



2020

Planning Resilient Communities and Adapting Rural Health Services in British Columbia

*Responding to climate change and
ecosystem disruption*



CHAPTER 3

Climate Adaptation Strategies

Climate change adaptation, or the set of actions that reduce the negative impacts and optimize the new opportunities that arise from a changing climate will be essential for planning rural health services in the coming years [1], and is the focus of this chapter.

Chapter Three Highlights

- *Local adaptation measures are most effective when integrated into larger policy frameworks and decision making processes, highlighting the need for collaboration between multiple levels of leadership [2].*
- *Based on current climate projections, Northern, Coastal, and Indigenous communities (which includes many rural communities in British Columbia) will be the hardest hit by climate change related-impacts in Canada [9].*
- *Ecosystem-based approaches to climate change support resilient livelihoods, protect food and water, and ensure healthier environments in the face of a changing climate [3][4]. Given the huge breadth of land-based knowledge present in many rural communities, this may be a critical consideration for rural health services planning.*

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DESPITE PREVIOUS AND ON-GOING EFFORTS TO REDUCE GREENHOUSE GAS EMISSIONS, OUR CLIMATE IS CHANGING IN AN UNPRECEDENTED MANNER WITH SERIOUS SOCIAL, ECONOMIC, ENVIRONMENTAL, AND HEALTH CONSEQUENCES [1]. Climate change adaptation, or the set of actions that reduce the negative impacts and optimize the new opportunities that arise from a changing climate will be essential for planning rural health services in the coming years [1], and is the focus of this chapter.

Climate adaptation can be reactive or anticipatory and includes a wide range of actions such as policy development, grassroots initiatives, research and innovation. Climate adaptation and climate mitigation (see our previous chapter), or the set of actions that reduce greenhouse gas emissions, are complementary and are both essential in fostering communities that are resilient to the impacts of climate change [1].



Overview of global adaptation initiatives

As climate change is a global issue, all nations must adopt some form of climate adaptation. International organizations, such as the United Nations and the Organization for Economic Co-operation and Development, have developed effective frameworks for developing climate adaptation strategies. Below, we outline components of these frameworks that are relevant for planning rural health services. Key considerations include:

Costs and benefits

A changing climate comes with both negative and positive impacts on individuals and communities. Although current climate projections show net benefits for Canada in the short term, longer term impacts of climate change are projected to be detrimental[2]. The market consequences of climate change in most jurisdictions will be negative: lower crop yields, land loss from sea rise in coastal zones, capital losses from extreme weather events, and economic consequences from adverse health impacts[2]. Further, most economic costs incurred by climate change will grow exponentially following certain tipping points[2].

Risk assessment and planning for uncertainty

Risk and uncertainty are inevitable in climate adaptation planning—therefore, assessing and managing risk is critical. It is imperative that climate adaptation policies include proportionate, flexible, and iterative risk assessment and management approaches. Coping with uncertainty is a key challenge when developing a climate adaptation plan. Climate risks are influenced by interacting complex and unpredictable elements and the impact of these climate risks will be dependent on multiple social and economic factors[2]. Developing flexible adaptation strategies is imperative for creating adaptation strategies that are effective in the face of this uncertainty. Additionally, adaptation planning will never be zero risk. It is thus imperative to prepare response and recovery systems to manage unanticipated and unintended consequences[2]. Organizations can achieve this by optimizing their knowledge on climate change to better predict future changes and plan for a range of outcomes [2]. Finally, adaptation strategies should include knowledge translation mechanisms to assure that all stakeholders are equipped with the knowledge and tools necessary to adapt to climate change[4].

Protecting and sustaining natural ecosystems

Preserving and restoring natural ecosystems is a cost-effective solution to climate change threats. Ecosystem-based approaches to climate change support resilient livelihoods, protect food and water, and ensure healthier environments [3][4]. Given the huge breadth of

communities, this may be a critical consideration for rural health services planning.

Resilience building and reducing vulnerability

One of the most effective ways for communities to adapt to the health impacts of climate change is to reduce the determinants of vulnerability and foster resilience[5]. This may be achieved by:

- Increase community capacity to respond to disaster [4]
- Providing adequate natural hazard insurance and other social safety nets
- Increasing food and water security
- Supporting sustainable economic development in rural areas [3]
- Improve access to climate information, climate warning systems, climate smart tools, training, and techniques
- Developing and maintaining climate resilient infrastructure [3]
- Developing integrated, ecosystem-based, climate-resilient management of lakes, rivers, and oceans

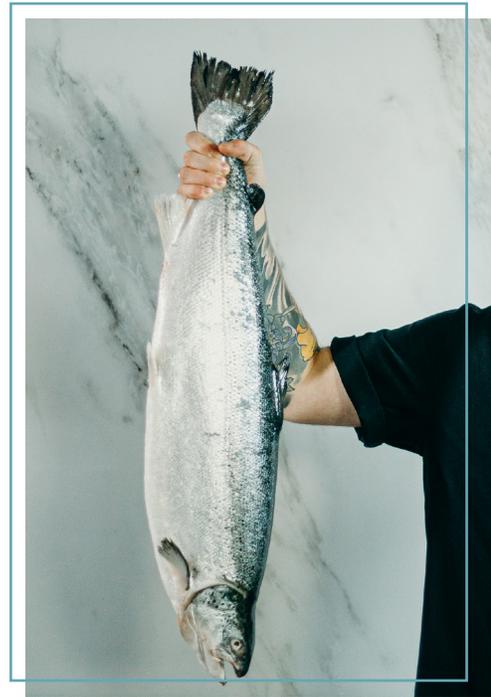


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Prioritizing climate adaptation at the decision-making level

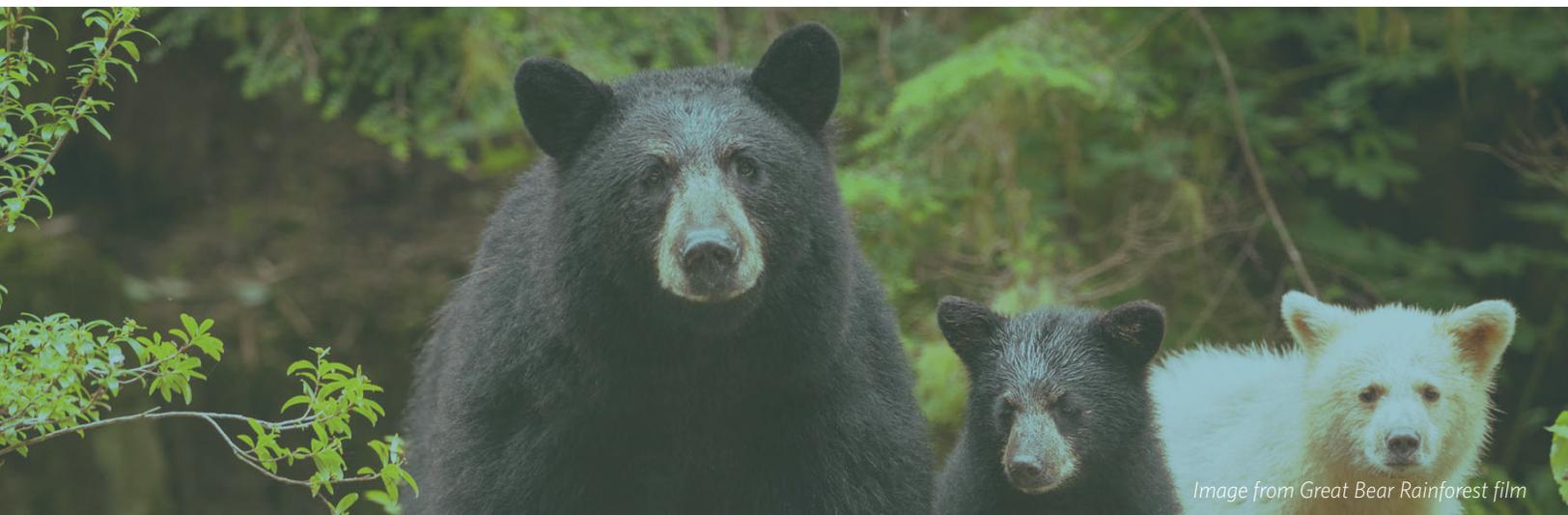
Developing and implementing effective adaptation measures will require buy-in from all levels of leadership. More specifically, decision makers should commit to the following:

 <p>Putting climate risk at the centre of decision making [4]</p>	 <p>Acting immediately in response to current climate impacts, and supporting the most vulnerable members of society [4]</p>	 <p>Increasing funding allocated for adaptation and resilience</p>	 <p>Developing the tools necessary for incorporating climate resilience into the decision making process [6]</p>
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Taking a diversified and integrated approach to climate adaptation

Adaptation planning is influenced by multiple sectors, and thus adaptation policies should be integrated into relevant policy frameworks and decision-making processes [2][3]. To this end, adaptation and climate resilience should be consolidated into long-term planning, and climate risk should be integrated into all financial decision making [3].

The challenges, opportunities, and constraints of adaptation strategies vary by sector and by region [2]. This is particularly relevant to communities in British Columbia as the province is incredibly geographically diverse [7]. Developing a range of diversified adaptation measures is the most effective approach for managing climate risk.



Nature-based and ecosystem-based adaptation solutions

International climate research suggests that nature and ecosystem-based climate adaptation solutions will be effective at protecting communities from the impacts of climate change while preserving biodiversity [3][8]. The restoration and sustainable conservation of ecosystems can complement other global and societal goals, for example, maintaining fish populations can increase food security, stabilize the economic well-being of fishers, and improve Indigenous cultural well-being [8].

Vast and widespread declines in biodiversity, largely driven by anthropogenic ecosystem disruption, put these solutions at risk and will additionally incur huge costs to society. Indigenous populations are disproportionately impacted by these declines, as changes to the environment underpin many broader social and economic issues for Indigenous communities, such as loss of subsistence and livelihood and detrimental impacts to health and well-being as a result of pollution [8].

Though rapid and improved deployment of existing policy instruments and initiatives may be sufficient in some instances, transformative change will be necessary for protecting biodiversity[8]. Existing political and economic structures may inhibit sustainable development, and current trajectories will not adequately protect biodiversity (for example, under current projections, the 2030 Aichi Biodiversity targets will not be met), therefore structural change is urgently needed [8]. Examples of mechanisms to realize such change include considering and incorporating the values of ecosystem functions into economic incentives and decision making, and recognizing the value of Indigenous knowledge and innovation [8].

Monitoring and evaluation

Effective monitoring and evaluation are necessary for adaptation policy development as it helps to inform more accurate adaptation policies as well as improves accountability [2][6].

Key tools for effective monitoring and evaluation include:

- Climate change risk and vulnerability assessments: identify climate vulnerabilities and help with setting adaptation priorities and risk management [2]
- Indicators: useful for assessing the progress made on advancing adaptation priorities
- Project and programme evaluations: help assess which adaptation approaches are most effective
- National audits and climate expenditure reviews: facilitate determining if finances are appropriately allocated for adaptation



Overview of national adaptation initiatives

Local adaptation measures are most effective when integrated into larger policy frameworks and decision making processes [2]. Below we provide an overview of Federal adaptation strategies and initiatives that are relevant to planning for climate adaptation in rural communities in British Columbia.

Climate change adaptation in Canada

Climate change adaptation is central to many key Canadian environmental policies and frameworks, including the Pan-Canadian Framework on Clean Growth and Climate Change, Canada's first climate change plan that includes joint and individual commitments by federal and provincial governments, with input from Indigenous leaders [9].

In 2017-2018, Canada invested \$192 million towards climate adaptation initiatives [9].

Federal policies targeted at adaptation range across multiple sectors including transportation, building codes, agriculture, and trade [9].

Pan-Canadian Framework on Clean Growth and Climate Change (2016)

The adaptation framework includes developing strong adaptation policies, making sure that infrastructure and communities are adequately prepared for climate change driven natural disasters and extreme temperatures and weather patterns [10]. Five key areas for taking action towards adapting and fostering climate resilience, as identified by the Framework:



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1. Translating scientific information and Traditional knowledge into action

- Strong scientific information is needed to develop effective adaptation strategies. Scientific data, tools, and information must be widely accessible, equitable, and specific to different settings
- Knowledge translation is critical in transforming scientific information into action
- Two mechanisms for fulfilling this area include providing authoritative climate information and building regional adaptation capacity and expertise

2. Building climate resilience through infrastructure

- Climate change related infrastructure failures are a serious threat to the health of rural communities in British Columbia. Climate change is already impacting infrastructure, and coastal, northern, and Indigenous communities such as those found in many rural regions across British Columbia have been identified as particularly vulnerable to these impacts.
- Climate resilient infrastructure can be realized through two key actions: investing in infrastructure to build climate resilience, and developing climate-resilient codes and standards

3. Protecting and improving human health and well-being

- As mentioned in Chapter 1, climate change has serious consequences for the health and well-being of rural communities. Indigenous communities are particularly vulnerable to the health risks of climate change
- The health and well-being of Canadians can be protected through two key actions according to the Framework: addressing climate change-related health risks through various mechanisms including public awareness activities, laboratory diagnostics, and risk assessments; and supporting healthy Indigenous communities by investing in the capacity of Indigenous communities to undertake climate-change and health adaptation projects that protect public health

4. Supporting particularly vulnerable regions

- Coastal and Indigenous regions have been identified as particularly vulnerable to, and disproportionately impacted by the effects of climate change
- Supporting vulnerable regions can be achieved through 3 key action areas relevant to rural health services in British Columbia: investing in resilient infrastructure to protect vulnerable regions, supporting community-based monitoring in Indigenous communities, and supporting adaptation in coastal areas

5. Reducing climate-related hazards and disaster risks

- Climate change has and will continue to increase the intensity and frequency of climate hazards and natural disasters such as extreme heat, floods, wildfires, droughts, and sea level rise.
- Reducing climate hazards and disaster risks is imperative for any climate adaptation strategy and will require 3 key actions: investing in infrastructure to reduce disaster risks, advancing efforts to protect against floods, supporting adaptation in Indigenous communities



Overview of climate adaptation in British Columbia

Although the Province is currently taking measures to reduce its greenhouse gas emissions (for more information on this, please see Chapter 2: Mitigation), changes to British Columbia's environment as a result of climate change are inevitable. Some impacts are already observable across the province: in recent years there has been increased incidence and severity of wildfires, and record-breaking heat waves [11]. It is therefore critical for human health and well-being that British Columbian communities are prepared to adapt.

Climate change adaptation and BC's provincial government

The provincial government is taking two main strategic approaches to climate adaptation in the province. Firstly, the Province has conducted a climate risk assessment to guide climate adaptation decision-making. Secondly, a province-wide climate adaptation and preparedness strategy is being developed and will be released later in 2020 [11].

The Preliminary Climate Risk Assessment

High quality, evidence based climate risk assessments are crucial when developing effective climate adaptation strategies and fostering climate resilience at the decision-making level [2]. This report uses the best available evidence to assess the impacts of 15 climate risks on the province, both in the short term as well as at 2050, to help the Provincial government address those risks. It allows for an evidence-based understanding of the likelihood of each of the climate risks and their subsequent consequences on the BC population [12]. This assessment is done at a provincial level while accounting for the vast geographical diversity in BC. Therefore, this report presents general trends of climate risks rather than community-specific risks [12].

The greatest climate risks in British Columbia, both in their high probability and high consequence, are forest fire, seasonal water shortages, heat waves, ocean acidification, glacier loss, and long-term water shortages. Though less likely, ocean storm surges and river floods will have some of the most severe consequences on the province [12]

Preparing for Climate Change: BC's 2010 Adaptation Strategy

The primary objective of the adaptation strategy was to guide the way for a climate-resilient British Columbia. To realize this objective, the provincial government adopted 3 principles in its adaptation planning [13]:

- Building a strong foundation in climate knowledge and tools
- Making adaptation a part of the Government of British Columbia and British Columbian businesses
- Assessing risk and implementing priority adaptation actions in key climate sensitive sectors

The government of British Columbia will additionally be releasing an adaptation strategy later in 2020 which will be informed by the Preliminary Climate Risk Assessment [11].

Climate adaptation in Indigenous communities in British Columbia

Despite demonstrating remarkable resilience to change and immense land-based knowledge, many Indigenous communities will be disproportionately impacted by climate change, due to socio-economic conditions, the geographic location, and reliance on land-based food sources [9]. Adaptation is thus especially important for Indigenous communities, and adaptation strategies should respect and incorporate traditional knowledge of Indigenous populations and be tailored to meet the distinct needs of Indigenous communities.



Photo by Louis Whitehouse / The Narwhal

Fostering climate resilience through food sovereignty and food security in Indigenous communities

Relative to other First Nations communities in Canada, First Nations communities in British Columbia are actively engaged in harvesting traditional foods and eat traditional food on a more regular basis [14]. Harvesting and consuming traditional food, such as fish, berries, and shellfish may be immensely beneficial to the health and well-being of First Nations communities in British Columbia, as they are more rich in essential nutrients, lower in calories and saturated fat, and strengthen cultural capacity and well-being [15]. As many First Nations communities experience food insecurity and its related health consequences, access to traditional food sources should be a key consideration for rural health services planning.

Currently, with exception to traditional foods harvested using lead bullets and large fish harvested in Northern regions, especially in Quebec and Manitoba, traditional food sources have contaminant concentrations that are comparable to other food sources in Canada, and are considered safe for consumption [14]. However, climate change induced alterations of the environment threaten safety of and access to traditional food sources in the future [10]; alarmingly, over half of all harvesting First nations adults reported that harvesting has been impacted by climate change and industry-related activities [14]. Taking protective measures to sustain access to traditional food sources will be crucial for fostering climate resilience in Indigenous communities.

According to a 2019 report for eight Assembly of First Nations regions, the following measures should be taken to protect traditional food sources in the face of climate change [14]:

- Generate sustained public health risk-benefit communications to promote the importance of harvesting traditional food while decreasing exposure to environmental contaminants such as mercury
- Monitor, protect, and ensure that local ecosystems are healthy and allow for Indigenous access to traditional food
- Develop a long-term traditional food contaminant monitoring program
- Develop guidelines and a monitoring program for the protection of aquatic, land, and human health to avoid unnecessary exposure to pharmaceuticals and other contaminants

First Nations in BC are also taking measures to preserve access and availability to traditional food sources in the face of anthropogenic ecosystem disruption. For example, in 2019, the Syilx Okanagan, Ktunaxa and Secwepemc Indigenous Nations signed an agreement with federal and provincial governments to re-introduce salmon to the Columbia River Basin in interior British Columbia. Salmon have been locally extinct in the region since the 1930s following the building of the Coulee dam in the Columbia river, but were historically an important traditional food source to the Syilx Okanagan, Ktunaxa, and Secwepemc nations. The re-introduction efforts, if

successful, could restore fish stocks to support Indigenous food, social and ceremonial needs and harvest opportunities for Indigenous and non-Indigenous communities. Additionally, this landmark agreement may serve as a model for combining scientific and traditional knowledge in climate resilience decision making and leadership [16].



Climate adaptation and resilience in the rural health context

Based on current climate projections northern, coastal, and Indigenous communities (which includes many rural communities in British Columbia) will be the hardest hit by climate change related-impacts in Canada [9]. It is thus imperative that rural communities in BC are equipped to adapt and become climate resilient in the coming years.

Climate adaptation and the health care sector

Climate change will inevitably have negative impacts on human health and generate new health risks; it is therefore imperative that health services and health service providers develop climate adaptation strategies targeted at protecting human health in the face of climate change [17].

Though health services adaptation strategies are highly dependent on local context, these general approaches for fostering climate resilience in health care should be adopted wherever possible [5]:

Reduction in amplifiers of vulnerability

- There are certain risk factors that increase the severity and incidence of climate change related impacts on human health. Such vulnerability determinants include poverty, poor quality of education especially in areas relating to climate change and public health.
- Identifying and addressing these vulnerability determinants will be crucial in developing effective adaptation strategies at the health services level.

Enhancing social capital

- Social capital refers to links, shared values, and understandings that build trust between individuals and allow groups to work together [18]
- Enhancing social capital reduces vulnerability and increases community resilience, as

belonging to a social network can help mitigate some of the detrimental impacts of climate change and facilitates the inclusion of marginalized groups in decision making processes so their needs are met when adaptation strategies are developed.

Epidemiological surveillance

- Rigorous and on-going epidemiological surveillance allows for the early and effective detection and intervention for climate related health impacts.

Barriers to implementing effective adaptation strategies in the health care sector include [5]:

- Social inequality
- Perception of decision makers that climate adaptation is a future problem and should be therefore be low priority in health policy decision making

These barriers should be considered and addressed in the development of a health services-specific climate adaptation strategy.

PlanH: public health and climate adaptation in British Columbia

PlanH is implemented by BC Healthy Communities Society in partnership with provincial health authorities, UBC Medicine, and the Ministry of Health to facilitate local government learning, partnership, and planning to improve the health of BC's communities [19]. As a public health organization, PlanH has identified the following overlaps in climate adaptation and public health goals [19]:

- Reducing vulnerability and risk of individuals and communities
- Increasing resilience and protective factors to improve the health and well-being of individuals and communities
- Enhancing livability and well-being
- Investing in long-term future benefit and outcomes

Furthermore, PlanH has identified areas where BC's public health sector may contribute to local adaptation and resilience building initiatives [19]:

- Climate knowledge translation
- Mitigation of climate change related health incidents
- Contributing health information to inform local and provincial adaptation policy planning

In summary adaptation strategies have been outlined at global, national and provincial levels and include high level statements of intention towards: better education about the challenges of climate change, strategies to stabilize ecosystems, recognition and support for vulnerable



Photo by Quang Nguyen via Pexels

people, and investment in mitigating infrastructure. Rural communities are mentioned, particularly indigenous communities, but the projected health impacts of climate change and ecosystem disruption are only superficially addressed.

In our next chapter, we describe in detail how rural communities and rural health services in British Columbia may adapt to climate change and foster climate resilience. We have identified six key areas for accomplishing this, as outlined below.



Sources

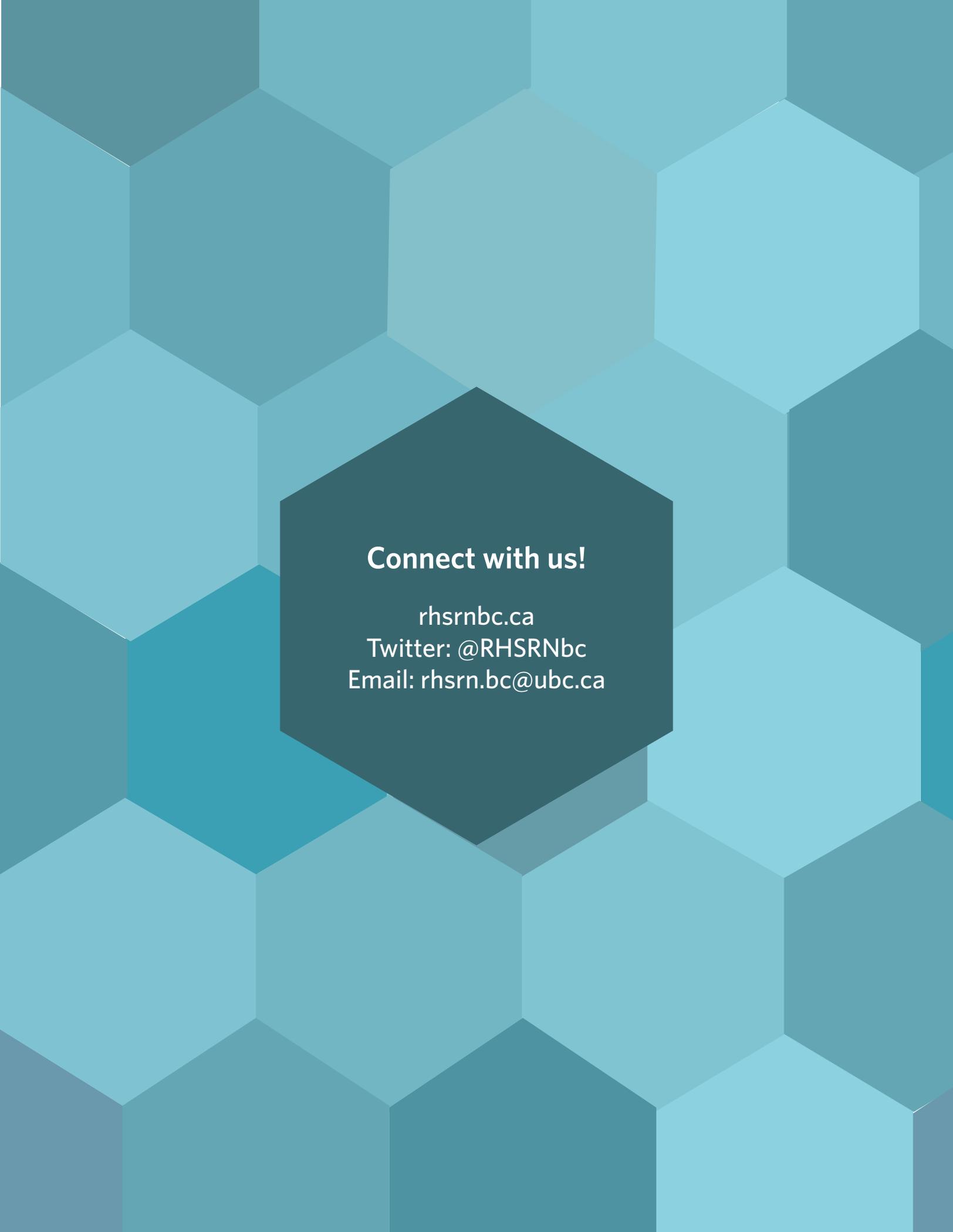
- [1] Natural Resources Canada. CHAPTER 1: An Introduction to Climate Change Adaptation. 2015. <https://www.nrcan.gc.ca/environment/resources/publications/impacts-adaptation/reports/municipalities/10081>
- [2] OECD. Adapting to the impacts of climate change: Policy Perspectives 2015. <http://www.oecd.org/environment/cc/Adapting-to-the-impacts-of-climate-change-2015-Policy-Perspectives-27.10.15%20WEB.pdf>
- [3] UNDP Climate Change Adaptation | UNDP Climate Change Adaptation n.d. /about (accessed August 27, 2020).
- [4] UNDP. Adapting Now for a Resilient Future | UNDP Climate Change Adaptation. 2020 / adapting-now-resilient-future (accessed August 27, 2020).
- [5] Confalonieri UE, Menezes JA, de Souza CM. Climate change and adaptation of the health sector: The case of infectious diseases. *Virulence* 2015;6:554-7. <https://doi.org/10.1080/21505594.2015.1023985>.
- [6] United Nations Development Programme Bureau for Development Policy. Designing Climate Change Adaptation Initiatives: A UNDP Toolkit for Practitioners 2010.
- [7] WelcomeBC - Geography of BC - WelcomeBC n.d. <https://www.welcomebc.ca/Choose-B-C/Explore-British-Columbia/Geography-of-B-C> (accessed September 4, 2020).
- [8] Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, IPBES. Summary for policymakers of the global assessment report on biodiversity and ecosystem services. Zenodo; 2019. <https://doi.org/10.5281/ZENODO.3553579>.
- [9] Environment and Climate Change Canada. Canada's Fourth Biennial Report on Climate Change 2019.
- [10] Canada. Environment and Climate Change Canada. Pan-Canadian Framework on Clean Growth and Climate Change 2016.
- [11] Environment M of. Climate Preparedness & Adaptation - Province of British Columbia n.d. <https://www2.gov.bc.ca/gov/content/environment/climate-change/adaptation> (accessed August 26, 2020).
- [12] Government of British Columbia. PRELIMINARY STRATEGIC CLIMATE RISK ASSESSMENT FOR BRITISH COLUMBIA 2019.
- [13] Government of British Columbia. Preparing for Climate Change: British Columbia's Adaptation Strategy 2010.
- [14] Chan L, Batal M, Sadik T, Tikhonov C, Schwartz H, Fediuk K, et al. First Nations Food, Nutrition & Environment Survey Final Report for Eight Assembly of First Nations Regions: Draft Comprehensive Technical Report 2019.
- [15] Centre for Indigenous Peoples' Nutrition and Environment - McGill University. Benefits of Traditional Foods. n.d. <https://www.mcgill.ca/cine/research/food/benefits> (accessed September 15, 2020).
- [16] Historic Agreement Reached Between Columbia River Basin Indigenous Nations, Canada and British Columbia to Collaborate on Salmon Re-Introduction - Okanagan Nation Alliance n.d. <https://www.syilx.org/historic-agreement-reached-between-columbia-river-basin-indigenous-nations-canada-and-british-columbia-to-collaborate-on-salmon-re-introduction/> (accessed

September 17, 2020).

[17] WHO. Adaptation resources for health partners. WHO 2010. n.d. <https://www.who.int/globalchange/resources/adaptationresources/en/index1.html> (accessed September 17, 2020).

[18] OECD. What is social capital? n.d.

[19] BC Health Communities Society. Climate Action & Public Health | PlanH n.d. <https://planh.ca/take-action/healthy-environments/natural-environments/page/climate-action-public-health> (accessed September 22, 2020).



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