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Getting Off the Boat: Re-Considering Research Responsibility and Knowledge Dynamics in Ocean Literacy

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Abstract

In light of the UN Ocean Decade's calls for increased ocean literacy, what can critical perspectives on inter-epistemic exchanges contribute to the practice of researchers themselves? Herein, we aim to expand on scholarship analyzing the relationship between researchers and local/Indigenous knowledge holders beyond notions of knowledge commensurability, towards interpersonal practices. A framework of relationship-building allows local perspectives and knowledge to be included both actively and passively in research. However, this requires marine scientists to spend time disembarked from sampling vessels in local communities. This adaptation in research methodology involves the scientist becoming a person first, and a researcher second. A paradigm shift occurs where the researcher's function is that of a guest, whose primary exercise is to actively listen. This repositions ocean literacy as a reciprocal process, whereby the scientist learns from diverse perspectives to inform and enrich mutual understandings of the ocean. We build here on research experiences to show how interpersonal relationships, rather than systemic ones, can help build richer collaboration. This dynamic is illustrated through the case of a marine habitat mapping study in the Canadian Arctic. Community engagement was prioritized by the researcher as a first step, allowing for exposure to local understandings of the ocean to orient research questions. Outcomes included locally relevant marine maps and research findings, culturally responsive outreach materials, a recovered airplane, short-term local employment, and long-term relationships which continue to the present day. This case demonstrates how the intentional development of interpersonal relationships can leverage research activities towards building ocean literacy which respects and recognises diverse knowledge systems.

Keywords

Arctic; Indigenous knowledge; knowledge politics; local knowledge; marine mapping; ocean literacy; ocean research

1. Introduction

At the culmination of a two-year marine habitat mapping graduate research project, the maps are finally ready to share. It is a joyous, triumphant feeling to return to the arctic hamlet outside of which these machine-learning-rendered maps of the seafloor took place. Upon displaying the final habitat maps to the municipality, hunters and trappers, and anyone interested, the response was unanimous: "We know." These AI maps only mirrored what is already known in the community. Despite this oversight, I am invited to participate in a fishing excursion in the waters where these maps predicted I would eventually go for nourishment. At the crest of my master's project, I am a beginner student of the ocean anew.

Research is full of chance encounters that can inspire us to reconsider what we know and how we know it. Drawing on such an experience and inspired by the UN Ocean Decade's call for increased ocean literacy around the world, we want to encourage a critical perspective on the knowledge dynamics which are at play in ocean science. In this article, we argue that a paradigm shift is needed in how ocean research is conducted, including attention to a more reciprocal concept of ocean literacy. As the importance of incorporating local and Indigenous knowledge in research gains academic recognition (Adams et al., 2014; Sjöberg et al., 2018), we follow others who have expanded the concept of ocean literacy outwards from its original educational framework, to include aspects pertaining to the social importance of oceans and the contributions of local experts (McKinley et al., 2023). Examining the contributions that ocean literacy research can make to policy discussions, McRuer et al. (2025, p. 5) argue that "there exists a collective need to prioritize place-based considerations and dismantle structured affiliations that have stagnated." We agree with these authors and propose that researchers take it upon themselves to develop relationships with local knowledge holders, directly embodying the change needed to produce insights into marine environments. Reconsidering the researcher's responsibility and awareness of their place in larger structures of knowledge and power dynamics can help to address current challenges in ocean literacy. Further, we argue that this shift in approach contributes to new opportunities to recognize, support, and learn from rich and diverse ocean knowledge systems. In addition to the policy-oriented call to collaboration of McRuer et al. (2025), this article contributes to the broader discussion through the study of a practical case that demonstrates how on-the-ground actions of individual researchers can contribute to fostering the reciprocal relationships needed to further an ocean literacy paradigm inclusive of many knowledge systems.

To support this, we begin by establishing the current knowledge dynamics upheld by scientific research practices. Acknowledging multiple ways of knowing the ocean requires recognizing how an individual's perspective and relationships shape their understanding of marine environments. Believing, as others studying ocean literacy initiatives have also highlighted, that multiple ways of knowing the ocean are valuable (Lobo & Parsons, 2023; Schwerdtner et al., 2023), we then discuss how academic science has maintained dominance over other ways of knowing the world (Niner et al., 2024). Through this, we highlight both the structural challenges that impede the equal recognition of local and Indigenous knowledge and the ways that researchers can adopt practices in their work to overcome these difficulties.

With an understanding of how researchers can situate themselves, we turn to a practical case to highlight how our position can be upheld in research activities. This case—part of one of the author's master's marine fieldwork—is an instructive example of how stepping off the boat, and into the community to build relationships can lead to mutual benefits, producing more robust science that recognizes and respects local

expertise. Getting off the boat in this instance is literal, but we believe it serves as a metaphor as well, encouraging researchers to find ways big and small to engage with local communities. The author's case exemplifies our position that relationship-building allows the integration of local perspectives and expertise into the work, all while contributing reciprocally to the community in which they are a guest. We believe this to be one of many required strategies, something to be practised alongside the supporting of local and Indigenous-led research (Held, 2019) and even the active stepping back of researchers to "make room" for Indigenous knowledge in institutional settings (Latulippe & Klenk, 2020). Which approach to apply in a given scenario is something that must be carefully considered alongside local and Indigenous peoples, hence the importance of developing interpersonal relationships. For marine scientists, this entails venturing beyond their vessels to engage directly with coastal communities.

Before beginning, we believe it is important to recognize our own positions concerning the knowledge dynamics we discuss. While legitimate critiques of practices such as positionality statements have been offered (see, for example, Gani & Khan, 2024, who examine how these statements can reify the privilege of those making them), our experiences working in Arctic communities have seen explicit requests by community members for the inclusion of such acknowledgements in academic writing. In this regard, the authors wish to acknowledge that their educational backgrounds have been in Western academic institutions, that they have had the privilege of support for their scientific research from major funders, and that they are based in southern Canada. The primary author is of settler-Canadian heritage, while the secondary author is of dual settler and displaced heritage, and is a woman of color. From these positions of privilege, we have aspired to learn from local experts and Indigenous knowledge holders with humility, and thank the people of Pangnirtung, Nunavut on whose lands and in whose waters the research described took place.

2. As Many Oceans as Ways to Know Them

Many fathoms under the sea, the delicate tendrils of feather stars sway gently in the cold passing current. Illuminated by the electric glow of lights mounted on the Remote Operated Vehicle (ROV), the seafloor of the fjord is being recorded in 4K for the first time. Local fishermen and divers, however, also know these *imammiutait*, or sea creatures, from their nets and the shallower waters of the fjord. These different vantage points in knowing the same benthos illustrate an easily overlooked reality: there are many oceans, not simply geographically, but also according to the perspectives from which we observe them.

There is more than one "ocean," and more than one way to view the same ocean (Lobo & Parsons, 2023; MacNeil et al., 2021; Schwerdtner et al., 2023). With the UN Ocean Decade's call to improve ocean literacy across the world, specifically via Challenge 9, to "ensure comprehensive capacity development and equitable access to data, information, knowledge and technology across all aspects of ocean science and for all stakeholders," we need to consider that there are many oceans to be literate on (Intergovernmental Oceanographic Commission, 2021, p. 23). This holds true for the range of conditions that distinguish oceans around the world, unique in their ecological and geological diversities, but also for different ways of knowing the same oceans. Depending on one's perspective and relationships, radically distinct aspects can be key in determining an understanding of the ocean (Gee, 2019; Jefferson et al., 2015). In this context, "perspective" refers to the unique combination of factors that shape an individual's viewpoint of the world. Perspectives are multiple and we as individuals can carry views which apply in multiple scales and scenarios, sometimes in

seemingly contradictory manners. Factors such as cultural background, knowledge systems, professional training, and even the languages they speak profoundly shape how the ocean is viewed by that person (Jefferson et al., 2021). A university-based researcher, for example, trained in oceanography and socialized in Western sciences is likely to hold a different view of the ocean than a local harvester, whose expert knowledge is the product of lived ways of knowing that same ocean.

The perspective offered of the ocean by diverse cultural and knowledge systems can challenge assumptions held by scientific researchers. Fundamental differences in how the environment is experienced and known are important in understanding how there can be multiple perspectives of the same ocean that unsettle even basic assumptions. Far from being constrained to the personal, these perspectives are highly social and often politically important (Potts et al., 2016). Maintaining and experiencing an Indigenous perspective of the ocean can be an important act of self-determination (Ingersoll, 2016). Further, affirming a perspective of the ocean which highlights commonality and connection between a region's Indigenous peoples is a means by which colonially imposed understandings can be supplanted (Hau'ofa, 1998). In referring to the impact of relationships on understanding the ocean, we are highlighting the connection between a person's social entanglements and their perspective on the world they inhabit. These relationships can be important not only for the ways that people use and interact with the ocean but also for the value their knowledge holds in different contexts (Battiste, 2005; Silver et al., 2022). The power of various perspectives on the ocean impacts ocean governance and literacy, with the difference in valuing these perspectives shaping policy, marine initiatives, and research engagements.

3. Science as One of Many Knowledge Systems

As one way of knowing the ocean, Western scientific knowledge is disproportionately leveraged in ocean literacy efforts, leaving little room for local and Indigenous ways of understanding. Currently, the majority of oceanographic research is conducted using offshore research vessels, which serve as platforms from which scientific inquiry dominates publications within the marine science realm (Intergovernmental Oceanographic Commission, 2020). The reasons for this are complex, ranging from the favouring of academic credentials and publication histories, to access to funding tied to academic institutions, to the bias towards physical science projects, all of which relate to the colonial history of ocean science (Silver et al., 2022). We want to draw attention to two factors that, with proper planning and collaborative intentions, researchers can work to mitigate. By recognizing the systemic dominance and the extractive practices of Western science, researchers can take steps to ensure that their own projects create space for more diverse ways of knowing the ocean.

As a knowledge system, science has historically been upheld in part by the idea that it provides an understanding of the world that is not predicated on biases or influences external to itself (Stamenkovic, 2022). This supposed neutrality was often used by colonial institutions to place knowledge produced through scientific practices in dominance over other forms of understanding (Niner et al., 2024; Singh et al., 2021). While rarely framed in explicit terms, the notion follows that if scientific knowledge is produced in neutral and objective fashions, then other forms of knowledge are implied to carry bias and are therefore unnecessary or incorrect. In the context of ocean sciences, this bias was leveraged by colonial governments and industry to attempt to erase Indigenous knowledge and access to rightful ocean resources (Silver et al., 2022). Critical scholars have described this as the systemic dominance of science and have examined the

various aspects, such as the "culture" of scientific laboratories (Latour & Woolgar, 1986) or the plain aesthetics of scientific cartography (Cosgrove, 2005), that act to support this power dynamic. Examining ocean governance, Tafon (2018) draws on post-structuralist philosophy to situate power in the discursive relationships between forms of knowledge. In such a framework, the dynamics of power are situated in the possibilities of discourse, or more simply, in what kinds of knowledge are considered valid for inclusion in a system (Foucault et al., 1997). Importantly, science is not a monolith but is continually produced, with power negotiated through the social practices of scientists (Albert & Kleinman, 2011). This system of power relations is important to understand as it helps to explain in part the difficulty often faced by knowledge holders in having their expertise recognized (Battiste, 2005) and the tendency in the deployment of ocean literacy projects to teach local and Indigenous communities scientific ways of knowing the ocean rather than vice-versa (see Spalding et al., 2023, for a similar critique of ocean governance).

Understanding the power dynamics of science also helps to shed light on how research can be an extractive process, sometimes due to systemic factors outside of the researcher's control. Without attempting to diminish the responsibilities researchers have, it is important to highlight that some of the factors making research extractive are structural and require considerable resources and experience to address. These resources can be more challenging for early career researchers or researchers from smaller institutions to access. In the Arctic especially, research tends to be characterized by short and intensive periods of data collection on boats, followed by long processes of analysis back in institutional environments (Gearheard & Shirley, 2007). These short summer visits often fail to produce opportunities for meaningful interaction between researchers and the communities they work in or around. Research becomes extractive in these scenarios where scientists acquire knowledge, experience, or data and then process it in their institutions without the engagement or collaboration of community members (Gearheard & Shirley, 2007; Singeo & Ferguson, 2022). Extractive research fails to participate in reciprocal relationships with knowledge holders and often fails to properly acknowledge those who have contributed towards supporting them in the field. Furthermore, the extreme cost of travel (upwards of $2,000) and accommodations ($400 per night or more) can be financially prohibitive for in-person visits to the Arctic (Mallory et al., 2018). Relatively smaller northern communities are unlikely to be visited by researchers since access may be restricted by limited transport options, lack of equipment, or insufficient accommodations. However, local radio and social media pages hosted by the communities are available channels to communicate and share research objectives with a low barrier to entry and a wide reach (Meyer et al., 2018). Despite critiques on the potential misuse of social media as scientific dissemination tools, the authors advocate for its use to enhance transparency and facilitate knowledge sharing (de Souza & Dale, 2024; West & Bergstrom, 2021). Therefore, logistical constraints are not meant to serve as a pardon for a total lack of communication or outreach from marine scientists.

Unfortunately, these practices have historically been prevalent to the extent that local and Indigenous authorities have put in place guidelines (see Inuit Tapiriit Kanatami & Nunavut Research Institute, 2007, *Negotiating Research Relationships with Inuit Communities: A Guide for Researchers*) and licensing processes to ensure more reciprocal research practices (de Vos & Schwartz, 2022). However, "umbrella" research licenses are usually awarded to large research vessels with multiple projects occurring simultaneously, thereby avoiding having numerous research license applications from one platform. As northern research licensing offices are understaffed (usually one or two people to process hundreds of applications), these measures help limit the overwhelming number of requests. However, this makes tracking results and research outputs

a challenge for research licensing bodies and the research platforms themselves. It also means much of this work is not shared with communities, as research vessels remain largely offshore during sampling, and the data is then dispersed across different academic and government institutions around the world afterwards. This dynamic perpetuates a disconnect between marine research and coastal communities, undermining efforts for inclusive ocean literacy.

The valuing of scientific practices over local or Indigenous ones is a serious concern, contributing directly to the colonial erasure of Indigenous epistemologies and ways of being (Lobo & Parsons, 2023; Silver et al., 2022). The systemic tendencies of science to be both dominant towards other ways of knowing the world and extractive in nature often result in the knowledge produced by research only returning to communities after it is finalized and cemented in the form of scientific reports and raw data. This unfairly burdens local and Indigenous experts, obliging them to operate in the knowledge system of Western science (Ortenzi et al., 2025; Trisos et al., 2021). While the importance of local and Indigenous knowledge on the ocean is increasingly recognized as necessary to broaden understanding and undo colonial dominance within ocean literacy efforts (see, for example, McKinley et al., 2023), systemic biases remain in place which tend to prioritize scientific research over other ways of knowing the ocean. Biases such as the favoring of academic credentials, or limited funding outside research institutions prevent understandings of different oceans from being considered valuable in the same way as scientific research, which can give marine researchers the impression that there is no benefit to working with local and Indigenous experts. Despite this dynamic, Indigenous organizations and governments have most effectively championed contemporary collaborative research projects. Groundbreaking works, such as the *SIKU: Knowing Our Ice atlas* (Krupnik et al., 2010), have demonstrated that long-term and reciprocal collaboration is most effective when many forms of knowledge are valued and shared. Acknowledging the multiplicities in knowing the ocean is the first step towards building a richer, locally informed understanding.

4. Opening Channels With Local and Indigenous Knowledge

A growing awareness of the systemic inequality of research practices and knowledge dynamics has led to increased recognition of the importance of local and Indigenous knowledge within discussions on ocean literacy. In their conceptual review of ocean literacy, McKinley et al. (2023, p. 2) note that:

> Echoing calls in the UN Ocean Decade, knowledge in the context of ocean literacy must acknowledge, integrate and value different types of knowledge, including and championing local and Indigenous knowledge, and recognising that diversity of knowledges and "ways of knowing" the ocean should be encompassed within ocean literacy discourse.

While such recognition is a step towards greater equality in knowledge dynamics, the centring of the knowledge itself can lead to an alienation from the cultural contexts of the knowledge holders who share it. Examples of this can be observed in the inappropriate incorporation of traditional ecological knowledge (TEK) into peer-reviewed research, and its underrepresentation in mainstream funding (Singleton et al., 2023; Wong et al., 2020). Research on the use of TEK has highlighted that the capacity for authoritative audiences to understand local knowledge leads to rewriting and assimilation into the dominant academic or bureaucratic systems (Nadasdy, 1999). In these efforts, local and Indigenous knowledge is often separated from broader ontological and cultural contexts for the sake of legibility and applicability (Cruikshank, 2004;

Nadasdy, 2005). The critiques of the uptake of TEK highlight that incorporating local and Indigenous knowledge into ocean literacy efforts without the involvement of knowledge holders is often done for the benefit of said systems, ignoring the situated, lively, and socially entangled nature of these ways of knowing the world.

Despite these challenges, there has been a growing trend in recent academic research to collaborate with knowledge holders and incorporate local and Indigenous knowledge more centrally in scientific works (Bohensky & Maru, 2011). This trend has been made possible by both an increased recognition of the importance of local and Indigenous knowledge and efforts to centre the voices of these knowledge holders through more funding streams. Said efforts emerged in pioneering works (for example Cruikshank, 2005, *Do Glaciers Listen?*) that recognized that presenting local and Indigenous knowledge in scientific monographs decontextualized and altered the meaning of what was shared. To counteract this, researchers presented knowledge as shared by knowledge holders, which was possible because of the relationships of trust and collaboration which existed between them. Ocean literacy scholarship has begun to advocate for similar approaches by adopting calls for a more multitudinous and regionalized approach to ocean knowledge (Schwerdtner et al., 2023). This progress has been slower on research vessels, where intense sampling schedules and the physical separation of the boat from shore limit direct interaction between scientists and local communities. Emerging initiatives in Canada, such as the Partnered Research Program at ArcticNet and Polar Knowledge Canada's Inuit Nunangat-led or partnered projects, mandate active engagement with Indigenous and Northern partners as part of the research. Additionally, Canada's only fully dedicated research icebreaker the *CCGS Amundsen* has recently committed to engaging with Inuit communities through its Northern Research Liaison program and collaborations with the Nunatsiavut Government for their Imappivut marine planning initiative. While promising, efforts such as these are only the beginning of bridging the longstanding divide between marine scientists and northern coastal communities.

5. Enhancing Ocean Literacy for All

The ocean is deeply intertwined with Indigenous and coastal identities worldwide (Buchan et al., 2024; Gee, 2019). These knowledge systems are crucial to ocean literacy, as they encompass not only data but relationships and lived realities entwined with the ocean. However, knowledge systems are not monolithic entities, but rather heterogeneous and interconnected across space and time, with shared growth patterns and histories (Dove et al., 2006). When considering ocean literacy, our understanding of the marine environment needs to include everyone in order to attain a more holistic scholarship of our oceans. By adopting a reciprocal approach where researchers actively listen and contribute to the communities in which they work, we can bridge these divisions and foster "two-eyed seeing." This practice, first introduced by Mi'kmaw Elder Albert Marshall, involves being attentive to multiple ways of knowing the world simultaneously (Marshall & Bartlett, 2004). Beyond knowledge integration, two-eyed seeing calls for responsible action based on the knowledge embodied in multiple perspectives (Wright et al., 2019). This collaborative approach not only enriches our collective knowledge but also contributes to building a more inclusive landscape of marine identities (Buchan et al., 2024). By recognizing and respecting multiple ways of knowing the ocean, we can cultivate a more comprehensive and nuanced appreciation of ocean systems, one that honours and incorporates diverse knowledge traditions.

With this framework in mind, the onus falls on visiting researchers to become literate in local ocean knowledge. Rather than an expert presenting themselves to transmit ocean literacy, the balance of social interaction shifts to the scientist being a learner, ready to listen. As a guest in a coastal community, the building of relationships becomes central to the work of the scientist engaged and committed to two-eyed seeing. Values involved in this process include respect (a), engagement (b), and reciprocity (c) with community members (Figure 1). These values have the benefit of creating meaningful ties to local realities, which affect the researcher's perspective of the local marine environment. The relationships fostered through these values enable the application of two-eyed seeing, where listening, learning, sharing, and integrating both Indigenous and Western ways of knowing the ocean can coexist and complement each other. By respecting (a) coastal community members, the doors to fruitful communication and sharing are opened for a reciprocal knowledge transfer, resources and logistical provisions, and long-term collaborative exchanges. Engagement (b) in this context means interacting authentically with the community, remaining present, and connecting as a person first, and a researcher second. By establishing these ties, respect and reciprocity are also strengthened. Since the researcher gains knowledge by respectfully engaging with communities, sharing (c) in return helps move ocean literacy efforts towards reciprocity. By sharing what has been learned back with the wider community throughout the research, ocean literacy enters a feedback loop, whereby understandings can be course-corrected and revised to local lived realities. These feedback loops of understanding are their own processes of enhancing collective ocean literacy when they are integrated into shared results, whereby no one perspective dominates our understanding. These methods resemble other collaborative models, such as those proposed by Reid et al. (2021) and Strand et al. (2024) for the co-production of sustainable ocean plans. By building meaningful relationships, applying two-eyed seeing becomes possible for researchers in the contexts where they are guests stepping off the boat and into communities. By honouring many worldviews of the ocean, ocean literacy can improve with a more comprehensive understanding and connection to the marine space.

The values of engagement, respect, reciprocity, listening, learning, sharing, and integrating are essential to fostering inclusive and ethical research practices that bridge Indigenous and Western knowledge systems. Engagement begins with researchers actively involving communities from the earliest stages of project

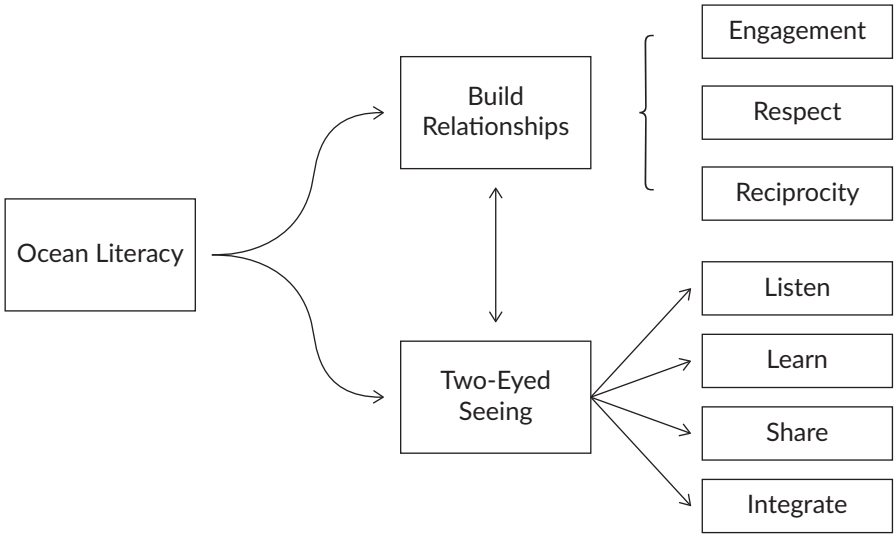

Figure 1. Conceptual framework for enhancing ocean literacy.

development, ensuring that local priorities shape research questions and methodologies (Dalhousie University, n.d.). Respect is demonstrated by recognizing Indigenous epistemologies and cultural protocols, such as incorporating traditional knowledge without decontextualizing it or privileging Western frameworks (Cruikshank, 2005; Smith, 1999). Reciprocity ensures a two-way exchange of benefits, such as hiring local research assistants or co-developing educational materials that reflect community interests (DuBois & Antes, 2018). Listening involves creating spaces for Indigenous voices to guide the research process, often through participatory workshops or informal dialogue (Dalhousie University, n.d.; Johnson-Jennings, 2023). Learning requires researchers to adopt humility and openness to understanding Indigenous perspectives on marine environments (Marshall & Bartlett, 2004; Rodriguez-Lonebear, 2016). Sharing knowledge back with communities in accessible formats—such as translated maps, comics, or public events—ensures inclusivity and accountability (Canadian Institutes of Health Research et al., 2018). Finally, integration involves co-creating hybrid methodologies that honour both scientific rigour and Indigenous ways of knowing while addressing shared goals (Marek-Martinez & Gonzalez, 2023; Wright et al., 2019). Together, these practices create a constructive direction for ocean literacy that is inclusive of diverse perspectives and responsive to the lived realities of coastal and Indigenous communities. Although conceptually these are broadly accepted, putting them into practice is challenging within the academic framework of marine science, particularly as an early-career researcher with limited funds and agency in research projects. Since marine science is often conducted at sea away from communities, leveraging the funding and the willingness of supervisors to invest time in building relationships on land is still a privilege offered to few.

6. Relationship Building on Land to Make Marine Maps

From 2022–2024, a marine habitat mapping study was conducted in two Arctic fjords by one of the authors as part of their master's fieldwork. As a research project designed and funded by a southern Canadian university in 2019, the initial goal of the research was to create habitat maps of the seafloor in Arctic fjords. An "umbrella" license was granted to the large research vessel by the territorial research licensing entity, permitting video and sonar data collection in Arctic waters in 2020 without the requirement of community engagement. In 2022, the author was selected as a master of science candidate and given the data from the research expedition for analysis. Although data had been previously collected, the project required more data in particular regions of the estuaries inaccessible to large boats. Therefore, a key first step was securing a way to sample with local vessels, a task which was not possible to achieve from a university office. An introductory visit was scheduled in the first month the student was assigned to the project, at the initiative of the student. As a marine science student, this was seen as unusual within the institution, and a lack of guidance and resources for how to proceed made this and subsequent visits an exercise in "learning by doing."

Upon arrival, the researcher prioritized community engagement, in the way a polite guest might introduce themselves to their hosts and offer any cooperation in return. Here the authors denote "guest" as a way of positioning oneself as a researcher, which comes with obligations for good behaviour as understood by the host. As a newcomer visiting a community, introducing themselves and their reason for being there was an initial step. This meant knocking on doors in public buildings, attending local events to meet community members, and striking up conversations in grocery stores and the post office. Cards with contact information and visuals of the seafloor were also left in public spaces, to increase awareness and access to more information (see Supplementary File, Figure 3). This exercise had the benefit of rapidly establishing local connections and provided the insight needed to know who to ask for permission and where to start.

For certain community members, the ability to voice concerns and questions towards the scientific study of their region was a positive prospect. To begin, the researcher sought permission from the mayor and the Hunters and Trappers Association, who gave their consent and provided valuable contacts. This led to collaboration with local fishermen who became the project captains and guides on the water. Within a week, the necessary sampling vessel, base of operations, and community ties were formed through scientific outreach and listening. The emphasis on relationship-building facilitated smoother research operations and enhanced awareness and local participation in the project.

The relationships built over initial visits and the trust reinforced in the two subsequent visits, allowed the researcher to progress in their community engagement and gauge local interests in the marine space. Interests in the community varied from academic interests, leading to different research questions forming. For example, multiple community members were interested in the distribution of Iceland scallops in their fjord. In contrast, academic pressure also led to more Western science questions being asked, such as the distribution predictions of benthic community assemblages in the fjord. Coincidentally, the maps which were generated using local interests yielded higher-accuracy maps than the ones answering questions interesting to the academic institution (83.3% vs. 69.2%; Graham, 2025). Further research is needed to clarify the underlying mechanisms contributing to the enhanced accuracy of the community-driven maps and to systematically validate Western scientific marine maps against local and Indigenous knowledge of these areas. Delving deeper into community interest-driven maps could potentially reveal valuable insights into the complementary nature of diverse knowledge systems in understanding complex marine environments using machine learning (Lauer & Aswani, 2008).

At the request of the Hunters and Trappers Association, educational outreach became a significant component of the project, even though it was not an initial aspect of the research design. The researcher presented original underwater footage to local elementary and high school students, sparking curiosity and generating questions like “Why does it snow underwater?” and “Is it always dark?” (Figure 2a). This engagement led to the translation of benthic species names into Inuktitut by the students, enhancing local relevance and understanding. Following this initial visit, the project expanded to include hands-on experiences for students. Before field sampling the next fall, high school students were invited to pilot an ROV in their harbour, providing them with direct observation of the seafloor near their classroom (Figure 2b). This practical workshop deepened students’ connection to the marine environment and the research process while enhancing the researcher’s awareness of local stories and interests in the surrounding waters. Students shared about the presence of an airplane crash in the vicinity, which led to the successful reconnaissance of a sunken DHC-3, de Havilland Single Otter airplane which sank in 1958. During benthic video sampling the following week, ROV video of the plane was captured and shared with the community, prompting further opportunities for discussions of local waters and the currents which led to the soft ice where the plane sank. This social integration via the schools contributed to a broader understanding of the community and its relationship with the marine environment for the researcher. Additionally, these outreach initiatives can be understood to have engaged students in developing their own ocean literacy learning, which Strand et al. (2023), argue to be key in better accounting for diverse knowledge systems. From these visits, the researcher hired local youth to participate in sampling and outreach activities on multiple occasions, providing employment opportunities and fostering continued community involvement in the research process (Figure 2c).

Figure 2. Community outreach examples from the case study: (a) a class outreach visits sharing underwater footage; (b) ROV piloting workshop with the school; (c) working with local experts and youth in marine sampling; (d) Benthic Bingo event in the community hall for all ages.

As an act of respect and reciprocity, cultural responsiveness grew to be a key aspect of the project through time spent in the community. In this case, cultural responsiveness was practised first by listening, then by applying storytelling, local Inuktitut dialects, games, two-way information sharing, and age-appropriate activities for youth. For example, the process of marine habitat mapping was transformed into a comic story by artist Misha Donohoe, inspired by the student's curiosity (see Supplementary File, Figure 4). The comic featured local elements such as boats, traditional clam-digging practices, and marine mammals vital for sustenance and cultural identity, making the scientific content more relatable to the community than a scientific report or infographic. The researcher's approach extended beyond prescribed marine research activities. Evening bingo and card games with new friends provided informal opportunities for knowledge exchange and relationship strengthening. It also led to the creation of a custom pack of cards using the artist's renderings of local animals, an educational gift with over 200 decks shared on subsequent visits. Once results were ready to be shared, maps were printed in English and Inuktitut, and Benthic Bingo events were held whereby the main animals surveyed were called out rather than numbers (Figure 2d). As a public event, the Benthic Bingo allowed community members to feel welcome to attend and share feedback on the presented work, which could be incorporated into the final draft. The timing of these events was also important—optimal engagement periods were outside regular working hours, busy hunting and fishing seasons, and community events such as radio bingo. To promote inclusivity, particularly for mothers, efforts were made to create family-friendly environments, thereby facilitating their attendance and participation. For those unable or uninterested in attending in-person events in the communities, local radio and social media announcements of the project were publicized and contact information was left in all public spaces for anyone to reach out with comments or concerns.

Finally, the research data was shared directly with the territorial research institutes and the municipalities, as well as deposited in the publicly available Canadian Federated Research Data Repository. This practice upholds the FAIR (findable, accessible, interoperable, and reusable) principles of data governance (Wilkinson et al., 2016), ensuring that data is widely available while considering local communities' access and storage capacities. By storing raw and processed data in formats that are interoperable and reusable (e.g., .tiff and .csv), this data serves not only to answer the current study's questions but any potential questions in the future. Sharing research data in both raw and processed forms also promotes Indigenous research sovereignty (Carroll et al., 2020). These principles guided conversations with local community members about their preferred methods of receiving the data, an approach that Ortenzi et al. (2025) refer to as fostering "good data relations." Moreover, sharing data contributes to building trust and fostering collaborative relationships with Indigenous communities, supporting their autonomy in research and decision-making processes.

This practical case demonstrates how prioritizing interpersonal relationships and community engagement can lead to more effective and locally relevant scientific research. For instance, the project integrated community-driven questions (e.g., mapping Iceland scallop distributions valued by local harvesters) and produced habitat maps that outperformed academic-driven models. Outreach initiatives such as translating species names into Inuktitut with students and co-designing culturally responsive Benthic Bingo games, ensured findings resonated with local lifeways. Additionally, hiring community members for fieldwork and sharing raw data with territorial institutes aligned with Inuit research sovereignty principles. By spending time off the boat, the project achieved not only its scientific objectives but also contributed to collective ocean literacy through its community-driven outreach initiatives and long-term connections within the community which continue to the present day.

7. Conclusion

A paradigm shift in how marine research is conducted is necessary, including special attention to the role of ocean literacy in research engagements. The authors wish to emphasize the importance of getting off the boat, venturing into communities and building interpersonal relationships with reciprocal knowledge exchanges. These practices are key to the creation of collaborative marine research which respects and recognizes diverse knowledge systems. By reconceptualizing the researcher's role as that of a guest and learner, we can foster a more inclusive and comprehensive understanding of ocean literacy.

The case study of marine habitat mapping in the Arctic demonstrates the tangible benefits of this approach, including locally relevant research outcomes, improved outreach materials and research results, and enduring relationships with community members. This shift not only enhances the quality and relevance of scientific research but also addresses power imbalances inherent in conventional research methodologies. In embracing the values of respect, engagement, and reciprocity to build relationships, researchers can create meaningful ties to local realities and integrate diverse knowledge systems into their work. By building relationships in conjunction with the two-eyed seeing framework, multiple ways of knowing the ocean can be uplifted while respecting local realities. This approach aligns with the UN Ocean Decade's call for increased ocean literacy and contributes to a more holistic understanding of marine environments.

Despite increasing efforts in ocean science to collaborate with Indigenous knowledge holders (see Keenan et al., 2018; and Laidler, 2006, for pertinent Arctic examples), our experiences working in the Arctic as early

career researchers indicate that there is still work to do in applying these conceptual frameworks of relationship building and two-eyed seeing in ocean literacy work. As a practical example, this case study had several notable limitations. Data collection in 2019 proceeded without community consent, and Inuit participation was not integrated throughout all research stages, such as the data analysis. No formal community workshops were conducted, and the research methodology remained firmly grounded in Western scientific approaches. While results were translated into the local language, Indigenous knowledge systems were not meaningfully integrated into the final analysis. This was evident from the community reaction to the final maps, as the predictive modelling of where scallops would be was already known. Additionally, the high costs of northern travel and accommodation presented significant barriers to sustained community engagement, with only about 30 in-person days in the community over two years. These limitations highlight the need for institutional support and resources to help early career researchers build meaningful relationships with northern communities. Future research should prioritize Indigenous involvement from the outset, integrate diverse methodologies, and ensure adequate funding for sustained community engagement throughout the entire research process.

Moving forward, it is crucial for the scientific community to actively work towards building relationships that facilitate two-way knowledge exchange. For ocean scientists, there are several ways this can be accomplished throughout the research process. Researchers can consider learning directly from local knowledge holders, engage local experts in collaborative research design, or disseminate plain-language summaries through appropriate channels (such as community radio stations), for example. The most crucial aspect in determining the path towards reciprocity, however, is for researchers to reach out to local communities with the intention of building a genuine and mutually respectful relationship. By doing so, a more inclusive and comprehensive approach to ocean literacy can be created which benefits both researchers and coastal communities. In getting off the boat and into communities, we create new opportunities for knowing the ocean for all.

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Conflict of Interests

Myrah Graham is currently the Northern Research Liaison for Amundsen Science and, as part of her master's research, collaborated with the Nunatsiavut Government on the Imappivut marine planning initiative, which may be perceived as a conflict of interest.

Supplementary Materials

Supplementary material for this article is available online in the format provided by the author (unedited).

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