Co-Navigating Value:
An Exploration of Indigenous Environmental Valuation Through Participatory Mapping of Cedar Trees

by

Bethany Woodbridge
B.A., University of British Columbia, 2022

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We acknowledge and respect the Lək̓ʷəŋən peoples on whose traditional territory the university stands and the Songhees, Esquimalt and W̱SÁNEĆ peoples whose historical relationships with the land continue to this day.

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Abstract

Indigenous cultures around the world retain complex ways of viewing, valuing, and interacting with the land rooted in traditional cultures and belief systems. However, assessment of the value of natural landscapes frequently overlooks the ways in which environmental value is perceived through Indigenous knowledge systems. Chapter 2 of this thesis describes a participatory mapping case study conducted in partnership with T'Sou-ke First Nation on Vancouver Island, British Columbia exploring the value associated with the natural environment of T'Sou-ke traditional territory through the lens of cedar trees. Two participatory mapping workshops and one semi-structured interview were conducted, the findings of which were analysed through qualitative coding. Through this process, eight forms of Indigenous environmental value were identified. The significance of these findings is explored, particularly insofar as they highlight the diversity of available environmental benefits and support the growing argument that assessment models which neglect Indigenous ways of knowing will have failed to consider the full scope of potential environmental value. Chapter 3 provides a reflexive discussion of the benefits and challenges of participatory mapping as a research method in Indigenous contexts based on personal observations made during the case study discussed in Chapter 2. Emphasis is placed on the challenges of this research approach for graduate students and other early-career researchers. Suggestions for both experienced researchers and students for managing these challenges are discussed, and a brief set of guidelines for graduate students to assess whether participatory mapping is an appropriate method for their research is put forward. Chapter 4 concludes with a discussion on the merit and potential future applications of the findings in the context of Indigenous environmental valuation research and the development of multi-knowledge system environmental valuation models.

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Glossary

Table 1 - Glossary of key terms appearing in the text, listed in alphabetical order.

Key Term	Definition	Reference
Coast Salish	A group of Indigenous communities located along the Pacific Northwest Coast of Canada and the United States, connected by a common language family, which includes the SO,EȻ (T'Sou-ke), Sc'ianew, lək̓ʷəŋən (Songhees and Esquimalt), WSÁNEĆ (Saanich), and numerous others.	(Suttles, 1990)
Environmental Value	The material and non-material benefits humans gain from interacting with, using, and existing in proximity to the natural world.	(Normyle et al., 2023)
First Nations	A term used in Canada to refer to a self-governing group of Indigenous Peoples officially recognized as 'Indian' under the Indian Act. This does not include Inuit or Métis peoples.	(Cannon et al., 2024)
Indigenous Ecological Knowledge (IEK)	"Knowledge generated by Indigenous Peoples about their surroundings, including relations with other beings, human and other-than-human, which is adapted and transmitted from generation to generation."	(Bhagwat & Thornton, 2021, p. 1)
Indigenous knowledges	The inherently performative and context-specific knowledges held and practiced by Indigenous Peoples, driven by the utilitarian and everyday demands of life. There are multiple distinct forms of Indigenous knowledge, so the plural 'knowledges' is used. Indigenous Ecological Knowledge is included within this term.	(Muller, 2012)
Indigenous knowledge systems	The systems through which Indigenous Peoples around the world generate, use, and pass on knowledges and skills. Closely related to Indigenous ways of knowing.	(Bhagwat & Thornton, 2021)
Indigenous Peoples	A term used to refer to all Indigenous groups around the world, regardless of the geographic and social context in which they exist. In Canada, all First Nations, Métis, and Inuit peoples, as well as those who do not categorize themselves by any of those designations, are all included as Indigenous Peoples.	(UN General Assembly, 2007)
Indigenous ways of knowing	The ways through which Indigenous Peoples come to perceive, know, and understand the world around them. Closely related to Indigenous knowledge systems.	(Berkes, 2009)
Pacific Northwest Coast	A region which spans the coast of North America from the Alaskan panhandle through northern	(Platten & Henfrey, 2009)

	Oregon, and which includes all land west of the coastal mountains.	
Participatory Mapping	A learning, development, planning, and research tool in which members of a community can collectively contribute their own experiences, stories, relationships, and ideas to the creation of a map. These maps can exist in a variety of forms, depending on the needs and interests of the community.	(Lydon et al., 2017)
Straits Salish	A grouping of Coast Salish peoples, including T'Souke (SO,E₵), whose territories encompass the lands and waters of the Johnson, Haro and Georgia Straits.	(Spalding, 2022)
Western science	Systems of knowledge production rooted in the philosophies of ancient Greece and the Renaissance, favouring reductionism and physical law and prioritizing generalizability and replicability of results. Western scientific knowledge is part of a widely accepted political, economic, and cultural system which excludes other forms of knowledge production.	(McGregor, 2021)

A Note on Place Names

Indigenous place names have evolved for generations to describe the memories, stories, and uses tied to landscapes around the world. Colonization disrupted the use of these place names, removing many of them from everyday use through anglicization or replacement with Western names. While these traditional place names are being actively reclaimed through the efforts of Indigenous communities, in Canada and many other colonized countries most landmarks are still colloquially known by their colonial names. For the sake of clarity, I have used colonial place names throughout this thesis to describe locations in Canada and beyond. However, wherever possible I have endeavoured to respect the Indigeneity of these places through the inclusion of their traditional place names.

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Chapter 1 - Introduction

Biodiversity, both functional and genetic, is one of the key earth-system phenomena through which humans can measure planetary health and the progression of climate change (Rockstrom et al., 2009; Sharman & Mlambo, 2012). The accelerating rate of biodiversity loss was identified as early as 2009 as having surpassed safe levels, and now is one of the many ongoing crises contributing to the erosion of earth-system functionality and resilience (Rockstrom et al., 2009). For many years this problem was examined through a lens exclusively based on Western science, to the exclusion of all other knowledge systems (Redvers et al., 2022; Sharman & Mlambo, 2012). As biodiversity loss has advanced, however, it has become increasingly clear that to address this problem requires novel, interdisciplinary approaches co-developed through diverse knowledge systems, including Indigenous ways of knowing (Redvers et al., 2022; Sharman & Mlambo, 2012). Over the course of history Indigenous cultures around the world have developed unique ways of viewing, valuing, and interacting with the natural environment which are rooted in traditional culture and belief systems (Berkes, 2018; McGregor, 2004, 2021; Turner et al., 2000). While Indigenous ways of knowing have for generations been dismissed by Western scientific and political systems, today Indigenous knowledge systems and the peoples and communities to which they belong are increasingly recognized for the vital role they play in the management and protection of biological diversity (Latulippe & Klenk, 2020; Mazzocchi, 2006; McGregor, 2021).

A popular approach to environmental conservation and biodiversity management is environmental valuation, also referred to as natural capital accounting (NCA) and ecosystem accounting (EA), through which the benefits humans receive from interacting with the natural world can be understood and assessed (Normyle et al., 2023; Özdemiroğlu, 2019). This approach

proposes a shift away from thinking of both living and non-living aspects of the environment as mere entities and towards perceiving them as capital assets, recognizing the role they play as tools, materials, and services within our societies and economies (Özdemiroğlu, 2019). The power of environmental valuation lies in its ability to demonstrate the societal value and the economic benefits of investing in (i.e., conserving and restoring) environmental assets (Normyle et al., 2022; Özdemiroğlu, 2019). Governments and institutions around the world have developed numerous economic models for conducting environmental valuation, many of which are based on the *System of Environmental-Economic Accounting – Ecosystem Accounting* (SEEA-EA) recently standardized by the United Nations (Normyle et al., 2022). However, most existing models have either taken an extractive approach, incorporating Indigenous knowledge systems as a data source without input from or collaboration with Indigenous Peoples, or they exclude Indigenous knowledges completely (Normyle et al., 2022, 2023). This deficiency is one which many environmental valuation researchers are currently seeking to resolve, however reconciling the values and ways of knowing of Indigenous Peoples with the environmental valuation approach is an ongoing challenge (Normyle et al., 2023).

Indigenous ways of knowing have distinct characteristics which set them apart from Western science knowledge systems. Indigenous ways of knowing are defined by a holistic understanding of people, culture, and the natural world as deeply and inherently interconnected (Battiste, 2005). Through this worldview, humans are placed relationally within a greater community of living and non-living inhabitants of the earth (Battiste, 2005). Indigenous knowledges are deeply connected to the traditions, cultures, and experiences of specific peoples, and are inseparable from the cultural, spiritual, and ecological place-based contexts that produce them (Battiste, 2005; Latulippe & Klenk, 2020; McGregor, 2004; Turner et al., 2000). This

differentiates Indigenous ways of knowing from those of Western science, which can be contextually and geographically bound but are not inherently so (Latulippe & Klenk, 2020; McGregor, 2004). Additionally, unlike Western science many Indigenous ways of knowing are distinctly "action-oriented", something you do rather than something you can possess or collect (McGregor, 2004, p. 394; Turner et al., 2000). Understanding and respecting the ways in which Indigenous worldviews and knowledge systems differ from those of Western science allows for room within academic discourse for recognition of the validity and importance of Indigenous knowledges (Battiste, 2005; Hunn, 2021; Nadasdy, 2005; Normyle et al., 2022; Usher, 2000). With this in mind, the lens through which environmental value is understood through Indigenous ways of knowing can be explored.

The objective of this master's research project is to better understand and document Indigenous knowledges, cultural practices, and ways of perceiving environmental value through historical and ongoing relationships with the natural world. Specifically, this thesis examines Indigenous environmental valuation through the lens of cedar trees (Western Redcedar - *Thuja plicata Donn* ex D. Don; Yellow-cedar - *Callitropsis nootkatensis* (D. Don) Oerst. ex D.P. Little) as species of incredible social, cultural, and economic significance within the context of the Pacific Northwest Coast (PNWC) of British Columbia, Canada (Klinkenberg, 2020). The goal of this research is to contribute knowledge and insights to the landscape of Indigenous environmental valuation research, assisting with the pursuit of a co-developed natural capital accounting model which recognizes and respects Indigenous ways of knowing.

Chapter 2 begins with a review of the literature discussing how Indigenous Environmental Knowledge (IEK) is understood, the erroneousness of the knowledge integration approach and the landscape of methodological frameworks for knowledge co-production, and the

value of knowledge co-production for managing biodiversity loss, as well as an overview of the contextual landscape of cedar trees within the PNWC. A case study conducted in partnership with T'Sou-ke First Nation on Vancouver Island, British Columbia is then described, in which participatory mapping is used to explore the value associated with the natural environment of T'Sou-ke traditional territory. Cedar trees, identified through early engagement with community members as a culturally significant species and topic of current interest for T'Sou-ke, were used as an analytical lens through which to conduct this examination. Through two participatory mapping workshops and one semi-structured interview, this research identified eight primary forms of environmental value associated by the participating community members with cedar trees and the surrounding natural environment. These findings and their contributions in support of the inclusion of and respect for Indigenous knowledges within environmental valuation systems and models are discussed, and some suggestions are provided for further research expanding on these findings.

Chapter 3 presents a reflexive analysis of the benefits and challenges of participatory mapping as a method for Indigenous environmental valuation research, based on personal observations made by the author of this thesis over the course of the case study described in Chapter 2. These benefits include the ability of this method to break down barriers, facilitate participant and community empowerment, and validate qualitative participatory approaches to Indigenous environmental valuation research. The difficulty of balancing time commitments and managing institutional expectations when conducting community-based participatory research are also discussed, particularly in terms of how these challenges can impact graduate students working in Indigenous contexts. Suggestions are made for dealing with these challenges, and some guidelines are offered to help graduate students interested in working with Indigenous

communities assess whether participatory mapping is an appropriate method for their research. This thesis is concluded in Chapter 4 with a summary of the key findings of the preceding chapters, a discussion of the implications of these findings, and some suggestions for future applications, particularly regarding the co-creation of a novel natural capital accounting model centred on Indigenous knowledges.

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Chapter 2 – “Where would we be without cedar?”: A participatory mapping exploration of Indigenous valuation of forest biodiversity

Abstract

Assessment of the value of natural environments frequently overlooks the complex ways of viewing, valuing, and interacting with the land held by Indigenous ways of knowing. This article describes a participatory mapping case study conducted in partnership with T’Sou-ke First Nation on Vancouver Island, British Columbia exploring the value associated with the natural environment of T’Sou-ke traditional territory. Cedar trees (Western Redcedar - *Thuja plicata Donn* ex D. Don; Yellow-cedar - *Callitropsis nootkatensis* (D. Don) Oerst. ex D.P. Little), identified through early engagement with community members as a culturally significant species and topic of current interest for T’Sou-ke, were used as an analytical lens through which to approach this case study. Two participatory mapping workshops were held in November 2023 and February 2024, and one semi-structured interview was conducted in April 2024 with T’Sou-ke senior leadership. All material collected was analysed through a qualitative coding process, resulting in the identification of eight primary forms of value associated by study participants with cedar trees and the surrounding natural environment of T’Sou-ke traditional territory. The findings explored in this paper highlight the diversity of benefits possible to be received from the environment which are non-standard to environmental valuation systems built exclusively on Western science. These findings also support the growing argument that any assessment of environmental value which neglects Indigenous knowledges will have failed to consider the full scope of available environmental benefits.

1.0 Introduction

As both functional and genetic biodiversity continue to decline around the world it is increasingly important to find new and improved ways to monitor, slow, and ultimately reverse the progression of this catastrophe (Convention on Biological Diversity [CBD], 2022). A common approach to monitoring biodiversity loss and developing methods for conservation and restoration has been to use environmental valuation models (e.g. the United Nations System of Environmental Economic Accounting-Ecosystem Accounting, SEEA-EA) as tools for understanding and documenting the diverse benefits that humans receive from healthy, biodiverse ecosystems (King et al., 2021; Normyle et al., 2022). However, these valuation systems and the forms of value they include have historically been informed by the philosophical lens of Western science, either ignoring Indigenous knowledge systems altogether or integrating them into Western methodologies rather than recognizing the distinctness of Indigenous ways of knowing (Normyle et al., 2022). Indigenous knowledge systems and worldviews play a crucial role in supporting and valuing biodiversity through diverse interconnected approaches often missing in management systems based in Western science (Ogar et al., 2020; Wilder et al., 2016). The literature on these topics is vast and growing and speaks to the deep historical and ongoing relationships between Indigenous Peoples and their environments, including extensive knowledge of the land, of plants and animal species, and of the interrelationships between them (Berkes, 2018; Cronon, 1996; Gadgil et al., 1993; Garibaldi & Turner, 2004; Kimmerer, 2013; McGregor, 2004). While the legitimacy of these ways of knowing continues to be disregarded, the complex benefits which humans receive from the natural environment cannot be fully understood (Bélisle et al., 2021; Ciftcioglu, 2021; Delgado-Aguilar et al., 2017; Klain & Chan, 2012; Normyle et al., 2022).

In this article, we present a case study conducted in partnership with T'Sou-ke First Nation, located on Vancouver Island, British Columbia, Canada using cedar trees (Western Redcedar - *Thuja plicata* Donn ex D. Don; Yellow-cedar - *Callitropsis nootkatensis* (D. Don) Oerst. ex D.P. Little) as an analytical lens through which to explore the ways that participants view the value of the services which they derive from the natural environment (Klinkenberg, 2020). We worked with members of the community to document culturally significant cedar sites in T'Sou-ke traditional territory, their associated cultural practices, & the significance of their relationship with those areas & species through participatory mapping and semi-structured interview. The goal of this research is to contribute to the centering of Indigenous knowledges and ways of knowing in environmental valuation and management of biodiversity loss. This research is not intended to be considered representative of the perspectives and beliefs of T'Sou-ke Nation as a whole, nor a generalized sentiment on the knowledges of Indigenous Peoples. Rather, it is intended to be a snapshot of the value that can be derived from cedar trees and the natural environment, in this place and at this moment in time. Our aim is to provide insight into the complexity of equitable collaborative assessment of environmental value, to demonstrate that environmental valuation systems which exclude or neglect Indigenous ways of knowing will have failed to consider the full scope of possible value, and to support co-operative development of decision-making tools for biodiversity conservation that value & embed T'Sou-ke ways of knowing.

2.0 Literature Review

2.1 Indigenous Knowledges of the Environment: Terminology & Understanding

'Indigenous' is a complex term, which as an identity is understood not based on a rigid definition but on several interweaving factors including but not limited to self-identification at the individual level, historical continuity with pre-colonial and pre-settler societies, and the presence of distinct language, culture, beliefs, and social, economic, or political systems (UN General Assembly, 2007). When referencing Indigenous knowledges, however, particularly in the context of the environment, conservation, and climate change, different terms have emerged over the last few decades that each carry varying connotations (Hunn, 2021; Mazzocchi, 2006). The most frequently used is 'Traditional Ecological Knowledge' (TEK), having emerged at least as early as 1983 with the establishment of the Working Group on Traditional Ecological Knowledge (Hunn, 2021). TEK is used to describe the dynamic ways of knowing attributed to societies with historical and ongoing relationships with a particular land and natural environment and can belong to non-Indigenous peoples as well as Indigenous Peoples (Berkes, 2018; Turner et al., 2000). Other terms in increasingly common use alongside TEK are 'Indigenous knowledge systems' and 'Indigenous ways of knowing' (Table 1). Distinct from TEK, these two terms are both used to distinguish the frameworks through which Indigenous Peoples and cultures observe, discuss, and make sense of the universe from those of Western science (Turner, 2000; Lauer & Aswani, 2009; Berkes, 2018; Rathwell, Armitage, & Berkes, 2015; Johnson et al., 2016; Latulippe & Klenk, 2020; McGregor, 2021).

That the term 'Traditional Ecological Knowledge' has widespread acknowledgement at all is in and of itself an achievement, and the longstanding popularity of its use has been recognized as the first step in validating Indigenous participation in land and natural resource

management (Nadasdy, 2005). However, despite the extensive use of the phrase ‘TEK’, terminology continues to be a matter of debate, with many researchers fearing that a wrong choice in language could be misconstrued and misused as it spreads into popular dialogue and policy (Hunn, 2021; Usher, 2000). Some contend that ‘traditional’ implies a rigid attachment to the past and a lack of adaptability, instead preferring to use simply ‘Indigenous’, as in ‘Indigenous Ecological Knowledge’ (IEK), to acknowledge the importance of communities’ deep historical and cultural connections to particular places (Battiste, 2005; Hunn, 2021; Nadasdy, 2005; Usher, 2000). IEK also encompasses the growth, innovation, and adaptability of Indigenous knowledges in the present day without restriction to what is considered ‘traditional’ (Hunn, 2021; Nadasdy, 2005). It could be argued that the term ‘Indigenous Ecological Knowledge’ excludes communities that may be settler in origin, but which nonetheless have deep multi-generational ties to their local environment (Hunn, 2021; Huntington, 2000; Mazzocchi, 2006). However, there are key differences between Indigenous and settler knowledge systems that warrant their distinction (Battiste, 2005).

Indigenous knowledge systems are characterized by a holistic understanding of people, culture, and the natural world as inherently interconnected, with humans placed relationally within a larger community which includes all living and non-living inhabitants of the environment (Battiste, 2005). Indigenous knowledges are also deeply connected to the traditions, cultures, experiences, and ecological understandings of specific peoples, and are inseparable from the cultural and spiritual place-based contexts that produce them in a way Western knowledge systems are not (Battiste, 2005; Latulippe & Klenk, 2020; McGregor, 2004; Turner et al., 2000). Western science *can* be context-based, but it is not an inherent characteristic (Latulippe & Klenk, 2020; McGregor, 2004). Additionally, unlike Western science, many

Indigenous ways of knowing are distinctly “action-oriented” (McGregor, 2004, p. 394). IEK is something done, not something you possess or collect—it is not merely a body of knowledge, it is the way one relates to Creation and to all life (Hunn, 2021; McGregor, 2004; Turner et al., 2000). However, while some general observations can be made about Indigenous knowledge systems as compared to Western science, it is important to note that Indigenous knowledges are not monolithic; they are unique to the individual communities and cultures which produce them (Battiste, 2005). Grouping all Indigenous knowledges into broad taxonomic categories like TEK or IEK can be problematically reductive for this reason (Battiste, 2005). Nevertheless, these terms can be useful tools in academic writing for differentiating the unique ways of knowing informed by Indigenous worldviews from those of Western science and recognizing the validity and importance of Indigenous knowledge systems through a consistent body of research (Hunn, 2021; Nadasdy, 2005; Usher, 2000).

Accordance with the larger research landscape would incentivize the use of the term ‘Traditional Ecological Knowledge’ to describe Indigenous knowledges of the environment in this article (Nadasdy, 2005). That being said, the scope of our research is concerned specifically with the knowledges and ways of knowing of the Indigenous community of T’Sou-ke First Nation as understood in the present day and is not concerned with the knowledges of those outside of this community. Given this, going forward this article will primarily employ ‘Indigenous Environmental Knowledge’ (IEK) to describe the ways in which Indigenous Peoples relate to and value the natural environment around them, encompassing ecological knowledges and skills as well as the processes through which the environment is known and understood. Also appearing throughout this article are the terms ‘Indigenous knowledge systems’ mentioned above, used to describe the systems through which Indigenous knowledges come to be, and

‘Indigenous ways of knowing’, used to describe the ways in which Indigenous Peoples view and understand the world.

2.2 Moving Past Knowledge Integration & Toward Knowledge Co-Production

Much of the research on IEK and its applications thus far—particularly in the context of the climate crisis and environmental management—has been focused on integrating IEK into existing systems of knowledge production and analysis (Bhagwat & Thornton, 2021; Latulippe & Klenk, 2020; Mazzocchi, 2006; McGregor, 2021; Nadasdy, 2005). This approach has long been favoured by colonial systems for the ease with which it allows Indigenous knowledges to be fit into existing management systems, but it neglects to consider how Indigenous knowledges are viewed by Indigenous Peoples (Bhagwat & Thornton, 2021; Latulippe & Klenk, 2020; Mazzocchi, 2006; McGregor, 2021; Nadasdy, 2005). The Eurocentric understanding of IEK defines it simply as “the knowledge of Native people about their natural environment” (Nakashima, 1993, as cited in McGregor, 2004, p. 393). This understanding reduced IEK to a mere data source, enabling its extraction and incorporation into Western science (Latulippe & Klenk, 2020; McGregor, 2021). However, as previously stated IEK does not refer to a thing that can be possessed or used (McGregor, 2021). Rather, it is a verb, a thing to be done—it is something “that has to be lived in order to be known, understood, and practiced” (McGregor, 2021, p. 2). Because of this, it cannot be ‘integrated’ into other knowledge systems—it cannot truly be removed from the peoples who practice it or the ways of life that sustain it without compromising its integrity (Berkes, 2009; McGregor, 2004; The Indigenous Circle of Experts [ICE], 2018). In attempting to do so, the integration of Indigenous knowledges unintentionally imports hierarchies and distortions into research and policy, decreasing their effectiveness and viability (Lauer & Aswani, 2009). And while Indigenous knowledges are now more widely

understood as “a cumulative body of knowledge, practice and belief evolving by adaptive processes and handed down through generations by cultural transmission,” (Berkes, 2018, p. 8) the instinct to attempt to integrate IEK into Western science as data remains prevalent (McGregor, 2021; Reid et al., 2020).

An additional issue with the knowledge integration approach is that it abandons the local geographical and social context of IEK which differentiates it from modes of thought based in Western science (Berkes, 2009; Nadasdy, 2005; Turner et al., 2000). Unlike the philosophical abstraction typical to Western science, IEK is inherently contextual, inseparable from the cultural and spiritual place-based systems that produce it (Latulippe & Klenk, 2020; McGregor, 2004; Turner et al., 2000). Given this, if we are to continue this path of collaboration between Indigenous and Western knowledge paradigms, it is integral that we adopt an approach which considers IEK as part of and inherently connected to its systems of knowledge production (Berkes, 2009; Latulippe & Klenk, 2020; Nadasdy, 2005). Various methodological frameworks with their roots in Indigenous ways of knowing from around the world have been proposed with this in mind, seeking to retain the integrity of Indigenous ways of knowing and allow them to work together with Western science without one subsuming the other (Reid et al., 2020). From the Haudenosaunee there is the *Kaswentha,* or “Two-Row Wampum”, whose design features two rows of purple beads, each representing the canoes of the Haudenosaunee Confederacy and the ships of Dutch Settlers in 17th Century New York (McGregor, 2002; Reid et al., 2020). These purple rows are each surrounded by white beads representing the shared ‘river’ of existence these two groups travel along. While its origin lies in a historical treaty, this model of coexistence and partnership remains relevant to present day collaboration and knowledge sharing between Haudenosaunee and non-Indigenous peoples (McGregor, 2002; Reid et al., 2020).

Another example comes from the Yolngu peoples of the north-eastern coast of Australia, where the concept of the *Ganma,* or "Two Ways", the confluence of seawater and fresh water, is used to represent the way different knowledge systems can interact without blending into homogeneity (Muller, 2012; Reid et al., 2020). This approach focuses on the creation of a space in which two knowledge systems come together on equitable terms (Reid et al., 2020). Anishinabekwe scholar Robin Wall Kimmerer of Citizen Potawatomi Nation offers the metaphor of "braiding sweetgrass", introduced in her book of the same name (2013). The act of braiding sweetgrass symbolizes the weaving together of Indigenous ways of knowing, the knowledge of Western science, and the story of the knowledge holder who is braiding these three strands together (Kimmerer, 2013). This approach emphasizes the importance of collaboration in knowledge sharing; braiding sweetgrass is an activity best done with a partner, with one person holding the end of the braid steady to allow the other to weave the strands with proper tension, keeping the braid neat and even (Kimmerer, 2013). Similar in concept to the Yolngu people's Two Ways is "Ethical Space", a framework proposed by Cree scholar Willie Ermine of Sturgeon Lake First Nation in Saskatchewan, Canada (Ermine, 2007). This approach is likewise focused on shaping spaces in which groups with different worldviews and knowledge systems can interact and exchange expertise with no one system having more weight or legitimacy than any other (Ermine, 2007; ICE, 2018). Ethical Space is sometimes seen paired with other frameworks for knowledge sharing such as those discussed here, so that they might work in tandem to shape both the environment in which knowledge is shared and the mentality of those involved (ICE, 2018).

The *Waka-Taurua, or* "Double-Canoe" in te reo Māori, is a contemporary framework from *Aotearoa* New Zealand symbolized by two canoes which have been temporarily lashed

together to achieve a goal which neither could accomplish alone (Maxwell et al., 2020; Reid et al., 2020). As with the Two Ways and Ethical Space, this framework seeks to create a space in which the knowledges, values, and actions of both are respected, allowing for collaboration and innovation without forcing two different knowledge systems to merge (Reid et al., 2020). The "Double-Canoe" is rooted in the Māori concept of *Kaitiakitanga*, meaning reciprocated care between the land and its people, making it a framework particularly well suited to applications in environmental co-management alone (Maxwell et al., 2020; Reid et al., 2020). Finally, "Two-Eyed Seeing", or *Etuaptmumk,* is a Mi'kmaw philosophy originally brought forward in 2004 by Albert Marshall, an Elder of Unama'ki-Cape Breton in Nova Scotia, Canada (Bartlett et al., 2012; Reid et al., 2020). The term refers to someone learning to use the strengths of Indigenous Ways of Knowing to see from one eye, and those of Western science to see from the other, allowing them to see more than they could through either eye alone (Bartlett et al., 2012; Reid et al., 2020). While many parallels can be drawn between Two-Eyed Seeing and the other frameworks discussed above, what sets it apart is that at its core Two-Eyed Seeing is about *action* (Reid et al., 2020). Just as Indigenous ways of knowing often view knowledge as a verb—an action—rather than a noun, a central component of Two-Eyed Seeing is the notion that the person who has learned to see with two eyes bears a responsibility to *act* on their new knowledge (Hatcher et al., 2009; Reid et al., 2020). This has made Marshall's framework increasingly applicable to immediate and pressing environmental issues such as climate change and its impacts on the natural world (Littlechild & Sutherland, 2021; Reid et al., 2020; Wright et al., 2019).

Through these examples, we now have a toolbox of critical lenses through which to approach participatory research with Indigenous communities in an ethical, respectful, and more

effective manner which respects the autonomy of the community and rejects academia's long history of extractive research (Latulippe & Klenk, 2020; Mantyka-Pringle et al., 2017; McGregor, 2021). For collaborative research efforts supporting environmental conservation and management in Canada, the frameworks of Two-Eyed Seeing and Ethical Space are particularly helpful (ICE, 2018; Littlechild & Sutherland, 2021; Nikolakis & Hotte, 2022; Reid et al., 2020; Wright et al., 2019). These are methodological approaches rooted in the Canadian political and environmental context, built on the foundations of Mi'kmaw/Unama'ki-Cape Breton and Cree/Sturgeon Lake First Nation Ways of Knowing, developed by Indigenous scholars who are operating within colonial academic systems as well as within their home communities (ICE, 2018; Littlechild & Sutherland, 2021; Reid et al., 2020). This makes these two frameworks particularly well-situated to guide Indigenous participatory research and community engagement on environmental management in Canada (ICE, 2018; Littlechild & Sutherland, 2021; Nikolakis & Hotte, 2022; Wright et al., 2019). In addition, the action imperative foundational to Two-Eyed Seeing aligns well with both the urgency of environmental management issues and with the goals of Community-Based Participatory Action Research (CBPAR), in which collaborative research design and implementation is mobilized into co-action (Latulippe & Klenk, 2020; Littlechild & Sutherland, 2021; Saija & Pappalardo, 2022).

However, these frameworks for bringing together Indigenous knowledges and Western science are not without issues. As with the use of terms like IEK and TEK, there is a risk of creating a monolith of Indigenous communities and Indigenous knowledge systems when research with any Indigenous community is approached through a framework derived from the worldviews of specific peoples (Battiste, 2005). Two-Eyed Seeing, for example, is derived from the Mi'kmaw philosophy of the Unama'ki-Cape Breton Indigenous community, and yet it has

been applied to research with numerous different Indigenous Peoples across Canada and beyond (Wright et al., 2019). There is danger in equalizing all Indigenous knowledge systems through the assumption that the worldviews upon which these frameworks are built will align perfectly with those of any Indigenous partner community (Battiste, 2005). In addition, there is a distinct lack of clarity as to how these frameworks, and Two-Eyed Seeing in particular, are practically applied in research (Wright et al., 2019). Over time, numerous researchers have applied Two-Eyed Seeing to their work and relationships with Indigenous communities in different ways and to different extents (Wright et al., 2019). These discrepancies have led subsequent researchers to attempt to use this framework without a clear procedure for its application (Wright et al., 2019). When enacting collaborative research frameworks such as Two-Eyed Seeing, the Double-Canoe, or Ethical Space, it is integral that they are enacted in an authentic and all-encompassing way with full transparency in reporting the steps taken to do so (Wright et al., 2019).

2.3 The Value of Knowledge Co-Production for Managing Biodiversity Loss

A collaborative approach to knowledge production is well suited to finding solutions to complex environmental challenges, including the ongoing crisis of declining global biological diversity (Gadgil et al., 1993; Ogar et al., 2020). Biodiversity loss is a rapidly escalating catastrophe stemming from a multitude of drivers, including pollution, global warming, urban sprawl, conversion of natural landscapes to agricultural use, and numerous other factors intersecting in compounding ways (Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), 2019; Sharman & Mlambo, 2012). A recommended strategy for understanding and resolving complex environmental problems, including biodiversity loss, is to take a co-operative, multi-knowledge-system approach such as those described by Two-Eyed Seeing, the Two-Row Wampum, and the other co-research frameworks discussed in the previous

section (Henri et al., 2021; Johnson et al., 2016; Ogar et al., 2020; Reid et al., 2020; Sharman & Mlambo, 2012). This type of approach can facilitate an improved understanding of socio-ecological systems, breed greater trust in decision-making and research findings, and enable the implementation of evidence-based conservation action by different decision-making bodies (Henri et al., 2021; Johnson et al., 2016; Rathwell et al., 2015). To that end, co-operative knowledge production and mobilization between Indigenous and non-Indigenous researchers, governance bodies, and communities offers a potential path towards building solutions to problems like biodiversity loss (Henri et al., 2021; Johnson et al., 2016; McKinnon & Long, 2022; Normyle et al., 2022). With multiple different ways of gathering knowledge, analysing problems, and developing solutions at our collective disposal, the complex nature of any environmental problem can be more fully understood, and its possible solutions more readily determined (Berkes, 2018; Latulippe & Klenk, 2020; Lauer & Aswani, 2009; McGregor, 2004; Rathwell et al., 2015).

The development of effective biodiversity conservation methods is made especially difficult by the highly variable nature of biodiversity loss as a phenomenon (IPBES, 2019; Sharman & Mlambo, 2012). While there are generally observable key drivers of biodiversity loss, namely loss of territory due to encroachment or pollution, the direct causes of this problem and the ways in which it manifests are largely dependent on the local geographical context in which it is occurring (IPBES, 2019; Sharman & Mlambo, 2012). Climate conditions, elevation, latitude, level of nearby human activity and development, and numerous other factors can contribute to determining the base biodiversity of an ecosystem, and by extension can be key factors contributing to biodiversity loss (Sharman & Mlambo, 2012). This characteristic, however, makes IEK and Indigenous ways of knowing particularly well suited to developing

solutions to climate change problems like biodiversity loss (ICE, 2018; Berkes, 2018; McGregor, 2004). Indigenous knowledges have been developed over generations by communities living in close physical and spiritual contact with particular places, allowing the accumulation of centuries of detailed observations of its plants, animals, and ecosystems (Berkes, 2018; Chanza & Musakwa, 2022; Johnson et al., 2016; Rist & Dahdouh-Guebas, 2006). It is this attribute which makes IEK so powerful as a lens through which to examine contextually-dependent problems such as biodiversity loss. Like IEK, the biological health and stability of a region or an ecosystem is tied to the characteristics of that particular place (Rockstrom et al., 2009; Sharman & Mlambo, 2012). IEK offers tools through which to develop solutions to environmental problems rooted in the specific conditions in which that problem is occurring (Gadgil et al., 1993; Johnson et al., 2016).

IEK is particularly relevant to environmental conservation and management cases which occur at the intersection of 'natural' and 'human' environments (Bélisle et al., 2021). While all ecosystems on earth are or have been at some point in history significantly impacted by human activities, ecosystems which are not geographically or socially attached to human settlements can still be analysed through a primarily ecological lens (Davenport & Anderson, 2005; Dearing et al., 2006). In locations where human communities interact frequently with and have longstanding ties to the adjacent natural environments, it is no longer possible to view the conservation and management of these environments as a wholly ecological problem (Davenport & Anderson, 2005; Dearing et al., 2006). In these complex human-environment systems, conservation becomes a problem both ecological *and* sociological, where understanding the ways people use, interact with, and derive meaning from those areas is just as important as understanding the characteristics of the physical landscape lens (Davenport & Anderson, 2005; Dearing et al.,

2006). As a way of knowing that encompasses both ecological and socio-cultural perspectives, IEK is ideally situated to act as a lens through which the complexity of human-environment systems can be more fully understood (Bélisle et al., 2021; Berkes, 2018; McGregor, 2021). IEK understands "the relationship of living beings (including humans) with one another and with their environment" (Berkes, 2018, p. 8) as being inherently intertwined, it does not separate humans from the environment in which they are situated (Bélisle et al., 2021). This inherent intertwining of ecological and socio-cultural knowledges can offer invaluable insight into understanding conservation and management problems occurring at this same intersection (Ernoul et al., 2018; Klain & Chan, 2012; Normyle et al., 2022).

For some conservation and management tools, effectiveness in landscape contexts – Indigenous and otherwise—where communities hold deep and longstanding relationships with the environment relies on expanding the knowledge base used to develop these tools (Normyle et al., 2022, 2023). The research discussed in this article contributes to the field of environmental valuation, which seeks to account for the numerous socio-cultural and ecological forms of value associated with and benefits received from the natural world to encapsulate their worth beyond pure economic value (King et al., 2021; Normyle et al., 2022, 2023; Özdemiroğlu, 2019; Urzedo & Robinson, 2023). Environmental valuation is intended as a tool for designing more effective and equitable conservation and environmental management strategies through assessment of the benefits humans receive from natural landscapes (King et al., 2021; Normyle et al., 2022; Özdemiroğlu, 2019). However, deciphering how to ascertain and evaluate all forms of value associated with an area, ecosystem, or species is a problem in its own right (Brown & Weber, 2012; Delgado-Aguilar et al., 2017; Normyle et al., 2022). Assessment of environmental value through the lens of any one knowledge system—in this case, Western science—will inevitably

neglect to adequately consider forms of value which are not prioritized within the socio-cultural landscape from which that system originates (Bélisle et al., 2021; Normyle et al., 2022).

There is a growing body of research supporting the inclusion of Indigenous knowledges and perception of environmental benefits in environmental valuation (Normyle et al., 2023; Urzedo & Robinson, 2023). This typically takes the approach of attempting to reconcile Indigenous ways of knowing with environmental values derived through Western science, limiting the extent to which Indigenous environmental values can be fully recognized (Urzedo & Robinson, 2023). In their 2023 systematic literature review, Anna Normyle, Michael Vardon, and Bruce Doran identify a need for further research which engages Indigenous communities in collaboratively developing pilot environmental valuation models which are consistent with Indigenous ways of valuing the environment, as well as those of non-Indigenous peoples. This is supported by an additional literature review from Danilo Urzedo and Catherine Robinson examining recognition of Indigenous worldviews within ecosystem valuation frameworks, who also offer evidence of Indigenous groups having contested Western-science-based valuation models to assert the legitimacy of their own knowledge systems (2023). Drawing our understanding of environmental value from multiple knowledge systems allows for a more comprehensive understanding of how humans prescribe value to the environment (Bélisle et al., 2021; Normyle et al., 2022, 2023; Urzedo & Robinson, 2023).

2.4 Introducing Cedar as a Culturally Significant Species on the Pacific Northwest Coast

This case study describes a community-based research project in partnership with T'Sou-ke First Nation exploring forms of value associated with cedar trees, specifically Western Redcedar (*Thuja plicata Donn ex D. Don)* and Yellow-cedar (*Callitropsis nootkatensis (D. Don) Oerst. ex D.P. Little*) (Klinkenberg, 2020). Throughout this article, these two species of tree may

be referred to individually by name, or collectively as simply ‘cedar’. These are trees of incredible significance for T’Sou-ke and throughout the Canadian and American Pacific Northwest Coast (PNWC), a region which spans from the Alaskan panhandle through northern Oregon and includes all land west of the coastal mountains (Klinkenberg, 2020; Platten & Henfrey, 2009; Pojar & MacKinnon, 2016; Spalding, 2022; Turner et al., 2000). The high prevalence of cedar trees within the PNWC means that for most Indigenous Peoples of this region cedar is a vital part of their cultures and a heavily relied-upon resource (Pojar & MacKinnon, 2016; Spalding, 2022; Turner et al., 2000). T’Sou-ke and other Coast Salish communities, like countless Indigenous Peoples around the world, have spent generations tending and modifying the ecological landscape around them to harvest and use plants such as *T. plicata* and *C. nootkatensis* on significant geographical and temporal scales (Platten & Henfrey, 2009; Spalding, 2022; Turner et al., 2000; Zahn et al., 2018). Indigenous Peoples in the PNWC have not traditionally used terms such as ‘cultivation’ and ‘management’ to refer to these activities, instead using language such as ‘caring about’ or ‘tending to’ as an indication of a more reciprocal and obligatory relationship (Spalding, 2022; Turner et al., 2000; Zahn et al., 2018).

Referred to as the ‘Tree of Life’, cedar has provided shelter, clothing, tools, transportation, art, and sustenance for Indigenous Peoples for thousands of years, from birth to death, and continues to play a pivotal role in Indigenous communities in the present day (Pojar & MacKinnon, 2016; Spalding, 2022; Turner et al., 2000). Soft and easy to split yet durable and rot-resistant, cedar wood can be adapted to almost any use, including housing, canoes and paddles, totem poles, and numerous other applications (Spalding, 2022; Turner et al., 2000). Thin, smaller branches and roots can be used as ropes, woven into baskets, used for food preparation, and more (Turner et al., 2000). Cedar bark, removed by making wide cuts near the

base of the tree and pulling up long vertical strips, can be split into strands and woven to create everything from rope to clothing (Pojar & MacKinnon, 2016; Turner et al., 2000). Clothing made from cedar bark was especially important in the cool, wet climate of the PNWC, against which water-and-mold-resistant cedar provided protection (Spalding, 2022). Yellow-cedar bark is particularly valued for weaving clothing, blankets, and other textiles due to its softness compared to Redcedar and its bright yellow colour, which makes for an appealing contrast against Redcedar's darker tone when woven together (Pojar & MacKinnon, 2016; Turner et al., 2000).

In addition to the integral role cedar plays in Indigenous cultures throughout the PNWC, these trees are also a key resource within the British Columbia (BC) forestry sector and the economy of Canada as a whole (Antos et al., 2016; Klinka & Brisco, 2009). The majority of Canada's timber harvest revenue comes entirely from BC, which in 2018 held the largest standing stock of Western Redcedar in the world (Antos et al., 2016; Devisscher et al., 2021; Gregory et al., 2018). As of 2011, it was estimated that cedar volume in BC's Crown forests was approximately 750 million cubic metres, the majority of which is concentrated on the coast and roughly a third of which is found in designated timber production areas (Antos et al., 2016; Klinka & Brisco, 2009). In 2017, the province contributed approximately CAD 872 million in timber revenue and 140,000 jobs in the forestry sector, made possible by its roughly 22 million hectares of forest designated for timber production (Devisscher et al., 2021). In the past two decades the percentage of the provincial GDP stemming directly from natural resources—including lumber—has declined significantly as compared to previous years (Cross, 2024). However, a significant portion of BC's revenue now depends on local residential housing developments, which are reliant on cedar as a material (Klinka & Brisco, 2009). As timber species both *T. plicata* and *C. nootkatensis* are very valuable, prized for their unique colour,

aromatic features, lightweight and soft texture, decay resistance, and longevity (Antos et al., 2016; Gregory et al., 2018; Klinka & Brisco, 2009). While other timber trees found in BC are typically harvested in greater numbers (e.g. Western Hemlock), cedar's high value-to-volume ratio makes it a significantly more desirable forestry product—Redcedar products typically sell for more than double the price of other North American commercial conifers (Antos et al., 2016; Gregory et al., 2018; Klinka & Brisco, 2009). Although less common and thus harvested in lesser numbers, its unique colour and particular softness make Yellow-cedar particularly desirable in certain markets; Japan, for example, is one of the top importers of BC cedar products and shows a strong preference for Yellow-cedar over Red (Gregory et al., 2018).

The interest of BC and Canada in cedar as an economic resource often conflicts with that of the Indigenous Peoples of BC, particularly those whose traditional territories lie in cedar-rich coastal forests (Nikolakis & Nelson, 2015; D. B. Tindall & Trosper, 2013). Since colonization, the Indigenous Peoples of BC have consistently been excluded from the socio-economic benefits of the forestry sector (Nikolakis & Nelson, 2015; Riggs et al., 2023; D. B. Tindall & Trosper, 2013). Opportunities for Indigenous communities to conduct their own small-scale forestry operations have increased as the BC government has sought to address this inequity through the provision of increased forest harvesting tenures to First Nations (Nikolakis & Nelson, 2015; Riggs et al., 2023). Today many Indigenous communities rely on income from their own logging operations within their territories, in addition to the harvest of cedar for traditional use (Nikolakis & Nelson, 2015; Riggs et al., 2023; Spalding, 2022). However, in most cases, the majority of harvesting tenures on Indigenous traditional territory are still owned by colonial logging corporations, not by First Nations (Nikolakis & Nelson, 2015; Riggs et al., 2023; D. B. Tindall & Trosper, 2013). This exclusion has restricted Indigenous communities' ability to share in the

benefits generated by the Canadian commercial forestry sector, producing tension between First Nations and colonial governments and logging corporations (Nikolakis & Nelson, 2015).

While very similar species, there are key biological and physiological differences which set *Thuja plicata* and *Callitropsis nootkatensis* apart (Pojar & MacKinnon, 2016). Western Redcedar are large trees easily identified by their grey-to-reddish-brown fibrous bark, which can be peeled off the tree in long strips, and by their scaled dark-green needle-like leaves (Klinkenberg, 2020; Pojar & MacKinnon, 2016). Compared to *T. plicata,* the bark of *C. nootkatensis* is lighter and closer in colour to a greyish-brown than red (Klinkenberg, 2020; Pojar & MacKinnon, 2016). Unlike *T. plicata*, the bark of Yellow-cedar is softer and does not peel off in long strips, although short strips are still manageable (Klinkenberg, 2020). As their names imply, the wood of Western Redcedar is a vibrant rust red, while that of Yellow-cedar ranges from pale to vibrant yellow (Turner et al., 2000). Both species prefer moist-to-wet soil, growing best in locations such as coastlines, alluvial sites, bogs, and transitional bog-forests (Klinkenberg, 2020; Pojar & MacKinnon, 2016). Yellow-cedar tends to range from southern British Columbia into Alaska, and is most common in higher elevations, while the range of Redcedar extends further south into Washington and Oregon and is mainly seen in low-to-mid elevations (Klinkenberg, 2020). However, on the west coast of Vancouver Island—where the research discussed in this article occurs—Yellow-cedar can occasionally descend to sea level, resulting in a greater intersection of Yellow-cedar and Redcedar habitat in this region than is typically seen (Klinkenberg, 2020; Pojar & MacKinnon, 2016).

Both *Thuja plicata* (Western Redcedar) and *Callitropsis nootkatensis* (Yellow-cedar) play important roles in shaping the ecosystems of the PNWC, although Redcedar occupies a significantly more prominent position within forest stands (Antos et al., 2016; Klinka & Brisco,

2009; Pojar & MacKinnon, 2016). Ecosystems receive benefits from these trees in numerous ways, including soil quality amendment from litterfall, increased diversity of understory vegetation, increased structural diversity within the forest stand, improved soil stability due to their extensive shallow root systems, and improved rate of self-pruning in upper canopy trees such as Douglas fir (Klinka & Brisco, 2009). However, due to Yellow-cedar not typically occupying a dominant position within forest stands the ecosystem benefits they contribute are less noticeable (Antos et al., 2016). In addition, Yellow-cedar populations have undergone a dramatic decline in recent decades driven by shifting climate, particularly in low-elevation coastal areas (Antos et al., 2016; Wooton & Klinkenberg, 2011). This has decreased their range overlap with Western Redcedar, which has not been observed to be experiencing a comparable decline, and has further reduced the role Yellow-cedar plays in supporting coastal forest stand health compared to that of Redcedar (Antos et al., 2016).

It is within this complex web of cultural, economic and ecological importance that any examination of cedar trees in coastal BC and the surrounding PNWC must be situated (Antos et al., 2016; Garibaldi & Turner, 2004; Klinka & Brisco, 2009; Spalding, 2022; Turner et al., 2000; Zahn et al., 2018). In the case study described in the following section, we worked with members of an Indigenous community within the PNWC to explore the environmental value associated with cedar trees. Assessment of the environmental value of cedar through approaches based exclusively in Western science cannot encompass the full scope of environmental benefits provided by these species. The contextual complexity within which these trees exist requires governments, universities, and Indigenous communities to take a co-operative, multi-lens, multi-knowledge system research approach for an honest and ethical examination of cedar's value to take place.

3.0 Case Study: The Value of Cedar with T’Sou-ke First Nation

3.1 Study Area

This research occurred within the social, political, and ecological context of the Pacific Northwest Coastal region, which spans from the Alaskan panhandle across British Columbia and through to northern Oregon, and which includes all land west of the coastal mountains (Pojar & MacKinnon, 2016; Spalding, 2022). The ecosystems found here are some of the most distinctive and diverse on earth, featuring lush temperate rainforests, high-altitude alpine slopes, the unique Garry Oak meadow, and more (Pojar & MacKinnon, 2016; Zahn et al., 2018). Uniting this ecological diversity is the ever-present Pacific Ocean to the west, the border of mountain ranges to the east, and the consistently rainy and mild climate (Pojar & MacKinnon, 2016; Zahn et al., 2018). The Coast Salish peoples of this region share many cultural, linguistic, and socio-economic traits, with their common geography and overlapping paths of travel having encouraged the development of social and economic relationships between many neighbouring communities over the generations (Spalding, 2022; Suttles, 1990). Particularly complex kinship ties exist between Straits Salish peoples, a coastal grouping of communities based around the Johnson, Haro, and Georgia straits and united by a common language family, which includes the SO,EĆ (T’Sou-ke), Sc'ianew, lək̓ʷəŋən (Songhees and Esquimalt), WSÁNEĆ (Saanich), Lummi, Klallam, and Samish peoples (Spalding, 2022; Suttles, 1990).

This research was conducted in partnership with T’Sou-ke First Nation, whose traditional territory encompasses a large portion of the southwest coast of Vancouver Island (Fig. 1). Their territory is located just a short distance from the provincial capital of Victoria and encompasses the towns of Sooke (whose name is an anglicization of T’Sou-ke), Shirley, and Jordan River, as well as Sooke Potholes Provincial Park and the Capital Regional District Reservoir, which

provides water to Victoria and the surrounding communities (Spalding, 2022). Though not considered part of T'Sou-ke traditional territory, the northwest coast of Washington State, USA, was frequently visited by canoe for hunting and foraging before the enforcement of colonial national borders cut off access to the area (Spalding, 2022). The ecology of T'Sou-ke territory is largely consistent with the temperate rainforests typically seen along the west coast of Vancouver Island and differs from the Garry Oak meadows characteristic of Victoria and the southeastern parts of the island (Pojar & MacKinnon, 2016). T'Sou-ke Nation is one of the signatories of the Douglas Treaties, a series of 14 treaties between Sir James Douglas, governor of the Fort Victoria Colony, and many Indigenous communities on southern Vancouver Island (Spalding, 2025). However, T'Sou-ke has asserted that when signing the Douglas Treaty their ancestors believed it was about working collaboratively with the crown to manage the resources within T'Sou-ke

Figure 1 - Map of T'Sou-ke Nation traditional territory as submitted to the BC Treaty Commission (Spalding, 2022).

Territory, and did not interpret it as an agreement relating to land ownership (Spalding, 2025). It is the official stance of T'Sou-ke Nation that their traditional territory remains unceded (Spalding, 2025). Despite this, today their land is almost entirely occupied by government, corporate, or private tenures (Spalding, 2022). T'Sou-ke, meanwhile, was granted two small reserves along Sooke Inlet totalling just 165 acres, an area nowhere near sufficient to sustain the residential, economic, or cultural needs of their population (Spalding, 2022; T'Sou-ke First Nation, 2024). Some parts of T'Sou-ke territory have been legally reclaimed through the Nation's purchase of a few small lots, most of which are used for commercial logging by the Nation, but the majority of T'Sou-ke traditional territory remains outside their legal control (Spalding, 2022). Unless otherwise specified, any mention of T'Sou-ke lands or territory in this article refers to their unceded traditional territory and not to their reserve lands.

3.2 Research Partnership

T'Sou-ke First Nation has been a frequent partner of the University of Victoria in conducting co-research in their territory and with their community, particularly on projects engaged in ethnobotany, ecological monitoring, and conservation. The partnership between the co-authors and T'Sou-ke Nation spans several years through research conducted by Spalding (2022) and other cultural activities with C. Tremblay in 2019. Interest was expressed in exploring ecological valuation systems and the relationship between T'Sou-ke members and the biodiversity of their territory. Through initial engagement over the summer of 2023, it was agreed that cedar trees and their associated issues (e.g. logging, drought) were of particular interest and high concern to the community. Together, we agreed to focus the scope of this research on cedar trees.

This research was guided by the principles of respect and integrity outlined in the "Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans", particularly "Chapter 9 – Research Involving the First Nations, Inuit, and Métis Peoples of Canada", as approved by the University of Victoria (Canadian Institutes of Health Research et al., 2023). We the authors have endeavoured to respect the T'Sou-ke Nation community's rights and wishes regarding data ownership, control, access, and possession throughout all aspects of our collaboration, and have aimed to come together with our research partners in a physical and intellectual environment shaped by mutual respect and appreciation. We have carried these ideals throughout the process of conducting the research discussed in this article and will endeavour to continue to do so throughout all projects which may arise from this ongoing relationship of knowledge co-production in future.

3.3 Methods

3.3.1 Participatory Mapping Workshops

Participatory mapping, also known as community mapping, is a learning, development, planning, and research tool in which members of a community can contribute their own experiences, stories, relationships, and ideas to the creation of a map (Cochrane & Corbett, 2020; Lydon et al., 2017; Saija & Pappalardo, 2022). Many researchers have emphasized the transformative power of the mapping process itself over that of the map product, highlighting the potential these exercises hold to empower through the affirmation of shared experiences and facilitation of co-operative dialogue between community members (Cochrane & Corbett, 2020; Lydon et al., 2017; Saija & Pappalardo, 2022). The process through which this is undertaken can vary greatly, as can the resulting maps. These "collective re-presentations of geography and landscape" (Lydon et al., 2017, p. 1) can be created through a range of tools and techniques,

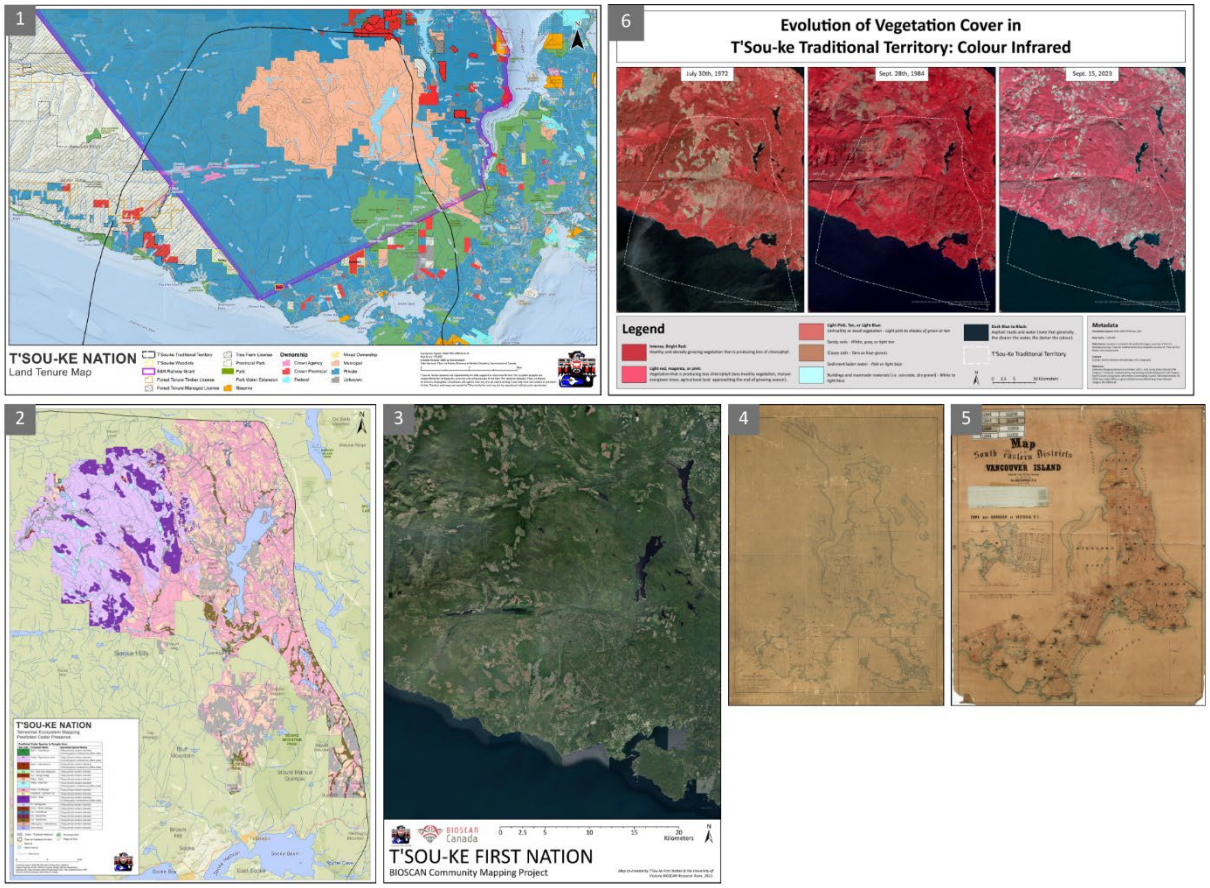

Figure 2 - Six maps used during participatory mapping workshops. From top left, counterclockwise: 1) Land Tenure Map (Spalding, 2022); 2) Predicted Cedar Prescence (Spalding, 2022); 3) unmarked satellite imagery basemap of T'Sou-ke Traditional Territory (created by B. Woodbridge); 4) "South Eastern districts of Vancouver Island" (Pemberton, 1855); 5) "Map of the South-eastern Districts of Vancouver Island" (d'Heureuse, 1860); & 6) comparison of vegetation cover in T'Sou-ke Territory with colour infrared imagery (created by B. Woodbridge).

including adding to existing maps, historical photographs, and aerial images ('sketch mapping'), building participatory geographic information systems (PGIS), and conducting drawing exercises ('mental mapping') (Boschmann & Cubbon, 2014; Cochrane & Corbett, 2020; Denwood et al., 2022). The maps produced can look very much like traditional maps, often involving participant contributions being overlaid over an existing basemap (Lydon et al., 2017). They can also look very non-traditional, manifesting as abstractions representing themes, values, and ideas shared by the community (Robinson et al., 2016).

Early in project planning with T'Sou-ke Nation, interest was expressed in using participatory mapping in this case study. Different variations of this tool have been used in

community-engaged environmental management research, particularly in the assessment of characteristics such as value or risk (Ernoul et al., 2018; Klain & Chan, 2012; Moore et al., 2017). Participatory mapping has also been established as a tool for co-operative knowledge production with Indigenous communities, both for environmental management and for other research and community development goals (Delgado-Aguilar et al., 2017; Gill et al., 2014; Robinson et al., 2016). Two workshops were held in November 2023 and February 2024 with approximately twenty participants total, six at workshop #1 and twenty at workshop #2 and all participants from workshop #1 having returned for the second workshop.

These workshops were conducted using a sketch mapping format in which participants were invited to contribute to large-scale printed maps using numbered stickers to mark locations of significance and paper capture sheets to record descriptions, knowledge, and ideas associated with those locations (Boschmann & Cubbon, 2014; Cochrane & Corbett, 2020; Denwood et al., 2022; Lydon et al., 2017). Six maps were brought to each workshop for participants to interact with and annotate (Fig. 2): P. Spalding's map of predicted cedar presence in T'Sou-ke traditional territory and of land tenure in T'Sou-ke territory and the surrounding area (2022), two historical maps of southeastern Vancouver Island retrieved from the University of Victoria Library digital collection, a comparison of vegetation cover in T'Sou-ke Territory at 3 points in time using colour infrared satellite imagery (created by B. Woodbridge for the workshops), and an unmarked basemap consisting of high-resolution satellite imagery of T'Sou-ke territory (also created by B. Woodbridge for the workshops). Both workshops were guided by the same set of questions, which asked participants to consider where significant cedar sites were located in their territory, why cedar was important, and how these trees contributed to their community's wellbeing (Appendix A).

Workshop #1: November 2, 2023

Workshop #1 was held in T'Sou-ke staff offices, with approximately six attendees from T'Sou-ke Nation and 3 facilitators from the University of Victoria. Attendance at this first workshop was limited to employees of T'Sou-ke Nation government. After a brief explanation of the participatory mapping process and the 6 guiding questions, participants were invited to ask questions about the maps, share any responses they had thought of to the guiding questions, point out locations of interest on the maps and share what they knew about them, and to share any other stories or knowledge they felt would be relevant. Stickers were used to record locations pointed out by participants on any of the six maps, and paper capture sheets were used to record notes on the associated story or information. The capture sheets were also used to record any knowledge shared which was not associated with a particular location; these entries were numbered but their corresponding stickers were discarded. Though eager to ask questions about and interact with the maps, the participants were hesitant to place stickers or use the capture sheets themselves. These tasks were taken on by the facilitators to allow the participants to engage in the mapping process at their own pace and comfort level. Stickers were placed by the facilitators at the direction of participants, and any information shared was written down by a facilitator on the capture sheets. The workshop ran for several hours over the course of the morning and concluded with a group meal, allowing for participants and facilitators to socialize and reflect on the participatory mapping process. With overall positive reviews from the workshop participants and their agreement to proceed with a second mapping session, the next workshop was planned for the new year.

Workshop #2: February 22, 2024

Workshop #2 was held on the evening of February 22nd, 2024, at the T'Sou-ke Nation Bandhall, with approximately twenty attendees from the nation, four facilitators from UVic, and

one facilitator from T'Sou-ke. Attendance at workshop #2 was not limited, all interested community members were welcome to participate. The same process of stickers and capture sheets was used as in the first workshop. This workshop began with a group meal, during which time the participants could mingle with the facilitators, explore the six maps, and ask questions about what the workshop would entail. Comfort with the mapping process varied; some participants placed their own stickers while others directed the facilitators to place stickers on their behalf. All capture sheet notes were taken by facilitators. This continued for approximately one hour before concluding for the evening. The participatory mapping process was well received by participants, and while it had been decided that this would be the last workshop for this project there was interest expressed in having more mapping workshops in future.

Semi-Structured Interview

A member of T'Sou-ke Nation government identified by community members as a key knowledge holder with insight and expertise relevant to our research was unable to attend the mapping workshops, necessitating the arrangement of an alternative time to speak to this individual. A semi-structured interview was organized and was conducted on April 9, 2024, in the T'Sou-ke Band Office. The questions used as a guide in the participatory mapping workshops were adapted for the interview to better suit the specific expertise of the interviewee and address gaps in what was discussed during the workshops (Appendix A). This interview lasted for approximately one hour, including a brief visit to the nearby woodcarving workshop so that the interviewee could demonstrate examples of T'Sou-ke's hand-carved canoes.

4.0 Analysis

The process of analysing the data collected during each of the participatory mapping workshops began with copying all physical map markers to a digital map in QGIS (Fig. 3) as point features. The capture sheet notes paired with each map marker were assigned to each point as attributes. Any notes taken during both workshops that were not paired with a map marker were added to the feature layer's attribute table manually, without an associated point feature. Preliminary observations of the recorded capture sheet notes were used to expand the attribute table to include characteristics such as whether cedar trees were explicitly discussed, what type of cedar, any other species mentioned, the activity or use mentioned (if any), and any issues or concerns expressed (if any). The process of creating this map and recording these initial

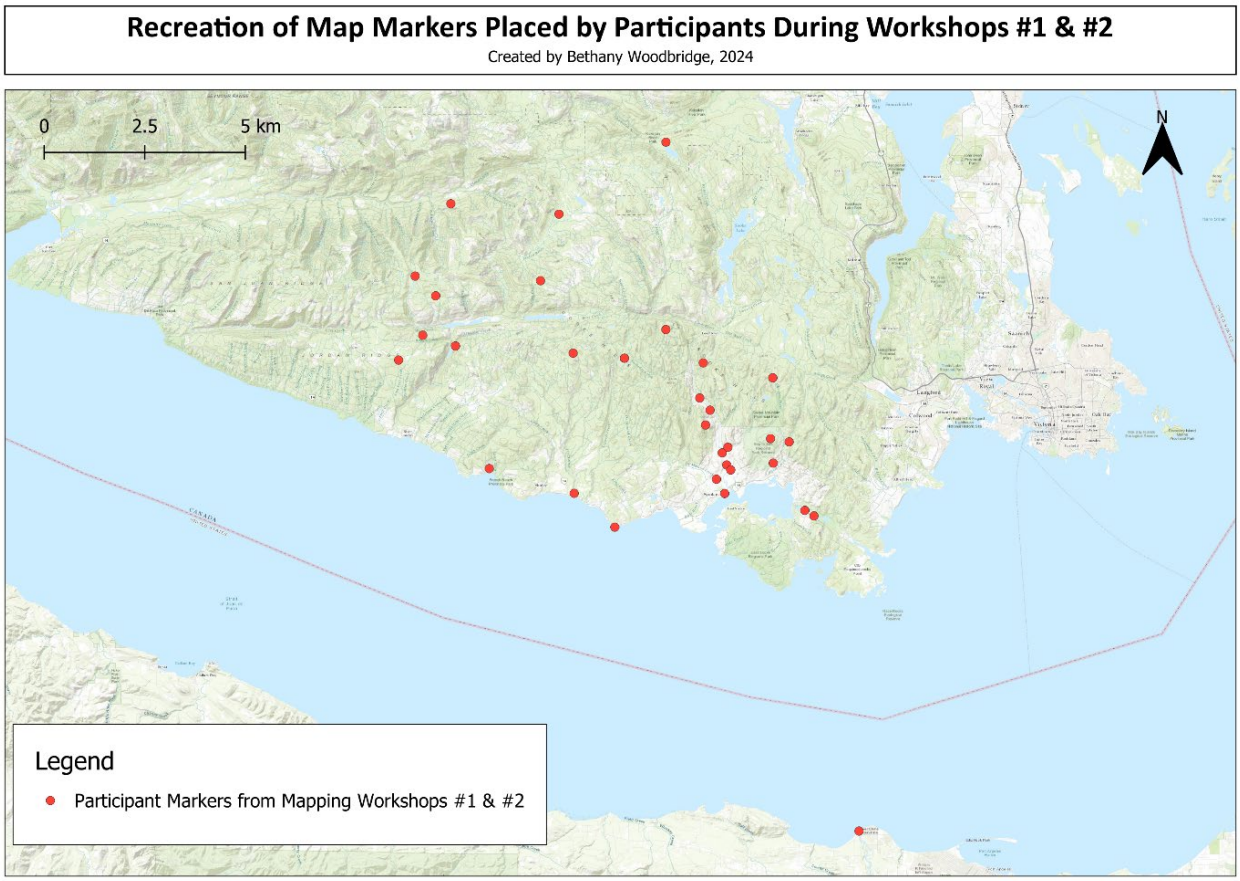

Figure 3 - Digital recreation of all map markers placed by T'Sou-ke Nation participants during Workshop # 1 on November 2, 2023 & Workshop #2 on February 22, 2024. Created by Bethany Woodbridge in QGIS.

observations served multiple purposes: to consolidate all data produced to one location in digital storage, to eliminate the risk of damage to the physical maps and capture sheets, to familiarize the researcher with the data and what to look for when beginning inductive coding, and to create a map product representing the results of both workshops for use at T'Sou-ke Nation's discretion. Ownership of this digital QGIS map file is to be returned to the Nation at the conclusion of this case study.

After adding all data from each workshop to the digital map in QGIS, the capture sheet notes then underwent the first pass of qualitative coding. Open coding was conducted by hand, working line by line to identify key concepts, with all capture sheet notes taken during workshop #1 as per the methodology described in Anselm L. Strauss's Qualitative Analysis for Social Scientists: Chapter 3 – Codes and Coding (1978). From this process, a codebook began to develop, with a provisional list of main categories, codes, and sub-codes generated from the themes and keywords identified during open coding. Once the second workshop was held and its data added to the digital map, this workshop's capture sheets also underwent the same process of open coding. Out of the themes and keywords identified from these notes more codes and subcodes were added to the codebook in progress from workshop #1. After concluding open coding analysis of all workshop data, the list of categories and codes produced from both data sets were compared, synonymous codes were combined and redundant codes removed, the coding terminology choices were refined, and the main thematic categories were more clearly defined. The draft codebook produced through the open coding process described above was then used to perform axial coding, switching to using the software NVivo rather than pen-and-paper to accommodate the volume of data and the breadth of the draft codebook. Axial coding was done once for each thematic category identified through the previous round of coding,

across the entirety of the textual data from both workshops. Through this iterative process the codes and subcodes were modified, repetition and redundancy between thematic code groupings was eliminated, and the descriptions and definitions of each thematic category and its codes were refined. The final codebook produced can be found in Appendix C. This concluded the qualitative coding of all workshop data.

The semi-structured interview was recorded with the consent of the interviewee and the resulting hour-long audio recording was transcribed using the software Sonix. The same axial coding process as described above was applied to this transcription, in which the codes of each thematic category were used to analyse the entire text, one theme at a time. This analysis was a mix of deductive and inductive—the coding process was based around the themes which had already been identified and existing codes were used when applicable, but novel discussion

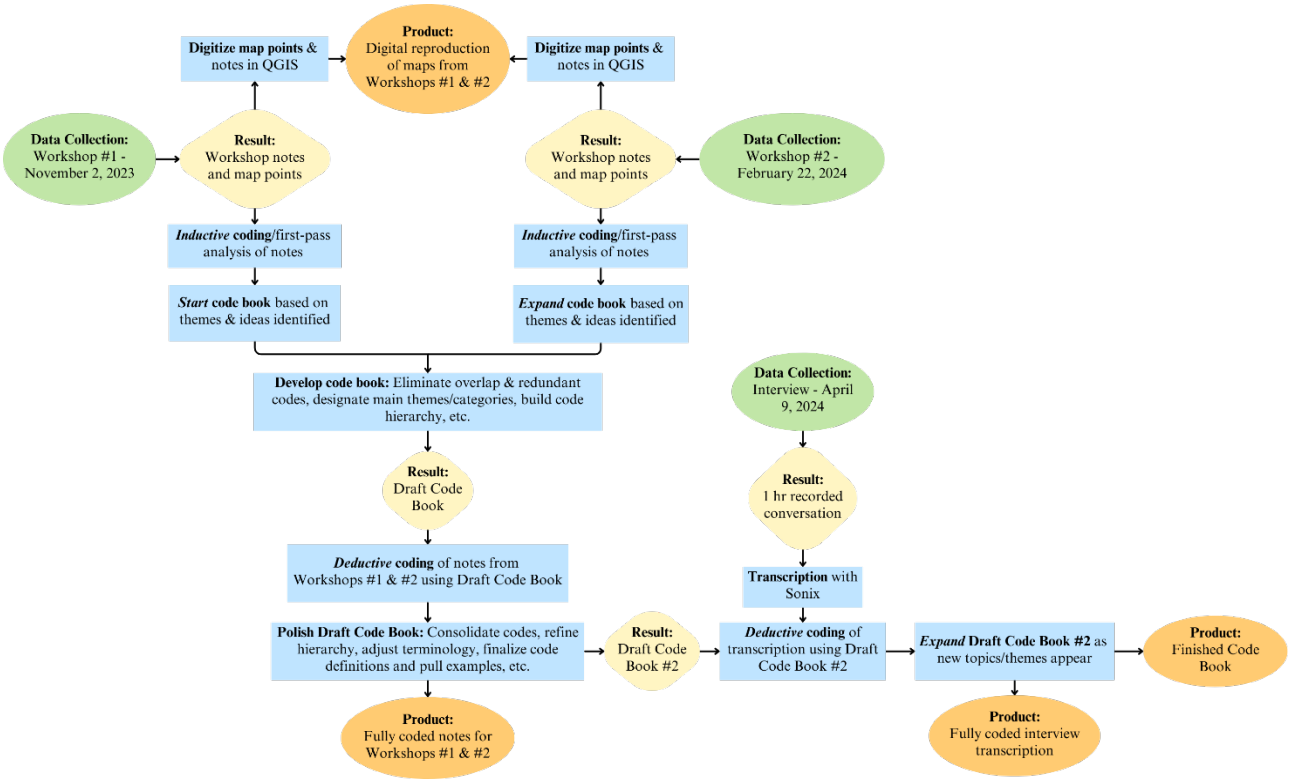

Figure 4 - Workflow diagram demonstrating the data collection and analysis process undergone over the course of this case study. Data collection points are shown in green, data products derived (in-progress) are shown in yellow, analysis steps are shown in blue, and final products of the analysis are shown in orange.

topics arose which necessitated some inductive coding, producing new codes and subcodes which were added to the codebook. This final round of coding concluded the analysis for this case study, the entire process of which is illustrated by the workflow diagram in Figure 4. Four products were derived from this analysis process: the digital map of locations identified and described during the participatory mapping process, the coded textual data from both workshops, the coded interview transcription, and the now-finalized codebook categorized into eight thematic categories (Fig. 5). The eight thematic categories identified are the key findings of this research and are described in the following section.

5.0 Key Findings: Eight Forms of Environmental Value Associated with Cedar

The key findings of this case study, derived from and refined through the open and axial coding process described in the previous section, are the eight forms of environmental value identified in association with cedar trees and their products. These findings are specific to the contexts of the participants in the two mapping workshops and one interview, all of whom are T'Sou-ke Nation knowledge holders or technical staff working for T'Sou-ke. These individuals have described the ways that they use and find value in cedar trees and the natural environment through their own views, experiences, and stories. Quotes from the mapping workshops and interview have been used as examples to illustrate how these forms of value appeared in the

Figure 5 - Mind map illustrating the eight interconnected forms of environmental value revealed and analysed during this case study. The largest circles show the eight main value categories, while smaller branching circles show examples of codes from those categories used during the qualitative coding analysis process.

notes and transcript. Following typical procedure for participatory mapping, the participants quoted are not identified (Cochrane & Corbett, 2020). It is worth noting that this case study was conducted with an extremely small sample of the community, with only around twenty total participants, and as such the patterns and forms of value identified should not be assumed to be representative of the perspectives of the community as a whole. It is also worth noting that despite the focus of the maps and guiding questions on cedar, these trees were not always the central topic of conversation, and their use or presence was often instead implied through connections revealed during the analysis process. For example, hunting, fishing, and berry-picking expeditions via canoe were mentioned multiple times; while cedar was not explicitly discussed in these instances, later conversations about cedar's use in canoe construction revealed an implied connection between these activities and cedar trees. The analysis process made evident that even when not explicitly discussed, cedar is connected to every part of T'Sou-ke life, culture, and history.

We do not intend to present these findings as inherently novel, nor to negate the extensive existing body of research on Indigenous plant use in T'Sou-ke, in British Columbia, and around the world. Rather, we intend to highlight the diversity of possible benefits received from the environment which are non-standard to environmental valuation systems built exclusively on Western science. We also aim to demonstrate the validity of community-based co-research as a tool for exploring these benefits and for collaboratively diversifying the knowledge base upon which environmental valuation and management tools are built. While this case study focused on the value of cedar trees as a species of singular significance to T'Sou-ke, these results and the research process described above may also have applicability to Indigenous Peoples and research on environmental valuation beyond this specific context.

5.1 The Value of Cultural Knowledges

Of the eight thematic categories—or forms of environmental value—identified through the coding process, the value of cultural knowledges was the most prevalent across all the data, referenced a total of 530 times (Fig. 6). We define this as the importance of cultural knowledges and skills associated directly and indirectly with cedar trees, including the value of learning, enacting, and teaching these knowledges and skills as well as the value of those knowledges and skills themselves. Specific knowledges and skills mentioned which relate directly to cedar include but were not limited to bark stripping, weaving cedar clothing and regalia, canoe carving, and knowledge of cedar's ecological and biological characteristics, while indirect examples include hunting and foraging (in cedar forests), fishing and travel (via cedar canoe), and cooking (using cedar tools). The value of T'Sou-ke cultural knowledges was demonstrated in many ways, including through expression of pride in their culture and traditions, in their land and waters, and in the skills and accomplishments of their family members (e.g. "He's the one that was involved with the canoe building actually… carved out a little canoe for himself…did an amazing job."). Emphasis was placed on the importance of sharing and passing on knowledge and skills through intergenerational and familial relationships, especially for educating and passing on skills to the young people in the community. However, the true value of cultural knowledges was made evident through participants' frequent expression of feeling to have lost their connection with these knowledges and skills (e.g. "I was over there for ten years, and I just got totally away from hunting. I want to get back into it and I just need time right now").

5.2 The Value of Cedar in Enacting Self-Determination

A close second in reference frequency was the value of cedar in enacting self-determination (Fig. 6), defined as the importance of T'Sou-ke Nation and its people's political,

cultural, and economic autonomy, as enacted through using and interacting with cedar trees and the natural environment. The term autonomy is used in the sense of both T'Sou-ke's self-governance & its people's personal independence. As with the value of cultural knowledge, this form of value was most frequently referenced through its absence. Participants repeatedly indicated that their opinions and rights were disregarded, disrespected, and exploited (e.g. Used to hunt across this whole area, but it's owned by Mosaic now, lots of it has been logged"). They commented on observed ignorance, hostility, and lack of transparency from those outside their community, and bemoaned how outsiders—particularly logging corporations—didn't seem to value the same things as them (e.g. "…But could now be logged. Why protect one side of the river, but not the other?"). On both a community and individual level participants expressed how important it was to keep practicing cultural activities and making governing decisions which uphold their cultural values, particularly when their autonomy is undermined. This was frequently expressed in relation to cedar and colonial logging practices, particularly as a desire to take a more proactive approach towards monitoring their forests and the colonial logging companies operating within them (e.g. "Cedar visible along the river here, but we want an inventory of what's there"). However, while dissatisfaction and frustration were expressed in reference to colonial logging operations, there were occasional mentions of T'Sou-ke's own logging activities, typically framed in a more positive light as a means of supporting the nation's economic—and by extension political—autonomy.

5.3 The Value of Environmental Health for Cedar

The third most frequently referenced form of value was that of environmental health, defined as the importance of the health of cedar trees to T'Sou-ke Nation and the value of overall environmental health for cedar's survival. While only referenced 381 times (Fig. 6), far less than

either of the two previous value forms identified, this was a subject which elicited particular passion from participants. It was evident that the health and stability of their forests was an issue that many were concerned about and were eager to discuss. Logging and drought were frequently mentioned as the threats of greatest concern to cedar trees (e.g. “Logging is the biggest threat unquestionably (to cedar), but also how warm it’s getting is putting cedar into drought. Water is vital to their survival”). Cedar requires a lot of water to thrive, doing best in riparian and coastal environments which experience frequent rainfall, something participants were aware of and troubled by (Klinkenberg, 2020; Pojar & MacKinnon, 2016). Participants expressed concern about the damage done to the trees during the droughts of recent summers. Other effects of climate change beyond increasing drought were also referenced, such as observation of changing ecological and seasonal patterns, and concern was expressed at how these changes would affect their ability to access and use cedar (e.g. “Went…to go cedar stripping at French Beach but couldn't get the right size of cedar"). However, it was reiterated that while climate change and drought are a concern, cedar trees are a hardy species and can withstand some drought without dying; the greater issue which they expressed a desire to see addressed was logging (e.g. “First priority is to slow down logging, protecting the integrity of the territory…”).

5.4 The Value of Enacting Territorial Reclamation Through Cedar

The fourth form of value identified, referenced a total of 270 times (Fig. 6), we have called the value of enacting territorial reclamation *through* cedar. We define this as the value gained from interacting with cedar trees, harvesting from them, using them for crafting, cooking, et cetera as a way of reclaiming the territory which was once stolen through colonialism. Cedar trees, cedar bark and other materials, and the activities involved in harvesting, processing, and using these materials, were repeatedly mentioned by participants in conjunction with stories in

which they reasserted their presence in physical and cultural spaces from which they felt excluded. In many instances this form of value manifested in a literal sense, with participants sharing stories of harvesting from cedar trees in locations from which they had been barred through colonial legal and political boundaries (e.g. "…Went back another time to strip cedar and was told to leave because it was private land. She responded, 'This is our land' and kept on harvesting"). Interestingly, no explicit mention was made of 'culturally modified trees' or 'CMTs', a term used to refer to trees scarred by past bark stripping which are often used as evidence of historical and ongoing Indigenous presence in an area (Spalding, 2022). Territorial reclamation was also expressed in a non-physical sense, as in the reclamation of emotional and cultural space from which access has been limited by colonial systems (e.g. "Youths were brought here last year for a special cedar stripping activity"). Participants also shared the importance of places which they once had unlimited access to but which they now are unable to use at all. Frustration was expressed at being physically unable to defy these restrictions, either due to strict enforcement of jurisdictional borders or due to these locations being so altered due to human activity that they are no longer able to be used as T'Sou-ke would have done in the past (e.g. "Used to go to Bellingham (United States) … Once US border was in enforced that couldn't happen anymore").

5.5 The Value of Cedar Technologies

The value of cedar technologies refers to the importance of both the activities undergone during the process of creating with cedar as a medium, and of the products created and tasks accomplished using cedar as a medium or tool. While closely related to the values of cultural knowledges and territorial reclamation, this form of value is distinct in that it specifically denotes the value gained from these items themselves, from participating in the process of creating them,

and from their use as tools to accomplish other goals. Though referenced only 168 times, far less frequently than the previous four forms of value described above, there was nonetheless significant versatility demonstrated in how the participants used cedar or had seen cedar used by others. Uses mentioned include art (e.g. “My brothers do. Oh, they got they got amazing carvings”), clothing (e.g. “Regalia, hats, clothing, rain protection”), cooking (e.g. “Clams and mussels were smoked by stringing them on thin cedar branches”), shelter (e.g. “We used to have a big house down here”), storage (e.g. “Also made money baskets, with coins hidden in the lid”), textiles (e.g. “Sometimes a wool blanket would get cedar that was beaten until soft woven into it to protect it from moths”), and transportation (e.g. “...Small cedar perfect for making poles (for paddles) and big trees for making canoes”). Respect for creativity both in the process of manufacturing with cedar and in the use of cedar-made items was repeatedly emphasized, as was creativity in adapting to a lack of access to cedar and other key materials (e.g. “...Called her the "Creative Native", used to say that if she ran out of stuff she'd use her yard”). Again and again, participants reiterated that cedar and technologies are an integral aspect of their culture and lives, ingrained into T’Sou-ke history and into their own lives (e.g. “Where would we be without cedar? ...It's everything.”)

5.6 The Economic Value of Cedar

The economic value of cedar, interpreted as any themes associated with the harvesting and use of cedar by the participants or the Nation for economic gain, was one of the least prominent forms of value identified within the data, referenced only 87 times. Cedar’s direct monetary value to the participants and to T’Sou-ke Nation itself, while occasionally mentioned, did not feature prominently within either workshop #1 or the interview and was not brought up at all during the second workshop. Most references were to logging activities as a source of income

for the nation (e.g. We log it every five years…they're small woodlots, just over six, seven hundred hectares"). There was distinct differentiation between T'Sou-ke's small-scale logging activities, discussed in mostly positive terms (e.g. "Yeah. We got a few bucks. And that's great"), and the large-scale operations by external corporations, which were associated with a negative effect on forest health and their disregard for the significance of the nation's traditional territory (e.g. "Loggers took it all out and then just left the cedar wood behind …whole trees just left to rot"). There was also some reference to having lost opportunities for receiving benefits due to logging by external corporations limiting participants' ability to conduct activities such as hunting or bark harvesting in large parts of their territory (e.g. "Used to hunt across the whole area, but it's owned by Mosaic now").

5.7 The Value of Cedar in Food Preparation & Hunting

Referenced at a nearly equivalent rate to cedar's economic value was the value and importance of cedar's role in the hunting, fishing, gathering, and preparation of food, in various forms and applications. While appearing infrequently compared to the majority of the other eight forms of value identified in this case study, cedar's importance in food preparation and hunting was an aspect of the tree's value which was not expected to feature as prominently as it did. Many participants shared stories about hunting, fishing, and cooking different foods, often in response to seemingly unrelated questions. However, although cedar was rarely mentioned explicitly during these conversations, it was apparent that cedar was an integral part of preparing many of these foods. Smoked foods, for example, were frequently mentioned (e.g. "We make salmon egg soup…used smoked salmon eggs— 'Utchpŏb', pronounced 'hatch-pa', means stink eggs"); cedar wood was used by T'Sou-ke and many other Indigenous Peoples for smoking fish, seafood, and meats (Turner et al., 2000). The versatility of cedar as a tool and material for

sourcing and preparing food was heavily emphasized, cedar branches in particular (e.g. “Clams and mussels were smoked by stringing them on thin cedar branches”; “Clam baskets were made from cedar branches, split in half”). There were also mentions of T’Sou-ke having traditionally travelled by cedar canoe across the Salish Sea to what is now Washington State to hunt, fish, and forage, a practice which ended during colonization, but which remains a key part of T’Sou-ke history (e.g. “Used to go to Bellingham (United States) for berry picking, and also Bainbridge Island. Once US border was in enforced that couldn't happen anymore”).

5.8 The Aesthetic Value of Cedar

The aesthetic value of cedar is by far the least frequently appearing form of value identified, referenced a total of only 45 times. We define this as the value gained from, appreciation for, and importance of the aesthetic beauty of cedar trees and cedar forests, as well as that of art and other items crafted using cedar as a material. Participants used adjectives such as ‘beautiful’, ‘amazing’, ‘perfect’, ‘big’, and ‘old’ to describe both cedar trees and items crafted from cedar, and many expressed admiration for the skills and knowledge of carvers and other artists. Some shared their personal love for the forest and being out in nature (e.g. “That's my tranquility, I would say. Yeah, yeah, yeah, yeah. I just love it, the forest”). Comments were also made which reflected a perception of cedar and their forests as having intrinsic value beyond their worth for specific purposes or uses (e.g. “Why protect one side of the river, but not the other?”). Old-growth trees in particular were discussed in these terms, with joy and admiration expressed purely for their existence (e.g. “Still some old-growth cedar here, right along the river, not touched”). Old growth cedar’s value for creating the largest and grandest dugout canoes was also briefly discussed, with admiration expressed for the skill of the carvers and for the size and beauty of these vessels (e.g. “This was all from one tree?” “One tree. Yeah, that was a big tree”).

6.0 Discussion

6.1 What did we learn?

This case study identified eight interconnected but distinct forms of environmental value in association with cedar trees through participatory mapping exercises with members of T'Sou-ke First Nation. These were, in decreasing order of their prevalence within the gathered data: 1) the value of cultural knowledges, 2) the value of cedar in enacting self-determination, 3) the value of environmental health for cedar, 4) the value of enacting territorial reclamation through cedar, 5) the value of cedar technologies, 6) the economic value of cedar, 7) the value of cedar in food preparation and hunting, and 8) the aesthetic value of cedar. Here we will discuss the significance of each form of value individually and in relation to the other values identified, as well as how these findings align with past research on environmental valuation with Indigenous Peoples.

6.1.1 The Value of Cultural Knowledges

This form of value appeared again and again across the data, with references noted in nearly every workshop note entry and line of the interview transcript. Where references to different value forms overlapped, which was often, every other form of value overlapped the most frequently with the value of cultural knowledges. Through this, T'Sou-ke cultural knowledges are demonstrated to be thoroughly intertwined with the participants' perception of cedar; using, interacting with, and caring for these trees is a key part of T'Sou-ke life and culture. This also demonstrates how separating Indigenous ways of viewing the importance of the environment into discrete categories, as is standard to environmental assessment systems, is an inherently flawed approach. While there is value in recognizing these distinct forms of value, it is important to also recognize the interconnectivity of these values. The emergence and prevalence

Environmental Value of Cedar	Number of References
Aesthetic Value	45
Cedar Technologies	168
Cultural Knowledges	530
Economic Value	87
Environmental Health	381
Food Preparation & Hunting	83
Self-Determination	470
Territorial Reclamation	270

Figure 6 - The eight identified forms of environmental value and the number of times each was referenced within the data from workshop #1, workshop #2, and the semi-structure interview. Note that more than one theme was typically referenced within the same text; overlap is considerable.

of this form of value within the data was expected; literature on Indigenous use of cedar within the PNWC had indicated the great importance of these trees in local Indigenous Peoples' traditional practices, and past research on environmental valuation with Indigenous Peoples have frequently identified comparable forms of value (Normyle et al., 2023; Pojar & MacKinnon, 2016; Spalding, 2022; Turner et al., 2000).

6.1.2 The Value of Cedar in Enacting Self-Determination

The highest degree of overlap between two forms of value across all the data was between the value of cultural knowledges and the value of cedar in enacting self-determination. This high level of correlation may indicate a connection between the participants' capacity for self-determination as individuals, their community's capacity for self-determination, and their use of knowledges and skills related to cedar. Both forms of value were often indicated concurrently, most often through participants' demonstration of their absence; feeling disconnected from cultural knowledges, skills, and practices, and feeling like their personal and communal right to self-determination was being undermined and disrespected. In this context,

the value of using, harvesting, and caring for cedar was as a way of reclaiming agency and sense of self, both at the individual level for participants and also for their larger community. Identifying the value of cedar in enacting self-determination as a key form of value was somewhat unexpected, as it was not a form of value featured explicitly in previous Indigenous environmental valuation research (Normyle et al., 2023). This may be due to our case study's focus on a specific species, selected due to T'Sou-ke Nation members' indicated awareness and concern over the high levels of colonial activity affecting the forests of T'Sou-ke territory, rather than focusing on an ecosystem or the environment in general. However, once identified it was evident that this form of value played a key role in the perception of cedar's importance, and the ultimate prevalence of references to this form of value aligned with this observation.

6.1.3 The Value of Environmental Health for Cedar

Many previous studies of Indigenous environmental value have focused specifically on cultural values or have separated the forms of value identified into cultural and non-cultural categories (Normyle et al., 2023; Urzedo & Robinson, 2023). While we have designated cultural knowledges as a distinct form of value, we also seek to acknowledge and emphasize the interconnectedness of cultural value with all other environmental value relationships. The value of environmental health was used to categorize references made both to the importance of cedar's health to the participants as well as the importance of overall environmental health to cedar's wellbeing. While not explicitly discussed during the workshops, the literature on cedar's role in PNWC ecosystems also emphasizes cedar's role in maintaining ecosystem health (Klinka & Brisco, 2009). References to this form of value overlapped most frequently with the value of cultural knowledges and the value of self-determination, indicating that the health of cedar trees and their environment plays a significant role for participants culturally and emotionally, as well

as ecologically. Given the indication of prevailing concern for cedar's health and interest in discussing cedar's wellbeing during early community engagement, the identification and prevalence of this form of value in the data is unsurprising.

6.1.4 The Value of Enacting Territorial Reclamation Through Cedar

Of the eight forms of value identified through this case study, the value of cedar in enacting territorial reclamation was the most unexpected and the least obvious. A comparable form of value does not appear in the studies surveyed by Normyle, Vardon, and Duran (2023). Urzedo and Robinson emphasize the importance of Indigenous self-determination and territorial validity in environmental valuation but do not mention it specifically as a value derived from an ecosystem, species, or other environmental aspect (2023). The identification and prevalence of this form of value may stem from the specific—although not unique—situational context of T'Sou-ke Nation. The Canadian government has restricted T'Sou-ke to two very small reserve lands at the coastal edge of their territory while corporate, municipal, and provincial entities continue to make use of the remaining expanse of their unceded traditional territory (Spalding, 2022). In this context the use of and interaction with cedar, the practicing of cultural activities and skills while physically exerting a presence on the land through modification of cedar trees, could be interpreted as a reclamation of the territory and cultural space from which the participants have been restricted. This appeared to be a more personal expression of environmental value than the others identified, drawn from individual experiences and emotions related to displacement. References to this form of value overlapped with the value of cultural knowledges, the value of environmental health, and the value of self-determination with almost equal frequency, which supports this assessment. However, this was not a form of value which participants were explicitly prompted to discuss. Rather, it was parsed through observations and

analysis by the researchers after the conclusion of the workshops, during the later stages of analysis. Whether or not participants consciously engaged with cedar as a way of reclaiming territory was unclear; it may be that this form of cedar's value is one which is felt subconsciously. The small sample size limited our ability to assess this form of value, a larger sample size may have provided more conclusive observations.

6.1.5 The Value of Cedar Technologies

This fifth form of value manifested through participants' stories describing everything from art, textiles, and clothing to storage, transportation, and food preparation. References to the value of cedar technologies overlapped most frequently with cultural knowledges, although it also appeared in frequent conjunction with self-determination and environmental health. This indicates a connection between participants' ability to create and use these important technologies and the health and accessibility of cedar trees and their forests. The act of creating and using these technologies is also reliant on participants' freedom of self-determination, and their restriction in that regard has hampered their ability to make use of cedar as they might once have. This form of environmental value is corroborated by both the literature on cedar's use in art, clothing, and technology by Indigenous Peoples of the PNWC and by the identification of comparable forms of value in past Indigenous environmental valuation research (Normyle et al., 2023; Pojar & MacKinnon, 2016; Spalding, 2022; Turner et al., 2000).

6.1.6 The Economic Value of Cedar

References to this form of value overlap most frequently with the values of cultural knowledges and self-determination, on nearly equivalent terms. While this may be attributable to the high number of references to both these forms of value, our analysis also found that cedar's economic value and use for economic gain was indicated as a contributing factor in participants'

and the Nation's capacity for self-determination. However, participants also discussed having lost opportunities for benefiting from cedar due to the economic activities of others (i.e., logging, development, etc.), and in correlation with references to the value of cedar in self-determination this suggests that these lost opportunities contribute to a reduced capacity for self-determination. Interestingly, while pre-contact trading of cedar and other plant products on the PNWC is well documented, there was no mention of past or present exchange of cedar-based goods between Nations during either workshops or the interview (Spalding, 2022; Turner, 1998). As with the value of environmental health, this form of value has been largely excluded from past studies of Indigenous cultural environmental value (Normyle et al., 2023). Many analyses have examined how Indigenous cultural practices can offer economic opportunities, but given that economic value is a primary form of value analysed through existing colonial environmental valuation frameworks, few Indigenous-focused analyses have examined direct economic profit from the environment (Normyle et al., 2023; Urzedo & Robinson, 2023). However, in the context of T'Sou-ke, who have both chosen to pursue direct economic profit from cedar through logging and have lost opportunities for indirect economic profit from cedar through cultural practices due to colonial logging activities, consideration of this form of value has validity.

6.1.7 The Value of Cedar in Food Preparation and Hunting

The identification of cedar's importance in food preparation and hunting as a key form of value was not entirely unexpected, as comparable forms of value were identified in past studies of Indigenous environmental valuation and use of cedar tools for food and hunting is well documented (Normyle et al., 2023; Pojar & MacKinnon, 2016; Spalding, 2022; Turner et al., 2000). However, given that this case study was specifically oriented through the lens of cedar trees and our guiding questions did not include prompts relating to other plant or animal species,

we did not expect this theme to arise during discussion as frequently as it did. While mentioned infrequently compared to most of the other forms of value identified, food preparation and hunting were nonetheless repeatedly the focus of conversation in both workshops and the interview. Despite this shift in focus, cedar was consistently mentioned directly or indirectly in relation to food provisioning and preparation, indicating that a significant part of cedar's importance is its versatile applicability to these activities.

6.1.8 The Aesthetic Value of Cedar

This final form of value was the least frequently referenced in the data and was the value which all others overlapped with the least frequently. The low number of references to this form of value may indicate that the aesthetic value of cedar is not a significant factor in participants' perception of the importance of these trees. Positive descriptive language appeared frequently enough to warrant aesthetic value being designated as a key value theme, but it did not feature prominently within the discussions at either workshops or interview. Only rarely was aesthetic appreciation of cedar or the forest mentioned directly. Identification of this value form was not unexpected, as comparable values have been noted in previous Indigenous environmental valuation studies (Normyle et al., 2023). However, these values were assessed infrequently, a notable contrast to colonial environmental valuation systems such as SEEA-EA which consider aesthetic appreciation as a significant non-monetary form of value (Normyle et al., 2023). While we cannot make judgements on the perception of environmental value by the greater community of T'Sou-ke Nation, our findings suggest that beauty is not a prioritized aspect of cedar trees for the participants we engaged. A larger sample size may have provided a better understanding of this form of value, as a conclusive assessment of the importance of unimportance of cedar's

aesthetic value to the community cannot be made based on observations of such a limited number of participants.

6.2 Contributions of This Research

While the findings of this research are limited in their scope to both a very small subset of a single community and to a single species, the observations made can nonetheless help enhance collective understanding of the unique ways in which the environment can be valued by Indigenous people. Through this analysis of Indigenous environmental value using cedar as a focal point and analytical lens, we have demonstrated not only that many diverse forms of value can be gained from a single species, but also that environmental values are deeply interconnected. Each of the eight forms of value that this research identified through thematic coding were found to consistently overlap with each other across all analysed data, and most were rarely the only value referenced within any given piece of text. These findings corroborate and validate the interconnectedness of all forms of environmental value, substantiating the notion that one species or activity can be looked at through different cultural and functional lenses to uncover different forms of value. Furthermore, this interconnectivity indicates that no one type of environmental value can be fully understood in isolation, and that the benefits Indigenous Peoples receive from the natural world need to be examined as a system rather than as discrete commodities.

This research has also demonstrated that there are unique and diverse forms of environmental value which are not accounted for within understandings of value based in Western worldviews. Several of the forms of value identified through this research are inherently Indigenous, stemming from specific cultural knowledges and experiences (e.g. ‘the value of enacting territorial reclamation through cedar’), Others, while not inherently Indigenous per se,

have in this context manifested in distinctly Indigenous ways. This exploration of the ways in which qualitative forms of environmental value can be understood and perceived by Indigenous Peoples offers empirical support for a lens which has frequently been absent from both environmental valuation research and practical models (Normyle et al., 2023). The insight gained through this case study will help expand the base of expertise available for generating multi-knowledge system environmental valuation approaches to biodiversity loss mitigation and environmental conservation (Normyle et al., 2022). This enhanced understanding is expected to enable an improved conceptualization of how Indigenous environmental values can both contribute to the development of and eventually be assessed by a multi-knowledge system valuation model. Specifically, our findings will contribute to the co-development of a pilot natural capital accounting model which aligns with Indigenous ways of knowing and perceptions of environmental value. This model will be constructed in collaboration with T'Sou-ke and other First Nations through the BIOSCAN Canada project, which seeks to partner with Indigenous and non-Indigenous local communities to develop an equitable multi-knowledge system environmental valuation tool (Centre for Biodiversity Genomics [CBG], n.d.).

At the conclusion of the case study, T'Sou-ke Nation will receive four products resulting from this research: the digital QGIS map file with locations identified during the mapping workshops and accompanying notes, the coded and uncoded interview transcript and notes from both workshops, the final codebook organized by the eight value forms identified, and a copy of B. Woodbridge's master's thesis, which includes this article. All original notes and any of the maps used during workshops which the Nation desires to keep will be returned as well, to be used by T'Sou-ke at their discretion. The Nation will eventually also have access to the environmental valuation model under development through the BIOSCAN Canada project,

equipping them with a tool for environmental valuation and conservation which is rooted in their own knowledge systems. Participants in the two mapping workshops may also have received additional benefits from engaging in the participatory mapping process. These activities provide a graphic framework in which stories, experiences, and knowledges can be shared, which can supply participants with space to reconnect with each other and to their shared home place (Lydon et al., 2017). Engaging in participatory mapmaking can be an empowering process which helps to affirm individual and community knowledges and experiences (Cochrane & Corbett, 2020; Lydon et al., 2017; Saija & Pappalardo, 2022). The response from the participants to these workshops has been overall positive, and we hope that more will be soon to come—both with university researchers and independently.

The mobilization of Indigenous ways of knowing alongside Western science through co-research projects such as this one also has specific additional benefits for Indigenous communities in general (Ens et al., 2016; Schultz et al., 2019; ICE, 2018; Whyte, 2018; Wilder et al., 2016). The most effective transmission of IEK occurs orally, passed from elders to young, attentive children, through engagement in traditional activities (Hunn, 2021; McGregor, 2021; ICE, 2018; Wilder et al., 2016). But Elders eventually pass away, often taking the wealth of knowledge they hold with them (McGregor, 2021). In addition, colonial stigmas on Indigenous cultural practice have shifted the interests of many youths away from traditional practices and towards contemporary Western culture (Ens et al., 2016; Hunn, 2021; ICE, 2018). Recognition, respect, and inclusion of Indigenous ways of knowing alongside Western science increases its use, visibility, and acceptability both within and outside Indigenous communities (Ens et al., 2016; Schultz et al., 2019; ICE, 2018; Whyte, 2018; Wilder et al., 2016). In addition, this research furthers the ongoing pursuit of reconciliation and decolonization through recognition of

the vital role Indigenous knowledges, cultures, and traditional practices play in developing systems for curbing biodiversity loss and environmental degradation (Bélisle et al., 2021; Graeme & Mandawe, 2017; Normyle et al., 2022). Co-research offers an opportunity to not only slow the loss of IEK but to revitalize its use and cultural relevance.

6.3 Future Considerations

This research has contributed valuable insight into the uniqueness and diversity of the benefits Indigenous Peoples receive from the natural world. However, further exploration is needed to fully understand how environmental value is perceived and understood through Indigenous knowledge systems in the local context of the PNWC and beyond. Our analysis uncovered uniquely Indigenous forms of value which, because of the limited number of participants as well as the limited ecological, geographical, and cultural scope, we were unable to fully explore the significance of at this time. In particular, our identification of cedar's value in Indigenous territorial reclamation (sections 5.4 & 6.1.4), a form of value absent entirely from the Indigenous environmental valuation research surveyed extensively by Normyle, Vardon, & Duran (2023), will require corroboration and further exploration. Moreso than any other form of value identified through this research, the value of territorial reclamation is inherently and uniquely Indigenous, representing an understanding of the importance of the natural world entirely distinct from Western and colonial ways of deriving value from the land. We recommend that future research in continuation of this project expand the scope of inquiry to engage with multiple diverse Indigenous communities across our region in similar participatory examinations of environmental value. As the scope of study expands, we would expect to see the forms of environmental value identified through this research confirmed, our understanding of their nuances improved, and the emergence of new forms of value unique to different cultural,

geographical, and ecological contexts beyond that of T'Sou-ke, thereby expanding how Indigenous environmental valuation is understood. In addition, given the unique nature of this form of value, we suggest focusing future research specifically on improving our understanding of territorial reclamation as a form of environmental value and the significance of this value for Indigenous communities across the Pacific Northwest Coast.

Furthermore, we would suggest that examination of environmental valuation with Indigenous communities through the lens of a single species of high importance or concern has applicability beyond this region, and could prove effective in any cultural, geographical, or ecological context. Cedar was selected as the focus of this project because it was significant to T'Sou-ke and had been identified by the community as a topic of great interest and concern. Focusing on a single species of known value to the community and the greater region facilitated a focused analysis of specifically how and why these plants are of value. Our findings relating to cedar's value as perceived by T'Sou-ke may not have much international transferability, but this research model is theoretically transferable to any community around the world, able to be adapted to suit their specific needs and interests. A similar project could be done in collaboration with another community in another part of the world through the lens of a different species identified as being important or at risk in that cultural and ecological context. Some limited past research has explored environmental valuation through the lens of a single significant species with both Indigenous and non-Indigenous communities; Ernoul et al., for example, analysed landscape values associated with the Greater Flamingo to identify value hotspots in the Camargue in Southern France (2018). Through this case study with T'Sou-ke Nation, we hope to contribute another example establishing the validity of this line of inquiry in Indigenous contexts and help set a precedent which may support further research on this topic around the world.

This case study and other participatory research efforts have served to collaboratively diversify the knowledge base upon which environmental valuation models are built. However, as projects such as BIOSCAN Canada move beyond the research stage and towards beginning development of the aspired-to multi-knowledge system environmental valuation models, a diversified knowledge base will prove insufficient without also implementing a diversified, collaborative development approach. In recent years, we have seen Indigenous environmental valuation research transition from knowledge extraction to knowledge co-production, with active involvement of and collaboration with Indigenous communities (Normyle et al., 2023). Environmental valuation models, however, which to date are still built almost exclusively upon the values of Western science, are developed by governments and academic institutions without input or collaboration from Indigenous knowledge holders (Normyle et al., 2023). Conflict will inevitably arise when trying to bring together disparate knowledge systems, but especially if the individuals and institutions attempting to do so are rooted in only one of those knowledge systems. Finding ways for fundamentally different modes of perceiving and interacting with the world to work together in this context will require active involvement from Indigenous knowledge holders. It is imperative then, that co-production of knowledge extends beyond the research phase and into the development and implementation of multi-knowledge system valuation models.

7.0 Conclusion

Environmental valuation models offer novel tools for understanding the manifold benefits which humans receive from the environment and can support the development of new methods for environmental management and biodiversity conservation (King et al., 2021; Normyle et al., 2022). This approach is used increasingly around the world, but despite this growing popularity, Indigenous ways of knowing and valuing the environment are consistently excluded from environmental valuation research and policy (Normyle et al., 2022). Through a case study applying participatory mapping to an exploration of Indigenous environmental valuation in collaboration with T'Sou-ke First Nation, we have surveyed eight forms of environmental value which are unique to the cultural, geographical, and ecological in which our participants are located. These forms of value include 1) the value of cultural knowledges, 2) the value of cedar in enacting self-determination, 3) the value of environmental health for cedar, 4) the value of enacting territorial reclamation through cedar, 5) the value of cedar technologies, 6) the economic value of cedar, 7) the value of cedar in food preparation and hunting, and 8) the aesthetic value of cedar. Through this research, we have demonstrated the diversity and uniqueness of Indigenous environmental valuation, that environmental valuation models which draw exclusively from Western science will have failed to consider the full scope of available environmental benefits, and that participatory examination of environmental value through a species-based lens offers a dynamic model for conducting environmental valuation research in a wide range of contexts. The observations discussed will help to enhance collective understanding of Indigenous modes of environmental valuation, thereby improving our ability to conceptualize how Indigenous environmental values will both contribute to the development of and eventually be assessed by transdisciplinary and multi-knowledge system environmental valuation models.

We hope that this manuscript will further the inclusion and respect of Indigenous ways of knowing in environmental valuation research and policy within British Columbia, across Canada, and beyond.

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Chapter 3 - Benefits & challenges of the participatory mapping method: Lessons learned with T'Sou-ke First Nation

Abstract

Over the past 25 years, participatory mapping has become both a well-used qualitative research method and a popular tool for governments, non-governmental organizations, and communities to engage with the public on topics ranging from emergency preparedness to green space access to local cultural knowledges (Cochrane & Corbett, 2020; Denwood et al., 2022; Lydon et al., 2017). In this article, I present a reflexive discussion of lessons learned during a participatory mapping case study exploring Indigenous environmental valuation, conducted in partnership with T'Sou-ke First Nation between 2023 and 2024 in partial fulfillment of a Master of Arts degree at the University of Victoria in British Columbia, Canada. I first provide a brief overview of participatory mapping's evolution as a method, with particular attention to the role of Indigenous communities in its development, followed by a review of the landscape of participatory mapping research and the variety of techniques employed in its execution. The benefits gained from using the participatory mapping method with T'Sou-ke Nation are then discussed, including its ability to break down barriers, facilitate participant and community empowerment, and validate qualitative participatory approaches to Indigenous environmental valuation research. This is followed by a reflection on some of the challenges of community-based participatory research (CBPR) as experienced by myself and my research team over the course of the T'Sou-ke Nation case study. Particular attention is given to how these challenges affect graduate student researchers, and some suggestions are made for managing these difficulties. I conclude by offering some guidelines for graduate students to assess whether participatory mapping is appropriate for their research.

1.0 Introduction

The term “participatory mapping”, also referred to as community mapping, is used to describe a diverse range of techniques for engaging communities in sharing and visualizing their connections with local places through the creation of a map (Cochrane & Corbett, 2020; Lydon et al., 2017). These maps can be as technologically simple as being drawn by hand in sand or as complex as a project-specific geographic information system (GIS), with the choice of technique being dependent on the social, political, and geographical context in which the project is occurring (Cochrane & Corbett, 2020; Denwood et al., 2022). Over the past 25 years, participatory mapping has become a well-used research method as well as a popular tool for governments, non-governmental organizations, and communities to engage the public in discussions on topics such as emergency preparedness, environmental justice, heritage sites, traffic patterns, green space, and more (Cochrane & Corbett, 2020; Denwood et al., 2022; Lydon et al., 2017). Participatory mapping initiatives can play an important role in supporting community interests, particularly for communities which have been historically marginalized through scientific, political, and social systems (Brown & Kyttä, 2018; Cochrane & Corbett, 2020). These maps can help challenge dominant worldviews and support the recognition of localized knowledges and histories (Brown & Kyttä, 2018; Cochrane & Corbett, 2020). However, numerous barriers to the effectiveness of participatory mapping have been identified which can limit the effectiveness of this method, ranging from skepticism of the mapping process from communities to distrust in the researchers or organizers to a lack of time and funding (Brown & Kyttä, 2018). How both researchers and partner communities navigate these barriers is pivotal to the success of a participatory mapping project and can have indirect effects on all parties for years to come.

This article is a reflection on the lessons learned while conducting a participatory mapping case study in partnership with T'Sou-ke First Nation, whose traditional territory is situated on the southwest coast of Vancouver Island, British Columbia, Canada (Chapter 2 of this thesis). T'Sou-ke First Nation has been a long-time partner of the University of Victoria in research with their community, particularly on projects engaged in ethnobotany, ecological monitoring, and conservation (e.g. Spalding, 2022). This case study explores the environmental value of cedar trees (Western Redcedar - *Thuja plicata* Donn ex D. Don; Yellow-cedar - *Callitropsis nootkatensis* (D. Don) Oerst. ex D.P. Little), using these trees as a lens through which to examine the ways that the participating community members view the value of the services derived from their natural environment (Klinkenberg, 2020).

From the summer of 2022 to the spring of 2024, my research team and I engaged with members of T'Sou-ke Nation on research design, organization of the participatory mapping workshops, and administration of the workshops and interview. Two mapping workshops were held in November 2023 and February 2024, as well as a follow-up interview with an executive leader of T'Sou-ke Nation government who was identified by community members as a key knowledge holder. During these workshops, participants were invited to contribute their stories, knowledge, and ideas to large-scale printed maps using stickers to mark locations of significance and paper capture sheets to record the information associated with those locations. The notes taken at these workshops and the transcription of the follow-up interview were analysed through deductive and inductive qualitative coding with the software NVivo. Through this analysis process, eight key forms of environmental value were identified as associated with cedar by the participants. The participatory mapping process helped solidify the ongoing partnership between my research team and our community partners in T'Sou-ke and resulted in meaningful insight

into Indigenous ways of perceiving environmental value. However, navigating the nuances of conducting community-based participatory research with an Indigenous community also posed several challenges, particularly for me as a graduate student and early-career researcher. The difficulty I experienced in managing these challenges limited the effectiveness of participatory mapping as a research method in the context of this project.

I came to this research from the position of an outsider. I am not a member of T'Sou-ke Nation nor any other Indigenous community; rather, I am of white settler descent, being a 4th generation Ukrainian-English immigrant on my mother's side and 17th-generation French-Canadian on my father's side. While Vancouver Island is the place I have lived the longest and the place I consider home, I have also lived in California and Québec and have social and family ties around the world. I come from the privilege of academia as a graduate student at the University of Victoria, where I have pursued my Master of Arts for the past two years, coming to this university immediately after completing my Bachelor of Arts at the University of British Columbia in 2022. While my supervisor and other members of my research team hold long-standing relationships with the community of T'Sou-ke Nation, I myself had no prior connection with this community before beginning research. Given both my positionality in entering this project and my lack of research experience as a graduate student, incorporating reflexivity into my approach has been a key part of both conducting effective research and of building a positive, collaborative relationship with my co-researchers in T'Sou-ke. 'Reflexivity' refers to the conscious acknowledgement of your individual beliefs, biases, and judgement systems before, during, and after conducting your research (Jamieson et al., 2023). I have endeavoured to engage a reflexive methodology throughout my research process, looking critically at my methods, my

relationship with the topic and with my partner community, and the effectiveness of the research I conducted both in terms of addressing my research objectives and in serving the community.

In the following article, I briefly discuss the evolution of the participatory mapping method, from its initial use by Indigenous communities as a tool for advocacy and social change to current techniques and applications in community-engaged research. I then discuss some of the benefits and challenges of participatory mapping and CBPR through personal observations made over the course of my master's research, providing specific reflections drawn from my positionality as a non-Indigenous graduate student researcher. I also offer some recommendations to graduate students and other early-career researchers for managing these challenges in their own work. I conclude the article by outlining some suggestions for graduate students to assess whether participatory mapping is an appropriate method to use in the context of their research projects.

2.0 Participatory Mapping: History & Approaches

While the current surge in popularity of participatory mapping is a relatively recent phenomenon, observed primarily in the past twenty-five years, the practice has a much longer history as a tool for research and governance (Cochrane & Corbett, 2020; Corbett et al., 2009; Guldi, 2017). The use of the term 'participatory' in this context originates in the 1930s, with the emergence of social movements advocating for public involvement in city and housing planning processes (Guldi, 2017). The participatory mapping method arose out of these social movements, initiated by urban planners and social activists who sought to use maps, surveys, and hearings as tools for incorporating the perspectives of excluded and marginalized communities into governance (Chapin et al., 2005; Guldi, 2017). The participatory approach to urban planning grew in recognition and popularity over the following decades, with planners and cartographers around the world surveying local communities to gather their knowledges and perspectives and integrate them into this new type of map (Guldi, 2017). Much of the development of this type of mapping occurred in partnership with Indigenous communities in Canada and Alaska during the 1960s as components of larger regional land-use and occupancy studies (Bryan, 2011; Chapin et al., 2005; Guldi, 2017). These studies were intended to contradict the European imperial doctrine of *terra nullius*, or empty lands, which propounded the idea that the land was "empty of people, a productive economy and a system of land use protocols" (Kidd, 2019, p. 961) because colonial conventions of agriculture and occupation were not the norm for Indigenous Peoples. This colonial myth was enabled largely by early map-making in the Americas, by which Indigenous occupation was actively erased from cartographic landscapes (Kidd, 2019). However, while the maps produced through these land-use and occupancy studies were based on information

contributed by communities they were still developed by outsiders; only later did the mapping process shift towards being built collaboratively by communities themselves (Guldi, 2017).

While the evolution of participatory mapping into a tool for social change has been driven by both Indigenous and non-Indigenous communities, during the 1970s there were particular efforts made by Indigenous Peoples in Canada which played a key role in this evolution (Guldi, 2017). In Alberta, increasing encroachment from mining companies led Cree communities to seek a way to use maps to prove their territorial claim and petition the Canadian government to protect their property rights (Brody, 1982; Guldi, 2017). At the suggestion of British geographer Hugh Brody, they began mapping family hunting lines, designated hunting spots which were normally recorded through oral tradition and renewed through seasonal hunts (Brody, 1982; Guldi, 2017). When compiled together into a single map these lines amounted to legally admissible evidence of continuous Cree habitation across their traditional territory and a clear dismissal of the industrial occupation of their lands (Brody, 1982; Guldi, 2017). Another example comes from the response of the Dene peoples of the Mackenzie River Delta to the Mackenzie Valley Pipeline project (Kidd, 2019). In preparation for the public hearings held by the Berger Commission, a Dene research team conducted map-based interviews with 546 members of their community about the hunting, trapping, and other productive activities they conducted on their land (Kidd, 2019). These maps, presented at public hearings, offered counterevidence to the colonial idea of extractivism as the only viable economic path in Mackenzie Valley (Kidd, 2019). The power of communally-generated maps in undermining the power of colonial hierarchies demonstrated through these and other Indigenous-led mapping projects of the 1970s had a profound effect, with Indigenous and non-Indigenous activists around the world deploying variations of this technique in their own communities over the following

years (Anthias, 2019; Bryan, 2011; Chapin et al., 2005; Guldi, 2017; Rye & Kurniawan, 2017; Sletto et al., 2021). In the past three decades mapping projects have been taken up by Indigenous communities around the world, both independently and with academic partners but with a common goal of collaboratively documenting land use in support of Aboriginal rights and land claims (Anthias, 2019; Chapin et al., 2005; Roth, 2009; Rye & Kurniawan, 2017; Sletto et al., 2021).

While the origins of participatory mapping lie in community and individual empowerment as a method for enacting and supporting social movements, over time it has evolved to also serve as a data-acquisition method to support academic research (Cochrane & Corbett, 2020; Guldi, 2017; Rye & Kurniawan, 2017). In this context, participatory mapping can serve as a method for enacting "action research", in which partners from all involved parties are active participants in the research planning and implementation process and the research topics are oriented towards the goals of both the researchers and the community (Amauchi et al., 2022; Lake & Wendland, 2018; Saija & Pappalardo, 2022). In many cases, however, this research method has been used extractively, gathering information shared by participants solely to serve the goals of the researcher and not the needs of the community (Cochrane & Corbett, 2020; Corbett et al., 2009). Cursory, superficial participant engagement can lead to unintended consequences such as the exacerbation of internal and inter-community conflict, and the expansion of state or institutional control over the community (Cargo & Mercer, 2008; Castleden et al., 2012; Cochrane & Corbett, 2020; Lake & Wendland, 2018). This method has also been used as a means of coercing public support, providing citizens with a means of intentionally superficial engagement without truly involving them in the research or decision-making process (Cochrane & Corbett, 2020; Corbett et al., 2009). If done properly, however, the process and

results of participatory mapping can be beneficial to all parties, providing both researchers and communities with information that can support their mutual and individual goals (Corbett et al., 2009; Lydon et al., 2017; Saija & Pappalardo, 2022). The action of participating in the mapping exercises can also serve the community by facilitating dialogue between participants and reaffirming their communal understanding of the historical, physical, social, and cultural attributes of their local environment (Lydon et al., 2017).

Recent literature reviews by Denwood, Huck and Lindley (2022) and Cook, Cochrane, and Corbett (2020) surveyed the landscape of modern participatory mapping-based research methods and applications. Cook, Cochrane, and Corbett (2020) observe the use of participatory mapping in a diverse array of fields beyond geography but also emphasize that there is immense variability in the terminology used to refer to this method and in techniques used in its application, which they found to be associated with distinct fields of research. 'Community mapping', for example, is a term most closely associated with health research, while 'counter mapping' is a term seen most in social justice-oriented research seeking to establish itself as counter-positional to classical cartographical and political opinions (Cook et al., 2020). Participatory mapping is often used as an umbrella term encompassing this diversity and can refer to various mapping techniques across numerous fields (Cook et al., 2020). This term also implies and recognizes that community members actively participated in the design process of the project (Cook et al., 2020). Cook, Cochrane, and Corbett also note that despite the variability present within participatory mapping as a discipline, the practice is nonetheless united by a clear set of unified principles regarding community participation and empowerment (Cook et al., 2020). Denwood, Huck, and Lindley (2022) similarly observe a lack of consistency in both techniques used for conducting the mapping process and researchers' approach to reporting their

work. The authors suggest that this lack of clarity has significantly impacted the replicability of participatory mapping research, widening the gaps between different applications of the method (Denwood et al., 2022). They recommend prioritizing an open-science policy in future participatory mapping projects to increase the transparency and accessibility of this methodology, allowing for improved understanding and trust in the mapping process both from other researchers and from communities (Denwood et al., 2022).

As well as participatory mappings varied terminology and applied disciplines, this method can be enacted through an equally varied array of techniques (Cook et al., 2020; Denwood et al., 2022). These can range from freehand drawing using mediums such as sticks in dirt or pen and paper (‘mental mapping’), to using drawing utensils and stickers to expand existing maps (‘sketch mapping’), to collecting spatial data in digital and online participatory geographic information systems (PGIS) (Boschmann & Cubbon, 2014; Denwood et al., 2022). Mental and sketch mapping techniques typically offer the greatest flexibility and accessibility, but the unrestricted nature of these maps makes quantitative analysis of the results extremely challenging (Boschmann & Cubbon, 2014; Denwood et al., 2022; Pocewicz et al., 2012). However, the lack of technical requirements often allows for greater levels of engagement, particularly when working with older demographics who may not be comfortable with GIS technology (Boschmann & Cubbon, 2014; Denwood et al., 2022; Pocewicz et al., 2012). PGIS mapping tools offer many opportunities for data collection and analysis not possible with other participatory mapping techniques but can introduce other limitations through their relative lack of accessibility (Brown et al., 2017; Denwood et al., 2022; Guldi, 2017; Pocewicz et al., 2012). While the multidisciplinary nature of this method has led to a lack of consistency and replicability in its use, this characteristic is also an asset in enabling truly community-based and

community-driven research, allowing for the mapping process to be adapted to suit the specific needs and interests of different communities (Cook et al., 2020; Denwood et al., 2022).

The case study discussed in the following sections, conducted with T'Sou-ke First Nation on the topic of environmental valuation, employed a sketch mapping approach to participatory mapping. This approach was selected based on the expertise and experience of the research team and on interest expressed by the Nation. Two workshops were conducted in November 2023 and February 2024, as well as a follow-up interview with a key knowledge holder. Approximately 20 members of the community were engaged over the course of both workshops. The data collected and findings ascertained through this research contribute to a) the completion of a master's thesis, b) the collection of evidence supporting T'Sou-ke Nation's assertion of the non-monetary value of their traditional territory, and c) informing the development of a novel natural capital accounting system which recognizes and prioritizes Indigenous environmental valuation (Normyle et al., 2022). In this case, the participatory mapping approach served both as a device for collecting research data for a specific goal and as a means of community engagement, supporting the growth of an ongoing research partnership which will continue over the next several years. In the next two sections, I review the benefits and limitations of participatory mapping in both these capacities within the specific context of this research project through my personal observations. It is my intention that these observations and lessons learned may support the validity of participatory mapping as a method for environmental valuation research while offering a realistic perspective on the difficulties of this method so that future researchers may approach its use from an informed position.

3.0 Benefits of Participatory Mapping for Community-Engaged Environmental Valuation Research

One could justifiably argue that an assessment of Indigenous environmental valuation as a case study with T'Sou-ke Nation could have been accomplished using many different qualitative research methods. However, there were distinct benefits to using the participatory mapping method in the context of this community and research topic, enhancing the results of this project. Below I discuss several of these benefits and how they impacted the proceedings and results of the T'Sou-ke Nation case study, using accompanying literature to support my points where necessary.

3.1 The power of hands-on sketch mapping in overcoming barriers

The form of participatory mapping referred to as 'sketch mapping', in which annotations are added to existing spatially-accurate map documents, offers specific benefits which favour it for particular contexts over mental mapping and PGIS approaches (Boschmann & Cubbon, 2014; Brennan-Horley & Gibson, 2009). The physical presence of a map can be an enormous benefit in group and individual interviews, acting as an 'anchor' around which the conversation can revolve and helping diminish any perceived barriers between the researcher and participants (Brennan-Horley & Gibson, 2009). This is particularly true in situations where the participants and researchers do not know each other, where the practice of participatory mapping is unfamiliar to the participants, or where the age and fitness of the participants might limit their comfort with technology and art-based mapping approaches (Boschmann & Cubbon, 2014; Brennan-Horley & Gibson, 2009). The maps can also serve as tools for stimulating participant engagement; seeing and interacting with visual representations of their home and lands can bring out excitement and energy in participants, encouraging them to discuss and show their stories and experiences (Boschmann & Cubbon, 2014). Since sketch mapping is done by annotating

existing maps rather than building them from scratch, participants can engage at their own pace and comfort level; it is not obligatory for participants to add to the maps themselves, facilitators can help by taking notes and making annotations at the direction of the participants (Boschmann & Cubbon, 2014).

In this case study with T'Sou-ke First Nation, the use of sketch mapping helped overcome barriers between the research team and our participants and was a powerful aid in capturing stories. Six maps were used in the mapping workshops, including a basemap consisting of high-resolution satellite imagery, two historical maps of the area, a comparison of vegetation cover in T'Sou-ke Territory using colour infrared satellite imagery (created by B. Woodbridge for the workshops), and two maps created by P. Spalding (2022) showing predicted cedar presence and land tenure in the area. During both workshops, I observed that participants required time to become familiar with the mapping process and to fully understand what was being asked. As comfort levels increased participants engaged more and more with the maps, which prompted participants to begin 'thinking out loud' and sharing stories as they explored these representations of their home. An additional benefit of the specific sketch mapping technique employed at both workshops, and beneficial at the second workshop in particular, was that this technique allowed the facilitators to add to maps and make notes on behalf of participants. Our approach to sketch mapping used numbered stickers to mark locations on maps and note sheets to record the information and stories which were associated with those locations. Unlike mental mapping, which requires participants to draw maps from scratch themselves, this technique allowed for participants who were not comfortable or physically able to make additions to the maps themselves to still participate at their own pace. Alternative techniques relying on digital mapping systems (PGIS) could have introduced unnecessary barriers to

participants' ability to engage with the project, limiting the accessibility and effectiveness of the mapping process.

3.2 Empowerment through collaborative sharing & mobilization of knowledge

Many participatory mapping projects and research initiatives claim that this methodology has a particular ability to empower both individual participants and their communities (Bryan, 2011; Cochrane & Corbett, 2020; Schweizer et al., 2024). The mapping exercises are argued to create spaces in which members of a community can engage in collaborative thinking, bringing together their diverse perspectives and affirming shared experiences (Lydon et al., 2017). In this way, the process can be as much a benefit as the resulting products, which can themselves play an important role in furthering this empowerment over the years following a project's completion (Corbett et al., 2009). Notably, collaboratively built maps can play key roles in supporting the legal legitimization of land rights and management claims, particularly for Indigenous communities (Anthias, 2019; Cochrane & Corbett, 2020; Corbett et al., 2009; Guldi, 2017). However, these potential forms of empowerment are ideals more than confirmed reality; whether the desired empowerment occurs or not can vary considerably depending on the project circumstances and is difficult to measure (Cochrane & Corbett, 2020; Schweizer et al., 2024).

Due to the recentness of the T'Sou-ke Nation case study and the difficulty of measuring its impact, it would be erroneous to speak of this project's capacity for community or individual empowerment in definite terms. I do, however, believe that this project, as well as the ongoing partnership between T'Sou-ke Nation and our research team, has the capacity to support the Nation's autonomy and foster empowerment in both individuals and the greater community in the months and years to come. At both the mapping workshops I held during this case study, while there was undoubtedly initial hesitance and wariness, I observed over the progression of

each workshop that participants' comfort, confidence, and interest in the mapping process grew. Those who participated in both workshops seemed much more comfortable with the process at the second and helped to encourage new participants to engage. People's mannerisms indicated excitement at the chance to reminisce about old stories, with their peers as well as the workshop facilitators. At the conclusion of the workshops, some expressed feelings of gratification and vindication that people beyond their community cared about the stories and knowledges which they knew to be important. It is my hope that for both individual participants and the community at large, taking part in these workshops and any future CBPR exercises stemming from this partnership will have contributed to the reaffirmation of the significance of their experiences and worldviews.

In addition, it is the goal of both my research team and T'Sou-ke Nation that published articles and maps produced through these workshops will contribute to community empowerment through collective knowledge mobilization. As discussed previously, collaboratively produced knowledge in the tangible form of maps and publications can carry significant weight in Western legal and administrative processes (Anthias, 2019; Cochrane & Corbett, 2020; Corbett et al., 2009; Guldi, 2017). This is particularly valuable for Indigenous communities, whose ways of knowing and territorial rights are consistently undermined through those same processes (Anthias, 2019; Cochrane & Corbett, 2020; Corbett et al., 2009; Guldi, 2017; Marlor, 2010). The findings from the T'Sou-ke Nation environmental valuation case study will be owned and controlled by the Nation to be used at their discretion in the manner they deem most useful. It is the hope of myself and the research team that over time, these findings might support the Nation's autonomy as a tool through which the community's knowledge of the

value of their land might be mobilized against external systems seeking to exert power and control over their territory.

3.3 Validation of qualitative participatory mapping approaches to environmental valuation research

The case study research project discussed in this article was conducted in contribution to the field of environmental valuation, which examines ways of assessing the forms of value associated with the natural world in order to encapsulate their worth beyond their economic value (King et al., 2021; Normyle et al., 2022, 2023; Özdemiroğlu, 2019; Urzedo & Robinson, 2023). In recent years this has become an increasingly prevalent area of study, contributing to the design of new environmental management strategies through assessment of the various ways through which natural landscapes contribute benefits to humans (King et al., 2021; Normyle et al., 2022; Özdemiroğlu, 2019). Participatory mapping has likewise become increasingly popular in the last few decades, applied to numerous different fields of study through a variety of techniques (Cook et al., 2020; Denwood et al., 2022). However, only occasionally have these two fields overlapped such that participatory mapping methods have been applied to research in environmental valuation and related fields. A significant number of these cases have relied on PGIS to conduct their research, engaging participants or conducting analysis through digital geospatial platforms (Brown & Fagerholm, 2015). Many have employed digital mapping systems to both engage their participants in collecting data and to conduct quantitative analyses (Chen & Lin, 2023; Cusens et al., 2022; Ernoul et al., 2018; Gill et al., 2014; Leguia-Cruz et al., 2024; Lipej & Male, 2015; Ridding et al., 2018). Some have engaged participants through hands-on sketch mapping exercises, only using GIS to conduct spatial and statistical analyses with the gathered data (e.g. Delgado-Aguilar et al., 2017; Klain & Chan, 2012). Very few, however, have

relied exclusively on low-tech sketch or mind-mapping techniques to analyse environmental value or other landscape characteristics (Robinson et al., 2016).

Beyond the direct advantages of this method for T'Sou-ke Nation and our research partnership as discussed above, this case study offers an example affirming the validity and merit of this approach to environmental valuation research. While quantitative participatory mapping methods have undoubtable merit in certain contexts, demonstrated through their ongoing popularity, they are not a requirement for valid research in the field of environmental valuation. Qualitative mapping methods such as those employed for data collection in this project do not limit the representation of intangible cultural benefits by spatial or numerical bounds, as can occur when restricting data collection to frameworks compatible with quantitative analysis (Klain & Chan, 2012). This is particularly relevant to environmental valuation studies conducted with Indigenous Peoples, whose ways of perceiving the value of the environment differ from those of Western science (Normyle et al., 2023). It is my hope that this research may offer endorsement to future researchers interested in pursuing qualitative sketch mapping as a method for environmental valuation research with Indigenous communities.

4.0 Challenges of Participatory Research in Indigenous Contexts as a Graduate Student

As I note these benefits of participatory mapping, I must also acknowledge the challenges that I experienced while navigating the nuances of community-based participatory research (CBPR) in partnership with an Indigenous community. In the following section, I reflect on the challenges I observed and how they affected the progression and outcomes of the research project, employing literature to corroborate my observations where necessary. I also provide a few suggestions for ways to manage these challenges and minimize their effects in future CBPR projects. I found these obstacles particularly difficult to navigate as a graduate student and early-career researcher, and so I hope the insights I offer will be of particular use to those demographics.

4.1 Balancing time commitments & priorities

In recent years Indigenous communities around the world have experienced a significant increase in requests from governments, NGOs, and universities asking them to participate in research and development projects (Castleden et al., 2012; Hatch et al., 2023). In Canada, the rise in demand for Indigenous engagement began in 1982 with the implementation of the protection of Aboriginal rights in *Section 35* of the Canadian Constitution (Spalding, 2022). The last several years have seen an even greater surge with the Canadian federal government's passage of the *United Nations Declaration on the Rights of Indigenous Peoples Act* in 2021 and the BC provincial government's passage of the *Declaration on the Rights of Indigenous Peoples Act* in 2019, both of which were intended to advance the implementation of the 2007 *United Nations Declaration on the Rights of Indigenous Peoples* (UNDRIP) in Canadian law (Bridges et al., 2023; Government of British Columbia, 2022; Government of Canada, 2022; Spalding, 2022). The increase in collaborative partnerships between academic institutions and Indigenous

communities signals a shift away from colonial conventions of knowledge extraction and towards a co-research model in which both researchers and community members participate in project design and implementation (Latulippe & Klenk, 2020). Many Indigenous communities, both in Canada and around the world, are going above and beyond to take advantage of these opportunities for collaborative research, often partnering on several projects with multiple research teams at a time (Kater, 2022). It is vital, then, that researchers working with First Nations and other Indigenous groups acknowledge the busy schedules of their research partners and recognize that balancing multiple projects may mean that the community's priorities and schedules may not always align with researchers' priorities (Latulippe & Klenk, 2020).

That being said, the challenge of managing time commitments goes both ways. Both professional and student researchers are also beholden to numerous responsibilities, including teaching, writing and publishing, other research projects, and sometimes other employment contracts (Castleden et al., 2012). Student researchers have additional obligations to their graduate study programs, including courses, assignments, and writing and defending their thesis or dissertation, all within the limited timeline for program completion (Laframboise et al., 2023). Graduate programs at most Canadian institutions allow one to two years for a master's degree and three to five years for a doctorate (EduCanada, 2023). While these deadlines are usually flexible, there is considerable social and financial pressure on students to finish 'on time' and not extend their studies beyond the recommended period (Laframboise et al., 2023). Time, then, is a precious resource on both sides of co-research partnerships, and finding ways to effectively manage your time can be a critical factor both in completing the project and in building lasting, trusting relationships that extend beyond project completion.

This observation holds for the case study discussed in this article. T'Sou-ke is a busy Nation; in recent years they have made increasing efforts towards building numerous collaborative research partnerships in pursuit of knowledge co-creation and exploration, both with the University of Victoria and beyond. My research team was likewise occupied; most are involved in multiple research projects beyond this one, and many also have commitments to other professional or personal endeavours outside of research. An additional scheduling constraint arose from the restricted timeline of the project, as it was being carried out in partial fulfillment of my master's degree and as such was expected to be completed within a two-year timeframe. Balancing the different time commitments of both the research team and our community partners in T'Sou-ke was difficult, and despite best efforts from all parties it was not always possible to align our schedules. Despite these challenges, however, this project was nonetheless successfully concluded within the approximate two-year time frame given. A deciding factor in facilitating this was the relationship that our team and the community had developed over the previous years. For the last decade, T'Sou-ke Nation has held a strong working relationship in land use and mapping with a member of my project's research team (Spalding, 2022). In addition, another researcher on this team had collaborated previously with T'Sou-ke on cultural activities outside of research. Working to develop a trusting collaborative relationship is arguably the most important part of Indigenous community-based research but can also take the most time (Amauchi et al., 2022). While as a new master's student from outside the community I had no previous association with T'Sou-ke, these ongoing relationships allowed for the project design and mapping workshop planning process to begin relatively quickly compared to projects in which these relationships must be developed from scratch.

Based on these experiences I recommend that researchers pursuing CBPR with Indigenous communities look for preexisting relationships and personal connections which can be nurtured and developed into collaborative research partnerships, rather than approaching communities with which they have no prior association. This may not be a suitable approach in all scenarios; for example, there could be times when communities approach researchers with whom they have no connection with a research project already in mind, and there could be times when a community you have an established relationship with may not be interested in pursuing research together. When appropriate for both the community and the research project, however, building out of an existing relationship of mutual respect is often the surest way to ease the difficulty of navigating the different demands on everyone's time and ensuring that research can move forward at an appropriate pace (Amauchi et al., 2022; Castleden et al., 2012; Wong et al., 2020). This is particularly vital for graduate students, who would likely not be able to complete their research within the timeframe allotted to them without relying on the connections of more senior researchers who have had time to develop these relationships (Amauchi et al., 2022; Castleden et al., 2012; Wong et al., 2020). Other suggestions for navigating this challenge include investing as much time and energy as possible into scoping and planning at the start of the project, thereby minimizing avoidable scheduling conflicts and delays later in project execution, and to align engagement activities with existing community events where feasible. For example, hosting a participatory mapping activity at a local festival or at a communal meal rather than scheduling a dedicated event. This was an option discussed with T'Sou-ke, and while it was not the direction ultimately chosen, under appropriate circumstances this approach can still be a conscientious way to limit how much a project adds to the community's schedule. Each of these suggestions is intended to minimize the burden that requests for engagement can place on a

partner community by ensuring that researchers are conscientious and respectful of the time and energy which communities contribute to research partnerships.

4.2 Education, experience, & perception of success in CBPR

A problematic dissonance exists between what is expected of research according to institutional systems rooted in Western academic values and the realities of enacting community-based participatory research (Amauchi et al., 2022; Castleden et al., 2012, 2015; Johnston et al., 2018). These systems typically emphasize measurable markers of successful research design and implementation, such as the speed at which fieldwork is completed, the amount of data collected, and the number of publications produced (Castleden et al., 2012, 2015). Informal and unquantifiable outcomes which are beneficial to the community but do not hold clear value for the institution, such as the development of researcher-community relationships and the empowerment of the community partners, are often trivialized in comparison (Castleden et al., 2015). This dissonance has been discussed at length by other researchers, including notably Heather Castleden of the University of Victoria (Castleden et al., 2012, 2015). In an exploratory case study involving interviews with numerous community-based researchers, Castleden notes that respondents consistently observed discrepancies between what their university or funding body expected them to be able to deliver (and when they expected it) and their actual project outcomes (Castleden et al., 2012). Castleden later discusses how academic institutional systems privilege a narrow understanding of what constitutes successful research and disadvantage research processes and outcomes which do not align with this understanding (Castleden et al., 2015). By (intentionally or unintentionally) diminishing the credibility of ‘slow research’, in which extended time is spent developing a relationship with community partners without producing archetypal research outputs, these systems risk perpetuating the colonial research

paradigms which CBPR is intended to help overturn (Amauchi et al., 2022; Castleden et al., 2015; Johnston et al., 2018).

Education and experience can be a significant factor in how well this dissonance is understood at the individual level. Senior researchers in CBPR have the benefit of years of experience with which to judge the success or shortcomings of their work (Atalay, 2022). Many graduate students, however, have no prior experience with CBPR before beginning their research projects and little-to-no training, making it particularly difficult for them to assess the quality and validity of their work (Atalay, 2022; Meloche et al., 2022). Just as academic institutions prioritize quantifiable metrics for research design and implementation, most graduate programs teach their students to plan their proposed research in concrete terms; for example, the number of participants they will engage, the size of the area they will survey, the amount of data they will collect, and the specific outputs they will produce (Atalay, 2022; Castleden et al., 2012; Meloche et al., 2022). This approach does little to prepare students for the variation inherent in and adaptability required for community-based research and can leave students with an inaccurate idea of what their graduate work will look like (Atalay, 2022; Meloche et al., 2022). While students may recognize that their project does not conform to these structures and understand that flexibility exists within graduate programs to accommodate various research approaches, they are nonetheless reminded constantly throughout their studies that quantifiable metrics are considered standard for successful project development and execution (Atalay, 2022; Meloche et al., 2022). This environment can be profoundly alienating, particularly when one's peers are not conducting CBPR and so can more easily demonstrate institutionally emphasized markers of successful research (Meloche et al., 2022).

This is particularly true for non-Indigenous students who will be working with Indigenous communities, and who are often unprepared for the realities of building these complex research relationships as outsiders. For most Canadian graduate students, the only preparation received for working with Indigenous communities comes from the "Course on Research Ethics" based on the "Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans", which at the University of Victoria all graduate students working with humans must complete (Panel on Research Ethics, 2022). While this course provides a detailed outline of the administrative and practical steps researchers should follow in ethically and respectfully engaging with an Indigenous community, it does very little to prepare students for the nuances and challenges non-Indigenous researchers, particularly students with limited experience, can face when navigating a research relationship with Indigenous Peoples (Castleden et al., 2015). This course presents a sanitized version of Indigenous community engagement, in which specific steps are followed in a specific order, and challenges are navigated via clear protocols. The reality is that the 'best practices' outlined in the "Course on Research Ethics" are not one-size-fits-all, and what works with one community may not work with another (Castleden et al., 2015). Reflexivity and adaptability are vital in order for non-Indigenous students to navigate the challenges and conflicts which can arise while building a collaborative research relationship with their Indigenous community partner, something that is not communicated through the "Course on Research Ethics".

While I am lucky enough to be part of a department which has made considerable efforts in support of community-based research, as a graduate student I still at times struggled to reconcile the realities of my work with what my education in the master's program taught me to expect of the research process. This was in some ways made more challenging by the

interdisciplinary nature of the department—geography—as my graduate student peers were engaged in an extremely diverse range of topics and methodological approaches, and few others were doing CBPR. In this context, it was difficult to judge my own success and to feel confident in my work when friends and colleagues were reaching milestones which I had yet to arrive at (and in some cases never would). While I was exploring possible research topics and working on planning participatory mapping workshops with T'Sou-ke, many of my peers had already departed for fieldwork, completed data collection, and then returned and begun analysis. It was a confusing and alienating experience to realize that the conventional structure of geographic research which my graduate courses had taught me to expect and plan for would not be my reality. Later, when conducting the mapping workshops, the preconceived notions I had developed around what made research successful made it difficult to judge whether the workshops had gone well—I looked at how many people had attended, how many note sheets had been filled, and thought I had failed because I had not achieved as big a sample size or data set as I had anticipated. It took time and insight gained through reflecting on my experiences at the workshops, analysing the information I had collected, and discussing my feelings with my more experienced research supervisor to realize that I needed to measure success not by the *number* of people engaged but by the *value* of those interactions, and not by the *amount* of data collected but by the *quality* of the insights gained.

While a difficult challenge to address, I offer a few suggestions based on these experiences which I hope will make the difficulty graduate students face in assessing the success and validity of their research easier to deal with. Foremost of these is a reminder to students to resist the temptation to compare their research methods and accomplishments to those of their peers. No two paths in research are the same, especially in CBPR where projects so often diverge

from institutional expectations (Castleden et al., 2015). Students need to remember that this individuality and uniqueness is a strength, not a drawback. Maintaining open lines of communication with your community partners, your research supervisor, and other mentors with experience in CBPR is integral to this. I advise graduate students to seek frequent feedback from more experienced community-based researchers, and trust that their assessments are genuine. This is also a reminder to supervisors; that your students may lack the experience to objectively assess their work, and so require the guidance and reassurance of researchers with more practice and training than them to inform their judgements (Meloche et al., 2022). Voicing affirmations—and constructive criticisms—and explaining them can both offer moral support and help educate your students as to what constitutes successful community-based research. Additionally, I encourage graduate programs to broaden the lens through which they frame student research design and implementation. A greater emphasis on CBPR approaches and non-quantifiable metrics for success would not only benefit students pursuing community-based research but could also encourage other students to approach their research with greater creativity and confidence (Amauchi et al., 2022; Meloche et al., 2022). I would also suggest that the "Course on Research Ethics" discussed above could be modified to include language which better reflects the complexity of doing research with Indigenous communities, particularly for non-Indigenous researchers, and could include suggestions for navigating unanticipated challenges and conflicts (Panel on Research Ethics, 2022).

5.0 Discussion & Conclusion

Participatory mapping can be a powerful tool in Indigenous community-based research, helping to build a positive relationship between researchers and partner communities and to facilitate community empowerment through knowledge mobilization. In the context of this research, it has also helped to validate the of use qualitative mapping techniques in the field of environmental valuation. While the challenges that I experienced were also considerable, it is noteworthy that these were not inherent to participatory mapping itself but rather arose from the nature of community-based participatory research (CBPR) and how it manifested in the specific context in which this research occurred. Whether or not this method is an appropriate choice for any research project is entirely conditional, dependent not only on what it will be used to analyse but on the context in which the research is situated. This is a particularly difficult thing for graduate students to judge and make decisions on given their limited experience and training in CBPR (Meloche et al., 2022). Given this, I offer a few suggested guidelines for graduate students planning on undertaking CBPR with Indigenous communities to help assess whether participatory mapping is an appropriate method in the context of their research.

1. **Before approaching a potential community partner, reflect on the depth and strength of your relationship.** How well do you know them? How well do they know you? Have you worked with them before? Has your supervisor, or anyone else on your team? CBPR requires time to build a solid, trusting relationship between the research team and community partner, particularly with Indigenous communities, time which graduate students do not typically have in abundance (Amauchi et al., 2022). Participatory mapping is also a time-intensive method, one which requires considerable planning and organization over an extended period (Denwood et al., 2022). If you have

the opportunity to work with an Indigenous community with which you or your team already have a good relationship, prioritize following those connections even if it means having to adjust your research topic or methods. Building your research off existing connections will save considerable time at the start of your project and can help minimize disruptions down the line (Castleden et al., 2012). If you do *not* have this option, consider whether changing your methods (for example, switching to semi-structured interviews, archival surveys, or focus groups) could allow you more time to work on building a solid relationship with your partner community.

2. **Assess your own financial, social, educational, and professional circumstances.** Do you have the financial stability and flexibility to extend your degree if necessary? Does your university impose strict limitations on the time you can take to finish your degree? Are there other personal or professional obligations which require you to finish your degree by a certain time? As mentioned above, both building a good community-researcher relationship and planning and executing participatory mapping workshops are time-intensive activities (Amauchi et al., 2022; Denwood et al., 2022). If your personal circumstances require you to finish your degree within a length of time not compatible with these processes, it may be that CBPR is not a good fit at this time. Students debating whether to pursue this avenue of research should engage in careful self-reflection as to whether CBPR and the participatory mapping method are compatible with their needs.
3. **Consider whether mapping itself holds significant value to the research project or to the community.** Is it important that the engagement process is spatially grounded? Is spatial analysis integral to answering the research question? If not, perhaps another qualitative method could be equally suitable in terms of addressing the research topic but

> might take less time and energy to plan and organize. If spatiality *is* integral, I suggest that researchers thoughtfully consider which of the variety of participatory mapping techniques available to them would be most appropriate in the context of their research. Depending on the interests, needs, resources, and time constraints of both the community partner and the research team, it may be that mental mapping, sketch mapping, PGIS, or a combination thereof may be more effective than the technique you might assume is best based on its popularity or your personal experience (Boschmann & Cubbon, 2014).

After reflecting on these suggestions, it could be the case that you decide that another research method may be more suitable for accommodating the challenges presented by the circumstances of your project. It could also be the case that the project cannot be changed and simply demands more time, and so requires you to either extend your degree or—for master's students—be shifted to a doctoral program. That being said, I would also note that as I experienced with the case study discussed in this article, even when there are challenges present participatory mapping can still have immense value both as a research method and as a means of facilitating meaningful engagement with Indigenous community partners. The ability of maps to help break down barriers between researchers and community participants is particularly valuable for non-Indigenous researchers working in Indigenous contexts, where as an outsider it can be difficult to build a good relationship with your research partners. As community-based qualitative researchers, it is our duty to consider and assess the circumstances under which our project will occur, and together with the community decide whether the benefits that could be gained by using participatory mapping outweigh the challenges.

The past two-and-a-half decades of participatory mapping research have established this method as a cornerstone of community engagement by governments, non-government

organizations, and universities (Cochrane & Corbett, 2020; Denwood et al., 2022; Lydon et al., 2017). The variety of possible techniques makes this method incredibly adaptable to different research topics and communities, and its unique ability to mobilize knowledge into forms which can help subvert dominant worldviews makes it a particularly valuable tool for Indigenous Peoples (Brown & Kyttä, 2018; Cochrane & Corbett, 2020). But while powerful, the challenges which can arise during community-based participatory research can make participatory mapping a difficult method to use, particularly for graduate students working with Indigenous communities. It is my intention that future researchers may gain some insight into the benefits and limitations of using participatory sketch mapping in Indigenous contexts through this reflection on lessons learned during a case study conducted with T'Sou-ke First Nation. Through these insights, I hope that future researchers—and graduate students in particular—will be able to approach Indigenous community-based mapping research from a more informed perspective and be able to more readily assess whether this method is appropriate in the context of their work.

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Chapter 4 - Conclusion

1.0 Summary

The goal of this thesis was to better understand how Indigenous knowledges and cultural practices inform perception of the value of the natural environment through a co-research approach. This is demonstrated through two articles, the first presenting a participatory mapping exploration of the diverse ways in which environmental value can be perceived and understood by Indigenous Peoples and the second critiquing the benefits and challenges of participatory mapping as a qualitative co-research method in Indigenous environmental valuation research as observed through my experience as a graduate student.

Chapter 2 details a case study conducted in partnership with T'Sou-ke First Nation through which the environmental values associated with the natural landscape of T'Sou-ke traditional territory are explored. Western Redcedar (*Thuja plicata Donn* ex D. Don) and Yellow-cedar (*Callitropsis nootkatensis* (D. Don) Oerst. ex D.P. Little) were used as an analytical lens through which to conduct this case study, selected through engagement with T'Sou-ke as species of high importance and concern both for the community of T'Sou-ke and within the socio-economic landscape of the surrounding region (Klinkenberg, 2020). Through two participatory sketch mapping workshops and one semi-structured interview, eight forms of environmental value were identified in association with cedar trees: 1) the value of cultural knowledges, 2) the value of cedar in enacting self-determination, 3) the value of environmental health for cedar, 4) the value of enacting territorial reclamation through cedar, 5) the value of cedar technologies, 6) the economic value of cedar, 7) the value of cedar in food preparation and hunting, and 8) the aesthetic value of cedar. While not a comprehensive picture of all possible forms of environmental value available, and although this case study only engaged with a limited number

of community members, this research nonetheless illustrates the diversity of possible ways of benefiting from the environment beyond those accounted for through Western science and demonstrates the interconnectedness of all forms of environmental value through their collective association with a single species. These findings highlight the importance of taking a multi-knowledge system approach to assessing environmental value, allowing the natural world to be analysed through different cultural and intellectual lenses and for forms of value inherent to different knowledge systems to be considered on equivalent terms.

In Chapter 3 I provide a reflexive critique of the participatory mapping method, discussing my experience during the case study outlined in the previous chapter and considering the benefits and challenges of this method, with particular attention to its applicability to graduate student research with Indigenous communities. These workshops were conducted using a sketch mapping method, where participants were invited to contribute to large-scale print maps using stickers to mark significant locations and paper capture sheets to record the stories and ideas associated with those locations (Boschmann & Cubbon, 2014). This method offered significant benefits, including helping to break down barriers and build trusting relationships between the community participants and my research team, facilitating opportunities for community and individual empowerment through knowledge sharing and mobilization, and illustrating the validity of using qualitative, hands-on participatory methods for Indigenous environmental valuation research. This method also brought challenges, however—namely the difficulty both researchers and Indigenous communities can face in balancing time commitments and the strain of managing institutional expectations when conducting community-based participatory research (CBPR). Special attention is given to the disproportionate ways in which these challenges can impact graduate students, and suggestions are offered to both professional

and student researchers for minimizing the effects of these challenges on a research project. In the discussion, I encourage graduate students intending to work with Indigenous communities to assess whether participatory mapping is an appropriate method to use within the personal and professional context in which they will be conducting their research project. Through this critique of participatory mapping as the method used for exploring Indigenous environmental valuation with T'Sou-ke First Nation, I demonstrate both the validity of using qualitative participatory methods in this field of inquiry and offer a realistic assessment of the difficulties a community-based participatory research approach can bring, particularly for graduate students and other early-career researchers working in Indigenous contexts.

2.0 Future Considerations & Implications

Through these two articles, this thesis contributes to the growing body of research exploring Indigenous environmental valuation and how recognition of Indigenous perspectives and ways of knowing can expand and diversify the knowledge base informing environmental valuation models (Normyle et al., 2023). This research also provides evidential support for qualitative, participatory co-research approaches in the study and assessment of environmental value.

The eight forms of environmental value derived from cedar trees which were identified through this project are corroborated by past research exploring Indigenous cultural environmental value through broader ecosystem or use-based lenses (Normyle et al., 2023). The use of cedar as the focal point for this research demonstrates the interconnectivity of these environmental values, illustrating how a single plant—or by extension a single animal, non-living landscape element, or activity--can be viewed through different cultural, social, and use-based lenses to identify distinct forms of value. These findings join the growing body of research emphasizing the importance of recognizing and including Indigenous knowledges in environmental valuation research, policy, and assessment systems so that the scope of potential environmental value can be more fully understood (Normyle et al., 2022, 2023; Urzedo & Robinson, 2023). In addition, the identification and analysis of these forms of value through a qualitative participatory mapping process co-led with T'Sou-ke demonstrates the validity and necessity of working *with* Indigenous Peoples on environmental valuation research, not merely extracting and integrating Indigenous knowledges into valuation models (McGregor, 2004; Reid et al., 2020; The Indigenous Circle of Experts [ICE], 2018).

As environmental valuation research transitions from a knowledge extraction approach towards knowledge co-production, so too must the development and application of environmental valuation models. As argued by Normyle et al. (2023) and Urzedo & Robinson (2023), the next progression in their development is to engage with Indigenous communities to co-design models which are consistent with both Indigenous and non-Indigenous ways of understanding and perceiving environmental value. The majority of current models, whether they are described using the term environmental valuation, natural capital accounting (NCA), or ecosystem accounting (EA), still rely on Western science and colonial knowledge systems despite the growing body of research undermining this approach (Normyle et al., 2023). The global popularity of environmental valuation as a method of biodiversity conservation and environmental management across different cultures, climates, and conservation challenges indicates the importance of more than a single knowledge system contributing to the development of these models (Hinson et al., 2022; Normyle et al., 2022). There is a pressing need for valuation models and the institutions developing them to shift away from the exclusion or extraction of Indigenous knowledges and towards co-development approaches through which the insights and perspectives of diverse peoples can inform how the value of their local environment is understood and protected (Hinson et al., 2022; Normyle et al., 2022).

The BIOSCAN Canada project, which the research described in this thesis supports, aims to "engage local communities and incorporate Indigenous ways of knowing into an accounting method for 'natural capital'" (Centre for Biodiversity Genomics [CBG], n.d.) as one of its four guiding pillars. In pursuit of this goal, the BIOSCAN project has engaged with T'Sou-ke First Nation to better understand Indigenous environmental valuation, an ongoing endeavour which will be continued with other communities and graduate students incoming to the project.

Reaching this goal will require active collaboration between the BIOSCAN Canada research team and Indigenous communities and researchers, not just during initial exploration of environmental value but at all stages of the development of this multi-knowledge system natural accounting model. To co-develop such a model requires reconciliation of the ontologies and epistemologies of Indigenous ways of knowing with those of Western science, through which the natural world and humans' role within it are understood in fundamentally different ways (Latulippe & Klenk, 2020; McGregor, 2004). This is not something that can be done without recognizing and respecting these differing realities and knowledges as valid and equal through a collaboratively developed pluralistic epistemology built by and encompassing diverse ways of knowing (Latulippe & Klenk, 2020; Reid et al., 2020).

3.0 Conclusion

Human beings around the world receive countless benefits from interacting with and existing alongside the natural environment, benefits which vary and fluctuate across every culture and knowledge system (Normyle et al., 2023). Understanding and assessing the value which humans receive from the environment offers an opportunity to demonstrate the economic and societal benefits of conserving environmental assets, but when this is approached through an exclusively Western science-based lens we neglect to consider forms of environmental value which are derived through Indigenous ways of knowing (Hinson et al., 2022; Normyle et al., 2022; Urzedo & Robinson, 2023). This research has explored some of the diverse and interconnected ways in which Indigenous communities interact with and derive benefits from the natural environment, and through this exploration of Indigenous environmental valuation demonstrated the need for future models assessing the value of natural systems to be developed through participatory co-research approaches which acknowledge and respect Indigenous ways of knowing.

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Appendices

Appendix A – Workshop and Interview Guiding Questions

Guiding Questions - Participatory Mapping Workshops

Q1 Where are there areas of significance for cedar in your territory, and why are they important to you?

Q2 How does cedar contribute to the well-being of your community? (Physical, mental, cultural, spiritual, et.)

Q3 What are the current challenges and threats to the health of cedar in your area? Are you concerned about biodiversity loss or habitat degradation?

Q4 What data or information would be most meaningful for T'Sou-ke in assessing the health and value of cedar?

Q5 What is T'Sou-ke Nation's vision for cedar in your territory in the coming years and generations? What are possible opportunities for cedar use?

Q6 Anything else important to include?

Guiding Questions - Semi-Structured Interview

Q1 Based on your experience both in your current role as Chief and former role as environmental officer, please can you share with us the significance of the natural environment to your Nation?

Q2 What about cedar trees makes them valuable and important to T'Sou-ke Nation? This could be described as value in multiple forms, economic, cultural, aesthetic, or any other. Please can you provide an example?

Q3 In which ways does cedar contribute to the well-being of your community? This can be physical, mental, spiritual well-being, et cetera.

Q4 Are there any sites of particular significance for cedar in T'Sou-ke territory we should be aware of? If so, why are they important?

Q5 What have been some of the biggest challenges or threats to the health of cedar in your territories? Are you concerned about biodiversity loss or habitat degradation? Please share any examples.

Q6 Are there long-term goals pertaining to the health and stewardship of the Nation's forests (and cedar in particular) that you envision for the future?

Q7 Is there any data or information that T'Sou-ke might benefit from having which would help the Nation in assessing the health and value of cedar trees in your territories?

Q8 Is there anything else you'd like us to know that is relevant to these topics?

Appendix B – Photographs from Participatory Mapping Workshops

Figure A.1 – Participatory mapping workshop #1 in November 2023. Top left: Group discussion; top right: array of sketch mapping tools on top of one of the basemaps used; bottom: thesis author Bethany Woodbridge (left) with committee member Pamela Spalding. Photographs by Crystal Tremblay.

Figure A.2 - Thesis author Bethany Woodbridge at participatory mapping workshop #2 in February 2024. Photograph by Crystal Tremblay.

Appendix C – Qualitative Codebook

Eight thematic qualitative coding categories, through which the eight forms of Indigenous environmental value analysed in Chapter 2 were identified, are laid out in the following tables. Each table contains all qualitative codes and subcodes for that category, the meaning of these codes and subcodes, and an example of each code from the data collected during the case study outlined in Chapter 2.

Table A.1 - All qualitative codes & subcodes belonging to Thematic Code Category 1: Value of Cultural Knowledges.

Thematic Code Category 1: Value of Cultural Knowledges			
The value and importance of the cultural knowledges and skills associated directly and indirectly with cedar trees, including the value of learning, enacting, and teaching said knowledges and skills (not only the value of the knowledge/skill itself).			
Code	**Subcode**	**Meaning**	**Example**
Adaptability		The ability of people to adapt their knowledge and skills to changing circumstances, needs, and situations.	"...dry kelp and weave into baskets. We called her the "Creative Native", used to say that if she ran out of stuff she'd use her yard."
Cultural knowledge revitalization		Mention of efforts being made, actions take, enterprises undergone to revitalize and reinvigorate cultural knowledge and skills.	"Youths were brought here last year for a special cedar stripping activity."
Disconnect	*Knowledge & skill loss*	A general feeling if a fading connection to cultural knowledges and skills. **Knowledge & skill loss** refers to a mention of specific lost or disappearing skills and knowledge sets.	"I was over there for ten years and I just got totally away from hunting. I want to get back into it and I just need time right now."
Education		Teaching others, imparting skills and hereditary knowledge onto others, particularly youths as part of passing on knowledges to the next generation.	"Currently there are cultural educational activities here."
Experience		Accounts of events and things said or done, either participated in by the speaker or a story they were told from someone else. Knowledge or understanding gained from personal experience or through the stories of others.	"There was going to be a campground here but T'Sou-ke asked for it to be stopped in order to protect the crab apple."
Forest-community integration		Mention of instances of blending community function and activity into the fabric of the forest. Activities taking place in the forest, the forest being integral to the function of the nation, etc.	"Very big cedar tree! Root gardens were here."
Innovation		Innovative application of knowledges and skills, use of materials, adaptation of	"...they'd cut a channel (in the river?) with a cedar canoe to

		tools, etc. Not necessarily "new" inventions, could just be evidence of creativity and innovation and adaptation of skills and materials for unusual use having occurred at some point.	either side and stab salmon and toss into the canoe. The salmon hide in the seaweed, so this is how they'd catch them."
Inter-community relationships		Mention of co-operation and knowledge sharing between communities, past or present.	"Went with a friend who is Scia'new to go cedar stripping at French Beach…"
Intergenerational relationships	*Family activities*	The relationships between different generations within the community, and the knowledge shared, skills learned, and activities undergone through these relationships. **Family activities** refers to the activities and tasks undertaken in a collaborative familial setting, done and learned together.	"...she and her husband went to Glintz Lake and stripped 2 trees there."
	Knowledge inheritance	**Knowledge inheritance** refers to mentions of the passing down of knowledge and skills through generations.	"Dad said they'd cut a channel (in the river?) with a cedar canoe to either side and stab salmon and toss into the canoe. The salmon hide in the seaweed, so this is how they'd catch them."
Place-based knowledge		Knowledge and understanding that is rooted in a locality, about and tied to a particular place.	"Right behind Poirier school is amazing cedar forest."
Plant-based knowledge		Knowledge, skills, and understanding about and inherently connected to a specific plant, particularly cedar.	"You can eat salmonberry sprouts-- when they're new (before berries), you scrape off the bark and eat the sprouts."
Pride	*Familial*	An expression of their pride in something or someone's skill, accomplishments, knowledge, etc. Could refer to expression of pride through the enactment and revitalization of these things. **Familial** refers to pride in their family's actions, accomplishments, skills, and knowledges.	"Grandma Sue would dry kelp and weave into baskets. We called her the "Creative Native", used to say that if she ran out of stuff she'd use her yard."
	Cultural	**Cultural** refers to pride in cultural knowledge and traditions, pride in their Nation and community.	"T'Sou-ke wants to put in some cultural camps up here."
	Territorial	**Territorial** refers to pride in the land and waters of T'Sou-ke, the protection and care of it, it's beauty and health, etc.	"...once was nicest forest on Koksilah watershed."
Problem solving		Use of T'Sou-ke knowledges, skills, and ways of knowing to solve current problems the community or individual is facing.	"Want to either acquire the Mosaic lands or partner with them to make the whole area a protected area (tribal park)."
Skill		Explanation or account of a skill-based knowledge set.	"Sometimes a wool blanket would get cedar that was beaten until soft woven into it to protect it from moths."
"Way of life"		In-Vivo code: Indication of the interweaving of traditional and cultural	"Back in the day, everyone had a smokehouse"

		knowledges into everyday life, that these skills and ways of knowing are an integral part of life	

Table A.2 - All qualitative codes & subcodes belonging to Thematic Code Category 2: Value of Cedar in Self-Determination.

Thematic Code Category 2: Value of Cedar in Self-Determination			
The value and importance of T'Sou-ke Nation and its people's political, cultural, and economic autonomy, as enacted through the use of and with cedar trees and the rest of the natural environment. Autonomy in the sense of both T'Sou-ke's self-governance & of its people's personal independence.			
Code	**Subcode**	**Meaning**	**Example**
Adaptation to colonial structures		Denotes mention of choices made or actions taken which function within and take advantage of external colonial systems-- both governmental and private/commercial-- for the benefit of T'Sou-ke and the protection of the environment.	"She tracked and shot a cougar and now it's at the museum."
Community stability		Actions taken or decisions made to protect the wellbeing and functional stability of the greater community of T'Sou-ke Nation and its function.	"T'Sou-ke wants to put in some cultural camps up here."
Exertion of rights		Exertion of T'Sou-ke Nation's legal rights, both granted through colonial political processes and held inherently in their culture and traditions.	"...was told to leave because it was private land. She responded, “This is our land” and kept on harvesting."
Financial stability		Actions taken or decisions made to protect the financial stability and generation of communal income of the greater community of T'Sou-ke Nation.	"Have to find a way to protect forests that doesn’t majorly reduce revenue."
Freedom of expression		Enacting T'Sou-ke's right and freedom to express their voices, opinions, culture, knowledge etc. as they choose.	"Currently there are cultural educational activities here."
Freedom of practice		Enacting T'Sou-ke's right and freedom to practice traditions, activities, etc. as they choose.	"After Charters River, she and her husband went to Glintz Lake and stripped 2 trees there."
Lack of autonomy	*Disparate ethical paradigms*	A lack of control and freedom to govern one's own actions and make one's own choices; refers to individuals feeling like they lack personal autonomy and to feeling like their Nation or community lacks autonomy. **Disparate ethical paradigms** refers to a fundamental difference in views on 'right and wrong', in what is considered moral and ethical behaviour.	"New owner is logging but once was nicest forest on Koksilah watershed."
	Disparate values	**Disparate values** refers to a fundamental difference in what things, in what characteristics of a thing, are considered important and therefore valuable.	"Loggers took it all out and then just left the cedar wood behind so T'Sou-ke took it."
	Disregard	**Disregard** refers to feelings of irrelevancy, like their opinions or choices don't matter to others.	"Used to hunt across this whole area, but it’s owned by Mosaic now,

			lots of it has been logged."
	Disrespect	**Disrespect** refers to feeling like their rights, wishes, and opinions are being disrespected, particularly by exterior corporations, governing bodies and individuals.	"Used to go to Bellingham (United States) for berry picking, and also Bainbridge Island. Once US border was in enforced that couldn't happen anymore."
	Exploitation	**Exploitation h**ighlights instances of exploitation, both of people and of the natural environment.	"But could now be logged. Why protect one side of the river, but not the other?"
	Frustration	**Frustration** refers to an expression of anger, annoyance, and irritation towards corporations, people, or governments for actions taken which infringe on T'Sou-ke autonomy, particularly for actions which affect or damage the forests and natural environment.	"Jordan Meadows - used to be able to drive out there but can't get in any more."
	Ignorance	**Ignorance** refers to a lack of understanding, perceived and real, on the part of others, particularly towards the legal and cultural rights of T'Sou-ke.	"There was going to be a campground here but T'Sou-ke asked for it to be stopped in order to protect the crab apple."
	Lack of transparency	**Lack of transparency** refers to purposeful obstruction of truth, and a lack of honesty and openness from others, particularly felt to be coming from external corporations and governments.	"She found out later that that site is part of T'Sou-ke's treaty settlement offer…"
Prioritization		Emphasizes mention of making certain activities or goals a priority over others.	"Logging is the biggest threat unquestionably (to cedar), but also how warm it's getting is putting cedar into drought. Water is vital to their survival."
Respect		Feeling like their rights, wishes, and opinions are respected by others, particularly exterior governing bodies and individuals. Feeling of respect for someone or something else, for their knowledge, skill, accomplishments.	"Maisey Lazzar (she's in the Sooke Museum) hunted cougars here. She tracked and shot a cougar and now it's at the museum."
Responsibility		Feeling of responsibility towards a mission or goal, specifically regarding the protection of the environment and of the forests in particular.	"Cedar visible along the river here, but we want an inventory of what's here. "
Self-determination		Expression of desire for or actions taken to further T'Sou-ke's ability to govern themselves, support themselves financially, and achieve their own goals. The community or individual deciding for themselves what makes them 'them'.	"T'Sou-ke is going to evaluate land to West of lake-- there's first growth forest there."

Table A.3 - All qualitative codes & subcodes belonging to Thematic Code Category 3: Value of Environmental Health for Cedar.

Thematic Code Category 3: Value of Environmental Health for Cedar			
The themes associated with environmental health and cedar trees, in particular the importance of the health cedar trees and the value of overall environmental health for cedar's survival.			
Code	**Subcode**	**Meaning**	**Example**
Anger		Expressing displeasure; upset by the topic, particularly regarding climate/environmental concerns.	"…was told to leave because it was private land. She responded, 'This is our lant', and kept on harvesting."
Awareness		Expression of their knowledge and perception of threats, dangers, controversies, current actions, etc. surrounding the subject of discussion, particularly regarding climate/environmental concerns.	"T'Sou-ke asked for it to be stopped in order to protect the crab apple."
Changing times		The area, activity, tree, etc. has changed; expression of nostalgia over how it used to be. No longer able to count on resources to be available at the places and in the abundance they once were.	"Used to hunt across this whole area, but it's owned by Mosaic now, lots of it has been logged."
Climate change	*Changing ecological patterns*	Expressing knowledge of, concern over, measures taken to protect against climate change. **Changing ecological patterns** refers to knowledge/observations of or concern over shifting distributions of species, i.e., to higher elevation or latitude, disappearing populations, etc.	"Went…to go cedar stripping at French Beach but couldn't get the right size of cedar"
	Changing seasonal patterns	**Changing seasonal patterns** refers to knowledge/observations of or concern over changing seasonal patterns, i.e., earlier and longer summers, milder and shorter winters, etc.	"…how warm it's getting is putting cedar into drought."
	Secondary concern	**Secondary concern** refers to the perception of climate change as the lesser threat to cedar trees relative to colonial logging practices.	"First priority is to slow down logging…climate change comes second."
Conservation		Interest in or activities in service of protecting the environment (territory, plants, animals, etc.)	"…make the whole area a protected area (tribal park)."
Drought		Expressing knowledge of and concern over drought/lack of water and its effects on cedar trees.	"…how warm it's getting is putting cedar into drought."
Encroachment	*Degradation*	The increased presence and impact of humans, human activity, and human infrastructure in a non-human environment. **Degradation** refers to the destruction of and reduced health and viability of the natural landscape.	"Pockets of cedar all along the road here…Lots of adjacent logging activity."
	Human proximity	**Human proximity** indicates that human activity and human infrastructure exist in abundance nearby.	"Right behind Poirier school is amazing cedar forest…"
	Pollution	**Pollution** refers to an observation of human pollution impacting or having the potential to impact the nearby environment	"…go back where the Sani dump site is and then

			to follow along 1 driveway…"
Fear		Expressing fear and/or anxiety, particularly regarding climate/environmental concerns.	"There was going to be a campground here but T'Sou-ke asked for it to be stopped in order to protect the crab apple."
"First growth"		In-Vivo Code: Refers to "old growth", it being special and unusual and of conservation value, but the speaker specifically used the term "First growth".	"First growth timber at top of Grant Lake…"
Guilt		Feelings of guilt, some level of perceived responsibility for harm or impact to the environment, particularly to cedar trees.	"…how do you how do you feel about the logging that you guys are doing? ...Eh. Yeah. I'll feel bad in a sort of way, I guess."
Healthy = valuable (cedar)		The relative value of cedar and cedar forests is judged by tree health (size and strength), as well as diversity in age within the stand.	"...amazing cedar forest, with small cedar perfect for making poles (for paddles) and big trees for making canoes."
Interspecies connectivity		Demonstrated connectivity between different organisms in the natural landscape; mention of multiple species in conjunction.	"Yellow cedar!... Very good hunting in this area"
Logging (external)	*Antithetical philosophy*	Logging practices of other entities are spoken of in terms of environmental effects or territorial encroachment rather than economic opportunity. **Antithetical philosophy** refers to the contradictory philosophical approaches reflected in the practices of colonial and T'Sou-ke logging.	"Loggers took it all out and then just left the cedar wood behind …whole trees just left to rot; common practice is to leave wood in slash piles."
	Direct harm	**Direct harm** indicates an instance of damage done to cedar and the forest directly by colonial logging.	"…this area has been significantly logged and altered."
	Primary concern	**Primary concern** indicates the perception of logging as the primary threat to the health and abundance of cedar.	"First priority is to slow down logging, protecting the integrity of the territory…"
Resilience		The ability to withstand change, damage, and deviation from ideal conditions; can refer to trees or to the community and their culture.	"Still some old growth cedar here…"
Symbiosis		Demonstration of the interconnectivity and reliance of cedar, water, and T'Sou-ke on each other. Water is a vital part of the health and function of both cedar trees/ecosystems and T'Sou-ke Nation. Cedar benefits from the care of T'Sou-ke and T'Sou-ke relies on cedar in all aspects of life.	"When we get finished logging, my little crew will go out and plant the trees, the seedlings."
"Water is vital"		In-Vivo Code: Refers to the biological importance of water to cedar's health and survival. Refers to cedar being a moisture-loving coastal tree that is threatened by increasingly warm and dry conditions. Also used in reference to water/water-based resources to T'Sou-ke.	"Water is vital to [cedar's] survival."

Table A.4 - All qualitative codes & subcodes belonging to Thematic Code Category 4: Value of Enacting Territorial Reclamation Through Cedar.

Thematic Code Category 4: Value of Territorial Reclamation Through Cedar			
The value gained from interacting with cedar trees, harvesting from them, using them for crafting, cooking, etc. as a way of reclaiming the territory which was once stolen. Cedar harvesting and cedar crafts as acts of asserting physical and cultural presence in places from which T'Sou-ke has been excluded.			
Code	**Subcode**	**Meaning**	**Example**
Adaptability		The ability of people to adapt their traditions and practices to suit their current circumstances, needs, and restrictions.	"T'Sou-ke is actively pursuing installation of 100 wind turbines on the island…"
Boundaries	*Physical*	Barriers and delineations which divide up the territory, limit or grant access to different areas for different parties. **Physical Boundaries** refers to the tangible barriers in the landscape which affect management, use, and access. Ex: a mountain range, river, ocean, etc.	"...the land was too steep to log in the past."
	Political & Legal	**Political & legal** refers to the intangible barriers affecting management and access to traditional territories. Ex: political borders, land ownership, restricted spaces, etc.	"Our hunting and fishing territory went all the way to Elwah in the US."
Encroachment		Increasing presence and pressure of outside and/or development on T'Sou-ke lands and territory, affecting the integrity of their lands.	"Big area of first growth kept for the nation, but all around it is logged."
Fractured relationships	Land & territory	Having lost connection with or feeling isolated from something that in the past there was a connection with. **Land & Territory** refers to having lost a feeling of connection with the lands and waters of T'Sou-ke territory.	"Used to hunt across this whole area, but it's owned by Mosaic now, lots of it has been logged."
	Neighbouring communities	**Neighbouring communities** refers to feeling isolated from other Nations, villages, and communities with which there was once a relationship.	"Used to go to Bellingham (United States) for berry picking, and also Bainbridge Island. Once US border was in enforced that couldn't happen anymore."
Jurisdiction	*Public Space*	Commentary on the legal jurisdiction that different parts of T'Sou-ke territory fall under today, who manages different areas, and the effects of this division/exclusion. **Public space refers** to comments on areas within traditional T'Sou-ke territory which have been granted jurisdiction available for public recreational use	"She found out later that that site is part of T'Sou-ke's treaty settlement offer, so went back another time"
Landmarks		Indication or mention of a significant location (landmark) that is meaningful to the speaker.	"On Mount Muir, highest spot in the territory."
Loss of access	*Enforced borders*	Refers to T'Sou-ke as a Nation and/or individual community members being	"Cedar visible along the river here, but we want

		excluded from and loosing access to areas in their territory that they previously had access to. **Enforced borders** refers to this loss of access being due to the enforcement of jurisdiction/ownership over the area.	an inventory of what's here. Collaboration with Mosaic is required to make this happen."
Ownership		Commentary on the ownership of different parts of T'Sou-ke territory, and the effects of this division/exclusion.	"Boneyard lot (below) is a T'Sou-ke woodlot, but the District of Sooke wants to sell the area right above it."
Taking up space		Exertion of a T'Sou-ke Nation presence in spaces they have been excluded from that were traditionally theirs. Refers to both physical space and space in an abstract sense, exerting their presence in professions, activities, etc.	"Root gardens were here. Part of Spring Salmon Place. Currently there are cultural educational activities here."
"This is our land"		In-Vivo Code: Refers to the assertion of the Nation's right to and claiming of T'Sou-ke traditional territory, particularly in instances where their rights and access have been limited.	"...site is part of T'Sou-ke's treaty settlement offer, so went back another time to strip cedar and was told to leave because it was private land. She responded, 'This is our land'"

Table A.5 - All qualitative codes & subcodes belonging to Thematic Code Category 5: Value of Cedar Technologies.

Thematic Code Category 5: Value of Cedar Technologies			
The value and importance of both the activities undergone during the process of creating with cedar as a medium, and the value of the products created using cedar as a medium or tool.			
Code	**Subcode**	**Meaning**	**Example**
Adaptability		The ability of people to adapt to changing circumstances, conditions, and needs to harvest, craft, and use cedar.	"Loggers took it all out and then just left the cedar wood behind so T'Sou-ke took it."
Advanced techniques	*Carving*	Highlights an indication of a particular skill or practice that's part of the process of harvesting or crafting with cedar being particularly difficult, and therefore significant and valuable. **Carving** is an example of a mentioned advanced and valued skill.	"...he built a little canoe, or carved out a little canoe for himself. Still sitting in the shop. He doesn't really care anymore. Did amazing job. He's very smart. I think he's the only one. Oh, Gordon built a canoe, too."
	Cedar stripping	**Cedar stripping** is another example of a mentioned advanced and valued skill.	"Went with a friend who is Scia'new to go cedar stripping at French Beach but couldn't get the right size of cedar."
	Clam-basket weaving	**Clam-basket weaving** is another example of a mentioned advanced and valued skill.	"Clam baskets were made from cedar branches, split in half--very difficult to work with. Woven in a criss-cross pattern to let them drain."

Creativity		Unusual and creative approaches both to harvesting cedar and in the use of cedar (or other materials) in crafts and other applications.	"Grandma Sue would dry kelp and weave into baskets. We called her the 'Creative Native'..."
Disconnect		Expressing a lack of connection to, or affinity for, some or all cedar related crafts. A feeling of disassociation from something perceived as inherently linked with cedar.	"...and of course, the cedar. I don't really-- I try to carve, but I don't have the…"
Slow crafts		Examples or comments on the slow pace of crafting with cedar, the patience required to work with it and prepare it for use.	"The strips hang for a year and then can be used to make things like headbands."
Versatility	*Artistic expression*	Cedar's applicability to many different uses; the versatility of cedar as a tool, material, and artistic medium. **Artistic expression** highlights the use of cedar (or other materials) for expressing oneself artistically, more than just practically.	"...called her the "Creative Native", used to say that if she ran out of stuff she'd use her yard."
	Clothing	**Clothing** highlights references to the use of cedar in creating wearable items.	…"regalia, hats, clothing, rain protection…"
	Cooking	**Cooking** highlights references to the use of cedar as a tool used for or method of cooking.	"Clams and mussels were smoked by stringing them on thin cedar branches."
	Shelter	**Shelter** highlights references to the use of cedar in creating homes and buildings.	"actually don't know if you knew or not, we used to have a big house down here. You know that? ...It's going back into the ground, naturally."
	Storage	**Storage** highlights examples of cedar being used to create baskets and other items used for storage	"...made money baskets, with coins hidden in the lid (her invention)."
	Textiles	**Textiles** highlights references to the use of cedar to craft textile material other than clothing.	"Sometimes a wool blanket would get cedar that was beaten until soft woven into it to protect it from moths."
	Transportation	**Transportation** is used for references to the various ways cedar is used in the process of travel and transportation.	"...small cedar perfect for making poles (for paddles) and big trees for making canoes."
"Where would we be without cedar?"		In-Vivo code: Used to indicate conversation which highlights how ingrained crafting with cedar is into everyday life, how so many activities and practices are dependent on cedar.	"'Where would we be without cedar?' Uses: bowls, regalia, hats, clothing, rain protection-- could go on. It's EVERYTHING."
Yellow cedar		The presence or use of yellow cedar is emphasized, effort is made to specify that the cedar being talked about is yellow, not red. Indication of the particular value and special nature of yellow cedar.	"Old growth Yellow Cedar at Wye Lake; yellow and red cedar…"

Table A.6 - All qualitative codes & subcodes belonging to Thematic Code Category 6: Economic Value of Cedar.

Thematic Code Category 6: Economic Value of Cedar			
The themes associated with the harvesting and use of cedar for economic gain.			
Code	**Subcode**	**Meaning**	**Example**
Adaptation (to colonial structures)		Working with colonial entities or within colonial systems to enact the Nation's own goals and/or protect their interests.	"Want to either acquire the Mosaic lands or partner with them…"
Budgeting resources		How the Nation manages and decides to use their resources, financial and otherwise.	"...then it's money. They won't do it for free. Not nowadays anyways."
Financial stability		Not just that the community has a way to make money but that the community has consistent and sufficient sources of income.	"…money earned from turbines could make up the difference if we reduce/stop logging these vital areas."
Income gain		A source of income or opportunity for profit for the T'Sou-ke community.	"Boneyard lot (below) is a T'Sou-ke woodlot..."
Income loss		A lost opportunity for profit; a restriction of activities which could generate profits or reduce expenses for the group/individual.	"Used to hunt across the whole area, but it's owned by Mosaic now."
Logging (T'Sou-ke)		Logging practices of T'Sou-ke Nation are spoken of in terms of economic opportunity rather than environmental effects or territorial encroachment.	"Boneyard lot (below) is a T'Sou-ke woodlot, but the District of T'Sou-ke wants to sell the area right above it."
Value (vs. Importance)	*Abundance*	Different ideas of what is and isn't valuable (and why something is valuable); perceiving something as "valuable" because it has monetary value vs. perceiving something as valuable because it's important. **Abundance** indicates something is valuable and/or important because there are so many of that thing.	"Loggers took it all out and then just left the cedar wood behind so T'Sou-ke took it. There are other spots like this around the area, whole trees just left to rot…"
	Scarcity	**Scarcity** indicates something is valuable and/or important because there is so little of that thing.	…take advantage of yellow cedar's value and relative scarcity."

Table A.7 - All qualitative codes & subcodes belonging to Thematic Code Category 7: Value of Cedar in Food Preparation & Hunting.

Thematic Code Category 7: Value of Cedar in Food Preparation and Hunting			
The value and importance of cedar's role in the hunting, fishing, gathering, and preparation of food, in various forms and applications.			
Code	**Subcode**	**Meaning**	**Example**
Abundance	*Scarcity*	Food or tools for acquiring food being readily available. **Scarcity** refers to those things being difficult to find or acquire.	"My uncle used to just drop a net over ducks in order to catch them, down by the docks near the Bandhouse."
Adaptability		Adapting tools, methods, food sources to overcome adverse or changing circumstances.	"BC Hydro powerlines, which people are farming beneath!"
Associated species		Species used for food or food preparation referred to in association or conjunction with cedar.	"Clam baskets were made from cedar branches, split in half…"

Cooking & food preparation with cedar	*Cooking implement*	Reference specifically to using cedar as a tool for cooking or food preparation. **Cooking implement** identifies an instance of cedar being used as a tool for cooking using other methods.	"Clams and mussels were smoked by stringing them on thin cedar branches."
	Smoked food	**Smoked food** identifies an instance of using cedar to smoke food items as a way of cooking.	"Clams and mussels were smoked by stringing them on thin cedar branches."
Creativity		Using unusual and creative tools and methods to prepare or acquire food, particularly involving use of cedar.	"Once used clamshells to collect juice from roasting fish, then used the juice to make risotto."
Fishing		Describing the process of, habits associated with, places went, etc. for catching fish and sea creatures for food.	Dad said they'd cut a channel (in the river?) with a cedar canoe to either side and stab salmon and toss into the canoe. The salmon hide in the seaweed, so this is how they'd catch them.
Foraging		Describing the process of, habits associated with, places went, etc. for gathering plants or fungi for food.	"You can eat salmonberry sprouts--when they're new (before berries), you scrape off the bark and eat the sprouts."
Hunting		Describing the process of, habits associated with, place went, etc. for finding and killing animals for food.	"At the old pipeline near Mount Shepherd (old name for Mount Quimper). Hunted deer, grouse, quail, and 'hooters' as a young boy."
Proactivity		Preparing food or tools for acquiring food in advance, in preparation for the future.	"Back in the day, everyone had a smokehouse"
Transportation		Identifies cedar's use as a transportation method, specifically for hunting, gathering, fishing, etc.	"Our hunting and fishing territory went all the way to Elwah in the US"
Use everything		Using all or as much of a plant or animal in the preparation of food as is possible.	"We make salmon egg soup (using Jordan River Salmon), with mixed potatoes, celery, vegetables. Used smoked salmon eggs—'Utchpŏb'"
Versatility		The versatility of cedar to create different tools and assist in food preparation in different ways.	"Clam baskets were made from cedar branches, split in half-- very difficult to work with. Woven in a criss-cross pattern to let them drain."

Table A.8 - All qualitative codes belonging to Thematic Code Category 8: Aesthetic Value of Cedar.

Thematic Code Category 8: Aesthetic Value of Cedar		
The value gained from, appreciation for, and importance of the aesthetic beauty of cedar trees and cedar forests, as well that of art and other items crafted using cedar as a material.		
Code	**Meaning**	**Example**
Admiration	Appreciation for the characters of a thing or place, its beauty, its productivity, its health, etc.	"Right behind Poirier school is amazing cedar forest, with small cedar perfect for making poles (for paddles) and big trees for making canoes."
Beauty	Commenting on an appealing physical appearance with appreciation.	"Big, beautiful cedar trees..."

Emotional value	Expression of the importance of the emotions brought forward by something, the way it makes you feel.	"That's my tranquility, I would say. Yeah, yeah, yeah, yeah. I just love it, the forest."
Intrinsic value	Expression of something being valuable and worth something for its own sake.	"Why protect one side of the river, but not the other?