Community-Based Ocean Literacy: Four Examples of Ocean Optimism From Mi'kma'ki/Atlantic Canada

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Abstract

In this article, we consider the role of ocean literacy in coastal communities as an approach that fosters relevant, community-based learning. We also propose solutions to challenges facing human-ocean relationships by cultivating common understanding and collective action. We present four examples of community-based ocean literacy in Mi'kma'ki/Atlantic Canada demonstrate how intersectional approaches to ocean literacy that are context-specific and responsive to community priorities can foster healthier human–ocean relationships: (1) Oceans Week Halifax's organization of community events to strengthen human–ocean relationships; (2) the Apoqnmatulti'k (Mi'kmaw: we help each other) project's partnerships between Mi'kmaq and local knowledge holders and academia; (3) Fishing For Success's (Newfoundland and Labrador) inclusive approaches to connecting marginalized communities to the ocean; and (4) the Co-Existing With North Atlantic Right Whale Project's protection of whales without jeopardizing coastal community livelihoods. Without denying there are barriers to bridging community learning with formal education, we focus on opportunities for collaborations and the importance of ocean optimism in guiding these urgently needed efforts to benefit future community-based, ocean-focused, and solutions-orientated initiatives.

Résumé

Dans le présent article, nous examinons le rôle la connaissance de l'océan dans les communautés côtières comme approche pour favoriser l'apprentissage en milieu communautaire. Nous proposons également des solutions aux difficultés qui entravent la relation entre les humains et l'océan en cultivant la compréhension commune et l'action collective. Nous présentons quatre exemples de programmes communautaires dans la région Mi'kma'ki (Canada atlantique) qui montrent que les approches intersectionnelles de la connaissance de l'océan, lorsqu'elles sont adaptées au contexte ainsi qu'aux priorités des communautés, favorisent des relations saines entre les humains et l'océan. Les exemples sont les suivants : 1) l'organisation, par Oceans Week Halifax [la semaine de l'océan à Halifax],

*d'activités communautaires pour renforcer le lien entre les humains et l'océan; 2) les partenariats du projet Apoqnmatulti'k (qui signifie « nous nous entraidons » en mi'kmaw) entre les Mi'kmaq, les experts locaux et le milieu universitaire; 3) les approches inclusives de Fishing For Success (*Pêcher pour le succès*; Terre-Neuve-et-Labrador) pour connecter les communautés marginalisées à l'océan; 4) la protection des baleines grâce au Co-Existing With North Atlantic Right Whale Project [*projet de coexistence avec la baleine noire de l'Atlantique Nord*] sans mettre en péril les moyens de subsistance des collectivités côtières. Nous savons qu'il n'est pas simple de jeter des ponts entre l'apprentissage communautaire et l'éducation en milieu scolaire, mais nous nous concentrons plutôt sur les possibilités de collaboration et sur l'importance de rester optimistes dans les actions de protection de l'océan pour guider les efforts urgents à faire, afin que les futures initiatives communautaires de recherche de solutions pour l'océan en profitent.*

Keywords: ocean literacy, community-based, ocean optimism, case study, Atlantic, Mi'kma'ki

Mots-clés : connaissance de l'océan, programme communautaire, optimisme dans les actions de protection de l'océan, étude de cas, Atlantique, Mi'kma'ki

Introduction

Communities that come together to learn about and take action on ocean issues foster healthier, more collaborative, and more fulfilling relationships with one another and the ocean. In the context of Mi'kma'ki/Atlantic Canada, joining together to understand and resolve challenges in human–ocean relationships is especially important since regional cultures, identities, industries, trades, and histories are deeply and distinctly connected to the ocean. However, these solutions can be difficult to achieve given the complexity of the relationships and the legacies of conflict and distrust (Ostertag & Ammendolia, 2020) that often continue to hinder the collaborations and consultations necessary to catalyze collective actions. With a specific focus on Mi'kma'ki/Atlantic Canada, this paper considers regional issues that communities are currently struggling to address, including the designation of marine protected areas, expression of Indigenous Treaty rights and unrestricted access to fisheries, growth in marine renewable energies and aquaculture, climate change and its impacts on coastal communities, and industrial projects such as offshore oil and gas. Drawing on the teachings of Mi'kmaq Elder Albert Marshall, Indigenous communities across Mi'kma'ki have noted an urgent need for Two-Eyed Seeing and knowledge co-existence (see Reid et al., 2020) since these can lead to a shared understanding and collective call-to-action to co-develop environmental- and community-based solutions to address regional issues and crises confronting the global ocean.

While community-based projects typically emerge to address local priorities through action-oriented initiatives, the collective learning processes that enable these projects to flourish reflect the goal of ocean literacy to engage diverse actors and knowledge systems in order to better understand "the ocean's influence on us and our influence on the ocean" (Santoro et al., 2017, p. 5). Thus, community-based projects contribute to advancing ocean knowledge systems (e.g., scientific, Indigenous, local), strengthening ocean values (e.g., life-sustaining, cultural, economic, personal), and mobilizing ocean actions (e.g., individual behavioural change, social justice actions, ocean governance). We collaborated with community organizations, ocean literacy educators, and researchers to present, in this article, four community-based projects from across Mi'kma'ki/Atlantic Canada that exemplify ocean optimism. Each organization was also part of the Canadian Ocean Literacy Coalition's *Understanding Ocean Literacy in Canada* Atlantic regional study conducted in 2019–2020 (Ostertag & Ammendolia, 2020). We examine these projects' challenges and limitations and provide insights into building bridges between informal education, community-based interventions, and formal education.

The first example is Oceans Week Halifax, based in K'jipuktuk/Halifax. We discuss the creation of this grassroots project, one which celebrates World Oceans Day by exploring various local and regional ocean solutions and diverse human–ocean connections. The second example is the Apoqnmatulti'k (Mi'kmaw: *we help each other*) project, which joins Mi'kmaq and local knowledge holders with academia to work together to better understand economically and culturally valued species in response to local community priorities. In the third example, the Fishing for Success project in Petty Harbour, Newfoundland and Labrador, we examine inclusive approaches to connecting diverse and marginalized communities to the ocean through fishing, food, community, and culture. Our fourth example is a collaborative project co-designed *by* and *for* fishing communities to co-exist with endangered North Atlantic Right Whales without jeopardizing coastal community livelihoods. While each example is uniquely situated (i.e., geographically, linguistically, culturally, and socio-economically), together they illustrate common challenges, commitments, and approaches to healthier human–ocean relationships. These initiatives are instructive for re-imagining community-based ocean literacy across Canada and Turtle Island.

Prior to delving into our research methods and outcomes, we would like to acknowledge that the spirit of knowledge co-creation that lies at the heart of our understanding of community-based ocean literacy also informs the co-creation of this article. Partners from the four projects, as well as leading voices in the movement for ocean literacy that participated in the Atlantic regional study, collaborated on this article. While this may not be a convention in education research publications, feminist and decolonial approaches recognize the multiple knowledge systems (e.g., academic, community, Indigenous) that contribute to knowledge co-production (Liboiron et al., 2017;

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Reilly, 2010). In co-authoring this article, our positionalities broaden to include the following: primarily white settlers; primarily womxn[1]; Indigenous People; academic researchers; local experts; inland and coastal community members located primarily but not exclusively throughout Mi'kma'ki/Atlantic Canada; urban and rural dwellers; multiple linguistic communities (notably anglophone, francophone, and Mi'kmaw); and others. Evidently, prominent gaps continue to limit what and whose knowledge is included in these conversations; however, our collaborative approach to writing attempts to enact relationship-building strategies committed to overcoming systemic inequities in creating and sharing community-based knowledge.

Methodology

The examples presented in this article emerged during a year-long mixed methods study of ocean literacy across Canada led by the Canadian Ocean Literacy Coalition (COLC) (see Glithero, 2020 for a full description of the participatory study and COLC's collaborative approach to ocean literacy in Canada). The COLC research team conducted surveys, semi-structured interviews, and document scans to examine ocean literacy across nine sectors (government, NGO and advocacy, academia and research, industry, education, community, media, cultural heritage, and health) and across five regions in Canada. In total, the Atlantic regional study (Ostertag & Ammendolia, 2020) that is the basis for this article included 52 semi-structured interviews conducted by co-authors Julia Ostertag (Atlantic regional coordinator) and Justine Ammendolia (Newfoundland coordinator). Interviews were conducted in English and French with a wide range of ocean actors from each of the four Atlantic provinces: Newfoundland and Labrador (n = 18), Nova Scotia (n = 25), New Brunswick (n = 7), and Prince Edward Island (n = 2). Additionally, 61 participants completed an online organizational survey to map relevant ocean literacy initiatives and the projects' strengths and barriers throughout the region.

The four examples that we present in this article emerged from the Atlantic regional study and its semi-structured interviews. Participants from each initiative worked with the regional coordinators to write each case study for the Atlantic report (six case studies in total), review drafts of the Atlantic report, rewrite four of the cases for this article with a focus on community collaborations in intersectional contexts, and contribute to the conceptualization and co-authorship of this article. Moreover, these four examples were specifically selected to represent a range of distinct community contexts and community responses to different ocean issues. For instance, the communities profiled include three Atlantic provinces, small coastal communities, a large urban municipality, different spoken languages (French, English, Mi'kmaw), unique approaches to collaboration, distinct cultures, and diverse community values, interests, and

priorities. This regional lens allows for a more focused discussion on approaches to ocean issues specific to Mi'kma'ki/Atlantic Canada, though we invite you to read the full regional reports (https://colcoalition.ca/our-projects/regional-reports/) to gain an understanding of the notable distinctions and similarities when compared with other regions in Canada, namely, Inuit Nunangat, Pacific, Saint Lawrence (including the Great Lakes), and Inland Canada.

As a form of case study methodology, the collaborative approach to this article reflects a participatory case study process (Reilly, 2010), which engages project participants throughout the research process and is explicitly committed to empowerment, justice, and action. Furthermore, participatory case study research centres the lived experiences and oftentimes marginalized voices of community participants. In co-authoring and collaborating on this article, we amplify the voices, experiences, and knowledge from community-based initiatives that rarely have broader platforms beyond their local region to share the story of their work.

The case study approach also aligns with our ocean optimism framework (Kelsey 2016, 2021) by providing concrete examples of successful ocean projects that have benefited human–ocean relationships. We have rejected contributing to the "doom and gloom" (Johns & Jacquet, 2018) narratives that dominate headlines and limit our imaginations. While we do not intend to suggest the four interventions presented in this article are objective, unbiased, or replicable models, they nevertheless serve as examples of ocean optimism and "bright spots" (Cvitanovic & Hobday, 2018) that illustrate how, despite documented barriers and challenges, projects have tackled complex ocean issues collaboratively and meaningfully. While it is not within the scope of this article to evaluate the degree to which the four projects have been successful in transforming human–ocean relationships and increasing ocean literacy, the positive outcomes ring loud and clear for the community members invested in each initiative. Thus, we anticipate that these examples of ocean optimism will be inspiring and empowering for other communities, educators, and policy makers, illustrating the possibilities for both agency and action based upon common interests and knowledge co-production.

Community-Based Ocean Literacy and Ocean Optimism

To better understand the role and value of community-based ocean literacy, it is helpful to first position this approach within the existing literature on ocean literacy and community-based environmental education, as well as its alignment with ocean optimism as a lens that connects across our examples. Since ocean literacy and environmental education have largely been focused on formal and non-formal education directed toward children and youth, broadening our attention to learning processes in informal community contexts is needed to understand wider opportunities for environmental education and action.

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Ocean Literacy

Ocean literacy fits within the frameworks of environmental education (Gough, 2017), sustainability education, and ecological literacy (Kwauk, 2020); however, these frameworks generally express an implicit land bias and frequently lack explicit ocean content (Kelly, 2018). Ocean literacy, therefore, highlights the need for holistic approaches to ocean education within environmental education by helping all people connect to and better understand their place in the ocean continuum (Glithero, 2020)—a continuum that includes inland watersheds, aquifers, permafrost, glaciers, estuaries, coasts, sea ice, and open oceans. Holistic approaches to understanding the continuum take into account how the features along the continuum are inextricably and dynamically linked with one another and all earth systems.

To summarize briefly, the term "ocean literacy" first emerged in 2002 when concerned educators and ocean scientists in the United States (U.S.) noted that youth from Kindergarten to Grade 12 lacked sufficient ocean science knowledge (National Oceanic and Atmospheric Association [NOAA], 2013; U.S. Commission on Ocean Policy, 2004). Drawing on Western scientific methods to study and understand the ocean, the National Oceanic and Atmospheric Association (NOAA, 2013) developed an ocean literacy toolkit with seven key ocean science principles and 45 fundamental concepts that are aligned with the U.S. National Science Education Standards. In 2017, the IOC-UNESCO expanded on these seven principles and released the *Ocean Literacy for All: A Toolkit* (Santoro et al., 2017), connecting ocean literacy to the UN Sustainable Development Goals, civic engagement, multiple disciplines, experiential learning, multiple sectors, ocean governance, and the global ocean movement.

In 2013, Canada signed the Galway Statement on Atlantic Ocean Cooperation, which includes commitments to furthering ocean literacy (European Commission, 2013). Ocean science educators in Canada have identified many of the same concerns as in the United States and European Union, namely that the majority of K-12 students lack access to ocean science and knowledge systems. In Atlantic Canada, researchers have found that a significant proportion of students not only lack a general understanding of the ocean but also abhor and fear it (Guest et al., 2015; McPherson et al., 2018). In a provincial response, the Nova Scotia Department of Education (2015) developed courses and course content to help introduce ocean sciences and ocean literacy into the classroom. Other regions have engaged in similar approaches, but this has been ad hoc across the country given that provinces develop their own curricula and thus there is no national ocean literacy framework.

Although many ocean literacy advocates across Canada recognize the importance of a national ocean literacy framework, it is also clear that this framework must be co-developed to take into account a myriad of regional, cultural, historic, and linguistic differences. This is especially important in terms of incorporating Indigenous knowledge systems, cultural practices,

governance systems, and rights in a meaningful, non-exploitive way. As Held (2018) stated at the Canadian Ocean Education Network (CaNOE) conference in 2018, "a cross-cultural approach is imperative in order to reject the current colonial hierarchy of knowledge and advance the process of decolonization and reconciliation" (para. 5). Furthermore, CaNOE founding Director Anne Stewart (2019) noted that,

> Canadian ocean literacy differentiates itself from the prevailing European and American paradigms partly because of the enduring knowledge systems of Indigenous peoples. Indigenous laws, knowledge, traditional ecological knowledge, and Inuit Qaujimajatuqangit are recognized as different but also as facets of modern Canadian ocean science. These knowledge systems cannot be subsumed by Western science and must stand on distinct yet equal footing. (p. 116)

In addition to these limitations of the term "ocean literacy," many organizations are either unaware of or uncomfortable with the concept of ocean literacy. In Atlantic Canada, 65 % of COLC survey respondents noted that they "never" or "seldom" use the term ocean literacy to describe their ocean-related projects given its connections to formal education, deficit framing, and a strict focus on a Western science approach to education (Ostertag & Ammendolia, 2020). As one survey participant explained, "Ocean literacy, even the term literacy itself, is kind of an elitist term. And even the language that comes out of ocean science, it's more or less elitist. And the access to data, that's elitist" (as cited in Ostertag & Ammendolia, 2020, p. 8). Organizations that were familiar with the term often used it flexibly, depending on their audience, and largely employed it for grant-writing or reporting purposes. Expanding the term "ocean literacy" to "community-based ocean literacy," as we are proposing in this article, does not resolve the limitations and negative connotations associated with the former term. However, we hope it reflects the need for ocean literacy to include a more diverse range of relevant initiatives and knowledge systems.

Community-Based Environmental Education

Community learning and knowledge co-production are increasingly being recognized as powerful forms of environmental education and education for sustainable development (North American Association of Environmental Education [NAAEE], 2017). While it can be difficult to clearly define the scope and outcomes of community-based environmental education, Aguilar (2018) establishes the importance of rooting objectives in multiple community partnerships and projects that address specific community issues, orienting these projects toward collaborative civic action, and engaging in reflections on social institutions and power dynamics. Community-based environmental education initiatives allow for partnerships between formal settings (e.g., schools), non-formal settings (e.g., aquariums, museums, interpretive centres,

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parks, recreational spaces, and media), and informal spaces (e.g., home, work, community) (Paraskeva-Hadjichambi et al., 2020; Walter, 2020).

According to the North American Association of Environmental Education (NAAEE), communities are uniquely positioned to respond to local priorities and issues, as well as to connect with much broader ecosystems and sociocultural systems. The NAAEE (2017) also notes that communities do not exist in isolation from broader, interlocking systems:

> From the natural systems that sustain us (e.g., forests, wetlands, soils, water, air), to the social systems that shape our lives (e.g., housing, transportation, legal, educational, spiritual), to governmental and economic systems, no element of community exists in isolation. An understanding of the interlocking systems is a critical foundation for building people's capacity to create a healthy, sustainable, and resilient future (p. 10).

Systems thinking, civic engagement, relationship building, and environmental literacies can all be cultivated through community-based environmental learning (Zachariou & Symeou, 2009). However, it is critical to recognize that inequities can limit access to and the impacts of community projects for marginalized and underrepresented community members, and that these projects (including our four examples presented below) do not inherently represent the priorities of all community members with regard to addressing local environmental issues and injustices.

Community-Based Ocean Literacy

In this article, we shift from formal or non-formal approaches to ocean literacy, which focus largely on teaching children and youth about ocean sciences, to community-based ocean literacy, which focuses on the learning that happens within community contexts. By significantly broadening our understanding of "Ocean Literacy for All" (Santoro et al., 2017) to include community-based environmental education as well as adult environmental and ecojustice education (Walter, 2020), we acknowledge the important yet undertheorized role of community learning in responding to ocean issues. Community-based ocean literacy denotes an inclusive and contemporary approach to ocean literacy by integrating a broad range of knowledge systems, values, actors, and actions that are relevant to community priorities. While these community priorities are often locally determined, they are also inevitably interconnected with stakeholders and rights-holders on regional, provincial, national, and international scales. That is, community knowledge systems, values, and actions are often scaled up to include and be encompassed by non-local priorities and contexts (Glasgow Caledonian University, 2020; this video presents Dr. Michael Mikulewicz's talk entitled *Climate Justice & Intersectionality: Exploring the Theoretical & Methodological Links*). Furthermore, since the ocean is inherently fluid and fundamental to all earth systems, the ocean continuum transcends human boundaries and jurisdictions,

let alone an individual community. Therefore, while community-based ocean literacy may focus on local priorities, these interventions in the ocean continuum intersect with social and environmental justice issues on multiple spatial and temporal scales. As Paasche and Bonsdorff (2018) remind us, the scope of the changes required can even extend beyond human timescales (e.g., ocean warming and acidification cannot be reversed within one human lifetime), which may result in perceptual barriers to taking local and global action.

Growing economic precarity, ecological uncertainties (especially in the face of climate change and biodiversity loss), and community organizations' lack of jurisdictional power limits their abilities to directly influence national and international policies and regulations to the extent necessary to effect large-scale change. Such precarity and uncertainty perpetuate the fragmentation of communities and undermine their capacity for effective collaboration. As a result, community-based responses to ocean issues often place enormous pressure on individual leaders and small civil society organizations to build truly collective, grassroots visions and actions. It often requires time, skill, funding, and care to build and sustain the collaborative relationships required to engage in identifying and addressing common community goals. Despite the challenges, community-based initiatives can nevertheless mobilize around community strengths and connections to coasts and ocean to take meaningful collective action. Through such social movements, important new knowledge and new questions are generated and shared (Kelley, 2002) as participants respond to complex issues, conflict, dissenting views, and organizational challenges and "learn how to become social actors" (Choudry & Shragge, 2011, p. 512). More specifically, through "trans-situational conditions (i.e., being connected to the issue, seeing the impact of the issue on them and their families/communities)" (Glithero et al., 2020, p. 34), community-based ocean literacy becomes a process of knowledge creation, mobilization, and action.

Ocean Optimism

The scale of global challenges relating to the ocean can result in paralysis and inaction, which is why we turn to ocean optimism to frame our examples of community-based ocean literacy. Ocean optimism is an approach to ocean conservation that was formally launched on World Oceans Day 2014 and is now integrated into many facets of society, ranging from academic research to social media campaigns (Knowlton, 2019). In response to the global inundation of "doom and gloom" stories about ocean health and ocean governance, ocean optimism promotes the mainstream inclusion of marine conservation success stories by highlighting examples of communities and projects that achieved their goals through social action. Kelsey (2016) explains that, "far from making us complacent, stories of resilience and recovery fuel hope. Feeling hopeful enhances our capacity to take meaningful action. And that action flourishes in the supportive community of others" (para. 18).

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Ocean optimism advocates argue that the consequence of presenting the public with large environmental problems without accessible solutions can cause disengagement from important and collaborative actions (Balmford & Knowlton, 2017). Other researchers suggest that constant pessimism may lead to discouragement and fatigue (Landry et al., 2018; McAfee et al., 2019; Serani, 2008) that may inhibit our ability to take collective action by increasing anxiety among team members, increasing competition, and decreasing team performance (Cvitanovic & Hobday, 2018). By contrast, identifying, understanding, and celebrating successes may inspire and galvanize productive positive actions (Balmford & Knowlton 2017), team coordination, collaboration, and knowledge sharing (Cvitanovic & Hobday, 2018). Fostering this kind of collaboration is key to addressing complex ocean problems and the ongoing community fragmentation and conflict that continue to undermine progress on ocean issues.

Finally, while the need for ocean literacy and ocean optimism is becoming increasingly recognized, it remains important that these approaches respond to multiple knowledge systems and socio-economic inequities and oppression. Blue justice (Bennett et al., 2020), ocean equity (Österblom et al., 2020), marine justice (Martin et al., 2019), and ocean justice (Gardiner, 2020) must inform both ocean literacy and ocean optimism. For instance, responses by settler fishing communities (largely male), Fisheries and Oceans Canada, and the RCMP to the Sipekne'katik First Nation's lobster fishery on the 21-year anniversary of the Marshall Decision (APTN News, 2019; Denny, 2020) highlights how this crisis is part of a shared history that requires both re-imagining and decolonizing what "we are all ocean people" (OWHFX, 2020) means. As Allison et al. (2020) insistently remind us,

> Discourses about shared ocean values and campaigns for greater ocean literacy should not neglect the legacies of past exploitation and the denial of others' values and knowledges. Nations that built their economies and societies through mercantilism and colonialism, and the nations that were exploited or colonised by them, will have differing perspectives and priorities in governing their ocean estate. (p. 29)

The following examples reflect diverse human relationships with the ocean and offer tentative examples of ocean optimism through their collective responses to community priorities, whether in an urban centre (Oceans Week Halifax), across distinct knowledge systems (the Apoqnmatulti'k project), for newcomer refugee women in coastal Newfoundland (Fishing for Success), or through the transformation of relationships between fishing communities and endangered species (Co-Existing With North Atlantic Right Whales). However, our focus on ocean optimism and positive examples of community-based ocean literacy through these narratives is not with the intent to deny the presence of anxieties and conflicts that complicate each project's processes and outcomes.

Further research is needed to unpack how each collaboration navigates conflict, dissent, and inevitable moments of despair but, for the purposes of this article, we focus on presenting how each initiative addresses ocean problems through optimism, active hope (Humphreys, 2019), intersectional collaborations, and the creation of livable futures.

Oceans Week Halifax

Oceans Week Halifax began almost three decades ago as an ongoing living legacy of World Oceans Day (WOD). According to founding member Carol Amaratunga, the first "Oceans Day" was envisioned by the International Centre for Ocean Development (based in K'jipuktuk /Halifax, Nova Scotia) and launched on June 8, 1992 at the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro. Amaratunga (2019) notes,

> It was the genesis of a global social movement in public education and ocean literacy. The event called for a greater awareness of our relationship with the world ocean; in particular, the need to better understand the cumulative human impacts on climate change and global warming. (p. 116)

In 2008, the United Nations formally recognized WOD as an "international public good," and June 8 was designated for celebrating ocean awareness and action. Today, thousands of people across hundreds of countries participate in WOD events annually, with the number of participating communities and countries increasing each year. Since its inception in 1992, Oceans Day has been celebrated annually in K'jipuktuk. However, in 2016, Oceans Week Halifax (OWHFX) was launched to create even greater opportunities for community engagement through an ocean education and conservation lens. OWHFX is a community-based and youth-led volunteer initiative that aims to connect diverse actors in the local ocean community in order to promote greater awareness and advocacy for improving the health of the ocean, as well as to foster meaningful community partnerships. OWHFX supports local events that are inclusive, accessible, educational, open to the public, and fun. All events are streamlined onto a single digital platform that includes a community calendar, interactive map, active social media, and compelling photography. OWHFX also highlights local ocean solutions and optimism through community-based and interdisciplinary science and outreach projects. Events are hosted by a broad range of academic, governmental, NGO, Indigenous, and corporate groups and organizations, ensuring that OWHFX is highly representative of its community members, priorities, and current issues every year. OWHFX also hosts its own series of planning workshops, networking events, lectures, recreational activities, beach cleanups, and more as a means of further amplifying the work of the vibrant ocean community.

In 2019, OWHFX hosted the world's largest oceans week celebration with more than 40 events supported by over 35 organizations held over 10 days. The organization has expanded internationally by participating in the Explorer Club's World Oceans Week 2020, which hosted an online forum where OWHFX was featured as one of the three representative projects on behalf of the North-West Atlantic Ocean. It is worthwhile to note that OWHFX is an entirely volunteer-based initiative, co-founded by two women with academic backgrounds and professional experience in ocean sciences and communications, and who hope to continue learning about the ocean and its relationship to people by building genuine connections with their local community.

From WOD to OWHFX, the fundamental role of citizen engagement in creating connections to the ocean reflects a central commitment to ocean literacy through community-based approaches. Amaratunga (2019) reminds us, "As a social movement, World Oceans Day belongs in the public domain. It is not a proprietary name or concept and it belongs to every classroom, every community centre, library, school, university, and maritime museum in the world. WOD was, and is, a unique global social movement in the field of ocean literacy" (p. 117).

Two-Eyed Seeing and the Apoqnmatulti'k Project

In order to better understand the impact that humans have on the ocean, we need innovative approaches informed by more than Western science. Indigenous and coastal communities have a deep relationship with the natural world, as well as comprehensive understandings of many aquatic species and their environments that can transform marine management. The principle of bringing together different knowledge systems to better understand the natural world is referred to by Mi'kmaw Elder Albert Marshall as *Etuaptmumk* (Mi'kmaw for Two-Eyed Seeing, see Reid et al., 2020). Understood as learning to use the strengths of Indigenous and Western ways of knowing for the benefit of all, this principle is foundational to Apoqnmatulti'k (Mi'kmaw: *we help each other*) and the basis for a partnership built on sharing and co-developing knowledge.

Apoqnmatulti'k is a three-year collaborative research project[2] that brings together the strengths of different knowledge systems (Mi'kmaw, local, and Western) to increase our collective understanding of the movements and habitat use of ecologically and culturally important species in Atlantic Canada's Bay of Fundy and Bras d'Or Lake ecosystems. All aspects of the project are co-developed, including project governance, research questions, research methods, and training, and they reflect the values of all partners. Co-management, shared decision making, and knowledge transfer are at the heart of Apoqnmatulti'k and help ensure research and results are accessible and relevant to all users. Data collected are shared with communities, resource managers, and decision makers to support the stewardship of aquatic resources and the right of Mi'kmaq to self-determination.

Apoqnmatulti'k fosters learning and exchange across knowledge systems. Key to this is the diversity of the team, the incorporation of varied values within the partnership, and the openness of all partners to look beyond their own knowledge system. Project partner, Shelley Denny (Director of Aquatic Research and Stewardship, Unama'ki Institute of Natural Resources, UINR), notes "the willingness of the partners to learn to do things differently, and the courage to help each other because you don't know what you don't know. This sets our partnership apart from others and is in line with Mi'kmaw concepts of relying on many people for knowledge rather than one person (expert)" (as cited in Ostertag & Ammendolia, 2020, p. 39).

Community liaisons at each study site have been invaluable to Apoqnmatulti'k's success and have helped guide the exchange of knowledge and learning. On Bras d'Or Lake, project staff member and local resident Skyler Jeddore connects with his Mi'kmaw community, culture, and language to collect study samples and inform project activities while using Western science to tag *katew* (eel) and *jakej* (lobster). In the Bay of Fundy watershed, Alanna Syliboy does similar work facilitating the involvement of Mi'kmaq knowledge holders, providing communications support, advising on community engagement opportunities, and helping guide research activities to study *punamu* (tomcod) and *katew* (eel).

A key lesson learned is the need to devote time to establish trust and build relationships from the project's inception. Working with Mi'kmaq and local communities requires a different time frame than anticipated by granting councils, government, and academia, and is best achieved through in-person interactions. By taking this time, the project has established a diverse and inclusive partnership. Bay of Fundy fisher Darren Porter sums this up:

> We're all happy with the way the data is produced because we do it together. That's true ocean literacy. There is no way for one person or one side of this equation to actually produce true ocean literacy. It needs to be a meaningful partnership that is completely equal. (as cited in Ostertag & Ammendolia, 2020, p. 39)

Through Apoqnmatulti'k, the project partners are working to support a different way of doing research that is guided by, and responds to, community knowledge and priorities.

Fishing For Success

When we look throughout human history, we have fished since the beginning. As soon as we could walk down to the shore we've been fishing. If you look at any culture, any culture near rivers, streams, ponds or oceans, those people have fished. They have fishing stories.

- Kimberly Orren, Co-founder and Project Manager,
Fishing for Success (TEDx Talks, 2018)

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Located in Petty Harbour, Newfoundland, Fishing for Success is based on the idea that all humans have a shared heritage of fishing and that fishing connects communities to each other, to shared and diverse histories, and to the ocean. The small organization is also deeply premised on social justice and the conviction that fishing should be a "safe space," accessible to everyone—youth, girls, women, the LGBTQ2S+ community, newcomers, people who ride transit, people with disabilities, people without boats, and, especially, people who don't know anything about fishing! Through fishing, building small wooden dories, making nets, cooking fish, learning traditional music, using fish for art, and engaging in dozens of other activities for audiences of all ages, Fishing for Success strives to make everyone feel welcome and have their own personal relationship with the ocean and with water. It is these newly formed connections that may empower us to create a more inclusive, equitable, and sustainable ocean-centred future (TEDx Talks, 2018; this video presents Kimberly Orren's talk about the organization *Fishing for Success*).

In partnership with Suzy Haghighi of the Association for New Canadians, Fishing for Success co-founder Kimberly Orren has developed the Women Sharing Heritage (WiSH) program to connect newcomer women with Canadian-born women (volunteers from their Girls Who Fish program) and with land, sea, and community. WiSH has been recognized by the Centre for Addiction and Mental Health as a "promising practice" that supports women and refugees who may have experienced or might be vulnerable to sexual and gender-based violence (SGBV) by creating safe spaces to facilitate social networks and create community belonging. Activities are nature-based and follow the interests of the participating women. According to Haghighi (2019),

> Nature provides a safe space and time for self-directed healing and is a wonderful setting for cross-cultural knowledge exchange. The program has led to positive outcomes for many of the women we work with, including increased school attendance, fewer crisis interventions, and increased confidence in decision making with peers and family. (para 5)

Fishing for Success also collaborates with local organizations to increase food security for Indigenous, LGBTQ2S+, and other marginalized communities. Newfoundland and Labrador have long-standing food security challenges that have been exacerbated by the current COVID-19 crisis (Verma et al., 2020). Fishing for Success has responded to this local issue by developing a project called Fish for Friday that purchases fish from local plants or harvesters and distributes it to those in need through local food banks or prepared meal programs. By partnering with community groups that are already supporting vulnerable individuals and families, local fish is made available to those who might not normally have access to this nutritious and culturally appropriate food. Gifting a meal of fish forms a relationship with the ocean through food—one of the most intimate ways that we can come to understand how we depend

upon nature. With its focus on social justice, an "economy of care," and a holistic blend of traditional knowledge, local knowledge, scientific knowledge, historical understandings, place-based connections, and the arts, Fishing for Success exemplifies inclusive approaches to community-based ocean literacy.

Co-Existing With North Atlantic Right Whales Project

North Atlantic Right Whales (NARW) are increasingly present in the Gulf of St. Lawrence, possibly as a result of climate change (Bigelow Laboratory for Ocean Sciences, 2019). The whales' presence in this region leads to new interactions with other users of the marine environment, and thus new conservation challenges. Especially dangerous for the whales are entanglements and vessel strikes, which were identified as the cause of death for numerous right whales in 2017. In an urgent attempt to reduce mortalities of this species in the Gulf of St. Lawrence, Fisheries and Oceans Canada (DFO) enforced new management measures for crab and lobster fishers in 2018. However, these strict measures had significant unintended consequences for fishing communities along the coast.

In response to these impacts on lobster fishers in the region, Homarus Inc., the scientific research and education branch of the Maritime Fishermen's Union (MFU), developed the Co-Existing With North Atlantic Right Whales Project. Launched in 2019, the collaborative and multi-sectoral project included partnerships with industry, coastal communities, governments, environmental NGOs, and academics.[3] The goal was to develop solutions to ensure the protection of species at risk by putting fishers' knowledge at the heart of management plans. In order to sustain coastal economies largely dependent on fisheries, solutions must be developed collaboratively to engage fishers in playing a part in maintaining their fisheries and protecting right whales.

The project focused on three approaches to enhancing co-existence: (1) developing an inclusive management/mitigation system, where fishers are involved in early stages of the process to reduce overlap between whales and fisheries in the Gulf of St. Lawrence (in space and in time); (2) conducting research to develop new fishing gear technologies to reduce entanglements or fatalities when fishers and whales are occupying the same area at the same time; and (3) informing fishers, the public, and young people of the importance of conserving marine habitats and resources. As part of the project, the staff at Homarus developed interactive workshops and educational materials for both fishers and the general public to learn about North Atlantic Right Whales, other species at risk, co-existence, and coastal environments.

Deeply connected to local communities, fisheries, and local ecosystems, Homarus offers a much-needed model of ocean literacy that builds bridges between science and society. The Co-Existing With NARW Project is part of a larger initiative named "Clean Oceans" that the MFU created in the 1990s. Clean Oceans encourages fishing communities to be aware of, and take action

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to protect, their marine and coastal environments. Through collaboration, scientific research, and education, the Co-Existing With NARW Project emphasizes the importance of developing solutions *by* fishing communities and *for* fishing communities. In what can often become a highly conflictual situation, the project aims to increase trust and participation in management measures through authentic engagement processes that draw on the best available local, expert, and scientific knowledge to co-develop effective solutions. Engaging the community and raising awareness about the marine ecosystem is central to this process because it increases the knowledge required to build trust and involvement in decision making and management measures.

Strengths, Challenges, and Possibilities for Bridging With Formal Education

Each of these four examples of ocean literacy and ocean optimism reflects distinct community responses to local priorities. However, as different as these community projects may be with regard to how they define the parameters of community and the issues they are aiming to address, they nevertheless reflect similar strengths and challenges. Understanding these commonalities is helpful for advancing and sustaining community-based approaches to ocean literacy, and especially for bridging these informal spaces of community learning and the more structured worlds of formal and non-formal education.

While the notion of the ocean continuum reminds us that the ocean shapes and sustains all life on this planet, the most defining commonality between the projects profiled in the four examples is the *lived relationships between people and the coasts/ocean*. Furthermore, through sustained relationships between people and place, the projects draw on and strengthen *place-based knowledge systems*, recognizing that there is a plurality of knowledge systems that can co-exist (Reid et al., 2020). This is particularly exemplified by the practice of *Etuaptmumk* (Two-Eyed Seeing) that guides Mi'kmaq knowledge holders, fishers, and Western scientists as part of the Apoqnmatulti'k project, though the co-existence of plural knowledge systems is apparent across all of the examples. The connection between coastal communities and the ocean continuum is particularly strengthened through *cultural and embodied livelihood practices and values* that connect individuals and communities to the ocean (Engel et al., 2020). While these practices and values may be as distinct as urban Haligonians standing up against systemic racism on their surfboards during Oceans Week Halifax (OWHFX, 2020) or Syrian refugees learning to fish in Petty Harbour, they all offer pathways for collaboration on ocean issues that continue to be undermined by conflict, distrust, and siloed relationships (Ostertag & Ammendolia, 2020).

Across the four examples, *collaboration* emerges as a key to community-based ocean literacy. In particular, this collaboration greatly expands the notion of "community" since, rather than emphasizing similarities (e.g., similar sectors,

economic interests, cultural backgrounds, socio-economic status, etc.), the examples reflect *intersectional* approaches to responding to local priorities by striving to create inclusive spaces for diverse and underrepresented communities of humans and nonhumans (e.g., whales, turtles, eels, salmon, lobster, tomcod) to work together. Furthermore, the cases reflect the significant *role of womxn leaders*, particularly young womxn, in developing intersectional approaches to collaboration. While the ocean (and most fields in science) largely remains a male-dominated space, womxn across Mi'kma'ki/Atlantic Canada are taking action; they are responding to the urgent socio-ecological issues both impacting and being impacted by the ocean. Notwithstanding womxn's efforts to shape and change who comprises the seascape of participants defining ocean narratives and decision making, the "ocean-so-blue" remains an "ocean-so-white." Efforts for *blue justice* (Bennett et al., 2020) that work to increase racial equity, diversity, inclusion, and justice must continue.

In addition to limitations with regard to blue justice, the cases suggest that community-based ocean literacy projects also share common gaps and barriers. As with many community-based projects, particularly in marginalized regions or with underrepresented communities, the single greatest barrier to sustaining and advancing efforts is *lack of funding* (Ostertag & Ammendolia, 2020). Funding cycles are often short-term and competitive; moreover, they frequently lack flexibility and do not reflect the needs of community-based projects that require time and additional support to build and sustain diverse collaborative relationships. Closely related to the barrier of funds is the *barrier of time*, since many projects depend heavily on volunteers dedicating their time to developing, funding, and implementing projects.

The *emergent and responsive* characteristics of these highly diverse projects are essential for community-based projects to respond to local priorities; however, these become additional barriers since determining how to sustain projects over time without institutional frameworks and long-term funding is no easy task. For instance, how can projects be scaled up to influence policy and shape education beyond the local community? Also, since community-based learning is inherently tied to specific communities (e.g., local geographies, languages, cultures, issues), how can community-learning be measured or replicated when it is highly *context-specific*?

In responding to these questions, we suggest rethinking the implications of community-based learning that is emergent, responsive, and context-specific not as barriers but as opportunities. Perhaps the challenge is not to scale up and institutionalize community-based ocean literacy or to develop metrics to assess the learning outcomes of these diverse projects. Instead, the challenge may be to connect these rich, complex, action-oriented learning spaces with formal and non-formal education. Numerous education researchers (Lenton et al., 2014), particularly in environmental education (Elliott et al., 2020), identify the gaps between schools and communities as well as schools and non-formal education

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as lost learning opportunities for children, youth, teachers, and communities. There are, however, several barriers to developing connections and forming partnerships between formal education systems and community-based ocean literacy projects. One of the largest barriers to developing community-based ocean literacy collaborations in formal education is the *lack of ocean concepts* in the Atlantic Canadian curriculum (McPherson et al., 2018). For many subjects, the curriculum is already overcrowded, resulting in challenges for teachers to teach the designated topics within the allotted time. Furthermore, ocean literacy, particularly in community contexts, is highly trans-disciplinary and difficult to adapt to a *curriculum structured around subjects and a tightly scheduled school timetable*. These structural barriers are particularly challenging in the high school curriculum, though the shift toward inquiry-based learning in lower grades (e.g., Nova Scotia Department of Education and Early Childhood Development, 2018) offers greater flexibility for connecting broad learning competencies with school-community collaborations.

While McPherson et al. (2018) identify *teachers' lack of adequate subject knowledge* as a barrier to teaching ocean-related curriculum, community-based ocean literacy offers opportunities for teachers to build supportive communities of practice with diverse knowledge holders, experts, and practitioners in the community. Over time, these collaborations can support teachers in deepening their understanding of critical ocean issues, as well as in increasing their level of comfort in effectively communicating these ideas to their students. For students, these collaborations can lead to transformative and empowering learning opportunities by facilitating their engagement with local ocean issues.

Currently, the inclusion of ocean literacy concepts in formal education systems is also significantly limited by a *lack of access* to appropriate resources, including culturally relevant books and textbooks; however, other access barriers include lack of Internet connectivity and cost of transportation to coastal communities where many of these projects take place. Collaboration with community-based initiatives could assist in providing valuable, context-specific resources to teachers, oftentimes bringing these resources right into school settings (e.g., Homarus's mobile lab), especially in more rural areas where access to the aforementioned resources may be particularly scarce. However, while many community-based programs exist, these projects are often not widely accessible or publicized to teachers. Personal relationships with community members involved in local projects may be required to participate in community-based projects, resulting in barriers for teachers who may lack these relationships (for instance, because of high staff turnover, see Roy, 2021 in this issue). The Canadian Ocean Literacy National Strategy's recommendation to coordinate local, provincial, and national ocean literacy initiatives (including community-based projects) through an online "community of practice" digital platform responds to this need to improve schools' and communities' capacities to build relationships and collaborate (Glithero, 2020).

In order for teachers and schools to be collaborators in community-based projects, extensive professional development will be required for pre-service and in-service teachers, as well as for the school administrators and school board members overseeing these activities. Teacher education programs that offer community-service learning opportunities as part of pre-service teacher education are well-positioned to expand their relationships with community-based ocean literacy initiatives (Lenton et al., 2014). Ultimately, community-based approaches to ocean literacy fall within broader calls in environmental education to align formal, non-formal, and community-based education (Elliott et al., 2020; Sauvé & Asselin, 2018). As Elliott et al. (2020) write, involving the wider community in environmental education is important so that teachers and schools do not have to bear the burden alone of preparing the next generation to be responsible stewards of the environment. However, in order to make these changes, schools can no longer operate in isolation from the places where they are located and the communities they serve.

Conclusions

Ocean optimism compels us to learn from examples in which coastal communities have successfully tackled wicked ocean problems (Ardoin et al., 2020; Paasche & Bonsdorff, 2018). These examples offer significant insights that will broaden our understanding and practice of ocean literacy. Whether it is mobilizing a vibrant and diverse ocean community in K'jipuktuk /Halifax, as with OWHFX, using Two-Eyed Seeing as a guiding framework, as in the Apoqnmatulti'k project, supporting newcomer women's mental health and community belonging through the Fishing for Success Project, or collaborating with fishing communities, scientists, government, and other partners to support coastal livelihoods and protect endangered North Atlantic Right Whales, these examples share important commonalities. While not an exhaustive list, the strengths of the projects emerge from:

- sustained relationships between people and coasts/ocean;
- the co-existence of plural, place-based knowledge systems, particularly Indigenous knowledges;
- cultural, livelihood, and embodied practices and values connected to the coast/ocean;
- commitments to collaboration, diversity, inclusion, equity, and access; and
- the emerging leadership role of womxn and youth.

Common barriers include blue injustices (e.g., underrepresented communities continue to have limited access to ocean benefits and experience disproportionate impacts of ocean risks) and organizational pressures resulting from a lack of funding and time to sustain and grow projects. However, these

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challenges become more complex as we consider bridging community-based learning with formal education, where barriers include:

- lack of ocean content in formal curricula;
- rigid disciplinary structures and timetables;
- teachers' lack of ocean content knowledge and professional development; and
- lack of access to resources, coasts, ocean, and sustained personal relationships with community members.

At their heart, the relational, emergent, responsive, and context-specific nature of these examples reflect both the strengths and challenges of community-based ocean literacy. Fundamentally, the initiatives are exemplary bright lights that we can learn from; however, since these solutions will also need to be emergent and responsive to local contexts, they are not blueprints for replicable or scalable solutions to socio-ecological problems. Rather, they offer examples of intersectional collaborations and opportunities for building bridges between formal education, non-formal education, and informal contexts of community-based social action. And, while each initiative is imperfect and complicated in its own ways, taken together they offer examples of ocean optimism and community-based ocean literacy that allow for different voices to tell new narratives (Lubchenco & Gaines, 2019) for the ocean as we collectively strive to build healthier and more just human–ocean relationships.

Notes

[1] Womxn is a term encompassing all women, girls, and femme-identifying persons; it is not restricted to gender binary terminology such as women.
[2] The project is co-led by the following organizations: Unama'ki Institute of Natural Resources (UINR); The Confederacy of Mainland Mi'kmaq, Mi'kmaw Conservation Group (The CMM); Marine Institute of Natural and Academic Science (MINAS); Ocean Tracking Network (OTN); Acadia University; Dalhousie University; and Fisheries and Oceans Canada (DFO). The project is currently funded through a Natural Sciences and Engineering Research Council of Canada (NSERC) Strategic Partnership Grant (SPG). We believe the NSERC SPG has initiated a research program that will grow and flourish, providing critical knowledge long after the current funding cycle is over.
[3] This Homarus-led project would not be possible without the invaluable collaboration of the follower partners: M-Expertise Marine, CORBO Engineering, Ocean School, Verts Rivages, Cape Breton Environmental Association, Prince Edward Island Fishermen's Association (PEIFA), Oceans North, Association des Crabiers Acadiens (ACA), Nature NB, Marie-France Comeau (artist), Marie Cadieux (artist), Conservation Council of New

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