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Building community climate resilience through Western Washington small marine science centers

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Abstract

Western Washington plays host to a great diversity of small, community-based science centers as part of its regional museum landscape. Although the work done by community-based science organizations is understudied in the museum field, these organizations may offer an important model for other museums looking articulate the role(s) they play in supporting community climate resilience. The purpose of this research was to explore how small marine science centers (MSCs) in Western Washington are defining and supporting climate resiliency in their communities. Data collection occurred primarily through two rounds of semi-structured, 60-minute interviews with staff from both local MSCs (n=3) as well as MSC partner organizations (n=2). MSCs envisioned their climate resiliency work as fundamentally social endeavors focused on increasing their community's access to regional scientific infrastructure. All sites focused specifically on youth/young adult-serving projects as "embodying" the role(s) they strive to play in building community resilience. Finally, partners and partnership work were both pivotal to the role envisioned by the MSCs in supporting community climate resilience as well as integral to all focal projects examined in this case study. As museums at-large must reckon with the roles they play in supporting and stewarding sustainability in their communities, this research stands as a testament to the important work being done by small, local, community-based organizations. Building community climate resilience requires that museums develop broad networks outside of their institutional silos, and these small marine science centers may offer an important model of how to do so in practice.

Keywords

climate resilience; marine science; science museums; community-based museums; small museums

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Accepted: June 10, 2021

Published: (date uploaded to MuseumsForward)

Introduction

Western Washington has a dense concentration of small, volunteer-driven, community-oriented science centers peppered across its diverse coastline. Although the concept has only been sparsely applied in the United States, these small marine science centers (MSCs) meet many of the benchmarks of "ecomuseums," or heritage centers developed for and by local people which focus their missions on aspects of local identity and sustainable development (Chang et al., 2015; Hall & Sutter, 2019). Sustainability has recently emerged as a core priority of ecomuseum literature (Rivard, 2019), but recent research has revealed potential tensions in this goal: Many ecomuseums interviewed by Hall and Sutter (2019) considered their missions "more human focused," and therefore core components of sustainability/ecosystem stewardship were outside of their institutional purview.

However, the potential for local ecomuseums to be drivers in community "sustainability" should not be understated. Climate resiliency literature has identified multiple avenues through which to build the social capital necessary for community resilience, many of which fall naturally into established functions of ecomuseums (Fazey et al., 2021; Rivard, 2019; Saldívar-Lucio et al., 2021). Western Washington has been and will continue to experience increasing regional pressure from ocean acidification and changing fire regimes, among many other statewide climate impacts (Halofsky et al., 2020; Washington Marine Resources Advisory Council, 2017). Supporting pathways for climate resilience now is a critical component of ensuring long-term persistence of communities across the region. As museums must increasingly reckon with the roles they play in supporting and stewarding sustainability in the face of climate change, examining the approach taken by these small marine science centers may offer an important model in how museums can support this vital work.

The purpose of this research was to explore how small marine science centers are defining and supporting climate resiliency in their communities.

1. How do small marine science centers envision their role in supporting community climate resilience?
2. What kinds of activities, projects, and/or programs do they use to act on that role?
3. How do these organizations approach and utilize partnerships in these projects?

This research seeks to draw attention to the work being done by a subset of organizations who have had to rely on and reflect their communities since their founding. Although community-based museum work has been studied widely in other contexts, the impact and approaches taken by community-based science organizations is poorly understood. This research will begin the work to define, in practice, the value of these small organizations within their communities, both for the small marine science center community itself as well as for larger museums and/or funding organizations seeking to support community-based climate resiliency efforts.

Ecomuseums

The concept of "ecomuseum" was initially established during the 1970s in France, as a direct challenge to traditional museum function (Brown et al., 2019). Rather than a top-down (institutionally-driven), historical (looking toward the past) approach to preserving heritage, ecomuseums were envisioned as a bottom-up (community initiated and developed) and future-oriented tactic to protect, develop, and share local heritage (Chang et al., 2015; Stern & Hall, 2019). "Heritage" in ecomuseum literature tends to be defined broadly, encompassing everything "from the tangible manifestations of nature and human activities, to the suites of values, attitudes, actions and customs associated with living cultures" (Sutter et al., 2019, p. 11)

Rivard (2019) describes that ecomuseums have the following goals, which, in conjunction with an organization's founding stories, will be helpful in identifying local ecomuseums for study.

An ecomuseum seeks:

1. "To unite a community around a common project"
2. "To foster a strong, renewed identity"
3. "To transform its inhabitants as actors, protectors, and users of their own heritage and land"

4. "To develop with [the community] a "database on local issues" in order to spur community discussions, solve problems, and develop empowerment as well as socio-cultural and economic initiatives" (Rivard, 2019, p. 20)

International ecomuseum scholars have tracked three "waves" of interest in ecomuseums: The first wave was concerned with the preservation and collection of object-based heritage on a community's "own terms." The second revolved around preserving a community's intangible heritage, and deemphasized the collection of objects. The final, and current, wave of interest in ecomuseums prioritizes the organization's role as a method of action, or *tactic*, against prevailing socio-economic and/or environmental challenges facing their communities (Hall & Sutter, 2019; Rivard, 2019). Although the ecomuseum concept has not been widely applied in the United States, the concept of "ecomuseums as tactics" echoes many of the driving sentiments behind the community- and neighborhood-museums that appeared on the American museum landscape in the 60s and 70s. Although the movements grew from similar ideological origins, ecomuseum literature continues to emphasize the important of place-making and locality building in these organizations while literature on American community museums tends to deemphasize geography in favor of culturally-informed models of community.

Although natural heritage has always been a component of ecomuseum literature, a recent examination by Hall and Sutter (2019) found that many self-identified ecomuseums treated environmental concerns like biodiversity loss as outside of their institutional purview. This tension reveals that—while the letter of ecomuseum theory certainly encompasses aspects of natural heritage, and "sustainable development" has emerged as a priority in the literature—ecomuseums in practice may not be focusing on this work. In order to examine what these organizations *are* doing—in practice, not just in theory—it seems necessary to examine organizations that fit the description of an "ecomuseum" but do not necessarily self-identify under the term.

Community Resiliency and Climate Change

The concept of "resilience" draws from many disciplines and has been the subject of much scholarship, and it can be tricky to pin down a precise definition. "Community resilience" can be an even more unwieldy concept, since it requires a working definition of both

"community" and "resilience." This research will be relying on definitions adapted from Kais and Islam (2016):

Community begins as a "place-based geographical entity, located at the intersection of household and regional levels" (Kais & Islam, 2016, p. 3). While many understandings of "community" appear in scholarship, for this research it is important to understand community as a function of social networking *and* a shared, physical place.

Resilience is "a combination of resistance to frequent and severe disturbances, capacity for recovery and self-organization, and the ability to adapt to new conditions" (Kais & Islam, 2016, p. 3). Important to this understanding of resiliency is that it is both an outcome and a process: it is both the ability to maintain stability in the face of change and the adaptive process of iterating better systems.

Put together, *community climate resiliency* has emerged as a concept of primary importance in "addressing slow onset transformations like drought, famine, long-term temperature shifts, and sea-level rise" by "bring[ing] together cumulative, progressive, and dynamic knowledge, insights, and works in dealing with and learning from hazards and threats" (Kais & Islam, 2016, pp. 3–4). Community climate resilience can be further broken down into *specified resilience*, or resilience against a specific form of disturbance or threat, and *general resilience*, or resilience against more broad, unknown, or unpredictable threats (Carpenter et al., 2012).

Although policy makers typically turn toward physical infrastructure improvements to improve a community's climate resiliency, scholars are increasingly advocating that equal attention should go to building social capital and social networks for resiliency (Aldrich & Meyer, 2015). Fazey et al (2021) argues that "resilience building is…predominantly a social process involving different actors working and learning collaboratively" (p. 1732). Although the specific approaches utilized will vary from community to community, resilience building typically requires some level of relationship-building and trust; rich partnerships between local organizations; developing social supports for community members; and creating decision-making infrastructure and trusted information sources (Fazey et al., 2021). Additionally, Saldívar-Lucio et al. (2021) argues that the "issues at hand" when discussing community-based climate resiliency must be hyperlocal in their focus, or risk diluting community members' risk perception and the power of the community's collective memory.

Methods

This research utilized a case study approach to explore how three small marine science centers (MSCs) in Western Washington are working to define and support community climate resiliency. Data collection occurred primarily through two rounds of semi-structured, 60-minute interviews: In the first round of interviews, a MSC staff member was asked to discuss both the role that the MSC sought to play in supporting community climate resilience, as well as discuss a particular project where the MSC embodied that chosen role. In the second round of interviews, community partners (as designated by the staff member interviewed in round one interviews) were asked to describe their perspectives on the project under scrutiny as well as to more broadly discuss their perspectives on community climate resilience. All interviews were conducted virtually via Zoom, due to prevailing concerns over the COVID-19 pandemic.

Where appropriate, document analysis was used to support and contextualize themes that emerged from interviews. Specifically, the websites and Facebook sites for each MSC was examined to develop a richer sense of the scope of each site's program offerings.

Sampling and sampling process

As Western Washington plays host to a great diversity of community-based MSCs, the organizations examined for this case study were intentionally selected to represent the wide range of specific organizational contexts present in the region. These sites are "accessible by size and intent," with minimal (or nonexistent) admission fees, fewer than 10 paid staff, and annual budgets under $1 million (Community Marine Centers of the Salish Sea, 2019). Through their participation in the Community Marine Science Centers of the Salish Sea collaborative, all sites have self-identified as small, community-oriented science centers worthy of examination in this research.

Site 1. Puget Sound Estuarium; Olympia, WA

Mission: "Our mission is to foster learning opportunities that inspire people of all ages to connect with, protect, and enjoy the unique estuary environment of Puget Sound." (Puget Sound Estuarium, 2020b)

Founded in 2007, the Puget Sound Estuarium (originally, South Sound Estuary Association) was the result of two years of

discussions led by community leaders looking to create an "estuary-focused" organization in Olympia (Puget Sound Estuarium, 2021). Today, the Estuarium facility hosts five tanks featuring local South Sound organisms, as well as a variety of preserved specimens, permanent exhibits, and rotating exhibits. Popular programming includes intertidal beach walks ("Meet the Beach"), nighttime pier programs ("Pier Peer"), as well as STEM-focused school programs and camps (Puget Sound Estuarium, 2020a).

Site 2: Marine Science and Technology Center (MaST Center); Des Moines, WA

Mission: "To promote understanding, appreciation, and preservation of the marine environment through hands-on research, education, and community activities that highlights the beauty, complexity, and importance of the South Puget Sound ecosystem." (MaST, n.d.)

Originally developed in the 1960s as a training facility for Highline College's Undersea Diving Program, the MaST Center has undergone multiple iterations as a hands-on teaching facility for Highline students and the local community. The MaST's current facility opened in 2008, which holds 3000+ gallons of water across its tanks (the largest tank space of any site in this study) as well as permanent exhibits, research space and classrooms, and a rotating art gallery. The facility is open to the public each Saturday, but plays host to school programs/camps, current Highline students and community scientists throughout the year.

Site 3: Harbor WildWatch; Gig Harbor, WA

Mission: "To inspire stewardship for the Puget Sound, and greater Salish Sea, by providing equitable learning opportunities about the environment to our local community and beyond." (Harbor WildWatch, n.d.-a)

In 2004, a Gig Harbor resident founded Harbor WildWatch as a series of pop-up "touch tank" events on a local pier which subsequently expanded into additional programming avenues (interpretive signs, classroom programs) with Gig Harbor/Key Peninsula parks and schools. They moved into their public exhibit space in 2014, which houses a single touch tank as well

as preserved specimens and other interactive exhibits (Harbor WildWatch, n.d.-b). Today, they continue to offer a variety of all-ages, adult, and youth programming, as well as maintain a significant online presence through TikTok and Facebook (Harbor WildWatch, n.d.-d, n.d.-c).

For each MSC study site, one community partner was identified by the study site as having valuable perspectives on the projects under scrutiny. Due to scheduling conflicts at the time of data collection, no partner interview could be obtained for Site 3.

Analysis procedures

All interviews were recorded and initially transcribed in Zoom. Zoom-generated transcripts were then further checked for accuracy; minor edits were made to improve fidelity to the recorded audio as well as remove filler words. Interview responses were then emergently coded to reveal major themes within and among study sites.

Results

How do small marine science centers envision their role in supporting community climate resilience?

Defining community climate resiliency

All sites took systemic views of climate resiliency, focusing particularly on the role of ecosystem services and community knowledge in developing community resilience. One site described community climate resilience as: "Ecosystem health is community resilience, so the more we can strengthen ecological processes, the more we can maintain ecosystem services for communities." Other sites described the importance of supporting Indigenous efforts toward sustainability, as well as harnessing the power of local businesses and governments toward resiliency efforts.

Importantly, all three organizations focused specifically on the social aspects of climate resilience (building connections and trusted information sources between individuals and groups), rather than considering resiliency terms in discrete infrastructural improvements. Only one MSC cited an infrastructural improvement as a component of their climate resiliency work: "This area in particular is very susceptible to the king tides. We have water coming up to our building when those king tides happen. So we document, we get it out there, we ask other people in the community to share their king tide photos and we talk

about the challenges that go along with those things in our facility. [The city] had to completely redo the pump system that's underneath the park for our city sewage."

When asked about specific aspects of climate threat, all MSCs cited ocean acidification (and its specific impact on local oyster industries) and increasing extreme weather events (storms, flooding, etc.) as particularly relevant to their work. Changing fire regimes, heatwaves, and sea level rise were also cited as important aspects of climate change by two of the three MSCs. All sites described the inherently place-based nature of climate change, citing that salient climate impacts would change depending on which community they were reaching. One site described changing focal topics depending on the specific community being addressed.

Envisioning the MSC's role in climate resilience

Education was described as the primary goal of all sites. More specifically, all MSCs described that creating opportunities for students/community members to "do the work" was the most important mechanism through which the organizations could teach. Broadly, MSCs described programs that increased access to established scientific infrastructure within their communities, whether that was physically bringing students to habitat restoration sites or bringing fresh plankton samples into otherwise landlocked cities and/or schools. Finally, one site described increasing access to the "behind the scenes" of community science by livestreaming volunteer data collection efforts.

When extrapolating outward from the point of education/contact, however, all three MSCs had slightly different end goals for that mechanism. These goals are not mutually exclusive, but likely shape downstream programmatic decisions being made by these organizations.

One site described wanting to increase reach/access for frontline communities (or, those "that are hardest hit by climate change"). This site believed "that through education we can provide opportunities for [frontline communities] to get involved in and also advocate for their own communities, to make those communities more resilient to climate change in the here and now, and for the future."

Another site felt that their intent was specifically to increase community environmental literacy, "so that [students/visitors] are prepared and qualified to make wise decisions when it comes to their own practices

that impact the environment." This site drew contrasts between the "top-down" approach of advocacy organizations (who the MSC described as advocating for specific policy change and/or interfaced directly with community decision-makers) and the MSC's own "bottom-up" approach which focused on individual empowerment toward decision-making and policy change.

Finally, the third MSC articulated their ultimate goal as "[getting] the community to envision themselves as an integral part of a healthy Puget Sound" so that community members can see themselves as "advocates" and "scientists" with stake in a healthy marine environment. Further, this site described a desire to be a "stepping stone" opportunity for local youth/students to gain experience in marine science/STEM fields: "[For a] high school student in this area, there's no place around where they are going to work with sea turtles or dugongs. But [the MSC can] create that opportunity to build their resume, help them be successful in school, so that they can consider options that they've never considered before."

For all projects and programs highlighted in the interviews, partnerships were pivotal to both the success of the programs and, by extension, the role(s) envisioned by the MSCs. Specific themes from discussions around partnerships will be discussed later in this section.

What kinds of activities, projects, and/or programs do the MSCs use to act on their roles?

Surveying MSC programming

All MSCs examined for this research engage in a diverse range of public programs, an overview of which is described in Table 1. However, all MSCs chose to focus specifically on programs aimed at youth/young adults as "embodying" the role(s) they strive to play in building community resilience.

Table 1. Overview of public program offerings* at each MSC

Program Category	Puget Sound Estuarium	MaST Center	Harbor WildWatch
Festivals/ celebrations		X	X
Guided walks	X		X

Intertidal exploration	X	X	X
Speaker series	X		X
Community science		X	X
Camps	X	X	X
School programs	X	X	X
Other	X		

* To generate this list, a core list of program offerings was collected from each MSC's website. To account for events that were less well represented on main websites, Facebook events/posts were examined between March 2021 – March 2022 for any additional program offerings. The total program list was then emergently coded to reflect categories shown here.

When asked to describe programs that "embodied" the role that the MSC wished to play in supporting community climate resilience, the sites chose to focus specifically on the following programs/projects:

1. Puget Sound Estuarium described working with a local partner (Thurston TOGETHER!) to provide free afterschool programs to students in anticipated frontline communities.
2. The MaST Center described working with a regional partner (Foundry10) to facilitate a Directed Fieldwork course for students in the UW Museology program, with the intent of creating a place-based plankton exhibit to share with the Community Marine Centers of the Salish Sea (CMCSS) collaborative.
3. Harbor WildWatch described working with individual teachers/community members to develop classroom workshops intended to fill curriculum gaps and/or provide additional STEM support to local school districts.

Contextualizing MSC public programs

Multiple MSCs discussed being the only similar resource in their community, and one site discussed how this relative isolation made their site "fortunately placed where [the MSC] can have an outsized impact." Other sites hinted at the responsibilities inherent in being the sole trusted source for marine science communication in their area.

One site described, "Our community reach has exploded in the last couple of years [...] I think that as we've grown, we have become more and more aware of how many people we're reaching and the responsibility with reaching all those people with the messaging that's most effective for climate results."

For at least one site, digital engagement during the COVID-19 pandemic allowed for dramatic expansion of audience reach. At the time of this writing, this MSC's TikTok account has over 380,000 followers and generated 7.7 million video likes. Although this site felt that digital methods of engagement (through TikTok, Facebook lives, and through virtual programming) has allowed for increased efficiency of their programming, the MSC shared a sense echoed by other sites that "kids aren't learning as much" through virtual programming.

Finally, one site described the challenges in expanding support/programming into target communities. Although this site felt that their audience had grown dramatically over the last few years, some targeted programs (specifically aimed at non-English speaking audiences) were experiencing lower turnout. This site described having faced similar challenges before, and asserted that "consistency" was key to developing richer relationships with new communities. As this site described, "if we continue to promote the message to everyone that we can that we have accessible programs, eventually people will start coming and in larger numbers. We just have to keep at it." To further address this challenge, this site has recently developed an internship position aimed at building new and/or richer connections with target communities.

How do these organizations approach and utilize partnerships in these projects?

Partnerships were central to each MSC's organizational identity

Partners were shown to be pivotal to the roles envisioned by the MSCs. Multiple sites described working to "broadcast" messages, content, and work done by other partners within their communities, or otherwise utilizing areas of expertise held in their community partners, in order to not duplicate efforts. One site described that "we like to showcase the work of environmental groups in our areas, so people can know how to get involved and offset the effects of climate change." When speaking toward climate change education, another site commented that "there are climate experts, [but] we are not that. We learn from the climate experts. That's really our role as environmental educators, to take the

scientific data and package it in a way that is understandable and relatable to the average person." When considering their organizational approach to partnerships, one site saw their MSC as "helping to put the right people in the right place" such that each partner is leaning on the specific expertise they bring to the collaboration.

Importantly, multiple MSCs specifically considered their own organizational growth as "synergistic" with their partner organizations. Although many of the cited partners could be seen to have overlapping missions with the MSCs, they were not considered to be in direct competition with the MSC. One site described that their growth was "symbiotic with those [partner] organizations, because the more we grow, the more we can raise awareness about what they do and the opportunities that they have for people. Our message is, as much as possible, always one of hope, where we see a lot of ways to offset the effects of climate change by working with grassroots organizations in our communities that are already doing the work well."

Partner-pairs demonstrated goal alignment

When examining each focal project specifically, each partner-pair (MSC + partner site) was able to demonstrate shared alignment of goals and objectives for their partnerships:

In one partner-pair, both organizations expressed specific admiration for the other partner's ability to "reach kids" and make the collaborative program a rich, meaningful experience. Further, both partners discussed a desire to "change the narrative" around environmentalism and self-efficacy in the outdoors for the students they worked with. Both organizations considered the partnership extremely fruitful, and mirrored a specific desire to direct efforts toward communities who will be frontline communities in the face of climate change. In reflecting on the success of the partnership as a whole, the partner site commented, "[the MSC partnership] has allowed us to be able to share their resources with other partners and collaborate in whichever way we can to support them, and I think vice versa. We've already involved other partnerships [in the collaboration.] It's really opened up a whole new path for us to walk together and create opportunities for our youth."

In the second partner-pair, both organizations shared a sense of recognition of the opportunity-cost that is required of small organizations to take on larger-scale projects. As the partner organization commented, "one big theme of this whole thing is having the staff to actually capitalize on an opportunity." Both organizations

shared a two-fold sense of success for the project, one where graduate students within the program had an opportunity to "put to practice" skills learned in the classroom as well as where MSCs could share resources for a new exhibit that was immediately relevant to place-based Salish Sea programming.

Partnerships were future-oriented

All organizations shared a sense that the described partnerships were ongoing, and that opportunities for further collaboration were growing. This shared belief across all MSCs indicated that these organizations have stake in growing, deepening, and expanding their relationships with their partners over time. In considering the longevity of these focal projects, two MSCs described that these projects were entirely or mainly grant funded. For one site, continuation of funding was brought up as a potential barrier for the future of their focal project.

Partnership structures were diverse

Finally, each MSC's focal project required a range of leadership from the MSC themselves. One focal project was ideated and developed by the MSC following an expression of a need in their community, after an organic process of program expansion. Another focal project was codeveloped between two partners during a moment of synchrony, when both partners were looking to fill a need in a shared problem space. Finally, one project was ideated and developed by a partner organization and then proposed to the MSC for further input. The wide range of leadership required from the MSCs in these projects suggests that the MSCs examined here are dynamic in the methods and approaches they take toward supporting community climate resiliency.

Discussion

The purpose of this research was to explore how small marine science centers in Western Washington are defining and supporting climate resiliency in their communities. Furthermore, the intent of this research was to begin the work to define, in practice, the value of these small organizations within their communities. Although community-based museum work has been widely studied in other contexts, the approaches taken by community-based science organizations continue to be poorly understood. The following discussion will describe the

main themes that emerged from this case study, as well as begin to articulate avenues for future investigation.

How do small marine science centers envision their role in supporting community climate resilience?

All MSCs examined took systemic views of climate resiliency which incorporated both ecologic and human systems into their definitions. Importantly, all three organizations focused specifically on the social aspects of climate resiliency (building connections between individuals and groups within a community), rather than considering resiliency terms in discrete infrastructural improvements.

This focus suggests that the MSCs in this study already consider resilience-building efforts along the lines of Fazey et al.'s (2021) "predominantly social process involving different actors working and learning collaboratively" (p. 1732). Fazey et al.'s (2021) understanding of resilience building was further echoed in the MSCs discussions of partners and partnership-building, supporting community members, and providing resources/becoming trusted information sources within their communities. In sum, the MSCs' working definitions of climate resiliency position them to engage in resiliency efforts where museums are already best suited to take action.

When asked to describe their organization's ideal role in supporting community climate resilience, all organizations considered themselves primarily education institutions. All organizations shared a sense that their MSC was uniquely positioned to connect its audience to the "real work" of stewardship in the Salish Sea, frequently citing the relative isolation of these institutions from similar regional resources.

Taken together, these ideas paint a picture of organizations with the potential to have "outsized impact" on their communities. Given that Western Washington has been and will continue to be on the frontline of experiencing some aspects of climate change, such as increasing regional pressure from ocean acidification and changing fire regimes, these small MSCs may become increasingly relevant and necessary resources for coastal communities in the coming decades (Halofsky et al., 2020; Washington Marine Resources Advisory Council, 2017).

What kinds of activities, projects, or programs do they use to act on that role?

All organizations engaged in a wide range of public programming, including programming aimed at adult audiences, but chose to focus specifically on programs aimed at youth/young adults as "embodying" the role(s) they strive to play in supporting community climate resilience. Although this focus may be a product of circumstance, further exploration may be needed to understand whether this focus holds true for other organizations, and, if so, why.

Despite the prevailing conditions of the COVID-19 pandemic, multiple sites expressed that their audience reach has grown dramatically over the last few years. Although this does not suggest that the pandemic did not have effects on these organizations—all MSCs shared a sense of relief at increasing options/capacity to conduct in-person programming again—it does indicate that the audience for these community-based organizations may be shifting. As the influence of these MSCs shifts toward regional or national audiences, it may be worth exploring how these organizations choose to continue maintaining place-based connections rooted in their local communities. This tension between expanding/changing audiences and the place-based, community-rooted ecomuseum has been previously noted in the literature: Montanari called into question the extent to which European ecomuseums were continuing to successfully "mirror the socio-cultural connotation of local communities" given that source communities are constantly changing (due to immigration, emigration, or other cultural shifts) (Montanari, 2015, p. 369).

How do these organizations approach and utilize partnerships in these projects?

Partners and partnerships were both pivotal to the role envisioned by the MSCs in supporting community climate resilience as well as integral to all focal projects examined in this case study. Additionally, partner-pairs examined in this research were able to demonstrate clear alignment of goals, objectives, and reflections of the success of the focal projects, and considered the opportunity for collaboration between MSC and partner site to be growing over time. Taken together, these ideas show that the MSCs examined for this research deeply integrate rich partnerships as part of their core institutional identity, both in theory and in practice.

When considering how small MSCs may support climate resiliency in their communities, it is additionally interesting to note that the focal projects described by each MSC varied in the degree of leadership they required from the MSC itself. Taken together, the spectrum of

leadership displayed by MSCs in this study show that these organizations are flexible in the specific roles (for example, leadership, supportive, co-creative roles) that they play within partnerships. This flexibility may further allow MSCs to engage dynamically in climate resiliency efforts in their communities, with the MSCs engaging in local resilience movements in ways that amplify collective efforts rather than silo an individual organization's work.

Implications

As described earlier, this research aimed to begin the work to characterize the roles and practices that community-based science organizations engage with in their communities. Although community-based museum work has been widely studied in other contexts, community-based science organizations continue to be poorly understood and/or recognized as a unique organizational context within the wider museum field. As part of building this body of literature, the work done here would benefit from being repeated at both a larger scale (building cases across more than 3 sites) and different contexts (incorporating different regions and/or organizational content areas) to build greater understanding of the increasingly important work undertaken by these organizations.

Further, these case studies indicate that—as with all museum work in the wake of the COVID-19 pandemic—the specific context of these organizations' audiences, reach, and impact may be shifting. As these organizations continue to shift toward more regional audiences, it may be worthwhile to examine the approaches taken by these organizations to balance potentially competing interests of wider, more diverse audiences.

A final recommendation for the museum field that arises out of this work is to recognize the importance of asset-based treatment of small organizations. As museums at-large must increasingly reckon with the roles they play in supporting and stewarding sustainable development in their communities, this research stands as a testament to the important work being done by small, local, community-based organizations. The themes and stories that have arisen from this work are stories of success rooted in deep collaboration, place-based efforts, and local specificity, with nuance that may not have been achievable had the research efforts focused on issues of limited capacity/bandwidth. Building community climate resilience requires that museums (and museum leaders) develop broad social networks

outside of their institutional silos, and these small marine science centers may offer an important model of how to do so in practice.

Acknowledgements

This research was developed and conducted on the traditional land of the Coast Salish Peoples, who have been and will continue to be leaders in building resilient communities in this region. I invite readers of this research to understand the real impacts of climate change on Native communities, and to support local Indigenous-led efforts to create a more sustainable Salish Sea.

Thank you to my thesis committee—Dr. Meena Selvakumar, Diane Quinn, and Dr. Adrienne Russell—for the time, attention, and effort you've paid to my work this year. Without you, this research would have never gotten off the ground. Thank you to my participants for sharing their insights, passion, and time with me during our interviews. I walk away from this research even more inspired than when I began, and I can't wait to join your efforts in the field.

Thank you to my friends and cohort in the Museology program. Your humor and undaunted spirit has made going through grad school in a global pandemic possible. Thank you especially to Deekshita Ramanarayanan, whose weekly video calls have been a lifeline over the last few years.

A final thank you to Patricia Ghiossi, my stalwart mother, who taught me to place community first and center in all that I do. This research is dedicated to you.

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Appendix

Interview Guide: Marine Science Center (MSC)

Consent talking points:

- Data collector's name and affiliation (Ellie Kravets, UW Museology Graduate Program)
- Purpose of this study (The purpose of this research is to explore how small marine science centers are defining and supporting climate resiliency in their communities.)
- Voluntary nature of participation, and that there are no consequences for choosing not to participate
- Participation involves a 30 – 60 minute Zoom interview that will be recorded; only the research team will have access to the recordings and transcripts.
- Subject's responses will remain confidential; subjects may be quoted, but without any identifying information.
- Do you wish for your institution to remain unidentified in my published report?
- Name and email of data collector
- Do you have any questions? Do you agree to participate in this interview?

Interview Questions

1. From your perspective, what do you think climate resiliency is?
    a. What comes to mind when you hear the term "community climate resiliency?"

2. Are there specific aspects of climate threat that feel most resonant in your community?
        i. Why? (Or how do you know?)
        ii. What has been your organization's role in addressing those concerns, if any?

3. Currently, how do you envision your organization's role in supporting localized climate resilience?
    a. Why?
    b. Are there other organizations or projects that are doing climate resiliency work well? Tell me about them.

c. What role(s) do you envision for partner organizations in this work?
    i. What priorities/goals do you have for your organizational partnerships?

4. I'm hearing that you envision your organization's role as [x – interviewee given]. Can you tell me about a project (or a set of projects) that you feel exemplifies this role?
    a. What circumstances initiated the project?
    b. Is the project ongoing, or has it completed?
        i. Have any additional projects emerged from that initial effort?
    c. Do you think this project was/will be successful? Why? (Or, what would success look like for you at the end of this project?)
        i. Who benefited from this project?
        ii. What has changed within your community since the project began?
        iii. Has this project informed the way your organization approaches future projects? In what ways?
    d. What key partners were involved in getting the project off the ground?
        i. What roles did those partners play?
        ii. How did those partners come onboard?
    e. How was this project funded?
    f. Is there any other information you'd like to share about this project?
    g. If I wanted to get a full picture of this project, who else should I talk to? (2-3 people)

Interview Guide: Community Partner Organization

Consent talking points:

- Data collector's name and affiliation (Ellie Kravets, UW Museology Graduate Program)

- Purpose of this study (The purpose of this research is to explore how small marine science centers are defining and supporting climate resiliency in their communities.)
- Voluntary nature of participation, and that there are no consequences for choosing not to participate
- Participation involves a 30 – 60 minute Zoom interview that will be recorded; only the research team will have access to the recordings and transcripts.
- Subject's responses will remain confidential; subjects may be quoted, but without any identifying information.
- (If applicable) Do you wish for your institution to remain unidentified in my published report?
- Name and email of data collector
- Do you have any questions? Do you agree to participate in this interview?

Interview Questions

1. Currently, how do you envision your organization's role, if any, in supporting localized climate resilience?
    a. Why?
    b. Are there specific aspects of climate threat that feel most resonant in your community?
        i. Why? (Or how do you know?)
        ii. What has been your organization's role in addressing those concerns, if any?
    c. What role(s) do you envision for partner organizations in this work?
        i. What priorities/goals do you have for your organizational partnerships?

2. I'd like to talk specifically about [target project] now. What was your organization's role in this work?
    a. What circumstances initiated your involvement in the project?
    b. Do you think this project was/will be successful?

i. Why?

c. What do you think has changed, if anything, since this project began? (This could be in your organization, in your community, in your organizational relationships.)

i. Have any additional projects emerged from that initial effort?

d. How has your organization benefited from this project? How do you imagine others have benefited?

e. Has this project informed the way your organization approaches future projects? In what ways?

f. Is there any other information you'd like to share about this project?

Interview Guide: Community Member

Consent talking points:

- Data collector's name and affiliation (Ellie Kravets, UW Museology Graduate Program)
- Purpose of this study (The purpose of this research is to explore how small marine science centers are defining and supporting climate resiliency in their communities.)
- Voluntary nature of participation, and that there are no consequences for choosing not to participate
- Participation involves a 30 – 60 minute Zoom interview that will be recorded; only the research team will have access to the recordings and transcripts.
- Subject's responses will remain confidential; subjects may be quoted, but without any identifying information.
- (If applicable) Do you wish for your institution to remain unidentified in my published report?
- Name and email of data collector
- Do you have any questions? Do you agree to participate in this interview?

Interview Questions

1. Currently, what would a climate resilient community look like to you?
    a. Are there specific aspects of climate threat that feel most resonant in your community?
        i. Why? (Or how do you know?)
        ii. How have you seen your community address those threats?
    b. What role(s) do you envision for community organizations in this work?

2. I'd like to talk specifically about [target project] now. What was your role in this project?
    c. What circumstances initiated your involvement in the project?
    d. Do you think this project was/will be successful?
        i. Why?
    e. What do you think has changed (in your relationships with the partner orgs/MSC, in your community, etc), if anything, since this project began?
        i. Have any additional projects emerged from that initial effort?
    f. How have you benefited from this project? How do you imagine others have benefited?
    g. Has this project informed the way you regard or interact with any of the project partners? In what ways?
    h. Is there any other information you'd like to share about this project?