphasize the need for change.

Indian reserves are portions of land that are put aside by treaties or under the *Indian Act* (Hanson, 2009). These land bases generally have their own political structures and are available for band members to live on. Despite this, the land is still overseen by the crown with the Minister of Indian Affairs having control over the land and its people. According to the *Indian Act*, a reserve is a "tract of land, the legal title to which is vested in Her Majesty, that has been set apart by Her Majesty for the use and benefit of a band" (Government of Canada, 1985).

At the beginning of the colonization process land was set aside by the church for First Nations people in order for them to use for agriculture (Hanson, 2009). It was believed that teaching them agriculture and putting them in closer contact with Christianity would help "civilize" them. As soon as Canada became a country, these early forms of reserves became the basis for the structure of reserve we still have today. With increasing numbers of immigrants coming to the country, many disputes over land began. The government found the

easiest solution to the issues was to form reserves. Some of these reserves were formed under treaty while others, namely those in British Columbia, did not. These reserves divided Nations and separated families and clans that had partnerships for generations (Hanson, 2009).

For the purpose of this research, an emphasis will be put on reserves within British Columbia. Reserves in BC are a lot smaller than those in Alberta or the United States (Harris, 2002, p. xxv). The majority of British Columbian reserves were created without treaty and without land surrender in Canada's race to secure land 'from sea to sea'. The first Reserve Commissioners were more sympathetic of the Indigenous peoples, and were willing to allow a lot of negotiation in creating reserve boundaries. However, when Joseph Trutch became governor in the late 1860s he reduced reserves that were not using land "productively." After him, Peter O'Reilly, who became commissioner in 1880, was focused on efficiency and economics when he created most of the other reserves in British Columbia. As treaties were never formed, reserves too small to be self sustaining or serve as resource economy were created, yet this lack of negotiation also mean Native title was never extinguished. Though the Indigenous peoples will never be able to be compensated for the land they lost and the traumas they were put through, many nations are looking at what this means and are exploring ideas of self-determination, self-government, modern treaties, and land title claims (Harris, 2002).

As Indigenous people became wards of the Crown, they then became responsible to construct housing for the reserves. The houses were poorly made on a tight budget and in a western fashion with smaller nuclear families in mind (Hanson, 2009). Not much has changed today; houses are still often poorly made and not suitable for multi-generation families. The

bands are responsible for organizing and managing the houses with support from the federal government (Government of Canada, 2014).

Indian Affairs divides this money between regional offices, district offices, and the District Indian Councils, Tribal Councils and Bands (Kydd, 1992). The amount of money given to the different offices and bands depends on factors such as population, cost of construction, need, past spending performance, and how successful they are with negotiating with officials (Kydd, 1992). The government encourages bands to find other sources of money to supplement the government funding (Government of Canada, 2014). For the reserves that receive annual funding from Aboriginal Affairs and Northern Development Canada they are able to use the money for many different housing needs including the following: planning and managing, debt servicing, insurance, maintenance, renovating, and constructing.

Shelter allowance payments are given to those eligible for income assistance by the Department's Income Assistance program (Government of Canada, 2014). This money can help to cover housing costs. The Aboriginal Affairs and Northern Development Canada administer Ministerial Loan Guarantees that state if you do not make your loan payment, the minister takes responsibility (Kydd, 1992). Because the bank cannot repossess housing on reserve, they require ministerial guarantees to take out a loan (Kydd, 1992). Currently, $1.8 billion is issued in guarantee authority to support those First Nations obtaining loans for home ownership and social housing (Government of Canada, 2014). As band land can not be owned and transferred, bank loans and mortgages have historically been hard to secure as there is no land to use as leverage and collect on. This contributes to poor housing on reserves as

individuals are rarely able to build the places they want on reserve land because of an inability to secure a loan.

Bands can apply for a similar kind of loan called the Ministerial Guarantee Band Council Resolution (Kydd, 1992). The Band Council or Band Housing Society must apply for this type of loan to the Minister of Indian Affairs. This type of loan, however, has a clause that allows the minister to use band funds to reimburse the government if loan payments are not made (Kydd, 1992).

There are several other ways to receive funding. A federal housing agency called the Canada Mortgage and Housing Corporation helps in the building, repairing, and financing of homes both on and off reserve (Kydd, 1992). The Canada Mortgage and Housing Corporation spends an estimated $280 million dollars annually to support on reserve housing (Canada Mortgage and Housing Corporation, 2016). Other ways to obtain funding can be through Health Canada, and the First Nations Market Housing Fund (Government of Canada, 2014). Some bands may have a form of revolving housing funds as well (Kydd, 1992). In April 2019, the Government of Canada is launching an Indigenous Homes Innovation Initiative which will add an extra $30 million on top of regular funding with a focus on community well-being and revitalizing traditional housing practices (Impact Canada, 2019). Getting an understanding of the difficulty remote communities can have in getting financial backing and support, reinforces the idea that a change to the reserve housing system is necessary.

First Nations self-reported 107 627 housing units in March of 2013. To get an idea of the current state of the housing crisis between 2010 and 2031 it is estimated there will be a need for 130 197 new units, 11 855 replacement units, and a little under 10 000 major repairs.

It is no surprise that there are many challenges when it comes to reserve homes. Not only is there a trend of overcrowding, insufficient infrastructure and amenities, and difficulties accessing funding across the country, but there is also a lack of accurate numerical data to properly address the issue (Assembly of First Nations, 2013).

Although it has been agreed upon that mold growth in Canada is a problem, there is no comprehensive data to show the percentage of homes effected (Optis, Shaw, Stephenson, & Wild, 2012). Some research has explored why reserve homes are susceptible to mold growth. Reasons include high levels of moisture caused by structural damage, overcrowded homes, and insufficient use of ventilation systems. With loss of territory during colonization came loss of traditional homes being built and the importation of inappropriate building materials being used. Homes were built for the Indigenous people with little consideration for the environment or lifestyle of the occupants. In fact, because of this it is common for people on reserve to block off ventilation systems that would prevent mold in order to prevent heat loss (Optis et al.2012).

Overcrowding is another major issue. The Assembly of First Nations (2013) states 23.4% of First Nation adults lived in overcrowded homes. This is detrimental as overcrowding leads to a reduced lifespan of a home. Additionally, it increases family tension and violence (Assembly of First Nations, 2013). It also leads to many health problems including the high rate of tuberculosis (Optis et al.2012).

Housing shortages are a major problem as described earlier and lead to an increase in overcrowding. 94.1% of First Nations have waiting lists for housing (Assembly of First Nations, 2013). The housing crisis was made even worse after Bill C-31 passed and women

were able to return to their communities, yet no additional funding was available because of it (Optis et al.).

The isolation of many reserves also cause many problems. Not only does lack of jobs mean a decreased likelihood of personal funding going into home building and improvements, it also means an increase in labour and material costs to work on a home. One source notes, that in Ontario, building a house in the north costs an estimated 30% more compared to in the south (Assembly of First Nations, 2013).

Many other problems exist including water, electricity, heating and the like. In fact, it was found that 34% of communities get water by collecting it (rivers, lakes, etc), by truck, or from wells. In addition, 31% of homes have unsatisfactory heating systems (Assembly of First Nations, 2013). With insufficient heat and unsafe water prevalent in the communities it provides yet another reason for the high levels of health problems on reserve.

To address the lack of information on the state of reserve housing, The Standing Senate Committee on Aboriginal Peoples is doing research on housing and infrastructure on First Nations (Narine, 2015). The interim report only has data and observations as they feel any recommendations would be premature at this time. They did state though that there will be no blanket solution; as each reserve has its unique problems it will likely need its own solutions (Narine, 2015).

Chief Wilfred King believes the Assembly of First Nations needs to come up with a national housing strategy. He states that introducing new money to the housing area would be throwing “good money after bad” just to fix up the existing substandard units (Barnsley, 2004). A former regional director general for Indian affairs states that although money is

being allocated for housing, very little of it makes it down to the communities (Barnsley, 2004).

There are many reasons why the reserve system is problematic, but as new housing solutions are proposed, it is important to understand why there is a need for alternative housing solutions to begin with. Though there is a need for a more extensive look at the reserve system, the differing states of housing and land, and the how's and whys of funding, exploring all those topics fully in the literature review is not possible. The above information is not to shed a negative light on Indigenous communities, but to reflect the dominant literature stating what housing is like from a statistical point of view. Hopefully this provides context for those less familiar with the system and illuminates common priorities for improvement across communities.

Overview of Current Sustainable Building Technologies

The residential construction industry in North America uses huge amounts of energy to extract, manufacture, and transport building materials (Kennedy, Smith, & Wanek, 2015). Many aspects of modern housing can be improved to start building more sustainably. Design, materials, insulation, energy and heat generation, and water management are all areas of home building that could use a green upgrade. It is evident that in our current environment with greenhouse gas emissions threatening to destroy our way of life, we must start taking steps now to build homes for a greener world.

Natural building emphasises "using simple, easy-to-learn techniques using locally available, renewable resources" (Kennedy et al., 2015). It is making the decision to turn away from the easy and cheap, and instead be creative in designing a home that is better for our

world. Not only is sustainable building good for the environment, it is empowering. When people are able to build a lot of their home themselves, not only is it possible to build a home for a fraction of the price of a comparable house, but it becomes something they can really feel proud of (Kennedy et al., 2015). Natural building can also help people feel more connected to the land and in tune with their environment (Waziyatawin, 2016).

An issue with many sustainable building practices is compliance with building codes. Building codes are concerned about the hazard inside the building and pay no regard to how hazardous the building may be to the environment (Kennedy et al., 2015). Code officials are hesitant to accept many natural and sustainable building practices as they are uncommon and may not have been tested thoroughly enough to be proven safe. However, progress is being made. In 2015, the International Residential Code (which is the most widely used code in the USA) approved appendices for light straw-clay construction and straw bale construction. As organizations for environmentally friendly building become prominent, more natural building approaches are becoming more widely accepted (Kennedy et al., 2015). In Canada, each province and territory have their own building code which is based on a national building code. However, some cities, like Vancouver, do not abide by the provincial code but rather fall under a city bylaw (Province of British Columbia, 2017).

There are natural building techniques well suited for both warm and colder climates. Because the freeze-thaw cycles cause a lot of pressure on the building, the proper design is crucial for the building to withstand the elements (Kennedy et al., 2015). In order to keep the space warm, it is essential that the wall is airtight and well insulated. Although this is easy to do with straw bale walls, it is important to make sure there are no gaps around windows or

where the walls meet the roof and floor. It is also important to also address moisture control and use building techniques adapted to that environment.

In building a sustainable home, there are several methods one can use for electrical and heating systems. In 2004, the typical homes in the United kingdom used sixty percent of their energy consumption on space heating and twenty four percent on hot water. Although good insulation can decrease the energy consumption, different heating systems can make a huge difference (Pullen, 2011).

One method of heating is the rocket mass heater. It is a popular option for those opting to use wood/biofuel for heating in a sustainable way. Rocket mass heaters are slow release radiant heaters that use dried firewood as fuel. The system uses a narrow, well insulated chamber to maintain a clean, hot fire. Because the fire burns sideways at very hot temperatures, the design actually burns the smoke leaving almost pure steam and a little mineral ash. What makes it unique is that they provide quick radiant heat and steady stored heat. The system is easy to lay out and install, and can be designed and built using "local, earth-based recycled, and reclaimed resources" (Wisner & Wisner, 2016, p.2). A lot of the structure can be built using cob and an old metal barrel. The major appeal of rocket mass heaters is that they can offer a great heat source while living off-grid. (Wisner & Wisner, 2016).

Rocket mass heaters have two parts; the heat-exchange mass and the combustion unit. They can even be designed to offer an oven or a cook stove and are designed in a way that provides a heated bench or bed surface. The bench area makes up the heat exchange mass which absorbs the extremely high heat and slowly releases the heat over the course of a few days. This means a house can stay warm for days after the fire stops burning, hugely reducing

the amount of wood needed to heat the house when compared to a traditional fireplace (Wisner & Wisner, 2016).

When choosing where the rocket mass heater will go it is important to consider any other sources of heat in the house, which areas people need the most warmth, which areas can stay cooler, and which areas are naturally heated by the sun. Rocket mass heaters can be used as a room divider to keep several rooms extra toasty at once (Wisner & Wisner, 2016). Though some consider these to be the most sustainable option as they can be made without batteries or manufacturing, it does release some level of pollutants in the smoke which may not be suitable for everyone.

To address the electrical needs not fulfilled through heating methods, there are several technology systems for generating renewable energy. One method of conducting energy is wind turbines. An average family living in a 3-4 bedroom house uses around 5 000kWh to 6 000kWh of energy if the lighting is low energy and the appliances are new. Using this estimate can help determine the right kind of wind turbine for different homes. A wind turbine for domestic use costs between 8 000 and 80 000 Canadian dollars. In Pullen's book (2011), he compares several wind turbines including the 11 000 dollar Kestrel E300 which produces around 2 200 kWh annually and the 40 000 dollar Evance Iskra 9000 which produes around 9 000 kWh of energy annually. However these estimates are based on ideal locations. Wind turbines are not a good choice in urban locations. For them to be worth while, turbines should be placed in an area with an average wind speed of at least 6 meters per second. For optimum wind speed it has been found the height of the house times ten is how far away the turbine should be positioned. Optimally the wind turbine is twice the height of the house to catch the best wind (Pullen, 2011).

Another method of obtaining renewable energy is through photovoltaic cells, also known as solar panels. Solar panels work by allowing light to pass through silicon crystal. Like wind turbines, the effectiveness of solar panels greatly depends on location. Solar panels need air circulation to keep them cool, because of that they are often located on rooftops. In fact, it is now possible to buy solar panels that look like roof slates. Although still relatively expensive, as solar panels increase in popularity they are continuing to improve in quality and decrease in price to keep up with the growing market (Pullen, 2011).

Similar to photovoltaic cells is photovolatic-thermal. This system combines photovolatics with a thermal collector to provide electricity and hot water. This system is better able to cool to an ideal temperature than traditional solar pannels by using a fluid cooling system. However, lots of hot water is generated in the summer and little in the winter. Those considering this system should look into the two ways of storing the heat: phase change materials and geothermal storage (Pullen, 2011).

Depending on location, the best system of heating may not be from these new technologies but rather the design of the house itself. An example of this would be the architectural design called Earthships. Among other features, Earthships are built into the earth with large angled windows facing south. This maximizes natural light and solar-gain during the winter months, with windows on sun-facing walls admitting light and heat. The thick and dense walls, generally built with earth filled tires, provide thermal mass that naturally regulates the interior temperature. With the right angles and measurement, this design should be able to heat the house in the winter and cool it in the summer (Snell & Callahan, 2005).

Once electricity and heat systems are chosen, it is important to look at alternative methods of obtaining and disposing water. One of the best ways to reduce fresh water is to begin harvesting rainwater. Rainwater collection is great for agricultural irrigation and residential potable water (Kinkade-Levario, 2007). The most common method of capturing water is from roof catchments; however, water can be collected from concrete patios or other flat surfaces as well. There are many benefits to rainwater harvesting such as self-sufficiency, reduced costs, and soft water low in mineral content. A rainwater harvesting system has six components. The first is the catchment area. This is the surface the rain falls onto, often the roof. Second is the conveyance system which are the channels or pipes that transport water from the catchment area to storage. Third is the roof washing area, These are the "first-flush devices" that do an initial filter to remove contaminants and debris (Kinkade-Levario, 2007, p. 14). Fourth is the storage area which are cisterns or tanks that hold the rainwater. The fifth component is the distribution system that delivers the rainwater either by pumps or gravity. Lastly is the purification of potable water through filtration technology, distillation, and additives. There often is also an overflow system so that when the storage tank fills up the additional water will irrigate the landscape. Depending on the usage of sinks (such as using natural soaps) greywater from showers and non-kitchen sinks may be reused to water non-edible plants. In some areas, fog collection is also being used as an alternative water source. Depending on location and uses, an additional water source may need to be used in the home. However, rainwater collection is a great method to help reduce freshwater depletion (Kinkade-Levario, 2007).

Another way to reduce water is by using a composting toilet. Composting toilets are not only great for the environment but are a great option for those building an off-grid home.

Although there are many high-tech composting toilets on the market that make the experience more comfortable, a lot of people choose to make their own composting toilet (Composting Toilets Canada, 2017). A homemade composting toilet can be made easily with just a 5 gallon bucket with a seat, inside a wooden cabinet. Some people will use two buckets, one for solid and one liquid waste. Also required are natural materials, like sawdust or mulch, to cover the contents thoroughly after each use. Adding a fan or essential oil can help to eliminate the smell. Once the bucket is full, it is dumped into a composting container elsewhere on the property to sit for at least eight months. When it has fully composted, you can put it on non-edible plants and grass as fertilizer. Using two composting containers so one can sit is ideal. A store-bought composting toilet will often separate urine as grey water. A fan is used to dry waste and eliminate odour. The waste bin in a store bought toilet can generally last several weeks before emptying, compared to every day or two with most homemade toilets. Storebought composting toilets have a similar appearance to regular toilets and can be an easy adjustment in creating a more environmentally friendly home (Composting Toilets Canada, 2017).

For those looking to construct their homes with as little environmental impact as possible, building with natural materials is the best option. Although there are dozens of natural materials that are used in home building, for the purpose of this text a brief description of a few of the more popular materials will be included. Cob buildings, which are made of mud with no wooden frameworks or bricks, are beginning to regain popularity in North America and Europe. There are two popular types of cob, English cob and Oregon cob. English cob is a mixture of sandy clay subsoil with water, straw, and sometimes finely

crushed shale. Tractor or excavators mix the cob and load the cob onto the wall. The cob is then stomped on by foot and beaten into shape with a wooden paddle (Kennedy et al., 2015).

Oregon cob uses stiffer cob loaves which are worked into the existing cob. Oregon cob has a higher proportion of coarse sand and strong straw which helps strengthen it. It is generally mixed by stomping on it over a tarp. Because of the flexibility of cob it is very simple to create built in shelves, nooks, arches, and many other creative designs. Cob is frequently combined with other natural materials, especially straw bales. It is very appealing as it can be made very cheaply with minimal tools and limited training (Kennedy et al., 2015). As noted earlier, cob is a great material to use if building in a rocket mass heater.

Cob, when designed for the climate can withstand almost any natural force. Cob moderates humidity, discourages mold growth, is more or less fireproof, and is great at muffling sound. There are ways to test if your local soil is suitable for cob. Additionally, it is recommended to try building smaller cob structures like sheds, outhouses, benches or statues in order to find a good mix and develop better technique (Snell & Callahan, 2005).

Another building material is earthbag construction. Earthbags are polypropylene or burlap bags filled with soil, sand, gravel, or clay. The bags are filled with the damp substance, stacked in place, adjusted and tamped, and often secured with barbed wire. These bags are then covered with plaster. Although cement and lime plasters are most common, earthen plasters are often used as well. Earthbag homes can be made in a dome shape but all sorts of designs are possible. Wojciechowska's book, *Building with Earth*, explains many different building techniques as well as waterproofing methods and types of finishes (2001).

Cordwood masonry construction is another alternative building method which uses firewood to build walls. The firewood is laid in a double layer of either cement-based mortar

or cob. The gap between the two layers is filled with insulation, often sawdust or vermiculite. The advantages of cordwood is that firewood is easily and cheaply available, with little environmental impact. The type of wood used is important; while some types of wood, like cedar, change volume very little while wet, others, like white oak, can shrink and expand quite a bit. If wood is used that changes volume too much, it can weaken the stability of the home. However, in areas where wood like cedar and eastern white pine is readily available, cordwood can be a good building material for the home (Snell & Callahan, 2005).

There are a variety of great insulations that can be used in sustainable building. One great material is straw bales. Straw is generally sold in large bales that can be used as a form of building block. Straw building began in the late 1800s, and some of these structures are still standing today. Straw is an abundant waste product of farming that is renewable and cheap. Additionally, it has highly insulating properties that can compare to, and often outperform, traditional insulation. Strawbale is able to outperform because it allows for very thick walls at a cheaper price. As of the year 2000, straw cost between one and four Canadian dollars a bale. Thick walls also make walls very good sound barriers which is particularly desirable in urban areas (Magwood & Mack, 2000).

When buying straw bales, it is important to examine the tightness, dryness, seed content and size. Although straw bale walls are generally covered with stucco, natural plaster like clay and cob can also be used. Straw bale is ideal in almost all environments. Like the other natural materials, straw bale walls have huge flexibility in design and can be adapted to better meet the need of the climate and the occupants (Magwood & Mack, 2000).

Similar to straw bale is hempcrete construction. Since the hemp cultivation ban in Canada was lifted in 1998, building with hemp is gaining popularity. Hempcrete, also known

as hemp-lime, mixes hemp hurds with a mineral binder (generally lime) and water. When the binder is set, cured, and dried, the hemp particles adhere to one another. The resulting hempcrete has thermal, structural, and moisture-controlling properties that make it a desirable insulation. Hempcrete has even been used as mortar in cordwood building with some beneficial results as it expands and contracts similarly to wood. Additionally, hempcrete is easy to shape and mold making it easy to work with in more creative ways (Magwood, 2016).

Other natural insulators include wool. Wool is more often used in smaller areas, like the roof, because although it works well it can be expensive depending on the area. Like wool, cotton can also be used as insulation. Cellulose insulation is popular as it is inexpensive and made of recycled paper which is blown dry into the wall. When treated with borax the paper becomes resistant to mold, bugs, and fire (Kennedy et al., 2015).

Like walls and insulation, there are many different materials for building roofs. Many natural houses build roofs out of the same material as the house; however, there are many other roof options such as green roofs. Green roofs are often made with sod, turf or straw. These living roofs can help buffer the heat from the sun, act as light insulation in the winter, provide a surface to grow plants, and provide an aesthetically pleasing look. These roofs are built on a low pitch roof frame, filled in with a solid roof deck, covered in some form of waterproof material (membrane), and then covered in the organic material. A drainage mat or volcanic rock between the membrane and soil is encouraged to help water drainage. It is important green roofs are built on sturdy homes that can support all the extra weight (Kennedy et al., 2015).

Now that this literature review has covered roofs and walls, the last thing to look at are types of flooring. Although Traditional flooring like hardwood and carpet would work

fine in a natural material home, earthen floors can be a great option. The materials used for a basic earthen floor are sand, clay, and straw. The sand provides structure and strength, the clay binds everything together, and the straw provides strength to minimize cracking. Pigments for colour are often added as well. Once applied and dried, these floors get sealed with drying oil and wax coats. Not only are earthen floors natural and pretty to look at, they are actually warmer to the touch than concrete. They are also softer than concrete, which makes it more comfortable to walk on. Earthen floors are normally between one and two inches thick. They can be quite heavy, which is fine if placed on a concrete or gravel subfloor, but can cause problems on a wooden subfloor and should be checked for stability. Earthen floors are a good source of thermal mass as they can absorb and slowly release heat in the home. Earth floors are easy to maintain, can be cleaned like a wooden floor, and need to be refinished with oil or wax only every three to six years. Earthen floors provide lots of room for artistic expression as tiles and stones can be embedded in the floor for a cool look. Colour washes can be applied to all the floor or in designs to create a different look (Crimmel & Thompson, 2014).

Homes using earthen materials and sustainable technology are becoming a popular choice for people looking to feel more connected to their environment. Almost all aspects of the home can use natural products. When building a natural home it is important to consider natural foundations, paints, plasters, furniture, and landscaping as well (Kennedy et al., 2015).

Indigenous Sustainability Teaching

As noted in my methodology, one of the inspirations for this thesis was a book titled *Original Instructions: Indigenous Teachings for a Sustainable Future* (Nelson, 2008). It was important that in integrating sustainable values with housing, that those sustainable values were looked at from various nations to make sure local values were incorporated and knowledge shared from other nations was gathered and built upon. This book is a collection of chapters written by different Indigenous knowledge holders from across the globe. Although a lot of the traditional knowledge has been lost, the text mentions in its introduction the important role youth and those of mixed heritage have had in recovering and restoring these ethics and practices in a modern context. It also mentions that though Indigenous Peoples are romanticized as environmental gurus, traditional knowledge was practical knowledge for survival and lessons from past mistakes.

The first chapter focuses on listening to natural law and avoiding the point of no return (Lyons, 2008). He speaks of the prophecies that warn of acceleration of the winds and the mistreatment of children as being warning signs that the earth is in degradation. Chief Lyon says that everything begins at the home, change begins in the family. He speaks highly of agriculture stating "there will come a time, however, when only those who know how to plant will be eating"(p.24). He ends his section speaking of the importance of community, hard work, giving thanks, and ceremony. Lastly he shares that "there can never be world peace as long as you make war against Mother Earth" (Lyons, 2008, p.26).

Indigenous wisdom on the need to keep everything balanced could be key to our survival. In Adamson's chapter (2008) she points out the major overlap between Indigenous

territories and the world's biodiversity hotspots, Indigenous peoples have bio-engineered their surroundings and have been able to use nature abundance as their own pharmacy. Indigenous knowledge has been misused, and support behind Indigenous voices in political decisions is necessary to human survival. She further states there is no economic value on a "spiritual base" of an Indigenous homeland. We are connected to the web of life and any damage we inflict will hurt us as well. Her last point is how modern science is beginning to coincide with the ancient wisdom of how atoms are influenced by other atoms, and as we exchange oxygen, hydrogen and other elements with our environment, they become part of us and us a part of the environment. Those living in the lands of their ancestors are bringing into their bodies the same elements that were once in the bodies of their family before them and the importance of this may be greater than we understand.

Lastly, it is important to recognize that knowledge differs across territories. As this research is focuses in on the needs of BC reserves, understanding the Indigenous knowledge of one of the areas peoples is essential. The Okanagan have a Four Societies process for decision making, using the four roles of mothers, fathers, elders and youth, to address their corresponding area of concern: relationships, action, tradition, and vision (Sam, 2008). Sound decisions are made when all concerns have been addressed. He emphasizes adapting ethics and protocols, keeping nature as their school, respecting the ancestral frameworks with how to live with their land. The Four Societies is a strong force of healing and conflict resolution, but importantly it is a teaching from the land that has powerful success stories demonstrating the power of traditional teachings (Sam, 2008). Okanagan knowledge keeper Janette Armstrong believes the respect they have for the land is directly linked to their family systems (Armstrong, 2008). She explains that the Okanagan word for their bodies contains

the word for “the land” shaping their worldview to recognize that they are from the land, and the land is from them. Traditionally, the voice of the minority was the most important to point out weaknesses in the society. In her community, their version of the Four Societies process also has people speaking for the land, water and medicine. Janette explains that healing families and healing the land are intertwined, that love and care are needed and people are need to be on the land to heal. She recognizes it is a lot easier to reject the ideas of consumerist culture while understanding the greater need to care for the land that sustains us (Armstrong, 2008).

The second book that provided a foundation of knowledge on the areas traditional teachings is Turner’s book, *The Earth’s Blanket: Traditional Teachings for Sustainable Living* (2005). This book gets its title from Teit’s work on Nlaka’pmx plant knowledge. He wrote that “Flowers, plants & grass especially the latter are the covering or blanket of the earth. If too much plucked or ruthlessly destroyed [the] earth [is] sorry and weeps. It rains or is angry and makes rain, fog & bad weather” (p.20). Turner has worked with First Nations communities across British Columbia and states that most of the book is built off the knowledge and wisdom from this province. Building off of the Earth’s Blanket metaphor, Turner recounts a conversation with an Nlaka’pmx elder who expressed concern about materialist culture encroaching on her peoples values and respect of the land. She is dedicated to educating others on cultural traditions, values, and philosophies, believing this knowledge is crucial to slow the detrition of the environment which will impact health and well-being globally.

Turner sees that across British Columbia elders are saying no value can be placed upon their land, cultural traditions, and being able to care for and be cared by their homelands. It is noted that being removed from the food system, not having to harvest what you eat, has created a dangerous by-product of monetary wealth where we never have "to think about the environmental and social cost of the food we consume or the materials and tools we use" (p.26). Wealth does not indicate happiness or well-being and Turner refers to studies showing moving up the economic ladder can increase stress, depression, and discontent if one does not also increase social and family bonds, have a firm sense of identity, and feel a strong tie to nature or place. Being a direct player in the ecosystem (observing and participating) makes us more sensitive to the Earth's needs and aware of damage being inflicted. Nlaka'pmx have been weary of the downsides to progress. In 1914 construction of the railways caused a major rockslide near Spuzzum that blocked the sockeye salmon run. The text shares how local peoples worked tirelessly to transport sockeye across via flumes and bucket brigades. It has been noted that the famous Adams River run would no longer happen if it was not for their interference. Turners first section summarizes to explain that the wealth of our land and knowledge is more important than anything monetary and it is essential for us reconnected with traditional ways and have access to take care of our lands. A lot of the knowledge of traditional ways however are imbedded in metaphors, idioms, expressions of the local language, so the process of environmental revival has to be a holistic effort of revising all aspects of culture and language as well.

Both Turner (2005) and Elsey (2013) write extensively about the traditional stories of different BC peoples and how their stories can give specific lessons on caring for their land or the values they should posses. Having stories told about the place you are from can also be

empowering to young ones and can have a greater impact on people (Turner, 2005, pp.43-44). It is suggested that rooting oneself to a place and learning the local stories or creating our own stories and special connection to places can be a big part of sustainability and also be meaningful and healing to ourselves. Elsey and Turner also share similar knowledge about how Indigenous peoples view nature more as family and have a "kincentric" relationship with their environment. Turner helps to demonstrate this by looking at the mainstream science of astronomers determining that everything is made of "star-stuff". This converges with many Indigenous teachings such as the Dene word for 'star' which roughly translates to 'my ancient ancestor'. In the Kincentric world view it is understood living beings give them selves to each other for food and that when a creature sacrifice itself it should be respected, appreciated, and not wasted. (Turner, 2005). Turner elaborates say all nations have traditionally engaged in some sort of act of thanks, ritual, or in various ceremonies involved with hunting and gathering, often thanking both the creatures spirit and the creator, or the giving of tobacco (which is a ritual I have participated in and witnessed). Ceremonies can be both personal, or community affairs such as the First Salmon ceremony (I know of first salmon ceremonies that still occur and rituals such as gifting your first kill or first handmade item) or potlaches.

Turner's book (2005) includes a section on ensuring balance between humans and nature. Protocols such as only harvesting certain things at certain times and making sure to leave plenty of berries (or whatever else) so that other creatures can eat from that bush as well helped ensure all species thrived. Indigenous peoples were caretakers of the land and many people in BC would help support species (by pruning, or building up the beach) or engage in practice like fire management. Some blame lack of respect and ceremonial knowledge as a factor in environmental loss. Due to the destruction sacred spaces (and colonization practices)

even many Indigenous peoples are losing their reverence for nature. It is harder for people to continue to caretake for the land if other people can come and undo the work they did with no repercussions (Turner, 2005).

Implications for Interior BC Communities

Using the foundation of knowledge from the literature review, I want to explore the ideas Waziyatawin (2016) puts forth in her video lecture, and in my personal email correspondence with her and see if they would be appropriate in a BC context.

In Waziyatain's video, *Waziyatawin: "Regenerating the Roots of Indigeneity: Resurgence & Resilience in Troubling Times"* she describes wanting to explore a more sustainable path everyone can do, independent of their own nation or the federal government's decisions. In a time of environmental and social instability, compounded upon colonization destruction for Indigenous peoples, Waziyatwin believes civilization is crumbling as the support of everything needed to sustain life dwindles. In a more economical explanation she describes how most hunters and gatherers were able to get 10 calories of food for every 1 expended, where the energy equivalent in agriculture is flipped with only about 1 calorie gained for 10 expended. She believes the collapse of the oil and gas industry will happen well within our lifetime. As I personally engage with policy simulations and learn in my climate change economics class on where we are headed within the next fifty years based on various changes and predictions, I can't help but agree with Waziyatwin in the need for us to begin to power down to protect what is left, and be prepared for what is to come. As shown in articles like Hallock et al. (2013) oil production rates are at a steady decline and will not be able to reach anywhere near the estimates in growth of consumption. Also worrying are

models such as Hanson et al.'s 2006 report that any more than 1° of global warming relative the 2000 level, would be "dangerous" climate change based on its environmental effects, and would likely trigger positive feedback loops that will only increase the climate change (Hansen, et al., 2006).

I agree that we can't hope on technology to come in to save the day, technologies that are built with non-sustainable materials are not sustainable. Indigenous scholar and leader John Mohawk spoke of the need to localize and utilize only appropriate technologies (Barrerio, 2010). He defined appropriate technologies as needing to be low cost, ecologically sound, require only local resources and skill (therefore are under local control without external dependence), are flexible/adaptive, and support cultural assumptions (Barrerio, 2010). Though our transition to technologies like these wont happen all at once, this is the end goal. In her lecture, Waz speaks about the decision to add a solar panel as an transition off of electricity, she has updated me in personal communications that her current home has no electricity, and only a little bit of kerosene for her lamp.

Due to the shortage of land on her reserve, and having the resources as a university professor to do so, Waziyatwin was able to buy five acres adjacent to her reserve (2016). She talks about how reverting to old ways isn't always possible. Climate change is affecting our traditional knowledge of harvesting times and patterns, we can't access most of our traditional lands, and living in tippees are no longer appropriate without the need for mobility or ability to use traditional buffalo hide. Though Waz now lives in a Dakota earth lodge, in the video she describes a hybrid of Indigenous and colonial housing, the earth house. Her earth house made of cob, like beading or the jig, blends Western and Indigenous technologies and knowledge to bring out the best of both worlds.

Waz created a beautiful home out of mother earth, and used straw bales to adequately insulate from cold, snowy winters. As her climate in North Dakota is similar to some of BC's, there is a likelihood it would be appropriate here as well. Though many of the earth housing classes and research are out of Utah and Oregon, there are several earthen house communities on Vancouver Island and books about the building process being published within our province. I recently had a conversation with a peer about her interest in creating a cob home on her reserve for many of the same reasons outlined here, and has reaffirmed my belief in the relevance of this research. She told me about a group called 'Mudgirls Natural Building Collective' based on Vancouver Island. They are a network of female builders that specialize in local, natural, and recycled materials (Mudgirls Collective, 2019). This powerful group of self proclaimed rebels specialize in cob homes and host workshops in BC with attendance costing just money for food and a willingness to provide labour in that project. The Mudgirls can also be booked to come in to communities and teach our help design and execute your projects. The Mudgirls have a strong relationships with Indigenous communities and have helped the Secwepmec-based Tiny House Warriors which are described later in this section.

Waziyatwin's home used a compostable toilet which eventually fertilized the trees, food compost that fertilized her garden (2016). She also rain water collection, an efficient masonry stove, and a solar panel. This is a livable home. Though they had to give up a washer and dryer, they are able to run a refrigerator, lights, and their water pumps and filtration system with the exception of the odd time the sun is hidden for days, and on sunny days can even run a computer, water heater, toaster or other small electronic device. Knowing that they can't travel to harvest like Dakota used to, she has planted many of her own native

food species and is using sustainable permaculture techniques to create her own food system (Waziyatwin, 2016). What she has done needs some research and some practice, but it is doable by anyone. We can take control of our own environments and fulfil our own needs without factories, machines, or a reliance on others.

As mentioned in the literature review, much of BC is unceded territory and many nations are considering going through a land claim or modern treaty process. Most want self-determination and self-government; they want to be able to have control over their future and insurance of their livelihood. In order for a nation to be able to secure their own fate, they must be as self-sufficient as possible and not reliant on the government of the day (Waziyatwin, 2016). John Mohawk in 1974 began speaking to international audiences about the right of Indigenous nations to break free of federal bureaucracy. Mohawk believed "The Culture of Native nations was built around the knowledge of how to survive in an environment. To continue that culture meaningfully requires that the people be free to continue to nurture the environment in which we live and grow." (Barrerio, 2010, pp.3) On this principle he preached that to rebuild Indigenous community as a basis of cultural survival, political sovereignty is required (Barrerio, 2010).

Right now is a time of change for Indigenous peoples in BC, no matter if the band/tribal council is in negotiations or not, everyone is revaluating what they want to see from their communities and what they want to do for their future. Due to the current political climate, and a resurging interest in Indigenous ways of knowing and being, I think Indigenous communities are in the perfect time to revaluate the colonial structures they are living within and try to incorporate more traditional knowledge and values in their everyday lives. This doesn't seem to be completely against what the government wants either; Indigenous Service

Canada is starting to roll out an Indigenous Homes Innovation Initiative is said to prioritize new ideas and support culturally and geographically inspired designs to “encourage the revitalization of traditional building styles and techniques” (Impact Canada, 2019).

When it comes to more sustainable housing, some are looking back at their traditional housing structure. As can be seen in Secwepmec Nation Youth Network’s video (2012) even people in BC have begun experimenting with using traditional housing if not as permeant housing, than as a useable space. The Secwepmec have also created a housing movement with a group called the Tiny House Warriors (Tiny House Warriors, 2019). They are group of men and women are fighting against the pipeline creating sustainable tiny homes, powered by solar power and blocking the proposed pipeline pathways. Though their resistance has gotten them in trouble, this group continues to fight for sustainability in BC.

There are also communities such as the Tatanka Wakpala Model Sustainable Community (2019). which are trying to create a self-reliant community with renewable energy, non-conventional housing, rainwater harvesting, and organic gardens. The Cheyenne River reservations were undergoing the same problems of mold, overcrowding, and structural problems in their housing. Those who wanted to live on their reserve and in their homelands had to endure these poor conditions. They used superadobe building style in there houses which is very similar to the earthbag building style in the literature review. This was a pilot project to create a sustainable community that can serve as a model for others, and seems to be doing that, helping communities revive traditional values and decrease health and social problems (Tatanka Wakpala Model Sustainable Community, 2019).

Other reserves are embracing sustainable technology as well. In the year 2000, “an estimated 36.8% ... of housing units on the Navajo Nation lacked electricity” (Bain et al.,

2004, p. 67). The cost of adding power lines to the community is very high because of the low population density. As unemployment rate in this area is around 50 percent, it is out of the budget to connect to the power grid. To provide power to the 18 000 homes that lack electricity would cost between $115 000 000 and $350 000 000 to install (Bain et al., 2004).

Their article examines the possibility of installing self-contained solar systems in these 18 000 homes. If done by members of the nation it could provide much needed employment and economic development. When the article was printed in 2004, the Navajo Nation was developing an energy policy that included solar along with other fuel sources. If funding was secured for the project, it would be a great step in improving the quality of life and self-sufficiency for the Navajo Nation (Bain et al., 2014).

Natural building requires rejecting a lot of consumerist ideals and have been labeled as this niche subculture rather than penetrating regular discourse. Mainstream building technologies make big companies lots of money which can provide funding for advertising. People rarely hear about other building practices because the popular ones are financially backed and provide jobs for the people who gather the raw material, the people who manufacture the materials, the people who ship the materials, the people who sell the materials, and the contractors that build with the materials. Most sustainable practices cut these people out and obtain a lot of the needed materials locally from the land or from local farmers. It provides an independence from the consumer lifestyle that is unwanted by the companies that manipulate our spending. Many people in natural homes also grow their own trees for firewood and own plants for food. This provides an independent self-sufficient lifestyle that for many can be quite appealing.

These technologies could be very beneficial in rural communities. There are 80 isolated communities in Northern Canada that are not "connected to the North American electricity or natural gas power grids" (Quinn, 2015). Most of these communities rely on imported diesel and face extremely high energy costs. In 2015, a senate report listed five recommendations to address these power issues, namely providing incentives for energy efficient homes, supporting renewable energy projects, and upgrading diesel facilities (Quinn, 2015). However, as clean power may be hard to come by in the dark winters, and shipping costs of fuels is extremely expensive, training locals in more forested communities how to create more efficient heating systems can reduce the strain on expensive power options and reduce the environmental impact of shipping costs and diesel emissions). Biomass options such as pellet stoves are being considered, however if the government where to invest in testing some of these alternative biomass options, it could greatly improve lives with an assumed reduction in cost to alternatives.

Concluding Thoughts

For many Indigenous peoples around the world, they are already living a powered-down life so the need to have these discussions may seem silly. Many Indigenous peoples in Canada are losing touch with our own ways, turning to other Indigenous peoples globally are reminding us how to connect back. When we know better, we do better. Having even just a handful of individuals begin to live in these alternative housing with a renewed relationship to the land can help reassure others and provide an example for those who are also looking to live a more balanced and self-sustainable life.

However this does work better when communities get involved. In my work with Indigenous agricultural pursuits, I know of many reserves creating community gardens or more commercial agriculture that provides both food security and economic development (Community Futures Development Corporation of Central Interior First Nations, 2019). Others are looking into vertical gardens or hydroponics that use innovative food growing techniques to use less land and resources to grow more food no matter the climate (Smith, 2018). Communities are looking at ways to heal their community through real food and ensure everyone's basic needs are met. Other projects can be done at a community scale. There have been workshops and conference on Indigenous green economies (IGEC, 2017) and looking at sustainable local economies (Kainai Ecosystem Protection Association, 2019). There is no reason reserves can't follow the leads of communities like Abbotsford or Edmonton that have compost pickup a part of their utilities system (City of Edmonton, 2019). Education can also be a huge piece and communities empowered to rally around a this idea have many options to work together and fulfil the roles required to be a self-sustaining nation. Also as emphasized in the literature, the main tool to shift into a more Earth-conscious community is revitalization of culture and language.

This is to say, as much as we are beginning to decolonize in our education and our art, there is an urgent need to decolonize our homes. As children of the land we need to protect our homelands and prepare for the worst by relearning how to take care of ourselves.

Many reserves are investing in renewable energy infrastructure but that is not enough, to truly thrive we need to relearn appropriate technologies and ensure we are sticking to our roots and taking care of the land as our ancestors trusted us to. Using the global collective knowledge we have access to traditional ways from across the globe and by weaving our own

knowledge with our modern expectations and the wisdom of those from all walks of life, we have the chance to model a changed way of living that is in harmony with our mother and forces us to reconnect with our land-based values. Going further, communities could work towards a localized economy where people can trade building skills with food, or teach each other new techniques. Living this way will help us support each other's livelihood and work together as a community again.

If I were to continue in this research, I would want to work with a community to look into working together on a earth-friendly project. Additionally, I would like to be able to experiment with building structures myself to self-evaluate techniques, feasibility, and actual time and money needed to make a total switch to an earth home.

Going into my research, I was worried about the dangers of my writing about local reserve systems without being a band member. I have spent time working and staying on reserves, engaging in conversations with and sharing with local band members, and learning about some of the nuances of specifically interior BC reserves. However, I grew up as a Red River Métis, and as much as I have immersed myself into connecting with Indigenous peoples of this area (with my partner and his family having grown up here on their own land, and my job taking me to Indigenous communities across the Interior), it still felt like it might not be my place to comment on what is happening close to home. Several things eased this feeling and made me feel like my work was purposeful. First, as was discussed at our Knowledge Makers workshop sessions, Indigenous research should be done in response to an identified community need, as a form of service to the community. Looking at the BC interior, I see several bands dedicated to building solar and wind energy systems, a movement of tiny houses in response to Big Oil, and renewed interests in incorporating traditional

practices into everyday living. On a larger scale, many individuals and communities are using both traditional housing and the latest technologies to protect Mother Earth and incorporate traditional teaching in the context of modern society. There is a desire there, and some even view Indigenous Knowledge as the "last hope in implementation of a sustainable future" (Settee, 2008, p.45). Knowing there is a desire was the first step in easing my mind. The second was using the above mindset and methodology to guide my work. Arming myself with the knowledge of different ontological and epistemological works on Indigeneity, and learning how other Indigenous researchers danced that line of decolonization and scholarly convention, has helped to assure me I am doing this in the right way and that my intentions are not misguided. Making sure things are done in a good way is important, but I have learned to push past that and recognize that I am enough. All Indigenous peoples need to work together to overcome the onslaught of hurdles we continue to face.

I want to engage in Indigenous research both to normalize Indigenous knowledge and epistemology in academic settings, and to heal myself in actively engaging with information in the way that felt most appropriate to me. Building on the foundation laid by Indigenous scholars before me, I have the opportunity to use their work as precedent to nudge at the norms and boundaries of academia and question the way we learn and engage with research. I view it as a responsibility to continue to poke holes in the Western conventions so that future learners will have even more ability to engage in academia in ways viewed as "not legitimate" today. I hope that as I continue with my research I will be able to add to that effort, moving the boundary another millimetre and creating just that little bit more room for other ways of knowing in the formal education sphere.

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