Island Urban Indigenous Wellness Society (Source: AHMA)

CLIMATE RESILIENT BUILDINGS FOR URBAN INDIGENOUS HOUSING AND SERVICE PROVIDERS

Prepared by Ashiqin Ariffin, Sustainability Scholar, 2024

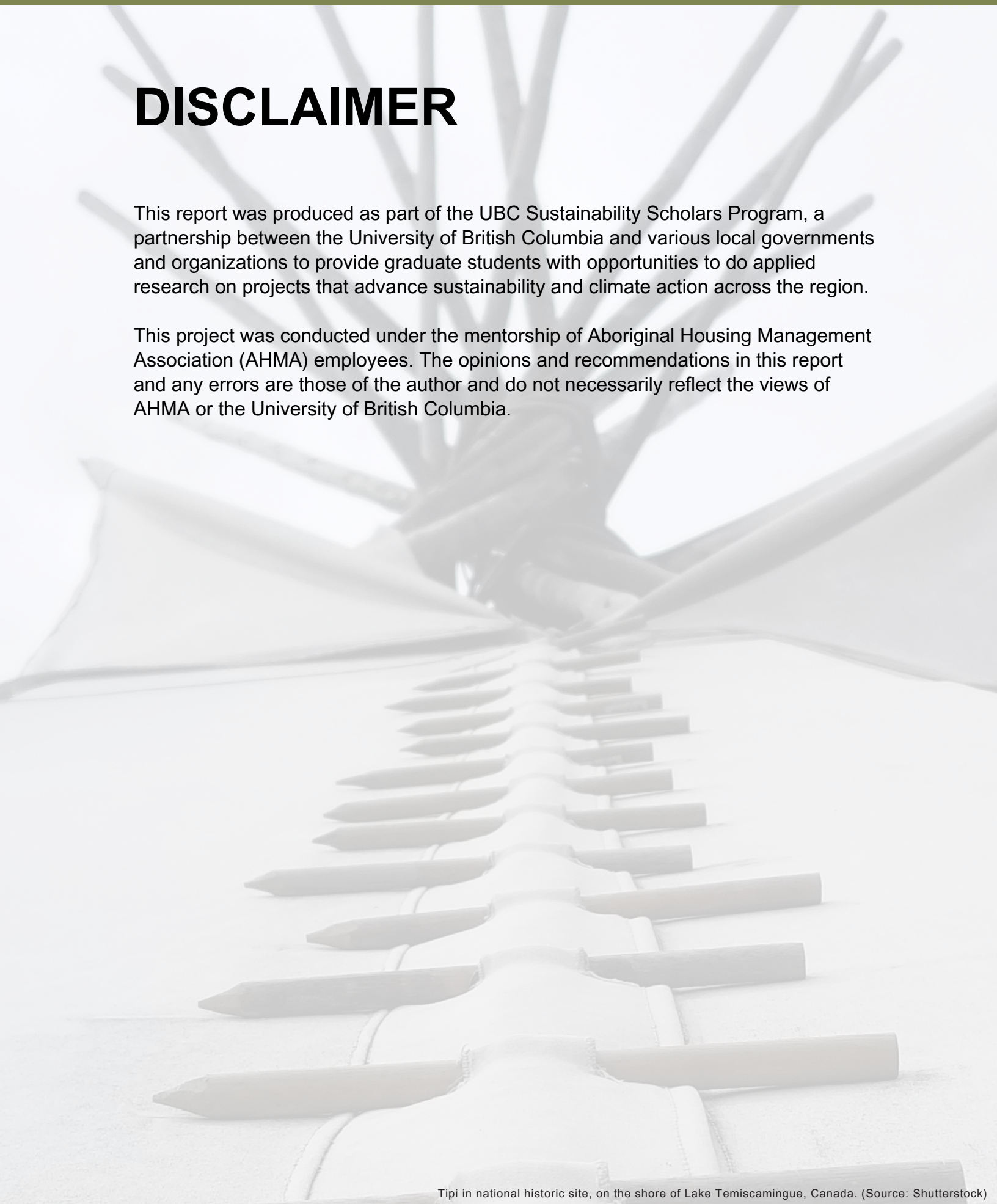
Prepared for Sara Fralin, Manager, Engagement and Technical Services, Aboriginal Housing Management Association (AHMA)

August 2024

DISCLAIMER

This report was produced as part of the UBC Sustainability Scholars Program, a partnership between the University of British Columbia and various local governments and organizations to provide graduate students with opportunities to do applied research on projects that advance sustainability and climate action across the region.

This project was conducted under the mentorship of Aboriginal Housing Management Association (AHMA) employees. The opinions and recommendations in this report and any errors are those of the author and do not necessarily reflect the views of AHMA or the University of British Columbia.



Tipi in national historic site, on the shore of Lake Temiscamingue, Canada. (Source: Shutterstock)

TERRITORY ACKNOWLEDGEMENT

The author acknowledges that the work for this project took place on the unceded ancestral lands and traditional territories of the xwməθkwəyəm (Musqueam), Skwxwú7mesh (Squamish), Stó:lō and Səlílwətaʔ/Selilwitulh (Tsleil- Waututh) Nations.

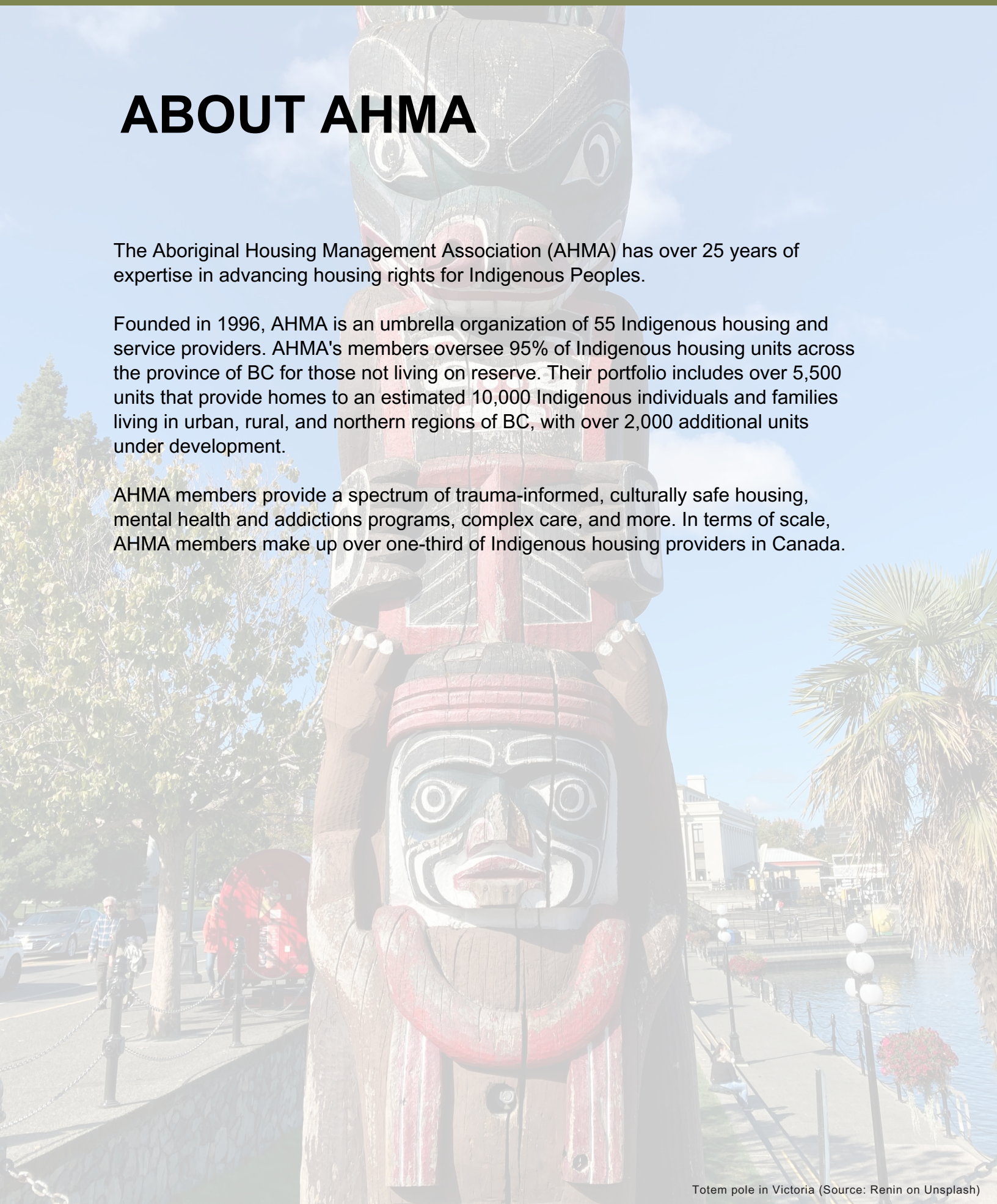
Haida Gwaii Totem Pole and Longhouse. (Source: Getty Images)

ABOUT AHMA

The Aboriginal Housing Management Association (AHMA) has over 25 years of expertise in advancing housing rights for Indigenous Peoples.

Founded in 1996, AHMA is an umbrella organization of 55 Indigenous housing and service providers. AHMA's members oversee 95% of Indigenous housing units across the province of BC for those not living on reserve. Their portfolio includes over 5,500 units that provide homes to an estimated 10,000 Indigenous individuals and families living in urban, rural, and northern regions of BC, with over 2,000 additional units under development.

AHMA members provide a spectrum of trauma-informed, culturally safe housing, mental health and addictions programs, complex care, and more. In terms of scale, AHMA members make up over one-third of Indigenous housing providers in Canada.



Totem pole in Victoria (Source: Renin on Unsplash)

TABLE OF CONTENT

EXECUTIVE SUMMARY

British Columbia is expected to face warmer temperatures in all seasons, intense drought, frequent wildfires, and rising sea levels. These hazards could impact infrastructure, economy, and health. The best way to overcome climate change uncertainties is to prepare for emergencies, and this can be done by implementing climate resiliency initiatives in essential sectors such as housing.

Climate resiliency can be achieved through various strategies, including capacity building and preparation for climate emergencies. Prioritizing climate resilience and energy efficiency could address some core challenges, such as quality of life, safety, and health.

This project aims to identify various ways to incorporate elements of climate resiliency into urban Indigenous non-profit housing and service providers to prepare for the impacts of climate change. It also highlights challenges, opportunities, best practices, and resources for AHMA member organizations and other stakeholders in building capacity for climate resiliency in asset management.

In-depth interviews were conducted to explore the best practices and recommendations for implementing a climate resilience approach among housing providers. Six individuals from five local organizations with experience in housing, emergency management, climate change and resilience were interviewed. A survey was conducted with AHMA member organizations to understand experiences related to asset management and climate emergency preparedness.

Totem pole in North America(Source: Getty Images)

(House by the water in Bowen Island (Source: Spravko on Unsplash)

Findings

- Survey respondents and experts indicated that lack of funding and limited capacity are the main challenges in implementing a climate resilience strategy.
- Most survey respondents have yet to conduct risk assessments on their organization or properties and still need emergency preparation within their organizations.
- Survey respondents identified several critical success factors, including developing partnerships with local government, receiving emergency planning training, and accessing funding to undertake emergency planning.
- Experts identify a disconnect between policies and execution, especially during the legislation of a new act, when there is no standard guideline for all other government agencies.

Recommendations

- Experts agree that understanding risk and gathering data about infrastructure is the first step in preparing for hazards. Data is used to prepare plans, apply for funding and advocate for community needs.
- Developing an emergency plan is the second step in building resilience. It prepares everyone in the community or organization for a disaster and reduces recovery time.
- Community building and engagement are vital to ensuring collective awareness, especially about staff and tenant roles during an emergency.
- Experts identify the need for funding reform to make funding accessible to organizations that may lack the expertise or capacity to fulfill restrictive requirements set by funders.

INTRODUCTION

Despite government initiatives to curb climate change's effects, daily news about extreme temperatures and natural disasters is reported around the globe (World Bank, 2023). This is an obvious indicator that no one is spared from the climate crisis, which experts and environmentalists warned about decades ago.

In recent years, many countries have collectively agreed to actively work to reduce the ever-increasing global temperature from crossing 1.5 degrees Celsius through the Paris Agreement (UNFCCC, 2015). Everyone has a role, including housing providers (US Department of Housing and Urban Development's Office, 2022). As the number of local extreme weather events has risen recently, housing providers must be more proactive now than ever.

Housing is one of the most significant sectors impacted by and connected to this crisis. In Canada, crises are intersectional, requiring specific knowledge and understanding. The intersection between housing, affordability, and climate change highlights the need for holistic solutions (Costa & Garza, 2022). Different communities, especially those who are vulnerable and marginalized in Canada, are in a precarious position if these crises fail to be addressed.

This includes Indigenous, racialized and gender-diverse communities (Howard, 2024. Therefore, applying a justice-based and rights-based approach is imperative in tackling interconnected issues. The changing climate is exacerbating the health and socio-economic inequities already experienced by Indigenous peoples. This report focuses on the intersection of climate change and housing development, specifically urban Indigenous non-profit housing and service providers.

Canada has recorded extreme temperature changes and natural disasters in the last five years. In British Columbia, 2021 was a devastating year for the residents. The record-breaking rise of the heat dome's temperature from June 2021, followed by the floods from the heavy rain in November, affected up to 15 per cent of the province's economic activities (Statistics Canada, 2024).

In the summer of 2023, British Columbians faced another climate disaster when the worst wildfire season occurred (McGillivray, 2024). Wildfires affect the economic sector and jeopardize residents' health as the air quality drops and the health-altering smoke emitted during the wildfires becomes carcinogenic (CBC News, 2023).

PURPOSE AND SCOPE OF PROJECT

Purpose

Integrating climate and energy resilience into existing asset management practices will prolong the service life of buildings and their systems, improve access to climate adaptation and energy retrofit funding, and reduce the impact of extreme weather events and recovery time. Therefore, this project aims to understand on the best way to integrate resiliency among urban Indigenous non-profit housing and service providers.

The core questions for projects are :

1. What might a Climate Resilience Community Strategy look like?
2. What are the main challenges that urban Indigenous non-profit housing and service providers and other stakeholders face?
3. How can AHMA connect with members regarding best practices and resources to build climate resilience and energy management?

Scope

The scope of the study on climate resilience for urban Indigenous non-profit housing and service providers focuses on evaluating and enhancing their capacity to adapt to and mitigate climate change impacts. Additionally, the project aims to identify the barriers housing providers face in accessing the resources needed for climate resilience projects.

To achieve this, it is essential to understand the position of urban Indigenous non-profit housing and service providers and learn about their approach to emergency management and climate resiliency. Best practices and recommendations were gathered from people who are considered experts in housing, sustainability and climate change.

METHODOLOGY

Three critical methodologies were chosen for this research project: literature review, survey, and interview. Each offers a unique perspective and depth of insight into the study's subject. Integrating these methodologies gives the research a deep qualitative understanding, leading to more robust and well-rounded conclusions.

Literature Review **Survey** **Interview**

Literature Review

The literature review serves as the foundation by providing a comprehensive understanding of existing research and theoretical frameworks related to the topic. This method plays a crucial role in shaping the research by analyzing previous studies, scholarly articles, and grey literature to identify gaps, trends, and key debates.

Grey literature, which includes reports, white papers, conference proceedings, and other documents not typically peer-reviewed or widely disseminated through mainstream outlets, can provide valuable, timely, and practical insights that might not be captured in published academic journals.

Survey

For this project, an email survey with 11 questions was shared among AHMA member organizations. This methodology allows the researcher to determine the respondents' positionality on climate resiliency.

Interview

This method is particularly effective for assessing trends and patterns within a population. Interviews allow the exploration of personal experiences, motivations, and perceptions, offering rich, nuanced data that surveys might overlook.

Five sustainability, climate change, and resiliency experts were interviewed for this project to provide insight into best practices and knowledge. Every interviewee brings different perspectives and experiences working with municipalities, Indigenous Peoples and vulnerable groups. Interviewees for this project include:

1) Executive director and emergency management consultant of a non-profit organization
2) Climate action and emergency program coordinator of a local government
3) Climate change specialist at an engineering consulting company
4) Climate change project manager at a non-profit organization
5) Climate resilience coordinator at a non-profit organization

LITERATURE REVIEW
Climate Adaptation and Resilience

Understanding the impact of climate change or a hazard is the first step in reducing risk. The next step is mitigation of the hazard to minimize the impact. The mitigation step is often referred to as climate adaptation or resilience. The terms adaptation and resilience are frequently used in government policy and official documents to indicate the process of mitigating climate change impacts. However, there is a significant difference between the two terms.

Figure 1: Comparison between disaster management, risk management, and resilience management (Wen et al., 2023)

Within the academic world, the concepts of adaptation and resilience are intertwined. Both concepts are part of the 'Disaster Risk Reduction' framework developed by the United Nations, which focuses on identifying and managing risks. Resilience management is a new paradigm that emerged from disaster management in the 1990s and disaster risk management in the 2000s (Wen et al., 2023).

These frameworks usually serve as a guide for governments in different parts of the world to take actionable plans against the ever-growing climate disasters that have devastated communities. See Figure 1: Comparison between disaster management, risk management, and resilience management. Disaster Risk Reduction is still the framework many nations implement to adopt measures and mitigate disasters through the Sendai Framework (UNDRR, 2015).

The Sendai Framework for Disaster Risk Reduction 2015–2030 is a global agreement to reduce disaster risks and enhance resilience to natural hazards. One of the guiding principles for the Sendai Framework is to make decisions that are inclusive and based on the knowledge of risks through a multi-hazard approach.

The multi-hazard approach refers to the identification of significant hazards and, at the same time, considering specific situations where hazards might potentially occur simultaneously in a chain reaction or build up over time while also accounting for their possible interconnected impacts (UNDRR, 2016).

Climate adaptation

Climate adaptation refers to **action taken to adapt to a changing situation.** It includes new inventions to protect the resident's area from climate change disasters.

Climate resilience

Climate resilience refers to **planning and preparing for expected and unprecedented ecological events or risks** to safeguard and secure the safety, livelihoods, and well-being of any community and the infrastructure.

Figure 2 : Comparison between climate adaptation and climate resilience.

Climate adaptation refers to action taken to adapt to the changing situation; this includes new inventions to protect residents from possible climate change disasters based on the data available and what has happened before (Mehryar, 2022). For example, a sea wall is one way to address rising sea levels. Climate adaptation is about controlling the variables or stressors that can be changed instead of focusing on the things that cannot be controlled. Scholars reiterated that climate adaptation needs to be done collectively and can be done in different aspects of life, especially culturally and legally.

Climate resilience is focused on preparing for natural disasters caused by climate change, it includes planning how to respond to emergencies and recovery (Harvard Radcliffe Institute, 2024). Scholars refer to climate resilience as planning and preparing for expected and unprecedented ecological events or risks to safeguard and secure the safety, livelihoods, and well-being of communities and infrastructure.

Regarding building and infrastructure, climate-friendly approaches can be taken to ensure physical resilience, which can help mitigate or adapt to the environment or any hazards. Since physical resilience directly contributes to economic and social resilience, safeguarding the built environment, especially in residential areas, is critical to ensuring equitable and just climate adaptation (Marx & Levy, 2022).

Integrating resilient thinking in asset management and the built environment or establishing a resilient city contributes to climate mitigation when focusing on reducing GHG emissions (Lin et al.,2021). In contrast, adaptation pushes a community to alter its action and response in a defensive manner, consisting of protection, accommodation, and relocation.

There must be a balance between efforts in adaptation measures favourable to the private and public sectors. Strategies to reduce GHG emissions and climate adaptation through infrastructure may not align with efforts to establish more affordable housing.

Indigenous Homes and Sustainability

Canada’s colonial history has impacted the sovereignty and the quality of homes for First Nations and other Indigenous communities. Homes need to provide a safe and healthy space for residents to achieve stability, grow and withstand the adverse impacts of climate change.

Indigenous communities often face challenges securing funding to ensure their homes are safe and healthy. Homes must not contribute further to common health problems associated with air quality, such as respiratory, cardiovascular and mental illnesses.

Healthy Energy Homes recommends that Indigenous housing is aligned with the common goal of combating climate change. This can be done by installing energy-efficient appliances or equipment, investing in deep energy retrofits of current buildings, adopting plans to incorporate healthy living and embracing Indigenous communities' diverse cultures (Wale et al., 2024).

Photo of a tipi at sunset. (Source: iStock by Getty Images)

Emergency and Disaster Management Act

At the federal level, the Canadian government developed a quality of life framework in 2020/2021, which included household emergency preparedness under the good governance section as an indicator.

Ensuring resiliency to adapt to myriad hazards builds confidence in facing trials and tribulations during and recovering from disaster. This signals that more emergency preparedness policies will be developed to support climate resiliency efforts in the community.

In the fourth quarter of 2023, British Columbia legislated the Emergency and Disaster Management Act (EDMA). This new and revised act was tabled to replace the previous act, the Emergency Program Act.

This act addressed three significant hurdles: facing climate emergencies, implementing the Sendai Framework and ensuring the declaration and the new rules are aligned. EDMA sets out cyclical emergency management requirements for preparedness, recovery and mitigation (Stacey, 2024).

The new legislation assigns roles for managing emergency strategies to different actors accountable to a coordinated network. This makes it challenging to hold authority responsible during an emergency. There are many uncertainties regarding the new act, requiring time to determine how the new legislation will be effective.

Photo of evening traffic at the Lion's Gate Bridge. (Source: Du Preez on Unsplash

Programs by Councils for Decarbonization in British Columbia

CleanBC is the BC Government's initiative to accelerate the province's agenda to lower GHG emissions by 40 per cent by 2030. Several plans were developed under the CleanBC Roadmap 2030. These can be divided into specific pathways such as low-carbon energy, transportation, buildings, communities, industry, forest bio-economy, agriculture, aquaculture, fisheries, and harmful emissions technology. The roadmap supports constructing and retrofitting buildings to be resilient and efficient and to use renewable energy sources.

According to the 2023 Climate Change Accountability Report, there has been a 70 percent increase in heat pump adoption in BC. By 2022, 12 percent of households in BC had switched from a traditional heating system to a heat pump. CleanBC's rebates and incentives for homeowners, electric car owners, and building owners, collaborating with energy companies such as BC Hydro and FortisBC, support the energy transition.

The BC Energy Step Code is a regulation introduced by the Energy Step Council to ensure buildings are "net-zero energy" ready by 2032 (BC Energy Step Code, 2017). The council's objective is to act as a mediator between local governments and other stakeholders. The regulation was first introduced in April 2017.

Photo of trees by the water in Vancouver. (Source: Allouche on Unsplash)

Approaches to Climate Resilience

International Examples

Italy – City of Naples

The city applied a ‘co-production’ methodology to integrate climate resilience into urban planning and development, particularly in low-income housing in urban areas. It was aimed to prepare the residents for any climate hazards.

The co-production approach allows stakeholders from different parts of society to participate in emergency preparation and planning, which enables the flow of conversation to happen in an open space occupied by not only specialists and experts but also people from the community to get a better insight into what transpired on the grassroots level.

This method allows the local community to participate in exploring their own characteristics, strengths, and weaknesses and, at the same time, represent their community to decision-makers. This also helps address the socio-spatial inequalities that may arise during emergency planning (Visconti, 2023).

(View of Naples City, Italy. (Source: Monmo on Unsplash)

Overview of Los Angeles from the Hollywood sign. (Source: Eliot on Unsplash)

USA

On the national level, the federal government, through the Federal Emergency Management Agency (FEMA), released a statement in April 2024 about adapting tribal knowledge and best practices to building climate resiliency via Traditional Ecological Knowledge (TEK).

The application of Indigenous best practices was proven successful through various ecological interventions in New Mexico after the area was engulfed by forest fires and monsoon seasons that disrupted the environmental systems in Santa Clara Pueblo.

The Tribal Nation embarked on a long recovery process and re-established a resilience culture, which had always been part of its culture, to overcome future threats and hazards, such as managing fire ecosystems (Federal Emergency Management Agency, 2024).

The city of Los Angeles applied a comprehensive plan to achieve climate resilience. The plan consists of 35 individual community plans that build resiliency across the city. The city underwent an extensive planning process at the evaluation stage to prepare the resiliency plan.

In March 2024, the National League of Cities (NLC), an organization of local leaders from cities, towns, and villages in the US, conducted a workshop about equitable climate resilience. NLC also conducted training to educate community leaders on building climate resilience in their communities, with the involvement of other stakeholders such as policymakers from municipalities and federal governments (National League of Cities, 2023).

In 2025, Hurricane Katrina led Greater New Orleans to vow to improve its strategies and preparedness for the next disaster, especially floods. This prompted the city to invest in infrastructure by upgrading tools involved in increasing the city's resiliency.

Right after the tragedy, the city witnessed a change of plans, and only seven months after that, New Orleans figured out its strategies for constructing flood-resilient infrastructure while also establishing rental and affordable housing and other amenities.

This was achieved through a collaboration of inputs from the community and a full understanding of the effect of severe weather on vulnerable communities by interacting with 9,000 residents, of whom 64 percent are African American from New Orleans to Dallas.

However, the city's effort to prepare the population may have benefited specific communities rather than everyone. This is primarily due to the social, political and economic disparities that continue to place low-income households at risk of vulnerability (Martin et al., 2024).

Photo of destroyed house after Hurricane Katrina in New Orleans, Louisianna. (Source: Highsmith on Unsplash)

Local Canadian Examples

News about extreme weather occurrences is no longer new and strange; everyday news headlines highlight other cases of extreme weather happening somewhere around the globe. For coastal areas like British Columbia, with different climates in different parts of the province, heatwaves happen frequently, making summer days in BC hotter and drier, while in winter, less snow is recorded every year (Government of British Columbia, 2019).

According to BC Hydro, the frequency of heat waves and windstorms has increased significantly over the last five years. This indicates the direct impact of climate change on weather, which can be threatening without adequate preparation.

Climate emergency planning and response are no longer optional but essential for any organization (Canadian Centre for Occupational Health and Safety, 2022). There is no one-size-fits-all solution. Preparing for a climate emergency takes time as it involves collaboration with different stakeholders, developing trust and working relationships, and identifying the best way to reduce risks (Hansen & Bi, 2017; Khan, 2024).

Through its Emergency Management and Service Continuity Program Planning training, the BC Society of Transition Houses (BCSTH) reiterated the importance of having perspectives from various intersections, such as gender equity, trauma, and violence-informed lenses. This is often neglected during emergency preparedness processes. Considering multiple vulnerabilities and safety concerns helps organizations execute plans that are accessible to the most vulnerable in an emergency.

Pool of still water along the Squamish river. (Source: Wheeler on Unsplash)

Totem poles at Stanley Park. (Source: Hettiarachchi on Unsplash)

The **Emergency Toolkit developed by BCSTH** is an 8-stage process with corresponding tools and templates to assist organizations in developing their Emergency Management and Service Continuity (EMSC) program. The toolkit provides a template for risk assessments and evaluation of the impact of each hazard. It also encourages collaboration with stakeholders, including local governments and other organizations.

Another crucial component of emergency planning is updating and adapting to policy changes, particularly those regarding Indigenous knowledge, disproportionate impacts, and cultural safety. The plan update should be conducted annually to avoid document irrelevance (Victoria State Government, 2020).

As for BCSTH's emergency toolkit, it has adopted some of the best practices in emergency management. Scholars have highlighted the importance of equity and inclusion, especially among older adults in precarious positions during climate emergencies. Risk metrics and assessment were also identified as the first step in planning for disaster risk management using sensitivity analysis, stress testing, scenario analysis and consideration of extreme events for older adults (Hosseini et al., 2024).

Root cause analysis (RCA) is recommended for emergency planning and geographic vulnerability mapping. Both practices will help understand areas requiring specific measures or mitigation, particularly areas prone to wildfires or floods (Hosseini et al., 2024).

With rapid global climate change, British Columbia is not singled out from any natural disasters, even more so. After a devastating fire in 2021 that engulfed the homes of some of the residents, the Indigenous nation of Nlaka'pamux or Lytton, prioritized climate-resilient strategies to rebuild the whole town again.

The Kanaka Bar First Nation's emergency plan focuses on four fundamental foundations: air, water, food, and shelter. The four elements were highlighted based on the community's experience during the tragedy to ensure they were ready and prepared to face future disasters. Part of the strategy is installing weather stations for weather monitoring and empowering the community on any expected predicament (Michele, 2023).

The rapidly rising temperature posed a high risk of flooding for coastal areas like Merritt. Merritt faced the devastation of a massive flood in 2021, prompting researchers to investigate post-disaster recovery. The stakeholders in Merritt have included risk reduction strategies such as buyouts as part of their post-disaster recovery mitigation (Cottar & Wandel, 2024).

Nonetheless, BC's disaster management policies have not caught up with the inclusion of buyout options compared to other provinces such as Quebec. Recently, **Halifax** has also moved closer to adopting managed retreats as part of its climate adaptation strategy. The city plans to prepare strategies to implement managed retreats as part of emergency planning (Halifax Regional Municipality, 2024).

Cisco Rail Bridges at Fraser River. (Source: Dizon on Unsplash)

Community Involvement in Emergency Strategies

Hey Neighbour Collective

The Hey Neighbour Collective promotes climate resilience among residents of a Victoria neighbourhood through the Victoria Ready Program. The program aims to empower individuals who live in the same neighbourhood to harness the social connection that can be instilled through social gatherings called “Connect and Prepare.”

The program becomes the platform for neighbours to get to know one another and recognize the people in the community to help prepare for small- and large-scale emergencies, including climate emergencies that can happen in British Columbia. The collective and local municipalities moderated the program, which transpired into workshops and other activities.

According to one of the program's champions, the program allows residents to build their emergency plans and enhance communication among neighbours by dividing the task according to different aspects of the emergency plan, including logistics, asset management, and strengths and weaknesses identification. After the pilot program, many communities communicated through email, informing everyone about the latest updates.

To promote resilience in preparation for emergencies, Hey Neighbour Collective suggested that housing providers conduct an annual residents survey to foster community building, especially in multi-unit housing, before creating any activities to unite the community, such as a typical garden, coffee chat, or mural painting.

View of Vancouver downtown from Cambie. (Source: Wang on Unsplash

Qualicum Beach and Parksville

Any plans developed to be successful must be communicated effectively to let people know about them.

When it comes to emergency preparedness, everyone must participate, as everyone needs to know what to do if disaster strikes.

Therefore, community engagement is imperative in raising stakeholders' awareness of what to expect and ensuring no one is left behind.

Qualicum Beach and Parksville are neighbouring towns that collaborated in developing emergency plans for both areas through Emergency Management Oceanside (EMO).

In April 2024, EMO received a grant of $59,956.14 from the Emergency Operations Centres Equipment and Training under the Community Emergency Preparedness Fund (Parksville Qualicum Beach News, 2024).

EMO is engaging with the public through a community event called Emergency Preparedness Expo 2024, which will be held in September 2024.

The event allows people to interact with local authorities and engage with one another about emergency preparedness for any disaster.

Other local authorities and communities, such as Central Saanich and Tsartlip First Nation, have also held the same type of event to educate the public.

BC Ferries (Source: Struna on Unsplash

Challenges in Implementing Climate Resilience

A few challenges were identified in the effort to integrate climate resiliency at every level of society, from government to the community. These include lack of funding, coordination at the governance level, and social capacity, especially in educating the community about climate change.

Financial capacity is one of the main barriers that hinder different communities in BC from taking a proactive approach to preparing for hazards, especially wildfires. Most of the time, communities rely heavily on government funding to jump-start climate change work. This is not just exclusive to the Canadian context; in fact, it is a global issue, as the United States also encounters the same hurdle (Corpes-Gerbit et al., 2022).

Cost remained an issue in implementing climate-resilient infrastructure. The government often scrambles to allocate funding for climate-resilient buildings when hazards such as Hurricane Harvey in Houston have already occurred. (Hill & Martinez-Diaz, 2020).

Besides funding scarcity, scholars also highlighted a need for more social capacity, such as staff and expertise, which is another main challenge many BC communities face. Lack of coordination at the governance level is also one of the challenges in achieving climate resiliency in any community.

From the local government perspective, goal misalignment between provincial and federal governments can affect the execution of policies (Dale et al., 2019). Canada Climate Law Initiative (2022) pointed out that gaps in data and information have made climate adaptation work challenging at both governmental and community levels. They identify accessible and standardized data, such as GHG emissions and measurements, that are needed to better understand the transition risks.

Demand-Side Energy Management

Energy transition refers to the global energy sector's shift from fossil-based systems of energy production and consumption. This transition requires meticulous planning to ensure sustainable energy consumption. With climate change, there is less global predictability regarding weather or any climate. Extreme weather, such as heatwaves, drought, cold snaps, and floods, occurs with varying degrees of impact, frequency, and risks (Canada, 2024).

Weather and temperature fluctuations are also significant factors in household energy consumption behaviour. The first step to enhance building resilience and reduce greenhouse gas emissions is using electricity and renewable energy to decarbonize building heating and cooling.

According to BC Gov News, electricity demand in British Columbia is anticipated to rise by 15 percent in the next six years, which can be attributed to population growth and the development of multiple construction and industrial sectors in the province. The BC government also mentioned that more residential housing and businesses have transitioned from relying on fossil fuels to electricity (BC Gov News, 2024). This approach requires strategies adaptable to the constant change in the environment, such as demand-side energy management (DSM) (Meng et al. 2024).

Demand-side energy management refers to the strategies used by electric utilities to encourage consumers to adjust their electricity usage patterns and levels. It involves planning, implementation, and ongoing monitoring activities.

BC Hydro has introduced a demand-side energy management or demand-response program as part of its strategy for business entities in BC. The program rewards those who shift their consumption by at least 5 percent before and after peak hours (BC Hydro). In June 2024, the Vancouver Sun reported that BC Hydro had extended a similar program to residential households who opted to join it. The program allows consumers a five-cent discount on electricity consumed from 11 p.m. to 7 a.m. and a surcharge between 4 p.m. and 9 p.m.

The community-based approach includes residential demand response, focusing on different approaches to promoting and empowering households to match the grid conditions and price signals with their energy consumption. This can be done using advanced control tools such as smart appliances in residential demand responses.

SURVEY TAKEAWAYS

LACK OF RESOURCES

Ultimately, lack of resources such as funding and staff capacity was cited as the biggest challenge among survey respondents.

MANY ORGANIZATIONS ARE NOT PREPARED

Only one organization has conducted risk assessments and has an emergency preparedness kit.

ENERGY EFFICIENT WORK

Three organizations have worked on their infrastructure to ensure their assets are climate-resilience and energy-efficient.

CRITICAL SUCCESS FACTORS IDENTIFIED

- Partnerships with local government.
- Emergency planning training.
- Accessing funding for emergency planning.

Survey Findings

A total of 15 urban Indigenous non-profit housing and service providers participated in the online survey. The survey questions identified challenges, approaches, and practices for building resilience to climate change for their assets (buildings).

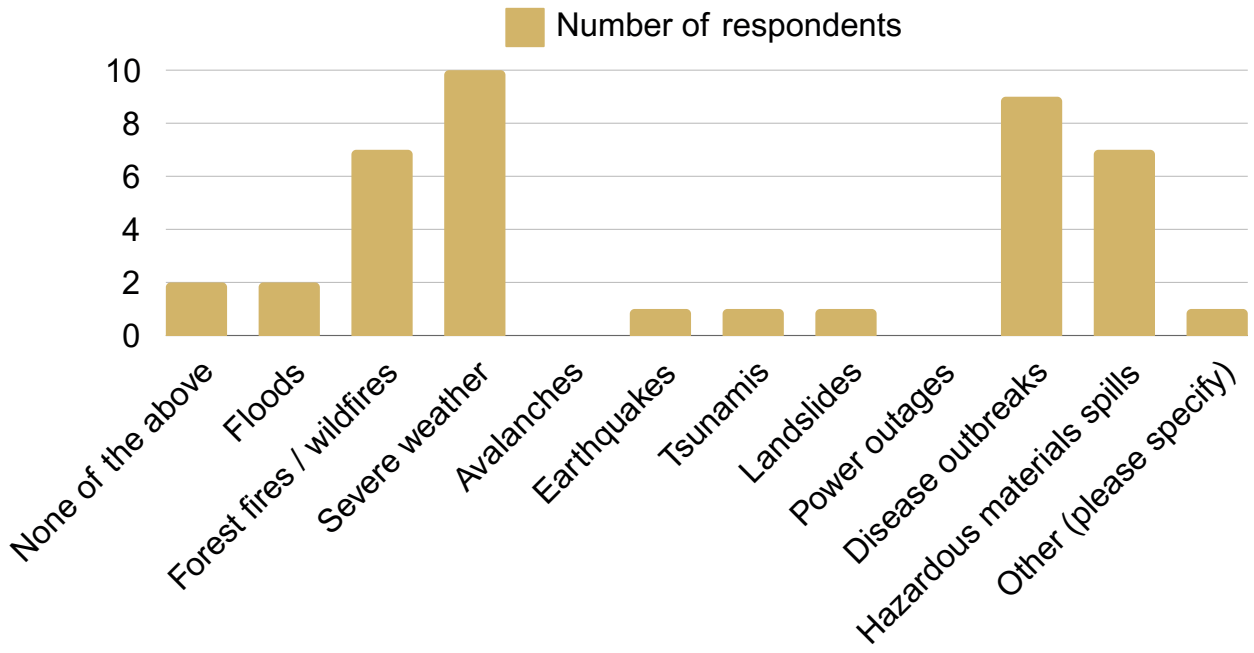


Figure 2: Hazards identified by survey respondents

Severe weather is the most common hazard organizations experience, followed by power outages, forest fires, and disease outbreaks. Survey respondents can choose more than one hazard, as all organizations have assets in different parts of B.C. with different climates and risks. One respondent specifically mentioned a fire that happened last summer as one of its emergencies; the fire engulfed businesses and properties.

Climate Emergency Preparedness

Five out of 15 survey respondents indicated that they have emergency plans. Two respondents followed the emergency plan set by the local government or utilized emergency resources available online by the local government or government agencies such as the City of Vancouver and Vancouver Coastal Health.

Four organizations stated that they took basic measures to ensure tenants are safe, such as ensuring exit pathways are clear and making sure fans and air conditioners are available, especially for vulnerable groups such as the elderly, young children and people with diseases, stay cooled in a ventilated place.

Only one respondent specified that they have an emergency plan and kit ready for any emergency that calls for evacuation or shelter-in-place. Three survey respondents indicated that they have emergency preparedness or response in place. [SF1] Nine organizations said that emergency planning is still an ongoing process for their organizations. Two survey respondents specified that they do not have any emergency plan or kit ready for emergencies.

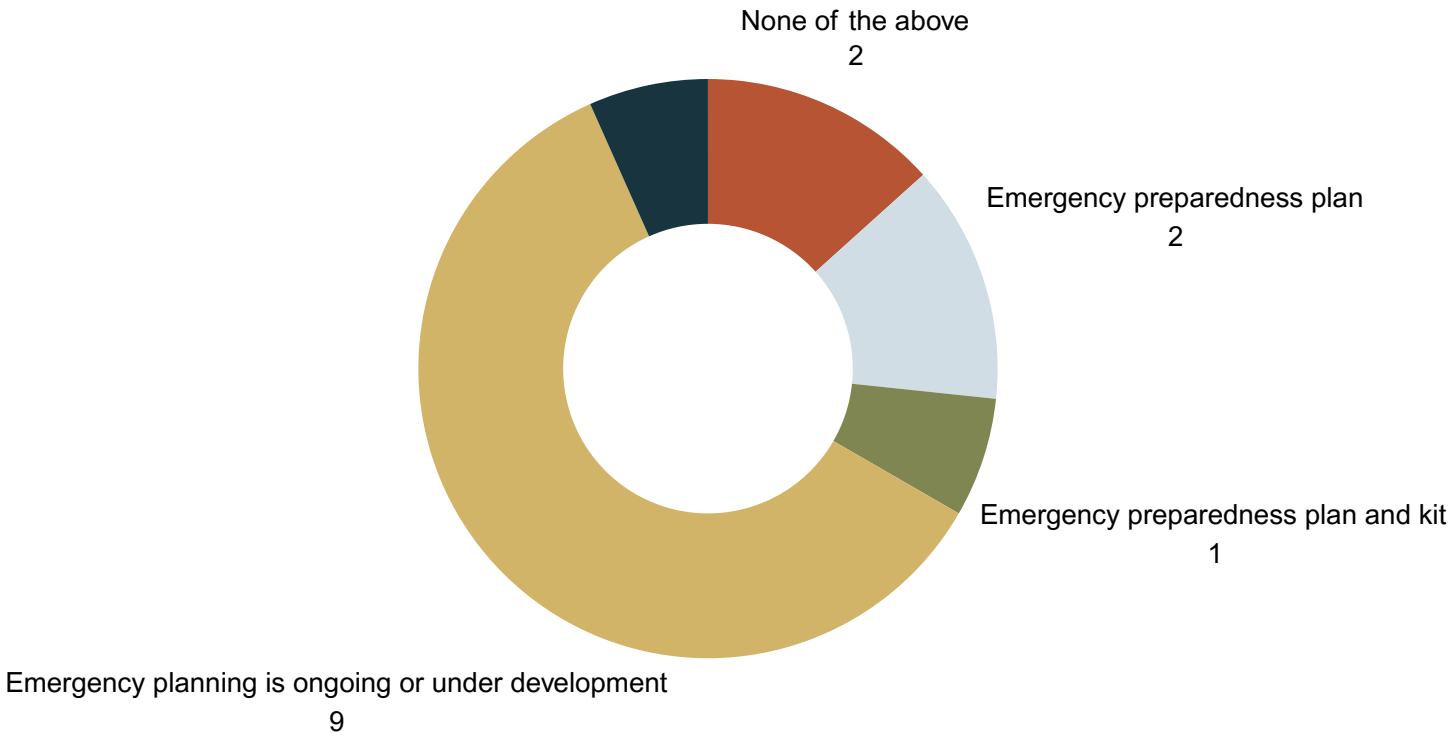


Figure 4: Preparation level by survey respondents

Three respondents said they had engaged tenants in their climate emergency preparedness plan; one specifically mentioned communicating with tenants using a Facebook Group. This echoed the community approach to raising community awareness in the literature review. Another said they conduct annual fire drills and encourage tenants to have emergency kits. Two respondents used supportive materials such as emergency plans and guide pamphlets and put the guide at the front desk, which could be a visible area in the building. One respondent specified the need to reach out to the local government to be more involved and aware of the local government's emergency plan and, simultaneously, to be included in the local government's plan during an emergency.

Risk Assessment

Only one respondent said they had conducted a risk assessment on their assets for climate-related hazards. Nine respondents said they have not completed any risk assessment, and five respondents expressed that they do not know of any assessment being done on their property.

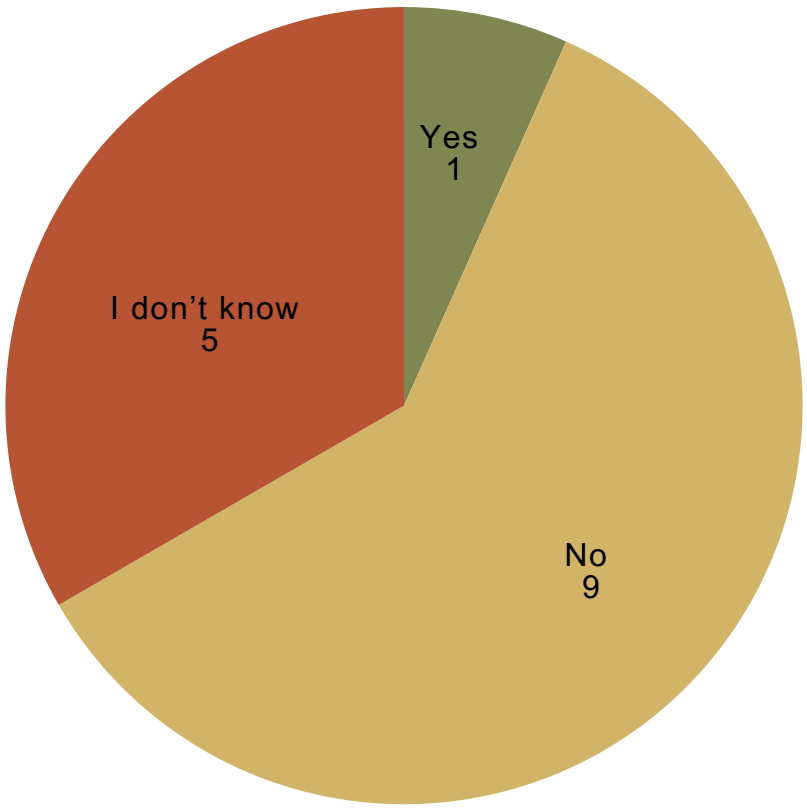


Figure 5: Breakdown of survey respondents who have conducted risk assessment

Energy

Interestingly, three respondents have done work to ensure their building(s) are energy efficient and climate resilient. About 40 percent or six respondents indicated that they have worked to improve the infrastructure and ensure their assets are more energy efficient, consisting of upgrades such as air sealing, heat pumps, insulation, or LED lights. Many survey respondents said they had replaced their light fixtures with LED, ensuring better insulation in the building. Two respondents expressed that they have done work to improve the heating and cooling system, of which one respondent said their assets were certified as passive houses, which are performance-based buildings that help cut down energy usage from cooling and heating. Two respondents indicated the intention to do more work, especially on heating, ventilation, air conditioning (HVAC) and heat pump, but the cost prevents them from doing so.

Resilient Infrastructure

One respondent said they have done climate-resilient work on their assets and infrastructure, such as green roofs, landscaping, fire safety, ventilation, or cooling. One respondent expressed frustration about doing more climate-resilient and energy-efficient work with no funding available to execute the plan.

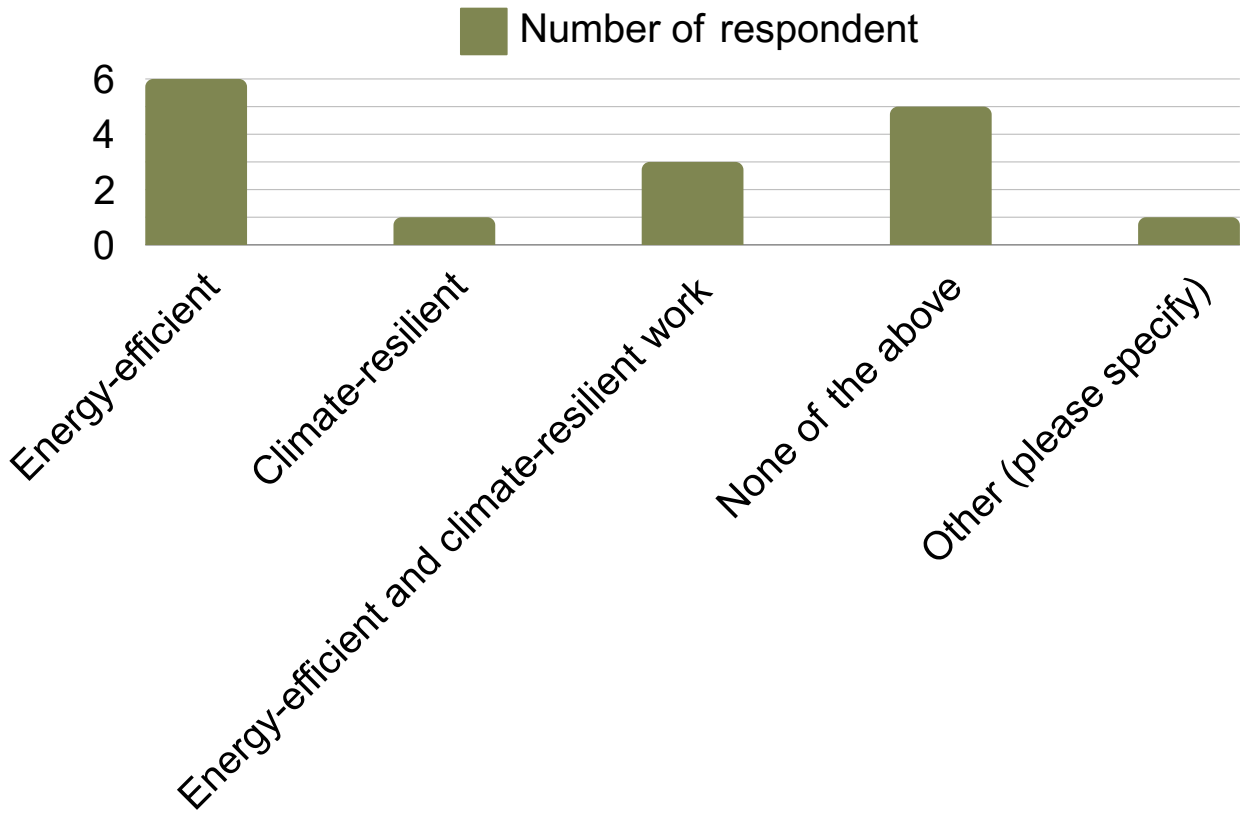


Figure 6: Number of survey respondents who have done climate related work to their infrastructure

Common Themes

Figure 7 : Venn diagram of the common challenges that was identified from all three methodologies

Across the three methodologies, two common challenges were identified: lack of funding and lack of support or capacity. The diagram reveals overlapping issues regarding climate emergency preparedness for housing providers.

Lack of Funding

Funding was identified as one of the significant challenges to moving forward in climate resiliency. Typically, most climate resiliency and energy management projects require substantial upfront investment, and survey respondents have indicated that funding can be hard to get.

Experts also agreed on the same sentiment and highlighted a few key barriers to funding, including insufficient funding for different communities to apply to prepare for climate disasters.

Furthermore, most of the funding is extremely competitive, and securing a grant that covers anything above the minimum standard can take time and effort. Regarding retrofit funding, an expert mentioned that more than the existing incentives or rebates are needed to motivate people to begin retrofitting their homes.

From the local government's perspective, no extra funding is set aside for local governments to comply with the new legislation. Like housing providers, local governments rely on grants from the Union of British Columbia Municipalities or other sources.

> Local governments are dependent on grants from UBCM or elsewhere, so no money (EDMA) or extra funding position has been attached to this. We're waiting on some regular regulations and assessments from a provincial level to apply for those grants, so it's not very well rolled out.
>
> - *Climate action and emergency program coordinator at a local government*

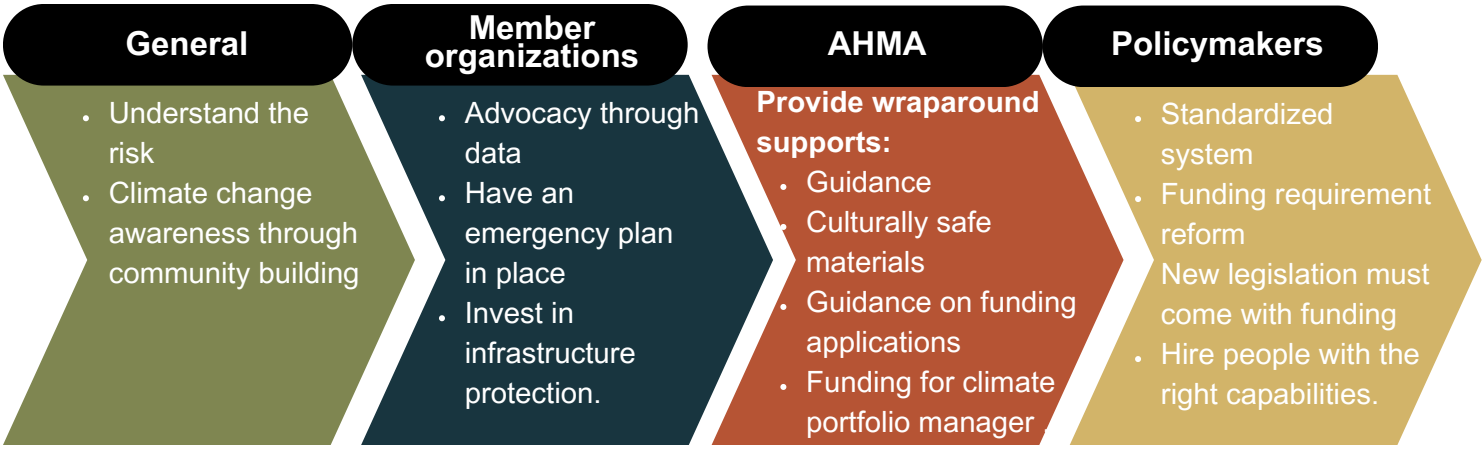
Lack of Support and Capacity

Apart from funding, support and capacity are two elements that both survey respondents and interviewees shared agreement. Limited staff capacity has bogged down the acceleration of climate resilience initiatives from all fronts.

This problem is not only limited to housing providers but also from the government's perspective. Both ends lack the manpower to execute any climate emergency adaptation or resiliency plan effectively. Another expert said many issues surround project management, including high staff turnover and a lack of training for the position.

People planting on hanging planters. (Source: Fuentes, on Unsplash)

RECOMMENDATIONS



General

Understanding the Risk

Knowledge is power, and knowing about the risks plays a massive role in navigating the next step in ensuring your property and community are safe from any threat or hazards. Risk assessments empower housing providers to reduce their vulnerability.

All experts agree that risk assessment is the first step to achieving climate resilience. A climate change specialist pointed out that it could help prepare for the worst, especially in climate emergencies, where data is the only thing that can be used to make calculated decisions.

Another interviewee, the local government's climate action and emergency program coordinator, recommended that residents or housing providers start assessing any possible risk to the property. According to her, early assessment by the fire coordinator could help support the funding.

> The risk assessment, first of all, shows that you know you have the evidence of what state your infrastructure or building is at, and it helps with decisions around how to, perhaps, like, spend some limited resources.
>
> - *Climate change project manager at a non-profit organization.*

> Climate change can be a bit of a polarizing topic. It did get so hyped in the media through the 90s and early 2000s, it created a bit of a polarization within society.
>
> Just try relate to people, to things that people know and you don't have to use the word climate change.
>
> You could be like *'Tell me about a time when you've experienced flooding in your community, or extreme heat or wildfire.'* Then you could say science is showing that these types of events are going to be coming more frequent and severe.
>
> - *Climate change specialist at an engineering consulting company*

Climate Change Awareness Through Community Building

Believe it or not, climate change is still a new concept to some people, and taking action to prepare for it seems farfetched. Most of the time, the topic would only come to light when disasters happened to the community.

Therefore, all experts strongly reiterated that collective awareness is crucial, and some even deemed it fundamental to achieving climate resiliency in every community. According to a climate change specialist, community involvement in preparing for climate change is vital in ensuring everyone knows their role and responsibilities during an emergency.

Apart from awareness, community building is also an integral component to ensure resiliency in every community. An expert mentioned that supplying tools and resources is great, but nothing beats community support, especially for those vulnerable during emergencies. The simple act of knowing their neighbours and checking up on them could help save lives.

Mungo Martin Aboriginal Longhouse at Thunderbird Park, Victoria, British Columbia (BC), Canada. (Source: AHMA)

Image of a women looking at poster in Vancouver. (Source: Rajput on Unsplash)

Some experts also highlighted the effectiveness of traditional forms of communication. They recommend developing seasonal hazard resources on site: flyers, posters, email, or letter templates to help keep tenants safe during emergencies.

The local government's climate action and emergency program coordinator revealed that due to town residents' lack of social media usage, the municipality would usually print out a monthly newsletter and place it somewhere visible and accessible.

Another recommendation is to conduct outreach to different communities by attending meetings and learning what the communities need and want.

> Tell them this is what we're doing, and we want to do outreach.
>
> Go to them, because they are the gatekeepers for their communities.
>
> - *Climate action and emergency program coordinator at a local government*

Member Organizations

Advocate Through Data

Most experts agree that for housing providers, assessment is the starting point for understanding the threat and danger that the infrastructure may face in the long run.

Risk assessment is also an essential aspect of climate resiliency. Most importantly, assessment information and data could help prepare for the worst, especially in climate emergencies, which can be used to strategize the following action: the adaptation plan.

> We work through a risk assessment with our members.
>
> A tsunami is more of a reality for some of our members; for others, fire is a bigger issue, and there are also floods.
>
> Then, based on that risk assessment, then they build their resilience plan around that.
>
> - *Climate change project manager at a non-profit organization.*

Understanding the risks is critical. At the same time, the local government's climate action and emergency program coordinator said housing providers could use the information to apply for funding or grants, which could ultimately help convince funders. The coordinator also added that early assessment, especially by the fire coordinator, could help support the financing.

Another suggestion for housing providers is to prepare a good report, especially for the government at any level (city, provincial, or federal). This report can be as simple as identifying the vulnerable people in the community, which can be used to make a solid case for local authorities, such as BC Housing.

The climate change program manager mentioned that conducting risk assessments can be time-consuming and requires specific technical knowledge to understand risks and hazards; therefore, if hiring a full-time climate change manager is not feasible, contracting the work to an external consultant is also a good start.

This also ensures that the information is valid, and housing providers can have better information to use in the report and as the foundation of any emergency plan.

> In any particular situation, there's always an event that could be so bad that it overwhelms whatever your preparations are. We do know that. So then queue in your emergency preparedness, emergency response and emergency recovery.
>
> That's all super important to have those things in place and to have everybody educated on on whose responsibilities are what.
>
> - Climate change specialist at an engineering consulting company

Have an Emergency Plan in Place

Organizations need to expect the unexpected. One way to do that is to develop an emergency plan and ensure that everyone from top to bottom is aware and familiar with their responsibilities during an emergency. An emergency plan can also include a recovery plan, which helps navigate the next step after a disaster.

Most experts agree that an emergency plan should be developed after conducting a risk assessment. This involves identifying step-by-step action for every possible hazard that is projected to happen.

The survey showed that 33.33 percent of the respondents indicated that they have an emergency plan in place. This suggests that many housing providers still need a plan. Those with a plan may be more interested in participating in our research, and even fewer housing providers have a plan.

Resources such as **BCSTH's Emergency Management and Service Continuity Program Planning** can facilitate the process. The online training offers step-by-step guidance for organizations to set up an emergency plan.

Photo of a hand pinning down thread on the board.(Source: Reyes, on Unsplash)

Investing in Infrastructure

A climate change specialist mentioned that structural protection could help during recovery. Housing providers could also consider investing in structural protection and having an emergency plan based on data and information gathered during risk assessment.

Communities can better withstand extreme weather events like storms, floods, and heat waves by enhancing the durability of structures through measures such as reinforcing walls, installing flood barriers, and upgrading roofing materials.

This proactive approach reduces the need for costly repairs and recovery efforts after disasters and ensures the safety and well-being of residents. Additionally, resilient infrastructure helps maintain essential services during emergencies, promoting continuity and stability. Overall, investing in structural protection is a crucial strategy for building long-term resilience to climate change.

> You could put structural fire protection on homes. What's shown to work is to get a sprinkler system installed on top of the house. Then, in the worst-case scenario, when you have to evacuate, you flick it on, you leave, and ideally, your homes are there when you get back.
>
> - *Climate change specialist at an engineering consulting company*

Photo of a cabin by the water (Source: Kristiansen on Unsplash)

AHMA

Wraparound Support

A few recommendations were gathered from the interview with experts suggesting ‘wraparound support.’ Wraparound support hinted at a more comprehensive support that guides housing providers from A to Z in achieving climate resilience for their properties and communities.

This includes step-by-step guidance on funding applications to address the complexities that can sometimes deter communities from submitting their applications. This can be in the form of grant writing training for housing providers. It also applies to funding with strict requirements, such as the endorsements of at least five local governments.

> A lot of funding for local governments and First Nations is not targeted funding for urban Indigenous housing. This forces these housing associations to rely on their neighbouring local governments to apply to these funding programs and include them in their development, and obviously, that's not the best strategy.
>
> - *Climate change project manager at a non-profit organization.*

Photo of a group of people in discussion. (Source: Gillis on Unsplash)

In terms of funding, AHMA is also recommended to help housing providers secure the financing of additional portfolios, such as climate change managers, to relieve the burden many property managers face regarding climate resilieancy. A climate change specialist also suggests that hired climate managers undergo training to have the knowledge, skills, and awareness to implement energy or climate-related projects. The training, can be implemented using cohort model which can promote teamwork, support and shared resources.

> So, a group of people in basically the same role can virtually connect with each other and learn from each other.
>
> I'm seeing this happening across the board in communities, mostly in local governments, but a lot within First Nations, where it's established, like climate action coordinators or community energy coordinators and their new staff positions who can focus solely on doing climate projects.
>
> - *Climate change project manager at a non-profit organization*

AHMA can also help connect members' organizations with experts who can help with risk assessment.

Photo of a typewriter (Source: Winkler on Unsplash)

> Learning about an Indigenous worldview and relationship to the land is where resilience can really come from. Indigenous peoples seem to have that mindset, which is almost an innate resilience to living with the world and understanding it.
> This knowledge can be used to build resilience in communities.
>
> - Climate change specialist at an engineering consulting company

Culturally Safe Materials

AHMA can provide more culturally safe materials and guidance for member organizations. Some mainstream guidance on achieving climate resilience may be too broad and general, which may not suit Indigenous communities. Both survey respondents and experts have reiterated the need for it.

A climate change specialist from an engineering consulting company and a climate change coordinator at a registered charity that facilitated climate emergencies highlighted the importance of understanding the cultural background of every community and tailoring any approach based on that community's background and needs.

Haida Gwaii Totem Pole and Longhouse. (Source: Getty Images)

Policymakers

Standardized System

Experts have highlighted the importance of having a standardized system that helps reduce confusion or community neglect during emergencies. A standardized system also helps ensure that everyone receives the same accurate information, which is essential, especially among local governments and government agencies.

> Responsibility is coming down from the provincial government to the local authorities. And I feel like that initial leadership and buy-in with some really clear processes, systems, and templates in place are important.
>
> We recently learned that they don't even provide a template to municipalities, so there are just so many different ways that people are actually doing this.
>
> It's just not coordinated or consistent across the board. It feels like a huge missed opportunity to ensure that everyone's speaking the same language
>
> - Emergency management consultant *of a housing non-profit organization*

New Legislation Must Come with Adequate Funding

Most experts agree that there are gaps between policies and execution, making ensuring policy effectiveness problematic. Lack of funding was identified as one of the main problems hindering local government from investing more effort in preparing the community for potential hazards.

> Most of us are struggling with what to do. Local governments are dependent on grants from UBCM or from wherever, so no money has come attached with this, no extra funding position has come attached with this, and we're waiting on some regular regulations and assessments from on a provincial level to then apply for those grants,"
>
> - Climate action and emergency program coordinator of a local government

Hire People with the Right Capabilities

Experts also mentioned that one of the common problems they faced was having people unfamiliar with the subject matter spearhead climate change work with the community. Therefore, policymakers must have the right people with extensive knowledge and familiarity with the subject matter to fill the climate change-related position.

> There is a great opportunity right now. But there seems to be a lot of scrambling at the top, with a lot of people moving around. People aren't staying in their positions. People are coming in who actually have no background or experience in emergency management
>
> - *Emergency management consultant of non-profit organization.*

Reform Funding Requirements

One of the biggest hurdles many Indigenous communities face is the requirements imposed on them for climate change funding applications. For example, a climate change program manager pointed out that certain funding requires applicants to have endorsements from five local governments to apply for climate-related financing. They reiterated that these requirements can be restrictive and inconvenient, especially for Indigenous communities.

A climate change coordinator suggested that funders or government grants change some parts of the application process. Typically, organizations that want to apply for funding must submit a detailed proposal that sometimes may involve information such as feasibility studies and others. The climate change coordinator suggested changing the project proposal to the expression of interest to make it easier for urban Indigenous non-profit housing and service providers to apply.

First Nations Dance. (Source:iStock by Getty Images

CONCLUSIONS

Urban Indigenous non-profit housing and service providers offer more than just shelter, AHMA members play multiple roles simultaneously. This requires coordination that enables communities to work with urban Indigenous non-profit housing and service providers.

The multifaceted roles that AHMA members play highlight the necessity for holistic solutions that integrate various aspects of community life rather than isolating housing and climate action into separate initiatives.

Building climate-resilient infrastructure is also a crucial component of this holistic approach. As the impacts of climate change continue to intensify, investing in resilient building practices is essential for mitigating damage and adapting to new environmental realities.

Strengthening buildings' physical infrastructure protects residents and ensures sustainable and resilient communities. By focusing on climate resilience, housing providers can safeguard against extreme weather events and other climate-related threats, ultimately contributing to urban Indigenous communities' long-term stability and security.

Government agencies such as BC Housing and local governments have a critical role in advancing climate action initiatives and overseeing their implementation. Addressing limitations such as funding, capacity, and resources is imperative to maximize the impact of local governments on these endeavours.

Lastly, equitable financing ensures all communities, particularly low-income and not-for-profit housing providers, access energy efficiency upgrades and other climate resiliency measures. Funders must prioritize equity in their financial support to help bridge the gap between available resources and the needs of vulnerable populations.

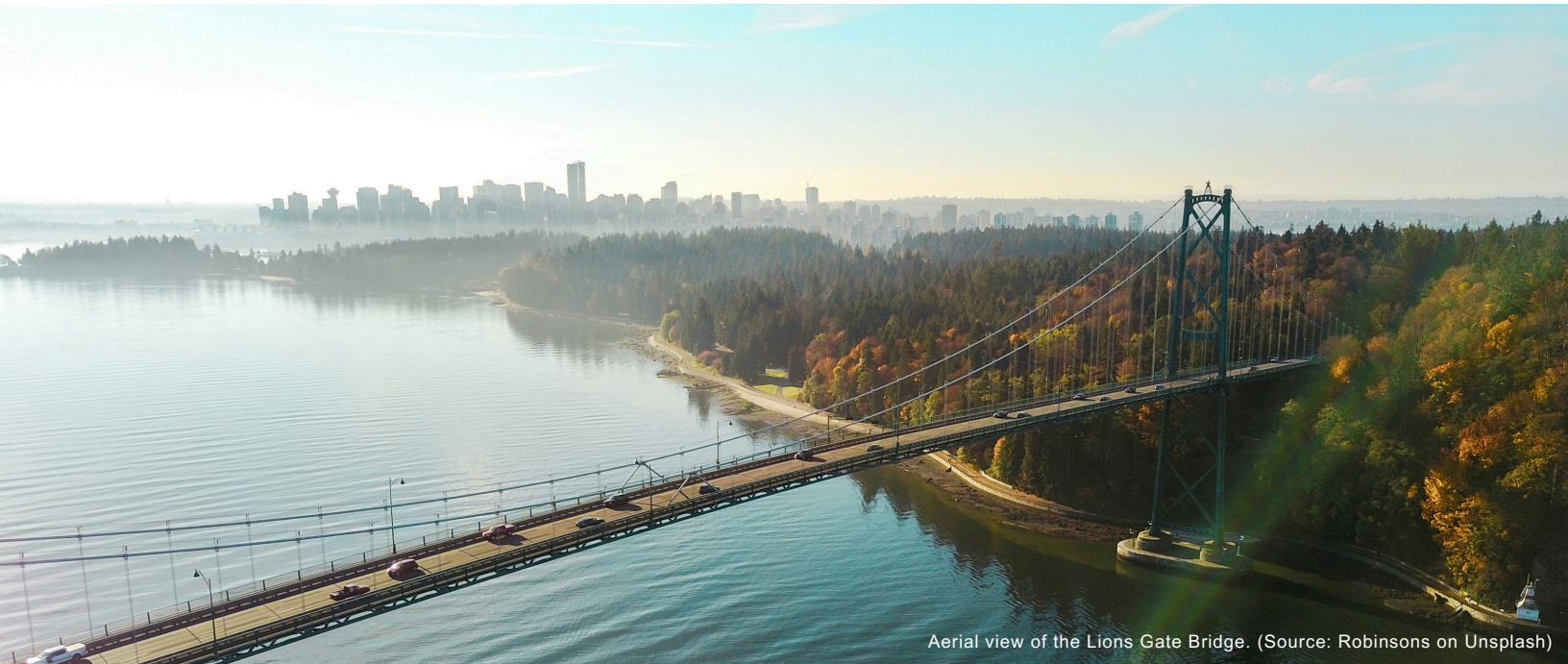
Totem pole in Victoria (Source: Renin on Unsplash)

FUTURE RESEARCH OPPORTUNITIES

Research ways to build local capacities and skills in managing and maintaining climate-resilient infrastructure.

In-depth exploration of member organization experience in regards of climate resilience implementation in buildings and infrastructure.

Study the long-term effectiveness of climate-resilient features in urban Indigenous housing and how they impact community well-being.



Aerial view of the Lions Gate Bridge. (Source: Robinsons on Unsplash)

REFERENCES

BC Energy Step Code. "Energy Step Code." *Energy Step Code*, 7 Mar. 2017, energystepcode.ca/.

BC Hydro. "Report: BC Hydro's Most Damaging Storms of All Time Are Recent History." *Www.bchydro.com*, 30 Nov. 2023, www.bchydro.com/news/press_centre/news_releases/2023/most-damaging-storms-are-recent-history.html. Accessed 14 June 2024.

BC Society of Transition Houses. *Emergency Management & Service Continuity (EMSC) Program Planning for Women's Transition House and Support Programs – BC Society of Transition Houses*. bcsth.ca/project/risk-reduction-and-service-continuity-for-womens-transition-house-and-support-programs-in-bc/. Accessed 14 June 2024.

British Columbia. *20%-Better Energy Efficiency & Zero Carbon Step Code British Columbia Building Code 2018 - Revision 5* . 1 May 2023, //efaidnbmnnnibpcajpcglclefindmkaj/www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/construction-industry/building-codes-and-standards/bulletins/20_better_ee__zcsc.pdf.

Canada Climate Law Initiative. "Collaboratively Building a Climate-Resilient Economy and Financial System in BC." *Canada Climate Law Initiative*, 13 Apr. 2022, ccli.ubc.ca/resource/collaboratively-building-a-climate-resilient-economy-and-financial-system-in-bc/. Accessed 19 Aug. 2024.

Canada, Environment and Climate Change. "Extreme Weather Event Attribution." *Www.canada.ca*, 11 June 2024, www.canada.ca/en/environment-climate-change/services/climate-change/science-research-data/extreme-weather-event-attribution.html. Accessed 13 June 2024.

Canadian Centre for Occupational Health and Safety. "Climate Change: Extreme Weather - Preparing for Climate-Related Emergencies." *Ccohs.ca*, 2022, www.ccohs.ca/oshanswers/safety_haz/climate/extremeweather_emergencies.html. Accessed 28 Aug. 2024.

CBC News. "Smoke Particles Can Change DNA, Cause Cancer, Says B.C. Scientist of Wildfire Health Risk." *CBC*, 17 July 2023, www.cbc.ca/news/canada/british-columbia/poor-air-quality-northern-bc-wildfire-july-17-1.6909132. Accessed 2 July 2024.

Copes-Gerbitz, Kelsey, et al. "Community Engagement with Proactive Wildfire Management in British Columbia, Canada: Perceptions, Preferences, and Barriers to Action." *Frontiers in Forests and Global Change*, vol. 5, 8 Mar. 2022, https://doi.org/10.3389/ffgc.2022.829125.

Costa, Cayo, and Jorge Garza. “The Intersection of Housing Affordability and Climate Action.” *Www.tamarackcommunity.ca*, Tamarac Institute, 2022, www.tamarackcommunity.ca/library/article-the-intersection-of-housing-affordability-and-climate-action?gad_source=1&gclid=Cj0KCQjwj9-zBhDyARIsAERjds0MiseNGqu_uTKRHxnXeJpCvJ3ExsoVFW-BbM1oO9dyYsjst_Mwgr0aAoPOEALw_wcB. Accessed 24 June 2024.

Dale, Ann, et al. “Meeting the Climate Change Challenge: Local Government Climate Action in British Columbia, Canada.” *Climate Policy*, vol. 20, no. 7, 16 Aug. 2019, pp. 1–15, https://doi.org/10.1080/14693062.2019.1651244.

“Demand Response for Business.” *Www.bchydro.com*, www.bchydro.com/powersmart/business/programs/large-demand-response.html.

Federal Emergency Management Agency. “Learning to Build Resilience from Tribal Nations | FEMA.gov.” *Www.fema.gov*, 22 Apr. 2024, www.fema.gov/blog/learning-build-resilience-tribal-nations.

Halifax Regional Municipality. “Use of Managed Retreat as a Climate Adaptation Approach.” Halifax Regional Municipality, 12 Mar. 2024.

Hansen, Alana, and Peng Bi. “Climate Change Adaptation: No One Size Fits All.” *The Lancet Planetary Health*, vol. 1, no. 9, Dec. 2017, pp. e353–e354, https://doi.org/10.1016/s2542-5196(17)30160-2. Accessed 1 Nov. 2020.

Harvard Radcliffe Institute. “Nemo’s Fever: Deep Thoughts on Water, Culture, and Climate Resilience | Rob Verchick.” *YouTube*, 22 Feb. 2024, www.youtube.com/watch?v=yGATLCzlrsA&list=PLTt9bwjR4BIcWkCZmfcZBFslfiTeQjGyH&index=10. Accessed 19 June 2024.

Hill, Alice C, and Leonardo Martinez-Diaz. *Building a Resilient Tomorrow: How to Prepare for the Coming Climate Disruption*. New York, NY, United States Of America Oxford University Press, 2020.

Hosseini, Madani, et al. “Climate Crisis Risks to Elderly Health: Strategies for Effective Promotion and Response.” *Health Promotion International*, vol. 39, no. 2, 3 Apr. 2024, academic.oup.com/heapro/article/39/2/daae031/7639701, https://doi.org/10.1093/heapro/daae031.

Howard, Jessica. “Climate Change and Gender | Learn the Intersectional Impacts.” *Canadian Women’s Foundation*, canadianwomen.org/the-facts/gender-climate-change/#:~:text=Intersectional%20gender%2Dbased%20analysis%20has. Accessed 2 July 2024.

Innovation, Energy Mines and Low Carbon. “BC Hydro Issues Call for New Clean Electricity to Power B.C.’S Future | BC Gov News.” *News.gov.bc.ca*, 3 Apr. 2024, news.gov.bc.ca/releases/2024EMLI0018-000470.

Khan, Nadia. “For the Love of Community: Ethics and Diversity in Climate Action.” *Comms2point0*, 28 May 2024,

comms2point0.co.uk/comms2point0/2024/5/28/for-the-love-of-community-ethics-and-diversity-in-climate-action. Accessed 28 Aug. 2024.

Kluttz, Jenalee. *Centering Justice in Climate Emergency Response a Toolkit for Organizations 2 Acknowledgement*.

Martín, Carlos, et al. "Housing Resilience in Greater New Orleans | Urban Institute." *Www.urban.org*, 2 Jan. 2024, www.urban.org/research/publication/housing-resilience-greater-new-orleans.

Marx, Rebecca, and Diane K. Levy. "Multidimensional Resilience | Urban Institute." *Www.urban.org*, 15 Sept. 2022, www.urban.org/research/publication/multidimensional-resilience. Accessed 3 July 2024.

McGillivray, Marisa. "Insights into the Impact of Extreme Weather Trends in Canada on Homeowners Insurance Profitability and Consumers." *Statcan.gc.ca*, Government of Canada, Statistics Canada, 15 May 2024, www150.statcan.gc.ca/n1/pub/11-621-m/11-621-m2024003-eng.htm. Accessed 28 Aug. 2024.

Mehryar, Sara. "What Is the Difference between Climate Change Adaptation and Resilience?" *Grantham Research Institute on Climate Change and the Environment*, 12 Sept. 2022, www.lse.ac.uk/granthaminstitute/explainers/what-is-the-difference-between-climate-change-adaptation-and-resilience/.

Meng, Fanyue, et al. "Demand-Side Energy Management Reimagined: A Comprehensive Literature Analysis Leveraging Large Language Models." *Energy*, vol. 291, 15 Mar. 2024, p. 130303, www.sciencedirect.com/science/article/pii/S0360544224000744#sec1, https://doi.org/10.1016/j.energy.2024.130303. Accessed 12 Feb. 2024.

Michell, Patrick. "Hope Flows from Action: Rebuilding with Resilient Foundations in B.C.'S Fraser Canyon Region." *Canadian Climate Institute*, 12 June 2023, climateinstitute.ca/publications/hope-flows-from-action-rebuilding-with-resilient-foundations-fraser-canyon-region/.

National League of Cities. "Local Indigenous Leaders (LIL)." *National League of Cities*, 15 Mar. 2023, www.nlc.org/initiative/local-indigenous-leaders-lil/. Accessed 28 Aug. 2024.

"Practice Guides." *Hey Neighbour Collective*, www.heyneighbourcollective.ca/guides/practice-guides/. Accessed 23 June 2024.

Ruttle, Joseph. "B.C. Hydro Launches New Optional Time-of-Day Pricing." *Vancouver Sun*, Vancouver Sun, 6 June 2024, vancouversun.com/news/local-news/bc-hydro-launches-new-optional-time-of-day-pricing. Accessed 13 June 2024.

Shaieree Cottar, and Johanna Wandel. “Municipal Perspectives on Managed Retreat and Flood Mitigation: A Case Analysis of Merritt, Canada after the 2021 British Columbia Flood Disaster.” *Climatic Change*, vol. 177, no. 3, 28 Feb. 2024, https://doi.org/10.1007/s10584-024-03707-4. Accessed 12 June 2024.

Stacey, Jocelyn. “Confronting Modern Disaster? British Columbia’s New Emergency and Disaster Management Act.” *Ssrn.com*, 3 Apr. 2024, papers.ssrn.com/sol3/papers.cfm?abstract_id=4783400. Accessed 15 Aug. 2024.

Stalhandske, Zélie, et al. “Global Multi-Hazard Risk Assessment in a Changing Climate.” *Scientific Reports*, vol. 14, no. 1, 11 Mar. 2024, p. 5875, www.nature.com/articles/s41598-024-55775-2, https://doi.org/10.1038/s41598-024-55775-2. Accessed 25 Mar. 2024.

Statistics Canada. “Research to Insights: Social, Economic, and Health Perspectives on Climate Change.” *Www150.Statcan.gc.ca*, 15 Apr. 2024, www150.statcan.gc.ca/n1/pub/11-631-x/11-631-x2024004-eng.htm.

The World Bank. “Reality Check: Lessons from 25 Policies Advancing a Low-Carbon Future.” *World Bank*, 19 Sept. 2023, www.worldbank.org/en/news/feature/2023/09/19/climate-policies-with-real-world-results.

U.S. Department of Housing and Urban Development’s Office of Policy Development and Research. “The Role of Housing in Climate Change Mitigation and Adaptation | HUD USER.” *Www.huduser.gov*, 2022, www.huduser.gov/portal/periodicals/em/Summer22/highlight1.html.

UNDRR. “What Is the Sendai Framework?” *Www.undrr.org*, UNDRR, 2015, www.undrr.org/implementing-sendai-framework/what-sendai-framework.

UNFCCC. “The Paris Agreement.” *United Nations Climate Change*, United Nations, 2015, unfccc.int/process-and-meetings/the-paris-agreement.

Verchick, Rob. *The Octopus in the Parking Garage*. Columbia University Press, 11 Apr. 2023.

Victoria State Government. “Review and Update of an Emergency Management Plan.” *Emergency Management Victoria*, 2020, www.emv.vic.gov.au/responsibilities/emergency-management-planning/emergency-management-planning-resource-library-0/emergency-management-plans/review-and-update-of-an-emergency-management-plan. Accessed 28 Aug. 2024.

Visconti, Cristina. “Co-Production of Knowledge for Climate-Resilient Design and Planning in Naples, Italy.” *Habitat International*, vol. 135, May 2023, p. 102748, https://doi.org/10.1016/j.habitatint.2023.102748.

Wale, Janna, et al. “The Power of Indigenous Healthy Energy Homes.” *Canadian Climate Institute*, 2 July 2024,

climateinstitute.ca/publications/indigenous-healthy-energy-homes/. Accessed 15 Aug. 2024.

Wen, Jiahong, et al. "Disaster Risk Reduction, Climate Change Adaptation and Their Linkages with Sustainable Development over the Past 30 Years: A Review." *International Journal of Disaster Risk Science*, vol. 14, no. 13, 7 Feb. 2023, https://doi.org/10.1007/s13753-023-00472-3.

PHOTO REFERENCES

Allouche, J. (2018, January 13). *Calm body of water near forest*. Unsplash. https://unsplash.com/photos/calm-body-of-water-near-forest-LLc-bFnJJ1o

Carol, H. M. (2022, September 5). *Barber Shop located in Ninth Ward, New Orleans, Louisian damaged by Hurricane Katrina* (Library of Congress, Ed.). Unsplash. https://unsplash.com/photos/barber-shop-located-in-ninth-ward-new-orleans-louisiana-amaged-by-hurricane-katrina-in-2005-ha3hueRV3xM

Dizon, G. (2024, July 31). *Fraser River Bridge*. Unsplash. https://unsplash.com/photos/a-train-crossing-a-bridge-over-a-river-gE57GJj0sCg

Du Preez, P. (2019, October 11). *Evening traffic the Lion's Gate Bridge in Vancouver*. Unsplas https://unsplash.com/photos/photography-of-vehicles-traveling-on-road-during-daytime vivfgMnc-8

Eliot, K. (2022, June 6). *Hollywood*. Unsplash. https://unsplash.com/photos/a-view-of-a-city-from-the-top-of-a-hill-lJQqq6E_8ns

Fuentes, D. F. (2017, March 22). *Person planting on hanged pots*. Unsplash. https://unsplash.com/photos/person-planting-on-hanged-pots-TyLw3lQALMs

Gillis, D. (2018, January 27). *Teamwork makes the dream work*. Unsplash. https://unsplash.com/photos/people-sitting-on-chair-in-front-of-table-while-holding-pens during-daytime-KdeqA3aTnBY

Hettiarachchi, D. (2023, July 6). *Totem poles at Stanley Park*. Unsplash. https://unsplash.com/photos/a-totem-stands-next-to-a-tall-tree-iL-tENNBLRk

Kristiansen, V. (2015, April 25). *Cabin over a misty pond*. Unsplash. https://unsplash.com/photos/house-near-trees-and-river-qv5yb436qRI

Monmo, M. (2016, June 9). *Naples, Italy*. Unsplash. https://unsplash.com/photos/aerial-photography-of-city-buildings-jPRFJ54o6M8

Rajput, V. (2020, June 1). *Woman in black long sleeve shirt*. Unsplash. https://unsplash.com/photos/woman-in-black-long-sleeve-shirt-hVCtuUzrbyE

Reyes, A. (2018, July 12). *Person working on blue and white paper on board*. Unsplash. https://unsplash.com/photos/person-working-on-blue-and-white-paper-on-board-qWwp wip31M

Robinsons, L. (2019, June 19). *Lions Gate Bridge* [Digital image]. Unsplash. https://unsplash.com/photos/aerial-view-of-island-with-bridge-Yc9h5SJdEzI

Ronin, K. (2024, January 24). *Totem Pole-Victoria*. Unsplash. https://unsplash.com/photos/a-statue-of-a-totema-in-a-park-next-to-a-body-of-water-O b9r0dckI

Spravko, D. (2023, August 7). *Instagram*. Unsplash. https://unsplash.com/photos/a-large-body-of-water-surrounded-by-trees-wOVlzf_-2Og

Struna, I. (2021, August 15). *White ship on sea near snow covered mountain during daytime*. Unsplash. https://unsplash.com/photos/white-ship-on-sea-near-snow-covered-mountain-during-daytime-tQ4ChsgPxiA

Wang, H. (2024, March 19). *A view of a city with mountains in the background*. Unsplash. https://unsplash.com/photos/a-view-of-a-city-with-mountains-in-the-background-ApWZ2KCz0jg

Wheeler, J. (2018, November 19). *Stones on water during daytime*. Unsplash. https://unsplash.com/photos/stones-on-water-during-daytime-ZLygSfE2wtk

Winkler, M. (2020, June 30). *Funding round*. Unsplash. https://unsplash.com/photos/green-and-white-braille-typewriter-jF1CqFpE62k