

Understanding Shared Responsibility Holder's Perspectives on Invasive Alien Species Management in the MABR Using the Three Horizons Framework



Horizons Group

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Land Acknowledgement

We acknowledge and thank the Snuneymuxw, K'ómox, Snaw-naw-as, Qualicum, Tseshaht, Hupacasath, and Ditidaht First Nations on whose traditional lands we are visiting, living on, and learning from.

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Abstract

Invasive alien species (IAS) are a global threat to biodiversity as they outcompete native plants and animals, alter traditional ecosystems, and can quickly spread far and wide. IAS also threaten to disrupt traditional knowledge systems closely related to native plants and animals within an ecosystem. Within the Mount Arrowsmith Biosphere Region (MABR) on Vancouver Island in British Columbia, Canada, IAS have been highlighted as a significant threat to the region's biodiversity by shared responsibility holders (SRHs). Our research project aims to understand the perceptions of SRHs within the MABR regarding IAS and their management. The research focuses on a futures thinking approach known as the Three Horizons framework to understand the current perceptions and management of IAS between different SRHs within the MABR and the visions for future management.

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Positionality Statements

I, Isabel Lingner, was born and raised in Germany, where I am currently pursuing a master's degree in Global Change Management. Throughout my academic journey, I have become increasingly aware of my privileges and potential blind spots. As an uninvited guest on Snuneymuxw, Quw'utsun', Tla'amin, Snaw-naw-as, and Xwkwa'luxwum First Nations territory, I am committed to learning from local knowledge and perspectives while acknowledging my limited familiarity with these histories and challenges.

My name is Chloe Canning, and I am a white Metis woman, born in Seattle, Washington, USA, and now living on Treaty Six territory and the homeland of the Metis in Saskatoon, Saskatchewan, Canada. I acknowledge how my personal experiences and lenses impact my interpretation of results and the privilege of participating in research where I do not live. It is with humility and gratitude that I participate in this

research in the MABR and the traditional lands of the Snuneymuxw, K'ómox, Snaw-naw-as, Qualicum, Tseshaht, Hupacasath, and Ditidaht First Nations.

I, Anda Mtshintsho, acknowledge the Snuneymuxw, K'ómox, Snaw-naw-as, Qualicum, Tseshaht, Hupacasath, and Ditidaht First Nations on whose traditional lands we are visiting, living on, and learning from. It is an honour and a privilege to be partaking in this work on lands with unimaginable traumas and history. As a Black Xhosa man from South Africa, I am reminded of my own traumas given our similar histories, and I am constantly guided by them to reflect on my positionality to eliminate my bias.

I am Stefan Rummler, born and raised in Germany, currently pursuing a master's degree in Forestry System Transformation at the Eberswalde University for Sustainable Development. I am aware of my privileged standpoint and consider this during my transdisciplinary work during the TILL 2024 to minimise bias on our research results. I acknowledge the Snuneymuxw, K'ómox, Snaw-naw-as, Qualicum, Tseshaht, Hupacasath, and Ditidaht First Nations and am grateful to be able to learn on and from their land.

Introduction to the Mount Arrowsmith Biosphere Region (MABR) and Invasive Alien Species

What is the MABR

The Mount Arrowsmith Biosphere Region (MABR) on the eastern side of Vancouver Island is one of 19 biosphere reserves in Canada under the UNESCO Man in the Biosphere programme (Government of Canada, 2022). The MABR follows the boundaries of five regional watersheds from Qualicum Bay in the north to Nanoose Bay in the south and covers roughly 1200 square kilometres (Mount Arrowsmith Biosphere Region, 2022). The MABR's mandate is to promote sustainable development through biodiversity conservation, maintenance, and restoration of ecosystem services, support education on sustainable development in the region, support sustainable economies and support reconciliation with First Nations (Mount Arrowsmith Biosphere Region, 2022). There are seven First Nations with traditional land within the boundaries of the MABR, including Snuneymuxw, K'ómox, Snaw-naw-as, Qualicum, Tseshaht, Hupacasath, and Ditidaht First Nations. The MABR is governed through a roundtable structure, where Shared Responsibility Holders (SRHs) within the biosphere can direct and participate in the actions determined by the MABR (Mount Arrowsmith Biosphere Region, 2022). The roundtable includes many interest groups (SRHs) within the MABR, including First Nations (Snaw-naw-as, Qualicum, and Snuneymuxw), the forestry industry (Mosaic Forest Management), regional municipalities (Parksville, Qualicum Beach, the Regional District of Nanaimo) and other community representatives. The Mount Arrowsmith Biosphere Region Research Institute (MABRRI) was created in 2014 as an academic partner through Vancouver Island University to facilitate the day-to-day operations and research within the MABR (Mount Arrowsmith Biosphere Region, 2022). MABRRI can support and fund research and education within the MABR and help promote community actions and interests as determined by the MABR roundtable, of which they are also a member.

Invasive Alien Species Within the MABR

In 2023, a subcommittee of the MABR roundtable met and decided to focus student research on the issue of invasive species within the MABR. Invasive Alien Species (IAS) are non-native species, mainly focusing on plants and animals, that can outcompete native species and fundamentally alter ecosystems, and at times disrupting ecosystem services (Charles and Dukes, 2007; Pejchar and Mooney, 2009; Walsh et al., 2016). The Coastal Invasive Species Committee (Coastal ISC), a local non-profit focused on reducing the negative impacts of and promoting education on IAS in the southwest of British Columbia, has a list of 46 IAS of concern in the greater coastal region of British Columbia, including the MABR (Coastal ISC, n.d.). Among the species listed on the Coastal ISC website include Scotch Broom (*Cytisus scoparius*), a woody shrub plant native to the British Isles and Europe (Coastal ISC, n.d.). Scotch broom was initially brought to

southern Vancouver Island in the 1850s as an ornamental plant. Scotch broom is an early successional species able to colonize dry, nutrient-poor sites due to its ability to fix atmospheric nitrogen (Slesak et al., 2016). Scotch broom also has reproductive advantages over many native plants, as a single mature broom can produce over 10,000 seeds that can remain viable for 60 years (Coastal ISC, n.d.). Scotch broom is known to impact the growth of native trees like Douglas fir (*Pseudotsuga menziesii*), an important forestry crop on Vancouver Island. Scotch broom has been shown to reduce ectomycorrhizal fungi (EMF) colonization, which Douglas fir relies on for sufficient nutrients and water resources (Grove et al., 2012).

Since its introduction in the 1850s, Scotch broom has advanced north along highways and logging roads across Vancouver Island. Coastal ISC categorizes Scotch broom as an invasive species to mainly control in high-value conservation areas due to its high prevalence on the Island (Coastal ISC, n.d.). Management of Scotch broom is complex, as any disturbance to the soil promotes new growth, making manual removal difficult, and the use of chemical controls can be controversial. However, conversations with SRHs in the MABR indicate that the presence of Scotch broom has extensive impacts on the biodiversity, economy and cultural practices within the biosphere region.

Our research focuses on understanding how different SRH groups within the MABR perceive and are impacted by Scotch broom, and how they envision future management and pathways or strategies for controlling the invasive species. The research is conducted through interviews with SRHs, analysed through thematic analysis and structured using the three horizons framework (Sharpe et al., 2016). To limit the scope of the research, we chose to focus on four main SRH groups within the MABR: forestry, Indigenous communities, academia (MABRRI), and non-governmental organizations and civic groups. Our goal is to understand where different SRHs within the MABR share common goals for IAS management, and where priorities may differ to start a dialogue about future IAS management strategies for the MABR. Final interpretations of the findings are presented as possible actions and pathways for the MABR roundtable to consider for future IAS management.

Research Questions

This section outlines the key research questions driving our investigation into the perceptions and management of Scotch Broom within the Mount Arrowsmith Biosphere Region (MABR). Our research aims to capture the current views of Shared Responsibility Holders regarding Scotch Broom and its management, identify the future conditions they aspire to for this invasive species, and determine the necessary actions to achieve a cohesive management strategy. The research questions guiding this research are as follows:

- 1) What are the current perceptions of Scotch Broom and its management by Shared Responsibility Holders in the MABR?
- 2) What are the desired future conditions of Scotch Broom in the MABR that each Responsibility Holder envisions?
- 3) What actions need to be undertaken to achieve a shared desired future of Scotch Broom management from the Responsibility Holders in the MABR?

Alignment with Sustainable Development Goals

The United Nations' Sustainable Development Goals (SDGs) are a collection of 17 interconnected global goals designed to be a "blueprint to achieve a better and more sustainable future for all" (United Nations Sustainable Development Goals," n.d). Adopted in 2015, the SDGs address a wide range of global challenges. Our research on invasive alien species (IAS) in the Mount Arrowsmith Biosphere Region (MABR) is directly linked to several of these goals, particularly SDGs 11, 13, 15, and 17. This chapter explores these connections, highlighting how our work contributes to achieving these global targets.

SDG 11: Sustainable Cities and Communities

Target 11.4: Strengthen efforts to protect and safeguard the world's cultural and natural heritage.

- By preserving the region's biodiversity and natural ecosystems, efforts to control invasive species contribute to safeguarding the cultural heritage of Indigenous communities, which often relies on traditional knowledge intertwined with native plants and animals. Additionally, involving local communities and SRHs in invasive species management fosters a sense of stewardship over the land, ensuring sustainable practices that support the preservation of cultural and natural heritage in the MABR.

SDG 13: Climate Action

Target 13.1: Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters

- Invasive species management in the MABR should focus on strengthening the resilience of ecosystems to climate-related hazards. By identifying and addressing vulnerabilities to climate change, such as increased frequency and intensity of wildfires, strategies can be developed to enhance the adaptive capacity of ecosystems to resist invasions by alien species.

Target 13.2: Integrate climate change measures into policies, strategies, and planning:

- Integrating climate change considerations into invasive species management policies and strategies in the MABR is essential. This involves recognizing the role of climate change in fostering the

spread of invasive species and incorporating adaptive measures into management plans to mitigate these impacts.

Target 13.3: Improve education, awareness, and capacity on climate change mitigation and adaptation:

- Enhancing education and awareness about the linkages between climate change and invasive species spread is crucial in the MABR. This includes educating stakeholders, such as land managers, policymakers, and local communities, about the potential impacts of climate change on invasive species dynamics and the importance of proactive management measures to mitigate these impacts.

SDG 15: Life on Land

Target 15.8: By 2020, introduce measures to prevent the introduction and significantly reduce the impact of invasive alien species on land and water ecosystems and control or eradicate the priority species.

- Efforts within the MABR should prioritize measures to prevent introductions and control existing populations, safeguarding native biodiversity and ecosystems. This involves vigilant monitoring and management to mitigate adverse effects on local flora and fauna, thereby conserving the region's natural heritage.

SDG 17: Partnerships for the Goals

Target 17.16: Enhance the Global Partnership for Sustainable Development, complemented by multi-stakeholder partnerships that mobilize and share knowledge, expertise, technology and financial resources, to support the achievement of the Sustainable Development Goals in all countries, in particular developing countries.

- Fostering partnerships among various stakeholders, including local communities, governmental agencies, academic institutions, and indigenous groups, is crucial. Collaboration facilitates the implementation of effective invasive species management strategies by enabling the sharing of knowledge, resources, and expertise. Working together, stakeholders in the MABR can develop coordinated approaches to invasive species management, promote community engagement, and ensure the long-term sustainability of conservation efforts.

Methods

The main data of the project was generated through a semi-structured interview approach that was informed by the Three Horizons Framework [herein referred to as “the framework”, Figure 1 (Sharpe et al., 2016)], blending and generating reflections from a range of perspectives. During the interview, participants were

guided through the process by guiding questions, with follow up questions used to supplement. Through this approach, participants were prompted to explore visions of the future and its positive or negative trade-offs associated with it. Whilst the interview had guiding questions, how participants interpreted the questions was left to them – either by answering positively or otherwise. Interview participants were engaged individually so to better explore group specific perceptions from an individual’s point of view (expert-led process). The process was also done this way to avoid power dynamics in a group setting (given that the framework is usually used in a group setting).

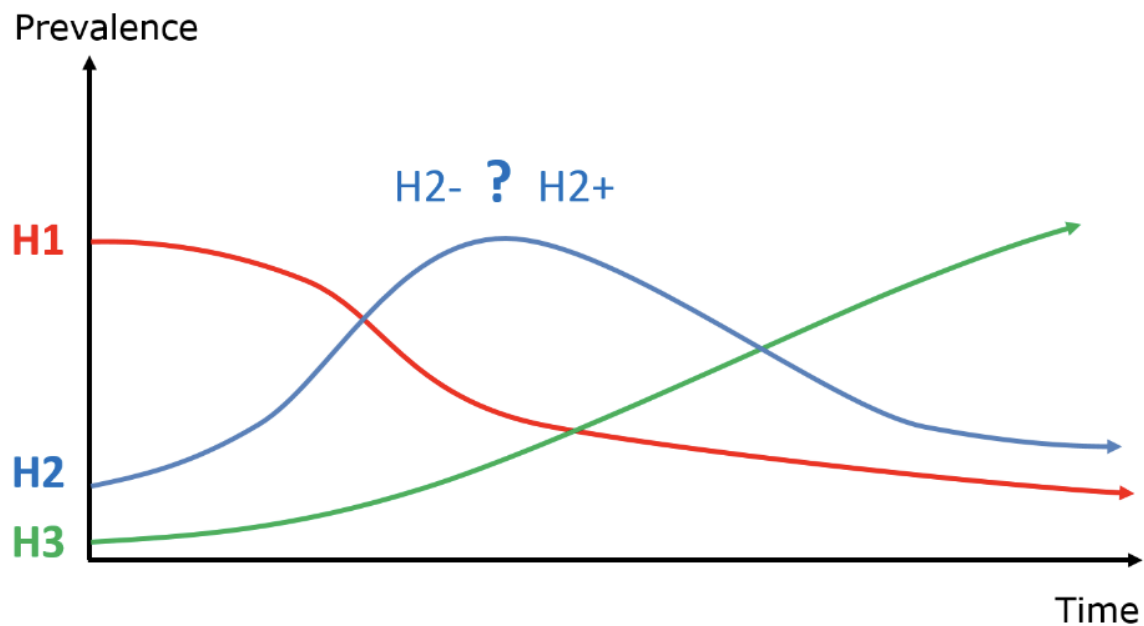


Figure 1. Three Horizons Framework outline as proposed by Sharpe et al. (2016).

The interviews had standardized discussion points, each with components that introduced an issue or topic and other components building from the previous (Table 1).

Table 1. Discussion points from the interview process (table adapted from Tebboth et al., 2020. Valuing local perspectives on invasive species management: Moving beyond the ecosystem service-disservice dichotomy. *Ecosystem Services*, 42. <https://doi.org/10.1016/j.ecoser.2020.101068>)

Component	Purpose
Theme 1: Horizon 1	Current conditions
Theme 2: Horizon 3	Desired future changes
Theme 3: Horizon 3	Inspiration Practices
Theme 4: Horizon 2	Transition Zone

As it is crucial to have a representative mix of people forming part of this process, we chose participants based on the following factors: (1) had to have been a part of either one of the SHR groups (Indigenous Peoples, Forestry, Academia (MABRRI), and non-governmental organizations and civic groups), (2) had some knowledge or exposure to invasive alien species and/or their management. From this, final participants (n=7) were diverse in terms of their expertise. All participants were asked to sign a participatory consent form prior to the interview. Ethical approval for the research was granted by the University of Saskatchewan Behavioural Research Ethics Board (Beh ID 3551).

Data analysis

Responses from the interviews were audio recorded and transcribed. Following that, the transcribed scripts were analyzed thematically, and responses were grouped by the extracted themes. The themes were then extracted and presented visually in the Three Horizons Framework (see Results section). There was minimal quantification of the data to avoid losing translations and nuances in certain data, so most data are presented qualitatively (Gerring, 2017).

Limitations

There are a few potential factors that were limitations in the study. Due to the nature of the research being conducted during a six--week learning lab. The time constraint to conduct interviews and analyse the results is present. Due to the time constraint, as much as we attempted to have representation from different Shared Responsibility Holders, one's perceptions and views are not necessarily representative of their community and colleagues and/or partners. Secondly, the findings of this study cannot be generalized because of the sample size, for example we were only able to conduct one interview with Indigenous representation. Thirdly, the use of perceptions is a limitation because there are many nuanced complexities that are embedded in different contexts such as relationships, the area's history, the environment, beliefs, and many others (Benett, 2016). Despite the highlighted limitations, this methodological approach provides great insights into the current context of invasion management within the MABR and surrounding areas.

Results

Based on the interviews, participants created pathways from shifting from unwanted current conditions to a desirable future. The pathways discussed a wide array of issues, ranging from both social-political, environmental and economic, highlighting the diversity in participants' perspectives.

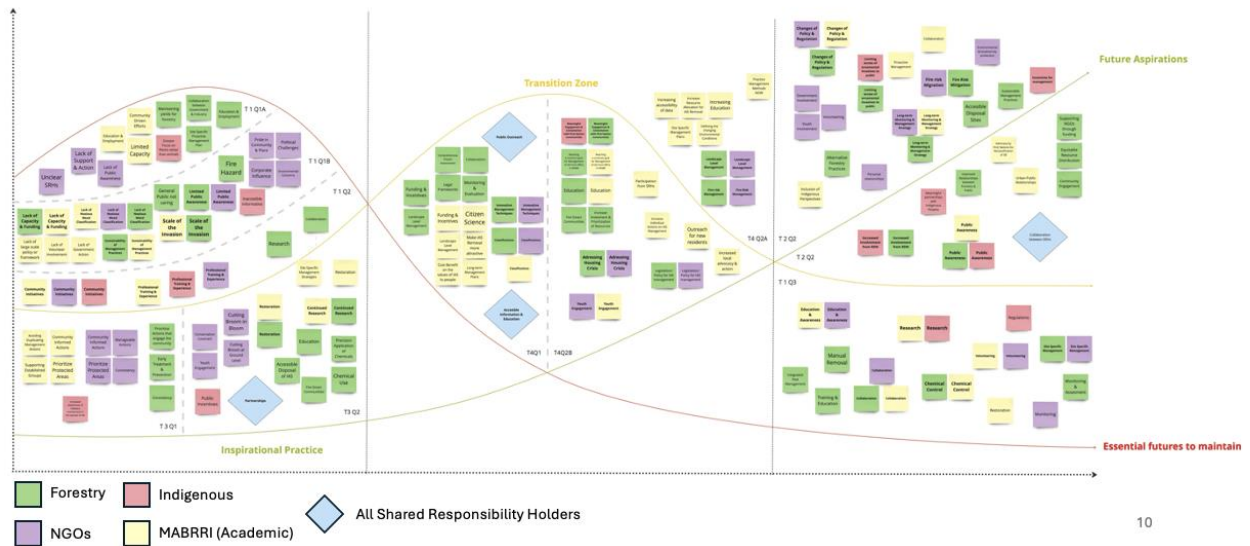


Figure 2. Digitized Three Horizons framework mapping.

Theme 1 – Current Conditions

There were many consistencies on perceptions of the current state of AIS and their management among SRHs in the MABR. When asked their views on the current state of invasive species management practices, some of the highlighted perceptions included lack of support and action by government entities and those in positions of power, lack of public awareness of management actions, limited capacity (funding and physical resources) of entities such as NGOs who are leading management actions and many others (Figure 2). Some respondents raised a concern that there is an unclear role of responsibility within the MABR on who is meant to be spearheading the eradication, mitigation and prevention of alien invasive species. As such, the respondents stated that NGOs have been the ones who have been taking the sole responsibility of AIS. Some perceived drivers of the current state were shared among SRHs, and these included the lack of public awareness, lack of capacity and funding, limited classification of the species – Scotch broom (not classified as a noxious weed), scale of invasion and sustainability of management practices. Other drivers that were highlighted included: influence by corporate bodies and other political challenges, a sense of pride and belonging in the community, environmental concerns, lack of large-scale policies and frameworks to regulate management, lack of action from the government and inaccessible information about the risk and threat that AIS pose on native landscapes. Community initiatives, professional training and experience, and trial and error (continuous research) were among some of the themes shared across SRHs on how they determine which invasive species management strategies are effective. Some themes included collaboration, regulation, and monitoring and assessment of areas (cleared and uncleared). Of the current perceptions on AIS and their management, participants were asked about current practices they think are working well to manage invasive species and should continue in the future. Of the highlighted practices, volunteerism, control (chemical and manual), collaboration, monitoring, and site-specific management.

Theme 2 – Desired future changes

When asked about their aspirations for the future of invasive species management, participants expressed a multitude of factors such as the need for increased awareness of the public about the threats of invasive alien species, the need for long-term monitoring and management strategies, changes to policy and regulation, and fire risk mitigation. These were shared among different SRHs (highlighted by multiple sticky notes in Figure 2). Other themes that were extracted from the responses included a call for more youth to be involved in the actions to combat alien invasive species, inclusion of Indigenous perspectives, proactive management, the involvement of government actors, sustainable management practices and alternative forestry practices that are not disruptive to the environment. Whilst volunteerism is viewed positively by most if not all respondents, there is still a highlighted need for more people to join the actions “We have a really strong volunteer group here, and that works, but there's only so much you can do, right”. Participants were tasked to discuss the kinds of relationships they believe are essential between SRHs to effectively manage invasive species in the region. All respondents highlighted collaboration as the initial step to achieving any of the desired goals. Due to the limited capacity of each SRH, they felt the need to mobilise resources to mitigate the issue of IAS. One responded said “...with our with our MISC group, like we've got kind of a little coalition of environmental groups and all this kind of stuff.”. Other themes that emerged included meaningful relationships and engagements with Indigenous Peoples, community engagement and improved relations between forestry and the public.

Theme 3 – Inspirational practices

There was a lot of diversity in the respondent’s perspectives on how they prioritize actions or practices to improve invasive species management. Some of the highlighted methods included prioritising manageable actions, protected areas and conservation zones, community informed actions, and supporting established groups that are already leading actions. Participants were asked to share examples of innovative or successful invasive species management practices that they have encountered or implemented. A theme that was shared across SRHs was partnerships. While they noted that partnerships may not be viewed as ‘successful’ or as ‘important’ by some, they are crucial for the success of combating invasive alien species and that even though it may be as prominent currently, there are positive trails of its existence at the very local scale (usually among different environmental groups). Another practice that was highlighted by multiple SRHs was restoration of cleared areas and continued research to improve management practices. One other practice that has been used and is ‘successful’, especially for Scotch broom, is clearing the plant when it is blooming and cutting it at ground level as to not disturb the soil (as the species thrives in disturbed environments).

Theme 4 – Transition Zone

When asked to explore what needs to happen to reach the desirable conditions, there were a few points that were shared by the SRHs. Of those, making information accessible, public outreach and education were among the most widely mentioned. Participants suggested that much of the current lack of engagement and involvement is mainly due to people being unaware of what is being done and why it is being done. They also alluded to the lack of classification of Scotch broom as a noxious weed as a barrier to having more actions to combat it. Currently, the species is not on the priority list of IASs to manage by the Provincial government and leads to the lack of initiative from governmental actors. Other pathways included long-term management plans, innovative actions, cost-benefits values of invasive alien species to people, legal frameworks and monitoring and evaluation. Lastly, participants were asked to discuss their approach to adapting invasive species management strategies in response to changing environmental and social conditions. Of the highlighted approaches to environmental changes, a few SRHs mentioned fire risk management and mitigation as being crucial to combating IASs. They alluded to Scotch broom as being a major fire risk species in the area and that they are constantly finding ways to ensure that they prevent the spread of fires by focusing the management of the species. Approaches to changing social conditions included mostly of ensuring that the public is aware of the current conditions and what that means for the future. Given the housing crisis in the area, some SRHs highlighted the need to address homelessness as to limit some of the forest fires that occur. One responded said “... a lot of the times, homeless people will make a fire to protected themselves against the cold and those often lead to forest fires”.

Additional Themes

Besides the previously described themes, which directly answered the interview questions, there were some themes mentioned by the interviewees, which could not be directly related to a particular interview question. Additional themes were also mentioned by subject matter experts guiding the different field trips we conducted during the TILL or during informal gatherings. Still, these additional themes, which are highlighted in this section, are important data and were considered for the compilation of our action plan.

Land Development

Land development, meaning the transformation of land from a natural or semi-natural state into an infrastructurally developed state for purposes such as housing or industry, was mentioned by three interviewees as one of the biggest drivers for the spreading of Scotch Broom. When a developer purchases land, the first step is normally to clearcut the present vegetation and sell the timber to generate income to cover the costs for planning and designing the foreseen infrastructure. In many cases, the soil of these plots

is left exposed and disturbed for a certain period. As this provides excellent growing conditions for pioneer species as Scotch Broom, these plots are rapidly colonised by it after the clearcuts and consequently function as distribution hubs. According to the interviewees' responses, one possible action to mitigate this risk for the future was the implementation of one mandatory removal day per year, on which developers are obliged to remove Scotch Broom on their land. It was also stated that due to social changes and increased valuation of trees and green spaces, clearcut land will lose value in the future and thus might change the current practice towards more retention of trees and vegetation on land purchases for development.

Youth Outreach

Integrating the younger generation into the voluntary work of the stewardship groups was another major additional theme mentioned by three interviewees. According to them, their current work relies solely on the boomer generation, who is mainly retired and thus has more time to engage in voluntary activities. It is suspected that most of the young people are disconnected from nature and prefer to spend time on social media instead of getting involved in voluntary outdoor work. One of the interviewees, who is involved in environmental education in kindergarten and high school experiences great excitement of the young people during outdoor activities and concludes that more opportunities for youth engagement must be provided. However, another interviewee recognises an increasing interest of young people to engage in voluntary environmental work and refers to a seven-day event organised by the MABRRI in collaboration with an environmental NGO and a First Nation to identify and remove invasive species together with children as a positive example on how to engage and motivate young people for this kind of work. Also, a high potential for improving the outreach of the MABRRI to young people but a lack of capacity and resources as barriers to achieve this was identified.

Prescribed Burning

Prescribed burning, meaning the regular controlled burning of the understory in forest to reduce the fuel load, is a traditional forestry practice used by Indigenous Peoples all over the world, was mentioned by one interviewee as a promising tool to manage the increasing risk of fire hazards due to climate change. As barriers for its implementation, the general public aversion against fires was mentioned.

Dependence on Generous Donors

Another finding, that was derived not from the interviews, but the field trips to the French Creek and Englishman River estuaries, was that both ecosystems can only be restored and conserved, including the regular removal and control of invasive species, because both projects were each founded by one generous donor. This emphasises the current dependence of landscape restoration and conservation activities on generous donors and the importance of finding new ways to raise fundings for this purpose.

Encouraging Cross Collaboration

While the presence of IAS within the MABR is an important issue, many SRHs are working to address the issue. One theme that continuously came up between all of the SRH groups was the need for collaborative

partnerships. These ranged from partnerships between the forestry industry and the government to partnerships between multiple different NGOs working towards similar goals. Partnerships between multiple NGOs was highlighted in interviews and during multiple field trips to different conservation areas managed by NGO groups within the MABR. Multiple participants spoke of the benefits of the creation of the Mid-Island Stewardship Committee (MISC). The MISC group is made up of individuals from multiple conservation focused NGOs mainly working within the MABR and representatives from MABRRI. By partnering together, these organisations who would normally be competing for the same resources to fund their activities, are able to build capacity and strategically plan between each other. However, groups like MISC lack representation from other SRHs and are typically only interacting with individuals who share a similar perspective, specifically Indigenous and industry perspectives.

While there is acknowledgement from NGOs in the MABR for the need to bring in Indigenous perspectives, there is considerably less of a desire to work with private land holding companies like Mosaic. The lack of collaboration is likely due to the fact that while the main NGO SRH groups in the MABR are fighting to preserve ecosystems in their communities, the forestry company has an economic interest to harvest the forests which can have downstream impacts to the ecosystems NGOs are trying to protect. However, while there may be some issues where NGOs and forestry may not agree, our results showed many areas for possible collaboration. For example, NGOs, Academia, and forestry all stressed how a change in the classification of Scotch broom to a noxious weed would mean that there would be a legal mandate to remove and contain the spread of the plant. Working together to promote this change would not only benefit all the previously mentioned SRHs but would also build partnerships between groups who have not traditionally collaborated, opening the door for future collaborations. Additionally, both NGOs and forestry see site specific management techniques as being a positive management practice to continue into the future. Both SRH groups saw this strategy as one of the most effective management strategies that can be realistically achieved given the current state of resources and capacity.

Action Plan

From the interviews, considerable information about the perspectives on IAS of multiple SRHs within the MABR were identified, along with future desirable actions. Interviewees also provided in depth information that went beyond the scope of the questions asked, but still provide important context for the perceptions and the impacts of IAS for different SRHs within the MABR.

Action	Responsible	Timeline	Priority	Status	Cost	Notes
Work with SRHs to create educational material in and around the MABR to promote awareness of the UNESCO Biosphere designation and the impacts of IAS in the region.	MABR SRHs	Short term			Low	Aligns with SDGs 11, 15 &17 <u>Pathways:</u> <ul style="list-style-type: none"> - At high traffic Mosaic managed gates, have signage about the impacts of IAS. - Work with schools to include education about IAS and their impacts in the curriculum. - Signage along highways around- the biosphere to highlight the designations and promote awareness of the ecosystems present.
Increase outreach to the public through social media	NGOs	Short term			Low	Aligns with SDGs 15 &17 <u>Pathways:</u> <ul style="list-style-type: none"> - One specific social media account for multiple NGOs that can be managed by a central person. - Information about IAS work parties posted to the MABR social media. - Posting (summer-) job opportunities for IAS management positions. - Each NGO manages their own social media. - Create a hashtag related to IAS awareness/ removal
Work with Mosaic to increase capacity for community outreach.	Mosaic, MABRRI	Medium term			Medium	Aligns with SDG 17 <u>Pathways:</u> <ul style="list-style-type: none"> - Have more opportunities for the public to ask questions. - Provide more communication training for their employees who may engage with the public.

Action	Responsible	Timeline	Priority	Status	Cost	Notes
						<ul style="list-style-type: none"> - Organizing a townhall with community to discuss invasive species management. - Organize a field day for the public to go out and learn about how Mosaic manages IAS.
Partner with the Regional District of Nanaimo (RDN) to increase awareness about IAS and their proper removal and disposal.	RDN, MABR	Long term			Medium	<p>Aligns with SDG 17</p> <p><u>Pathways:</u></p> <ul style="list-style-type: none"> - Educational Workshops & Seminars about IAS removal. - Online Resources & Information Campaigns - Handouts in the mail explaining proper disposal and links to additional resources. - Community engagement events with demonstration. <p>Monitoring usage of disposal services & Reporting System</p> <ul style="list-style-type: none"> - Continuous evaluation and feedback to assess ease of use of disposal services and accessibility. - School Outreach Programs.
Work with SRHs within the MABR to increase the number of core areas within the region.	MABR, First Nations, MOSAIC, NGOs.	Long term			High	<p>Aligns with SDGs 15 & 17</p> <p><u>Pathways:</u></p> <ul style="list-style-type: none"> - Enhance SRH Engagement and Collaboration - Habitat Mapping & Prioritization of areas (e.g. with GIS). - Habitat restoration projects. - Seek collaborative funding opportunities. - Develop long-term conservation plans and strategies. - Conduct community outreach to increase engagement.

Action	Responsible	Timeline	Priority	Status	Cost	Notes
						<ul style="list-style-type: none"> - Purchasing areas of high ecological value. - Landowner donation incentive programs - Establish conservation designations (e.g. OECM, MBS, IBAs...). -
Prioritize the creation of IPCAs within the MABR.	MABR, First Nations, MOSAIC, NGOs	Long term			High	<p>Aligns with SDGs 11&17</p> <p><u>Pathways:</u></p> <ul style="list-style-type: none"> - Meaningful Engagement and Consultation - Policy Advocacy for IPCAs - Supporting Indigenous communities seeking IPCA designations with financial resources and capacity when applying for IPCA designations. - Collaborative long-term planning - Applying for federal and provincial funding opportunities for the creation of IPCAs. - Work with Mosaic to set aside privately owned land to designate as IPCAs.
Work with regional municipalities and industry to conduct an assessment on the future impacts of climate change within the MABR	MABRRI, RDN, MOSAIC	Medium term			High	<p>Aligns with SDG 11, 13, 15 & 17</p> <p><u>Pathways:</u></p> <ul style="list-style-type: none"> - Transdisciplinary Research and Data Collection - Initiate partnership building and dialogue - Integrate findings into policies and long-term planning processes - Hire a consulting company to conduct vulnerability and risk assessments <ul style="list-style-type: none"> o Create list of areas of concern. - Establish monitoring framework for climate change adaptation measures

Action	Responsible	Timeline	Priority	Status	Cost	Notes
Work with the provincial government to classify Scotch broom as a noxious weed	MABRRI, NGOs, Mosaic	Short term			Medium cost	Aligns with SDG 17 Pathways: -
Partner with the regional NGOs to increase public awareness / education of environmental impacts and risks related to current forestry practices	MABR, MABRRI, NGOs	Long term			Low Cost	Aligns with SDG 17 <u>Pathways:</u> <ul style="list-style-type: none"> - Initiate dialogue and collaboration between regional SRHs - Collaborative Research and Analysis of forestry-related environmental impacts and risks - Education and Outreach Programs (e.g. workshops etc.) - Provide Information Materials and Resources - Building and maintaining partnerships and capacity sharing between NGOs - Media and Communication Strategies

Action	Responsible	Timeline	Priority	Status	Cost	Notes
Develop concepts to provide benefits for private forest companies to preserve their forests.	MABR, MABRRI, MOSAIC, RDN	Medium/long term				Aligns with SDG 17 <u>Pathways:</u> <ul style="list-style-type: none"> - Offer incentives to private forest owners (e.g. Tax Breaks, Subsidies and Grants) - Payments for Ecosystem Services (e.g. Carbon Sequestration Credits, Biodiversity Conservation Payments) - Sustainable Forestry Certification - Long-Term Conservation Agreements - Ecotourism Development (alternative revenue stream), e.g. providing carbon offset programmes - Pilot Projects that demonstrate the economic viability of sustainable forestry practices - Initiate Public-Private Partnerships for forest management - Enhance Social Licence Priority – Encourage private forest companies to adopt Corporate Social Responsibility initiatives to enhance their brand - Advocate for Legislative Frameworks that support sustainable forest management and conservation
Initiate discussions on changes to the Private Managed Forest Land Act	MABR, MABRRI, RDN	Long term				Aligns with SDG 15 & 17 <u>Pathways:</u> <ul style="list-style-type: none"> - SRH Workshops and Meetings - Assessment on the current opinions of SRHs in the MABR on the current forestry practices on privately managed lands. - Petition to strengthen environmental regulations in the Private Managed Forest Land Act to be the same as on Crown land.

Action	Responsible	Timeline	Priority	Status	Cost	Notes
						<ul style="list-style-type: none"> - Conduct Research and Policy Analysis - Draft Policy Proposals based on SRH input and research findings
Facilitate implementation of sustainable forestry practices and Indigenous Forest stewardship on Crown land.	MABR, MABRRI, RDN	Medium term				<p>Aligns with SDG 17</p> <p><u>Pathways:</u></p> <ul style="list-style-type: none"> - Implement the Collaborative Stewardship Framework for crownland within the MABR. - Establish a shared vision for sustainable forestry in the MABR - Build task force to promote the implementation of forestry guide according to the modernized forestry policy of BC within the MABR. - Form meaningful collaborative working groups with Indigenous communities - Establish funding mechanisms and grants to sustain capacities and resources - Establish monitoring systems and adaptive management approaches
Start conversations within the MABR roundtable around the effects of current forestry practices on IAS and ecosystem services within the MABR.	MABR roundtable	Short term			Low cost	<p>Aligns with SDGs 15 & 17</p> <p><u>Pathways:</u></p> <ul style="list-style-type: none"> - Collect relevant data, studies and case studies on impacts of current forestry practices - Identify key issues and facilitate collaborative problem-solving - Discuss costs/benefits to biodiversity and landscape level ecology from alternative harvesting practices. - Develop policy recommendations based on findings

Action	Responsible	Timeline	Priority	Status	Cost	Notes
						<ul style="list-style-type: none"> - Discuss opportunities for Mosaic to out more land within the MABR into carbon credit program. - Set up monitoring programs and regular reporting - Facilitate Community Engagement and Public Participation

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