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Identifying health priorities in sea level rise adaptation planning

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Key Messages

- Building on the earlier stages of the project and key informant interviews, this report sought to understand how health could be better considered in adaptation planning for sea level rise.
- Protection measures are the most common adaptation approach to sea level rise, followed by accommodation measures (e.g., nature-based solutions), which are considered to have the most co-benefits for communities.
- While it is recognized that sea level rise could disrupt access to clean water and sanitation, access to healthcare services, mental health, and many of the social determinants of health, the health impacts from sea level rise have not been fully examined by any jurisdiction, and as such, have not been a priority for adaptation planning.
- Some adaptation approaches to SLR, such as managed retreat, can also result in unintended impacts on individual mental health or broader social determinants of health driven by factors such as disruption of familial or ancestral ties, underlying intergenerational trauma, or anxieties based on prior exposure to climate-related events.
- Health is generally considered to be a provincial or territorial responsibility; hence, local communities rarely use a health lens in adaptation efforts. However, adaptation decisions should be assessed, not just on financial or environmental impacts, but also based on the potential health impacts on the local community.
- Coastal communities vary dramatically in their understanding of local climate risks and their ability to prepare for and implement actions to reduce the health impacts of sea level rise and to assess the impact of adaptation actions.
- Communities may need support to access and interpret data on geographical, social, and health vulnerabilities to assess possible health impacts, to identify and apply for funding, and to implement solutions that align with land use planning and development priorities.
- Building local capacity to lead implementation of adaptation actions is critical. This could be supported by working with technical experts, practitioners, and all levels of government to share information, science, and decision making for coastal resiliency.

Introduction

Sea level rise in Canada exacerbates coastal hazards, such as flooding and erosion events, and results in increased threat of gradual coastal land inundation and subsequent contamination of fresh water and land. As detailed in Report #1 of this series Overview of Canadian communities exposed to sea level rise, the regions of Canada projected to be most exposed to rising seas include the Atlantic coast, the mainland coast of the Beaufort Sea, the cities of Metro Vancouver and southern Vancouver Island, and the many Indigenous communities situated along these vulnerable coastlines. Coastal communities that are most exposed to these hazards may be subject to many health impacts, depending on their sensitivity to the hazards and ability to cope with the risks. Report #2 of this series summarized the Health risks associated with sea level rise on communities. In Report #3 of this series, the review of Community-based adaptation approaches to sea level rise and health found that most communities often consider sea level rise only in terms of infrastructure risks, without any consideration of health impacts. Indigenous communities are more likely to consider how sea level rise will affect health and the broader social determinants of health. Further, there are potential health implications in any coastal community from not only sea level rise itself, but also from adaptation measures used to address it, including protection, accommodation, retreat, and avoidance. These adaptation measures can affect mental health and the social determinants of health by causing displacement or affecting livelihoods, food security, and the cultural connection to place.

The purpose of the final report in the series is to consider the key public health priorities and types of adaptation measures for communities likely to be impacted by sea level rise. The report includes input from focus group discussions and key informant interviews from Atlantic Canada, Canada's North, and British Columbia, including impacted Indigenous communities.

Methodology

General approach

The data collection approach for the first three reports in this series was document-driven; that is, analysis was based on published literature, government reports, and community-led planning documents. The literature review identified a range of direct and indirect links between health and sea level rise, while the document scan of community-based planning approaches identified that adaptation measures for sea level rise tend to focus on infrastructure and rarely on health.

This report used key informant interviews and regional discussion groups to further examine how health is, or is not, addressed in adaptation measures for communities likely to be impacted by sea level rise,

and priorities in adaptation planning. Key informants and discussion participants were identified via recommendations from regional contacts and networks. They included people who work in climate adaptation, municipal or Indigenous governance, and public health in the regions in Canada most exposed to sea level rise. Four online discussions were held with participants in British Columbia, New Brunswick, Newfoundland-Labrador, Northwest Territories Nova Scotia, Prince Edward Island, and Québec in January 2023 (see Table 1).

Table 1. Regional Discussion Groups

Discussion Group	Number of participants	Areas of experience
British Columbia (January 10, 2023)	9	Public health (regional and provincial), governance and planning (municipal and regional) First Nations health, climate change (academic)
Atlantic – New Brunswick, Nova Scotia, Prince Edward Island, Quebec (January 11, 2023)	9	Public health (provincial), Indigenous organization, climate change (provincial, municipal, academic)
Newfoundland and Labrador (January 17, 2023)	6	Climate change, public health, emergency measures (provincial)
Northwest Territories (January 23, 2023)	6	Climate change, public health (territorial)

The discussions began with an introduction to the project, including summaries of findings from the first three reports of this series. A semi-structured approach was used with a set of key questions used to lead the discussions. Five questions were posed to the discussion groups:

1. What health impacts are being seen in your communities/jurisdictions, and is there a link to sea level rise?
2. Has your organization ever specifically identified communities at risk from sea level rise as priorities for adaptation measures? If so, were health impacts assessed and prioritized?
3. Which adaptation measures are seen as most important, and are health considerations part of determining the priority?
4. What kind of resources, legislation, systems, programs, or policies do you think would be useful to help communities respond to the threat to health from sea level rise?
5. Who needs to be part of the discussion to reduce health impacts from sea level rise?

The findings from key informant interviews and discussion groups were combined and analyzed by theme, and a narrative synthesis is presented in the following section.

Findings

Health-related impacts in coastal communities related to sea level rise

Participants from British Columbia and Atlantic Canada identified drinking water quality and quantity as key concerns for health, including saltwater intrusion into wells for rural coastal communities. Disruption in access to health care services and damage to coastal infrastructure (e.g., wastewater pipes, roads, wharves, jetties) during and following coastal storm events were also noted. Participants in all regions identified mental health issues and compromised determinants of health as the most predominant health-related issues caused by climate events and exacerbated by sea level rise. Participants noted that higher levels of anxiety are prevalent in coastal communities, particularly for those who have lived through storm and flood events (e.g., Hurricane Juan (NS; 2003), BC floods (2021), Hurricane Fiona (PEI, NS, NL; 2022). According to several Atlantic participants, in addition to post-traumatic stress and anxiety from lived events, many coastal residents are faced with leaving homes that have been in their families for generations. Making decisions to leave (or being forced to retreat) creates additional stress for these communities, particularly when people from the same community disagree with the best adaptation approach to be taken.

> *"One thing coming up in my work is understanding trauma in relation to climate change. This, of course, is a mental health issue, but it's also about adaptation approaches. It comes from a few places – recognizing that people are increasingly experiencing trauma from climate change (e.g., through evacuations, displacement, loss of homes, etc.) – most often as a result of extreme events. It's also a recognition that marginalized and racialized groups have intergenerational traumas they carry, and these compound with climate change."* (Atlantic discussion participant)

Current approaches to sea level rise adaptation in coastal communities

Participants identified a wide range of measures being used in coastal communities to adapt to sea level rise. Most frequently, participants noted that communities tend to adapt by "protecting" the coast (e.g., using armour stone), as such measures are seen to be less disruptive to people and communities than relocation. The second most frequent adaptation strategy to sea level rise noted by participants was related to nature-based solutions such the establishment of living dykes and sediment enhancement. According to several participants, nature-based solutions are becoming more accepted "accommodation"

strategies to communities and governments alike as they are often less expensive than hard infrastructure and provide additional benefits for environmental and biodiversity health, while also positively affecting human health. For communities with existing buildings and infrastructure in exposed locations, "relocation" becomes a necessary, but difficult conversation. This is particularly true for First Nations already dealing with imposed land constraints of the colonial Indian Reserve system, in addition to increasing coastal hazards. Some participants suggested that combining these adaptation approaches is likely the most effective way to protect communities. While relocating essential infrastructure is critical, attempts to protect cultural and archaeological sites can directly conflict with possible nature-based solutions like re-establishment of coastal wetlands. One participant suggested that trade-offs will need to be made in many coastal communities to balance protection of culture with protection of public safety. All of these adaptation options result in some type of impact for the health of community members.

> *"Relocation is currently being considered in Tuktoyaktuk, NWT. The big question is where to relocate the people who are being moved? If they are moved to a location that is "safe" [from any coastal hazard exposure], it is far removed from the rest of the community, which is at a lower risk of exposure. This will physically and emotionally separate community members, which will then affect individual and community health."*
> (NWT discussion participant)

When asked about various approaches to sea level rise adaptation, participants frequently mentioned "avoidance" as an effective approach to protecting people and the ecosystem. Examples of avoidance measures include creating and enforcing land use regulations such as setbacks for new development away from the most exposed coastal areas. However, several participants acknowledged that preventing development along the coastline is easier said than done, as it requires political will from provincial and territorial governments to mandate avoidance solutions. Several participants noted that current legislative gaps either allow for too many exceptions or do not contain adequate provisions to protect the coast, which then limits the strength of local land use planning options to control such development.

Consideration of health impacts in sea level rise adaptation

According to participants, a health lens is rarely used at the local level when considering sea level rise adaptation, mostly because health is seen as a provincial/territorial responsibility. Considerations for health in community-based adaptation actions are generally tied to elements within the local government's authority, such as water and wastewater services, roads and other infrastructure, and land use planning. Some provinces consider indirect health impacts from such things as extreme weather events, coastal erosion, and storm surge where sea level rise exacerbates the hazard. Further, provincial health departments do not usually work directly with communities, but provide advice and collect data

that is shared through regional authorities, many of which lack strong relationships with municipal governments.

> *"There is a lack of information and understanding at the local level [in terms of the health impacts of climate change generally, and sea level rise specifically] and this lack of understanding leads to lack of action."* (BC discussion participant)

Some participants noted that local governments' current focus on climate change risks to property, infrastructure, and land is very narrow and ignores larger social and environmental concerns. Capacity building and educating community members and local decision makers are key to adaptation planning. While acknowledging there is some benefit to understanding health impacts related specifically to sea level rise, several participants commented that because climate change effects are so interconnected, there is less value in focusing on such a narrow aspect of health impacts. The combined impact of all these interrelated factors that will have significant impacts on the health of coastal community members (BC and NWT).

Confirming findings of Report 2, participants identified that one of the most significant ways sea level rise would affect health would be seen through the range of impacts on the social determinants of health. One Atlantic participant recommended that social determinants be embedded into any climate risk assessment to capture the full breadth of potential vulnerabilities (environmental, economic, and social) of coastal communities. Further, another participant noted that while there are many communities that will be exposed to sea level rise, not all communities that are exposed have the same level of risk. Some small, coastal communities with compromised social determinants of health may be more vulnerable because they are more sensitive to the challenges and have less adaptive capacity; that is, the ability to adjust, respond, or otherwise cope with challenges resulting from climate change. As such, any adaptation measure being adopted to reduce the overall impacts from sea level rise needs to be evaluated against the potential impacts on health and the community's ability to respond. Currently, there appears to be a significant gap in understanding the health impacts from sea level rise related hazards, as well as the potential health impacts arising from adaptation measures being included in community-based adaptation plans (NL, Atlantic, BC, and NWT).

Opportunities and challenges to addressing health impacts in sea level rise adaptation

Several opportunities are available to assist communities to respond to the possible health impacts of sea level rise. However, adapting to sea level rise can come with challenges as the adaptation choices themselves can affect community health and well-being. Participants provided the following input:

- Funding programs – Funding is needed to make capital investments in communities and is available at the federal and provincial level. However, some coastal communities lack the internal capacity to know how to apply for funding, what to use the funding for, and how to best implement adaptation projects.
- Data and surveillance – A lack of data is a barrier to adaptation. However, determining what to measure, and how to interpret and use the data in a meaningful way is another challenge at both the local and provincial/territorial level. Data could be used to identify social or geographical vulnerabilities, to establish baseline information, and to monitor health status.
- Managed retreat programs and approaches – Managed or planned retreat can involve anything from moving an entire community away from the hazard, to smaller measures such as moving some buildings to create space for retention ponds to accommodate rising sea levels. It might also involve limiting opportunities to expand or rebuild following an event. In communities where retreat is the only viable option, it is vital that any community discussion is done in a thoughtful way using a holistic approach.

> *"Communities need to look at things from both sides of the coin [when it comes to managed retreat] – there is nothing that is all good or all bad. The governments and communities need to weigh the opportunities and decide how to meet the challenges." (NWT discussion participant)*

- Land use planning – Community planning is critical for coastal communities to incorporate climate change into the decision-making process. This might include zoning to limit further development in hazard areas, identifying appropriate locations for new infrastructure to avoid impacts from future sea level rise related hazards, and ensuring safe access to services (e.g., healthcare, sanitation), drinking water, and food supplies.
- Legislative and policy resources – Some jurisdictions are considering instituting coastal development policies at the provincial level to help guide future development away from coastal hazard areas. This requires political will to address development pressures in attractive coastal areas that may put people at risk in the long term.
- Multi-disciplinary efforts – Coastal communities depend on good information, science, and joint decision making for coastal resiliency. It is important to ensure that community members have the opportunity to learn from and work with technical experts and practitioners and are supported by government and non-governmental organizations.

A recurrent theme identified by participants from all regions was related to capacity. Critical to coastal community resilience is public education and building capacity for informed decision making by local governments. The public needs to understand what the risks of sea level rise might be in the short and long term; local governments need to understand both the risk and the long-term implications for the community; and public health departments need to have the ability to share information and facilitate

good decisions and responses at the local level. Several participants recognized that not all coastal communities will experience health impacts from sea level rise to the same degree, since vulnerability depends on who lives there, how and where dwellings are built, and what systems and supports exist around them. Finally, and most importantly, ensuring there is local capacity to lead implementation of climate change adaptation plans is critical. Local capacity includes having the understanding of the risks associated with climate change and sea level rise, as well as the ability to seek funding, undertake studies, and effectively implement adaptation measures.

> *"'Research-weary' communities do not need more studies or additional planning projects. The biggest challenge is having the capacity at the local level to implement all the adaptation actions." (NWT discussion participant)*

The way to build this much-needed local capacity could involve formal education, on-the-job training, and public processes to better understand challenges and gain feedback from communities. Support from all levels of government and non-profit organizations will be important to help facilitate local decision making, prepare funding applications and requests for proposals, vet submissions, and share expertise in design and construction of community-appropriate adaptation solutions.

Conclusions

Overall, participants representing communities, provinces, and territories of exposed coastal communities had not previously considered health impacts from sea level rise as a priority in vulnerability assessments or adaptation actions. While acknowledging that the project findings are informative, several participants suggested that sea level rise is part of a much larger challenge of ensuring that people living in coastal communities are aware of, and have the capacity to deal with, the entire range of climate change threats to health and well-being. This could include other hazards such permafrost melt (in the North) and extreme weather events (e.g., heat, precipitation, and wind).

Participants also emphasized the importance of considering the impacts of proposed adaptation actions on mental health and the broad-based social determinants of health in communities most at risk. Indeed, it was recommended that all adaptation actions be assessed not only based on the economic and environmental costs, but also on the potential health and social outcomes of the proposed action. Adaptation measures, such as retreat, were seen as having a larger impact on mental health than avoidance actions such as armour stoning the coast.

Effectively addressing these issues will take interdisciplinary teams to gather, interpret, and share data, knowledge, and expertise. While participants identified the need for data that is targeted to local

conditions and realities, they also noted that some coastal communities are being over-studied. Funding is widely available for studies and plan development; however, there is a lack of implementation of adaptation actions to reduce impacts from sea level rise and extreme weather events. The lack of implementation could be related to cost, or the lack of on-the-ground capacity to prioritize adaptation actions and see them through.

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