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"For me I got into this industry because I think it's the solution to climate change."

-Forestry Professional

The Átl'ka7tsem/Howe Sound Forestry Industry and its Relationship to the United Nations SDGs— A Qualitative Study

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Land Acknowledgment

The research team would like to respectfully acknowledge that the land on which this research took place is the traditional and unceded territory of the Coast Salish Peoples and the Interior Salish Peoples including the territories of the Skwxwú7mesh (Squamish), the səl̓ilwətaʔɬ (Tsleil-Waututh), the xʷməθkʷəy̓əm (Musqueam), the shíshálh (Sechelt), and the Líl̓wat (Lil'wat) nations.

UNESCO Biosphere Region

This project's partner organization, The Howe Sound Biosphere Region Initiative Society (HSBRIS), successfully achieved the designation of Átl'ka7tsem/Howe Sound as Canada's 19th UNESCO (United Nations Education, Scientific, and Cultural Organization) Biosphere Region. Átl'ka7tsem/Howe Sound is located northeast of Vancouver, British Columbia, Canada, encompassing 218,723 hectares of land and ocean, along with a growing population in all municipalities (*Image 1*). Biosphere regions are areas for learning, collaboration and reconciliation; through education of the UN's Sustainable Development Goals (SDGs), engagement between communities and sectors, and consultation with Indigenous communities. The ecological significance, vast biodiversity, and unique geography of the Átl'ka7tsem/Howe Sound area is home to many different communities of people. These lands and communities deserve a future that prioritizes environmental and economic sustainability.

Biosphere regions contain areas of terrestrial and coastal/marine ecosystems which include three designated zones (*Image 1*): Core areas, which are strictly protected ecosystems. Buffer zones, which are used for activities that reinforce ecological practices like scientific research, education and training. Transition zones (areas with the greatest use), which foster socio-culturally and ecologically sustainable development (HSBRIS, n.d.). A designated Biosphere has five key functions while working towards a more sustainable future:

1) Conservation - of ecosystems, wildlife, and landscapes.

2) Development - sustainable economic and human development.

3) Reconciliation - collaborate with Indigenous Peoples and uphold the UN Declaration on the Rights of Indigenous Peoples (UNDRIP).

4) Climate action - empower communities to mitigate climate change and partner with sectors to create climate action projects.

5) Logistic Support - provide support for research, monitoring, education and information exchange related to issues of

conservation and development (HSBRIS, n.d.).

The Átl'ka7tsem/Howe Sound Biosphere Region Society is continuing the efforts of conservation established by community members through facilitating conversations between government, business, and the private sector that operate in the Átl'ka7tsem/Howe Sound area. Encouragingly, there has been emerging dedication from all sectors to implement sustainable resource development (Lions Gate Consulting, 2016 & HSBRIS, 2020). The importance of engagement and collaboration with these sectors is crucial for mutual understanding, respect, and commitment to a sustainable future.

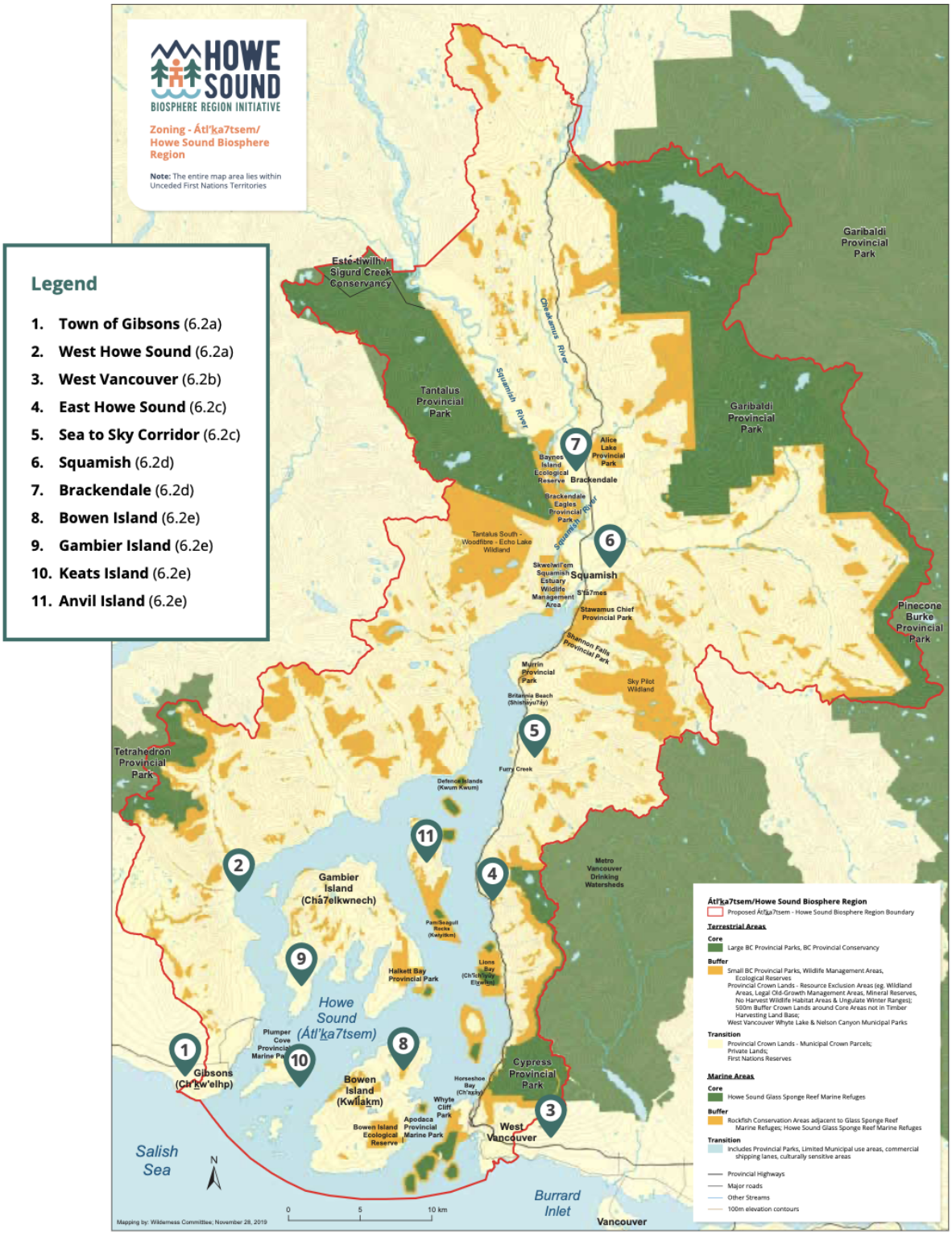

Image 1: Átl'ka7tsem/Howe Sound Biosphere Region Map (HSBRIS, 2020)

Introduction

The forest sector plays a significant role in the Átl'ka7tsem/Howe Sound area, both economically and environmentally. Harvesting and manufacturing of timber provides high paying jobs and contributes millions of dollars back into the community via taxes and economic spin off, as forestry companies purchase most required goods and services directly from other community businesses. Decent work and economic growth is essential for the increasing human population residing in Átl'ka7tsem/Howe Sound. However, forestry can be devastating to habitat and biodiversity. As the area's population grows, finding a balance between economic incentives, demand for resources in the form of timber products and the need to preserve the natural environment will be key to a sustainable future.

With some of the strictest regulations in the world, Átl'ka7tsem/Howe Sound forests are managed to the highest standards. These standards include protection of certain wildlife species, conservation of biodiversity, and preservation of culturally important areas. Many forestry businesses operating in the area are going above and beyond these rigorous standards, showing the quality and care these businesses have for Átl'ka7tsem/Howe Sound forests. Of course, these practices don't come without barriers and struggles. Encouraging economic growth while ensuring environmental sustainability creates challenging conversations. The United Nations (UN) Sustainable Development Goals (SDGs) help to create a framework for this dialogue and guide action as we navigate this delicate economic and environmental balance.

In 2015, the UN created an ambitious agenda that addresses the need for a sustainable planet as well as targeting human rights and eradicating poverty (United Nations, 2015). This agenda is presented in the form of 17 SDGs and 169 targets that all stakeholders and civil societies in all countries are aiming to achieve or implement by 2030 (United Nations, 2015). These SDGs are a global concept that are applicable to all countries, institutions, and businesses. Economic growth, equality, climate change, and preserving ecosystems are key elements that present themselves in the framework of the SDGs and the specific goals/targets. In order to reach this agenda by the proposed date of 2030 it is essential that all countries and stakeholders do their part to implement the Sustainable Development Goals.

This research is intended to view the SDGs in a corporate context. Specifically, understanding what the forestry sector in Átl'ka7tsem/Howe Sound is doing to achieve these goals and what barriers they

face. While the partner organization for this project is the HSBRIS, the intent of this project is to concurrently benefit forestry companies working in the Átl'ka7tsem/Howe Sound and Canadians as a whole as we strive in our commitment to the UNSDGs. Biosphere regions are mandated to promote the SDGs, educate, and foster collaboration to make the region more sustainable. This project will directly help the HSBRIS fulfill these goals by bringing together stakeholders in the forest industry to learn about SDGs, share best practices and encourage collaboration to solve sustainability challenges.

The primary aim of our project is to facilitate the sharing of new ideas and sustainable practices between companies operating in the Átl'ka7tsem/Howe Sound area. This research is an effort to learn and understand what sustainable forestry practices are currently employed in the Átl'ka7tsem/Howe Sound Biospher Region and their alignment to the UNSDGs.

Literature Review

UNSDGs are important and applicable to the forestry sector. Previous research has identified the complex relationship between forestry and the SDGs (Baumgartner, 2019; Carr, et al., 2021; Högbom, et al., 2021; HSBRIS, n.d.) discussing the positive and the negative impacts on the SDGs, and the importance of synergistic opportunities between stakeholders that benefit multiple SDG goals and targets (HSBRIS, n.d.; Högbom, et al., 2021).

Baumgartner (2019) explains the relationship between the SDGs and the forest sector, directly organizing forestry into SDG 15 "Life on Land: Protect, Restore, and Promote Sustainable Use of Terrestrial Ecosystems; Sustainably Manage Forests; Combat Desertification; Halt and Reverse Land Degradation, and Halt Biodiversity Loss". Forestry can be directly and indirectly related to other SDGs including but not limited to; SDG 8 "Decent Work and Economic Growth," SDG 9 "Industry Innovation and Infrastructure," SDG 11 "Sustainable Cities and Communities," SDG 12 "responsible Consumption and Production," SDG 13 "Climate Action," and SDG 14 "Life Below Water" (*Figure 1*). Positive impacts on economic and social goals can come at the cost of environmental goals, which is a common trade-off described by Baumgartner (2019). Such trade-offs include harvesting forests efficiently to reduce emissions (SDG 13) and increase wood production (SDG 8) which can negatively impact biodiversity and ecosystems (SDG 15) (Baumgartner, 2019).

Figure 1: SDGs directly and indirectly related to the forestry industry

Högbom et al. (2021) also discusses the environmental impacts of forestry and how the UNSDGs can be implemented to promote a sustainable industry. Focusing on achieving SDG 12, 13, and 15, Högbom et al. (2021) highlights the "trilemma of (i) increasing wood production to substitute raw fossil materials, (ii) increasing forest carbon storage capacity, and (iii) improving forest biodiversity and other ecosystem-service delivery" (p. 1). This trilemma showcases similar trade-offs to Baumgartner (2019) and identifies the difficulties in balancing economic and social improvements with biodiversity conservation.

The UNSDGs are a universal framework and plan to achieve a better and more sustainable future for all. As seen in previous literature, SDGs can be useful to understand the role of the forestry sector and the barriers to environmental sustainability. This research utilizes the SDG framework to help understand the forestry sector and the commitment to sustainable forestry in this community.

Methods

In preparation for the qualitative data collection (interviews) in this methodology, the research team and the partner organization (HSBRIS) created a database of all timber harvesting and associated businesses working within the Howe Sound Biosphere Region. The database includes company names and public contact information found from the internet. Once the public contact information was found and the database completed, an engagement email was sent to companies in the database. Since the partner organization is aware of many of these companies, there was assistance and guidance during the recruitment process. Using contact information from the database and recommendations from the partner organization, the businesses were sent an engagement letter via email (or phone) outlining the details of this project and inviting them to participate and/or learn more. If the company was interested, a secondary email was sent containing a recruitment instrument and consent form. This second letter asked companies to send the recruitment instrument and consent form to owners, managers, foremans, or employees with good knowledge of

company operations. In the recruitment instrument they were prompted to contact the research team if they were interested in participating. There were many cases where the initial engagement email went directly to the owner of a smaller company. In these cases, if the owner was interested in participating, the email and recruitment language was adjusted to fit this scenario.

Participants included eight individuals, seven males and one female, working in forestry or related businesses in Átl'ka7tsem/Howe Sound. Participant occupations included: timber harvesting, log sorting, resource management, project management, fiber supply management, timber assessments, environmental assessments, log brokerage, log salvage, consulting and environmental specialists. Informed consent was obtained from all participants prior to data collection and participants were given the choice of remaining anonymous. This research project was approved by the Capilano University Research Ethics Board.

Each participant was interviewed once in person or by video-call, by one or more of the research team. In line with phenomenological research, qualitative data was obtained using interviews lasting 30-60 minutes. The interviews were semi-structured and allowed for the participants to elaborate on questions regarding sustainable practices and the SDGs. Questions asked by the research team were similar between interviews but changed slightly depending on participant occupation. The semi-structured questions were co-designed by the research team, which includes the partner organization. Sample questions can be seen in the *Appendix*. With participant consent, the interview was audio recorded, transcribed using Word Dictation, and written transcriptions were sent to participants to ensure accuracy of context.

Because of the small sample size, a manual thematic analysis was used to identify common themes and trends in the interviews. This formed a collection of validated stories outlining best sustainable practices in the Howe Sound forestry sector. The best practices were linked to specific SDGs and organized accordingly.

Results and Discussion

SDG 8: Decent work and Economic Growth “Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all”

The forestry industry plays a huge economic role in British Columbia. This industry is the largest manufacturing sector in B.C. and the largest exported good. Annually, $14.1 billion of wood, pulp, and paper products

are exported (Province of British Columbia, 2022). BC's forestry sector has an annual GDP of $13.1 billion, $8.4 billion in labour income, and over 100,000 jobs throughout the province (Niquidet & Kan, 2021). Átl'ka7tsem/Howe Sound has an active forestry sector in both the West and East, providing living wages for employees and an economic contribution to the community.

The interviews from this research showcase the importance of forestry related jobs in Átl'ka7tsem/Howe Sound and includes high paying jobs throughout all levels of the industry. An independent forestry consultant explains the amount of manpower needed for one project: a log broker to confirm the value of the timber, a geoscientist to confirm stability, various engineers for bridge or flow of water design, a silvicultural expert who can confirm the type of ecosystem and how it will be reforested, geomatics mapping expert to bring together all the different information and ensure accuracy on this information in order to get a land lease (Stirling Angus). A log sort owner in the West Howe Sound hires over 30 full-time employees, including log scalers, equipment operators, and boom men. Some of these employees make an entry level wage of $30.00 per hour, plus benefits, and the ability to make between $80,000 and $120,000 a year (anonymous) This list of jobs only scratches the surface for what is required for timber harvesting and manufacturing.

One of the ways the forestry industry makes an economic contribution to a community is through purchasing goods and services directly from other community businesses. Regular payments on items such as fuel, propellers, mechanical repairs, equipment, and uniforms directly support small businesses within Átl'ka7tsem/Howe Sound. According to the Council of Forest Industries March 2021 report, for every dollar of output produced in the pulp and paper industry, $0.41 is generated indirectly in other businesses. The pride in creating this type of economic spin off was echoed in our interviews, noting that millions are spent annually within the community. One forestry business owner in the area explained the considerable amount of expenditures contributing to local economic growth, which equates to approximately 2-3 million dollars annually being spent in the community (anonymous).

With a minimum wage of $15.65/hr and a calculated living wage of $19.79-20.52/hr for the Sunshine Coast and Metro Vancouver (Living Wage for Families Campaign, n.d.), forestry provides jobs that give individuals and families economic security, while also contributing to other community businesses.

SDG 9: “Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation”

Taking action to ensure more resource-use efficiency and environmentally friendly technology is a large part of innovation and sustainable industrialization in the Átl'ka7tsem/Howe Sound forestry sector. These innovative ideas and technologies can be seen within large corporations and small businesses.

Howe Sound Pulp and Paper Corporation (HSPP), owned by Paper Excellence, is ensuring sustainable industrialization by creating renewable energy with their power boiler and recycling chemicals with their recovery boiler. “The mill is 91% self-sufficient” (Siew Sim), and that is because the mill burns hog fuel—waste from the timber harvesting process—in the power boiler to make energy. This not only creates green energy for the mill but also contributes to solving the hog fuel surplus problem on the coast. The recovery boiler creates biomass energy and recycles chemicals; white liquor, the chemicals used to break down wood chips, eventually turns into a product that is about 70% solid. That product is burned in the recovery boiler and the chemicals are recovered and reused in future operations.

HSPP is also undertaking multiple projects aimed at reducing their environmental footprint and reducing greenhouse gas (GHG) emissions. An interview with the environment specialist at HSPP illustrated the current projects her team is working on. Project number one consists of offsetting their natural gas consumption by using methanol extracted from foul condensate. Foul condensate is a product of the pulp process and is rich in methanol; it’s usually sent to their effluent treatment system and makes up one third of the BOD that goes to the treatment plant (Siew Sim). Instead, they are taking the foul condensate and putting it through a stripping column to pull out the methanol component. The methanol component is then burned in the lime kiln and offsets natural gas consumption that’s usually used in the kiln (Siew Sim).

HSPP’s second project focuses on the power boiler which had the bottom converted from a traditional style grate to a fluidized bed in 2010. The original boiler had a grate at the bottom that catches and collects all the ash. In contrast, the fluidized bed contains a series of air nozzles and perfectly uniform sand where the grate would be. Hot air is run through the air nozzles, heating and fluidizing the sand, creating a heat sink that is more efficient at burning damp hog fuel, which is prevalent on the coast. A positive change was seen

right away, “when we converted the bed, our emissions went right down” (Siew Sim). Impurities from the hog fuel can create issues within the boiler: “you can get sections of the boiler bed that stop fluidizing because you get basically sticky globs that'll attach to the sand and then the bed doesn't fluidize” (Siew Sim). More natural gas is used to break up these sticky globs and sometimes the boiler is completely shut down to remove them, and restarting the boiler uses a lot of natural gas. The current project focuses on enhancing this fluidized bed by modifying the bottom hoppers to become more efficient in trouble areas, resulting in less solid build-up and less natural gas being used (Siew Sim).

For smaller companies, industry innovation can be more difficult. Themes mentioned by multiple interviewees mention the lack of government incentive and turbulent times in the forestry sector make it difficult to use resources on new projects. Despite this fact, there are smaller businesses showing great interest in wanting to be involved in new environmentally forward projects. Oceanview Forest Products Ltd mentioned their passionate view on the issue of slash burning—a required process to clear leftover wood waste from timber harvesting sites. “We go out and burn every year and we're required to, we have to. But you just look at what you’re doing and it’s just ridiculous. But, it’s a really hard problem to solve” (Sam Grill). They are looking at options to network and partner with companies to make products, like fertilizer, out of the wood waste instead of burning it.

Stirling Angus, from SJA Forestry Consulting in Squamish, is involved with various Indigenous people that have been managing First Nation reserve land in their family for the past 100 years. As a forest professional, he is helping First Nations to navigate legislation while concurrently learning from their stewardship ideas. He explains the innovation that is actively being pursued on First Nation lands and how educational institutions are wanting to learn these management techniques (Stirling Angus).

There is effort being made to create a more environmentally friendly industry in Átl'ka7tsem/Howe Sound and these interviews portrayed the passion that lies behind these projects. Companies need to continue their efforts towards sustainable industrialization, and it is essential for the government to help create these opportunities. More incentives for businesses to develop innovative products as well as transition companies to clean-energy equipment will go a long way in achieving SDG 9.

SDG 11: “Make cities and human settlements inclusive, safe, resilient and sustainable”

An important part of creating sustainable cities and communities includes participation from all stakeholders to assist in the planning and management of settlements and resources (United Nations, n.d.). Community forests allow local governments and First Nations to manage an area of crown land, instead of being controlled by the provincial government. This gives residents surrounding community forests an opportunity to be involved in how the land is used, prioritizes community values and increases awareness of forest management (Province of British Columbia, 2022; District of Squamish, n.d.). Goals of community forests include: diversifying the use and benefits of the land area, supporting the local economy, providing local jobs, strengthening relationships between Indigenous and non-Indigenous people and communities, implementing environmental stewardship and fostering innovation (Province of British Columbia, 2022).

The Squamish Community Forest is a new addition to the Átl'ka7tsem/Howe Sound and is governed equally by the District of Squamish and the Squamish Nation. The Sunshine Coast, Cheakamus and Pemberton community forests surround the Átl'ka7tsem/Howe Sound area and set the stage for the possibilities of community forests.

The manager of the Sunshine Coast community forest explains the beneficial community involvement and importance of community values. Activities like mountain biking and hiking occur in and around the community forest; these recreational activities are protected by creating offsets and buffers around the network of trails and the community forest has the flexibility to be able to manage those values (Warren Hansen). Money from timber harvesting in these areas goes directly back into the community as legacy funds and grants (Warren Hansen). These funds and grants fuel projects such as a community firewood program, mountain bike trail building, the Chapman Creek fish hatchery, and major renovations for the Roberts Creek Hall (Warren Hansen). In Whistler, residents also take great pride in the Cheakamus community forest. Some of the pros of the community forest, as described by a forestry consultant in the area, includes residents actually feeling engaged with the land base, while seeing where the revenue is going and that there are more “people on the ground that care” (Stirling Angus).

A majority owned Squamish Nation company, Sqomish Forestry LP, will be managing the new Squamish Community

Forest. Sqomish Forestry LP has a high standard when it comes to sustainable forestry management. A company that assists Sqomish Forestry LP with the management of their forest operations described this high standard, “they manage over and above what would be required”—in terms of things like old growth management areas, ungulant wintering ranges, goat wintering ranges, spotted owl habitats, and goshawks areas (Sam Grill). This community forest will give some residents of the Átl'ka7tsem/Howe area the ability to have a voice in forest management and see how the additional profit is able to flow back into the community. It is also the first time the Squamish Nation and the District of Squamish will work together to manage a local asset (District of Squamish, n.d.), which is a huge step towards increased collaboration between governments.

Additionally, SDG 11 focuses on providing accessible, safe and inclusive communities for all people, while also protecting cultural and natural heritage (United Nations, n.d.). A common theme presented in almost all the interviews was the importance of Indigenous collaboration and consultation. Ensuring the surrounding Nations have approved forestry plans is an integral part of the timber harvesting process; according to our interviewees, logging won’t happen without it. Almost all forestry businesses are operating on unceded lands. Consultation is not only required but it is also essential to assist in decolonization within resource management, safeguard culturally important areas and aid in the reconciliation between Indigenous and non-Indigenous foresters.

SDG 12: “Ensure sustainable consumption and production patterns.”

“The annual allowable cut (AAC) is the annual amount of timber that can be harvested on a sustainable basis within a defined forest area” (Alberta Government, 2016). The AAC determines the amount of trees that can be cut down for timber supply areas (TSA) and tree farm licenses (TFL). The AAC is estimated by professional foresters and built upon ensuring a non-declining wood supply for the future (Environment and Climate Change Canada, 2018). The AAC establishes set numbers for sustainable consumption, but more can be done to improve sustainable consumption and production patterns.

Sustainable consumption and production need to be at the forefront of forestry operations to ensure the UNSDG’s are achieved. This is a crucial element to mitigating the negative effects of industrialization and it’s something companies can continually work on and improve. Some factors that increase

responsible production and consumption have already been discussed previously such as knowledge from a wide range of professionals including geoscientists, geomatics mapping experts, log brokers, silviculturists, engineers and registered professional foresters. These professionals all aid in making sure timber harvesting and production is sustainable. Reducing waste through reduction, reusing and recycling is a part of sustainable consumption and production patterns. This was seen with the recycling of chemical products at HSPP to reduce waste and the efficiency alterations of the boiler to reduce natural gas use.

Managing the size of cut blocks is another way foresters can manage consumption patterns. Leaving things like wildlife retention patches and adopting a more selective logging practice can improve the visual quality and protect surrounding ecosystems; but the process also needs to be cost effective. “I think we should do everything in our power to figure out a way to, you know, not cut rectangles out of the [trees] and just figure out a way that we can do that cost effectively where we can leave retention” (Sam Grill). There are technologies in place to assist with sustainable logging practices and this includes things like LIDAR, a technology that captures 3D images of forests from above. This form of imaging allows forestry professionals to overlay old growth management areas or wildlife areas while looking at places to harvest timber, ensuring that protected areas are not logged or touched during the process (Barry Simpson).

Other systems are in place to help ensure sustainable consumption and production patterns and this includes environmental management systems and sustainable forest management certifications. Environmental management systems are in place for almost all industrial businesses and one interviewee highlights the importance of having systems in place in case something goes wrong, and how crucial it is to have the resources to come up with solutions to potential environmental threats (Rob Liden). BC has the highest amount of forest management certifications; there is about 60 million hectares of forest in BC (Province of British Columbia, n.d.) and approximately 47 million hectares of forest is certified by a third party (Certification Canada, 2022). These certifications meet rigorous standards to ensure that companies are operating sustainably and going beyond what is required for conservation (Natural Resources Canada, 2021). All these factors are put in place to strive for more sustainable industrialization in the forestry industry.

SDG 13: “Take urgent action to combat climate change and its impacts”

It is no secret that SDG 13 is one of the most important goals to achieve. The global temperature is increasing and causing catastrophic events around the globe that are taking lives and disrupting national economies. It is seen locally, with the record summer temperatures, leading to multiple *heat domes* and disastrous wildfires throughout the province. Reducing greenhouse gasses is of utmost importance if we want to protect BC’s forests and the people who live here.

BC’s forests, once a large carbon sink, are now emitting huge amounts of carbon dioxide from wildfires. Between 1950 and 1999 the amount of forests burned by wildfires nearly doubled (Natural Resources Canada, 2020). BC forests provide a huge amount of carbon sequestration, as they have the ability to store CO2 and greenhouse gases (GHG) to help mitigate the effects of climate change (Province of British Columbia, 2013). With the increasing wildfires, droughts, and insect damage, the once praised carbon sink is now becoming a site of major CO2 emissions (Saxifrage, 2022). The sustainability efforts by the forest sector are crucial to the fight against climate change and, with environmentally focused management, can be part of the solution to climate change.

Combating climate change takes effort from all stakeholders. The HSPP mill is working hard towards mitigating their GHG emissions through innovative projects seen earlier. We also saw interest from foresters wanting to create solutions to slash burning to decrease carbon dioxide, methane and nitrous oxide emissions. Some industry professionals got into forestry to help combat climate change, “for me I got into this industry because I Think it's the solution to climate change” (Sam Grill). All plastics could be cellulose based and 50% of the concrete being used could be replaced with wood, a renewable product (Sam Grill). “The bioeconomy is the solution in my opinion” (Sam Grill). In the Átl'ka7tsem/Howe Sound the effort towards climate change from the forestry sector is apparent, but more needs to be done to stop these harmful emissions altogether.

SDG 14: “Conserve and sustainably use the oceans, seas, and marine resources for sustainable development”

Land based activities can have detrimental effects on oceans and marine life. Safeguarding all waterways while timber harvesting and processing will protect coastal ecosystems and avoid significant adverse impacts (United Nations, n.d.).

Target 14.1 of the UNSDG's states, "By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution." With the Átl'ka7tsem/Howe Sound's unique geography and surrounding oceans, rivers and lakes, caution needs to be taken while performing cut block layouts, building logging roads, and sorting logs.

According to Warren Hansen from Chartwell Resource Group Ltd, his team goes through great lengths to protect surrounding streams, rivers and fish. They bring in professional biologists to determine if there are fish in surrounding streams and what kind of buffers and offsets need to be put in place to protect these areas. Geoscientists are hired to assess the land and prescribe measures for them to follow for building roads (Warren Hansen); this allows for proper stability, so roads don't wash out during adverse weather events and risk harming nearby water sources.

Another threat to local bodies of water is run-off from hog fuel (biomass) piles at log sort operations in the Átl'ka7tsem/Howe Sound. Excessive amounts of hog fuel in the area are becoming an increasing problem, and the run-off from these piles can be toxic to fish. Hog fuel can be defined as unrefined wood waste—coarse chips, bark, or any type of leftover wood fiber that could be burned for fuel (Cloverdale Fuels, n.d.). The run-off from these piles consists of very fine, sand-like wood fibers (anonymous) that contain high biochemical oxygen demand (BOD) levels. When the run-off is measured directly from the hog fuel piles, the BOD is so high that it would kill fish, although, when it enters the ocean, the dilution effect decreases the BOD to a level that doesn't actually kill fish in great numbers (anonymous). Nevertheless, the risk of harming ocean wildlife is too high, and local log sorts are doing their due diligence to ensure the run-off is properly filtered before it enters any bodies of water.

West Átl'ka7tsem/Howe Sound log sorts are using a series of man-made ponds for hog fuel run-off to filter through so BOD levels are adequate before they enter the ocean. The series of settling ponds and marsh create aeration for the water and return the lost oxygen as it filtered through. The run-off is collected in a drainage that surrounds the hog fuel; from there it is pumped to their main system where it goes through a series of settling ponds (Rob Liden). These settling pond systems are being used by multiple companies in the Átl'ka7tsem/Howe Sound; going above and beyond to improve their processes and exceed minimum standards.

Not only is the forest sector doing their best to protect life below water, but they are also participating in projects to

enhance fish hatchery projects. The HSPP mill hosted about 35,000 salmon fry from the Sunshine Coast Salmon Enhancement Society this past summer (Siew Sim). During the heatwave in the summer, Chapman Creek reached about 20 degrees, which creates an oxygen deprived environment and causes a lot of heat stress. “They were going through a process of Drilling some new wells and because of the water restrictions, they actually lose their water or good water source in the summertime. And it's really stressful for the fish. The temperature gets really high” (Siew Sim). They approached the HSPP mill because they have a hatchery on site that used to be run by the society. “They were able to bring their fish here over this past summer and enjoy the nice cool waters of Rainy River. I said it was like summer camp for the fish” (Siew Sim). A retired forestry professional explained their involvement with a creek rehabilitation project. They paid for all the machine time and helped manage the project for five years to help get the river to a place of self-sufficiency. The project's goal was to get the natural return of coho, pinks, cutthroat, steelhead, and chum salmon (Rob Liden).

Impressive efforts are being made to decrease harm to bodies of water in the Átl'ka7tsem/Howe Sound while enhancing existing rivers and supporting local fish hatchery operations.

SDG 15: “Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.” Sustainable management of forests and conservation of ecosystems will be essential for maintaining biodiversity and reducing the degradation of animal and plant species (United Nations, n.d.). There are multiple measures in place to protect certain wildlife areas by leaving breaks between trees, goshawk retention patches and wildlife retention patches, which is standard for all timber harvesting practices in the Átl'ka7tsem/Howe Sound area (Sam Grill). Standard practices of logging in the area include many things such as preservation of riparian zones and following rules around site disturbances (Sam Grill). Land can’t be returned to its original state but efforts to de-build, return slopes and put water back in channels is seen across the board (Sam Grill). Ensuring the integrity of the environment and minimizing destruction is important to the foresters interviewed in this project.

More innovative strategies are being used to increase culturally important vegetation, decrease risk of forest fires and enhance selective logging practices. Oceanview Forest Products Ltd explains the

way they help the Squamish Nation achieve some of their cultural goals; mushrooms are being put in cut blocks to help with mushroom regeneration and berries are coming in after areas are being logged. Mushroom and berry picking are a large part of First Nations cultural heritage and cultural burning practices are being implemented on cut blocks to see what happens in those areas (Sam Grill). Berry growth after logging is also helpful for the protected grizzly bear population around the Squamish area (Sam Grill).

Fire thinning practices are being used to help reduce the chances of forest fires by harvesting larger trees from above and leaving smaller ones. This allows for forest to grow in behind the smaller trees and creates a more fire-resistant area (Sam Grill). Snap and fly helicopter logging were used in McNab Creek to take select logs out of a goshawk area (Warren Hansen) instead of going in on the ground and risking more damage. The Cheakamus Community Forest is also coming up with ways to use helicopter logging to leave some of the larger trees in the area without damaging them so they can continue to live after the logging operations (Stirling Angus).

Lastly, the research team interviewed a local log salvager; an industry that is key in cleaning up after marine log transportation. If it weren't for the forestry industry there would only be a few root trees on the beaches, but most of the logs that make some beaches hard to access come from the logging industry (anonymous). Some of these pile ups can occur in estuaries and rivers and cause environmental degradation; log salvagers help with this problem by retrieving logs that were lost in the transportation or storage process. With an extensive historical background in the West Howe Sound, log salvagers are "the original recyclers" (anonymous).

Barriers to the Industry: Lack of Capital Investment, Incentives and Support

In contrast to the positive sustainability efforts of the Átl'ka7tsem/Howe Sound, the forestry industry also faces multiple barriers and challenges, preventing them from being as environmentally friendly as they could be (*Figure 2*)

Figure 2: Barriers to the industry

Wood Waste

Whether burned as slash or left to rot, waste wood emits carbon into the atmosphere. In terms of carbon emissions, this is a sunk cost. Instead of having this potential resource go to waste, it could be a resource. One participant, who asks to

remain anonymous, says the technology exists to convert waste wood into hog fuel and electricity. This solution could offset electricity currently being produced in the Lower Mainland by burning natural gas. Researchers in Munich have identified Canada as a primary place to use wood waste as a source of ethanol, using a process that "can produce a low CO_2 fuel that has a greenhouse gas reduction potential of 75% in comparison with a fossil fuel such as gasoline" (Technical University Munich, 2022). Unfortunately, projects like these require large, long-term investments. Left to the market economy, these investments are unlikely to materialize. Investors like certainty and current unclear changes in forestry legislation have created an atmosphere of uncertainty in Átl'ka7tsem/Howe Sound. It would take political will and government incentives to move these types of large-scale projects forward.

Another structural barrier leading to excess wood waste in the Howe Sound was identified by Sam Grill. He explained how most coastal mills are set up for "large logs with a four to five inch top". The technology and infrastructure exist in the interior where mills can process logs down to two inches. The extra transportation costs to take smaller logs from the Átl'ka7tsem/Howe Sound to the interior is not economically viable and would also have environmental impacts. As such, logs that would be viable in other parts of the country are left as waste in the Howe Sound.

Environmentally Friendly Equipment

Air pollution caused by the industry could be mitigated by investing in new machinery. However, there are two primary barriers; lack of certainty and the current licensing system where bids are won or lost solely on price.

Multiple interviewees expressed frustration over the current licensing system administered through BC Timber Sales, where the license goes to the highest bidder. There is a sense that contractors undercut costs and the quality of logging to win bids. Once bids are allotted, there is a lack of oversight to ensure that proper safety and environmental standards are fully maintained.

According to our interviewees, this manifests in a variety of detrimental ways In order to make the large capital investment required to purchase new machinery, investors want to know there will be work available to pay for that investment. As it currently stands, the higher cost of new equipment can be disadvantageous to winning a bid based solely on price. There is also uncertainty due to changing legislation regarding the industry in Átl'ka7tsem/Howe Sound. Ironically, this uncertainty in the industry is exacerbated by

climate change, where work needs to be shut down due to weather and fire conditions, limiting the season.
There's no incentive or recognition for companies maintaining a high standard of safety and environmental sustainability. High safety and sustainability standards are expensive for companies to maintain and there is no advantage to meeting or exceeding these standards in the appraisal allowance system. Scoring companies based on their environmental sustainability in the licensing system would dramatically change how companies operate and invest their money. Punitive systems, such as those seen in the fishing industry, have not been as effective, as systems which favor and reward companies who actively invest in environmental sustainability.

Companies which champion sustainability efforts are more likely to invest in new, more efficient, and environmentally friendly equipment. Companies concerned with meeting the minimum standard and maximizing their profit often use old equipment which hemorrhages diesel and environmentally damaging waste into the ecosystem or equipment that breaks causing injury or further environmental damage. New equipment can be upwards of 15% cleaner with regards to fuel emission and waste than equivalent equipment that is ten or fifteen years older (Warren Hanson).

Differing perspectives and misunderstandings

A common thread between all interviewees in this study was a pride in the industry and how it has evolved to become more and more environmentally friendly. There is also great optimism about how forestry in the Átl'ka7tsem/Howe Sound can continue to evolve and improve. Concurrently, there are public protests and political unrest. Differing points of view and lack of understanding that has led to frustration on both sides in the Átl'ka7tsem/Howe Sound.

Barry Simpson recounted how techniques have changed since he started in 1974. Areas of social and environmental significance are now more respected. The design of cut blocks have been improved to protect ecology and slope stability. Road building techniques have also improved, and Fishery Management and water quality are considered at every step. While things have evolved in the industry, there is a sense that political posturing at the Provincial level vilifies the industry and does not acknowledge the positive change. The result is further polarization.

Sustainability is a complex concept where something can be viewed as sustainable by one person, and not sustainable by another. One interviewee who prefers to remain anonymous pointed out how time frames add to this complexity and differences in opinions. Trees are a

renewable resource and will grow back when they are cut down. Silviculture and reforestation play a large part in the forestry cycle in the Átl'ka7tsem/Howe Sound. Foresters look at a long-term time horizon in terms of regenerating a stand of trees. “The problem that you run into is that the sustainable module of time is greater than the lifespan of most people” (Anonymous).

Silviculture is a mandatory part of logging. One serious challenge and threat to that aspect of forestry, and the subsequent sustainability of the industry is climate change. While we are currently facing challenges like droughts and atmospheric rivers, there are also many unknowns. “Is the tree we plant today going to be the right trees 100 years from now”? (Warren Hanson)

While the foresters interviewed in this study overwhelmingly agree that some areas need protecting, they find themselves at odds with protesters. There is a belief that many protesters oversimplify the issues and industry.

While protesters fight to limit logging, there appears to be little consideration for curtailing end use demand and the potential detrimental impacts of alternatives to locally produced wood products.

Warren Hanson notes that the “regular consumer does not understand” the First Nations consultation and environmental standards that are maintained in our local forest industry. He points to a disconnect between the end users of forestry products and sustainable actions.

Many wood products that come from other parts of the world are not harvested or produced to BC standards, yet they are purchased by local consumers. Furniture produced from locally milled wood may have less environmental consequences than furniture produced offshore using glues and epoxies.

Much of the wood produced in Átl'ka7tsem/Howe Sound is used by the construction industry. The common alternatives to using locally sourced wood is concrete and steel. The production of those products involves mining, smelting and increased transportation which also have environmental consequences. If wood used in construction is obtained from other countries, it will most likely be produced at a lower standard for sustainability and need to be transported furthering the detrimental environmental impact of the import.

The forest industry in Átl'ka7tsem/Howe Sound provides consumers with valuable goods and supports the economy with well-paying jobs. Concurrently, there are increasing protests and publicity surrounding old growth logging. If old growth is not harvested, that leaves 2nd growth trees. However, there can also be public discord with the harvesting of

2nd growth when it is used for recreational or food purposes. As a Forest Land Manager, Stirling Angus was tasked with solving this seemingly insolvable dichotomy.

A final concern found in this research surrounding logging protests was public safety. While historically logging has been a very dangerous profession, there have been many Worksafe improvements made to protect employees in this dangerous environment. Now, with more public recreationalists and protestors, people put “themselves in dangerous situations” through “ignorance or arrogance” (Stirling Angus). Foresters and “compliance and enforcement” want to ensure that people stay safe (Stirling Angus).

Implications and Limitations

The information found in this research builds a foundation for acknowledging and understanding the sustainability efforts being made in the Átl'ka7tsem/Howe Sound forestry sector. Further research is needed to include more industry professionals and identify solutions to the common barriers to sustainability. Some possible limitations to the research include: a small sample size due to lack of interest or response; a manual analysis of results, without the use of software, due to time constraints and lack of resources; lack of previous studies in this research area and research inexperience on this topic could have led to limited scope of discussions. Lastly, the research team was composed of Átl'ka7tsem/Howe Sound community members and personally knew some of the interviewees which could have led to biased views of the research.

Conclusion

The Átl'ka7tsem/Howe Sound forestry industry is an integral piece to the economy and the environment. As seen in the interviews, local foresters and logging related business owners take great pride in operating to high environmental standards. This research was intended to view the SDGs in a corporate context. Specifically, understanding what the forestry sector in Átl'ka7tsem/Howe Sound is doing to achieve these goals and what barriers they face. Topics brought up by interviewees were found to be directly or indirectly related to SDG 8, 9, 11, 12, 13, 14, and 15. Common themes found in the interviews included: benefits to the local economy, innovative sustainable project ideas, the importance of Indigenous consultation and collaboration, techniques to ensure sustainable consumption, best practices to keep bodies of water protected, and efforts to sustainably manage forests to prevent

biodiversity loss (*Figure 3*).

Figure 3: Common themes within the interviews on the positive efforts of the Átl'ka7tsem/Howe Sound foresters

The industry also faces barriers preventing them from achieving some of the SDGs and these topics were continually mentioned throughout interviews. Lack of capital investment, incentives and support was the overarching theme in many of the interviews. Investment and incentives for problems like wood waste and environmentally friendly equipment could go a long way in achieving SDGs. Differing views and perspectives along with lack of acknowledgement of positive change at a provincial level have led to a tense relationship between the forestry sector and other members of the community.

From this research it is clear that strong efforts are being made in the Átl'ka7tsem/Howe Sound to work towards achieving the UNSDGs in the forestry sector. The primary aim of this project was to facilitate the sharing of new ideas and sustainable practices between companies and to understand what sustainable forestry practices are currently employed in the Átl'ka7tsem/Howe Sound Biosphere Region. The researchers that took part in this project had no previous experience in the forestry industry. The constructive conversations, discussions about the UNSDGs and learning from current industry professionals formed positive relationships that showcase the importance of collaboration and education to improve the conversation around sustainability efforts between foresters and community members.

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Appendix

Sample Interview Questions

SDG #15 - What does forest stewardship look like for your company?

_____
_____

SDG #15 - What are some common problems you encounter in the forestry industry while trying to do your part to ensure sustainable forestry?

_____
_____

SDG #14 & #15 - What is your company doing to minimize or deal with wastewater?

_____
_____

SDG #12 - What does your company do with forest biomass? (hog fuel, waste) What do you do to minimize this waste?

_____
_____

Is this a common problem in the industry?

- Yes
- No
- Prefer not to answer

SDG #13 - Is your logging practice working on any projects that enhance or restore the ecology in the area? (air, land and water quality)

_____
_____

SDG #13 - Do you have any best practices that you want to share and encourage others to do?

_____
_____

SDG #8 - One of the ways the forestry industry makes an economic contribution to a community is through purchasing goods and services directly from other community businesses. What companies in the community receive regular payments from your company? Approximately what is the monthly expenditure on these services? Example: fuel, props, mechanical repairs, safety supplies etc.

Goods and services being purchased: _____
_____
Total monthly cost: _____

- Prefer not to answer

SDG #10 - How often do you consult with First Nations and community stakeholders regarding timber harvesting? What does that consultation process look like?

_____

_____

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