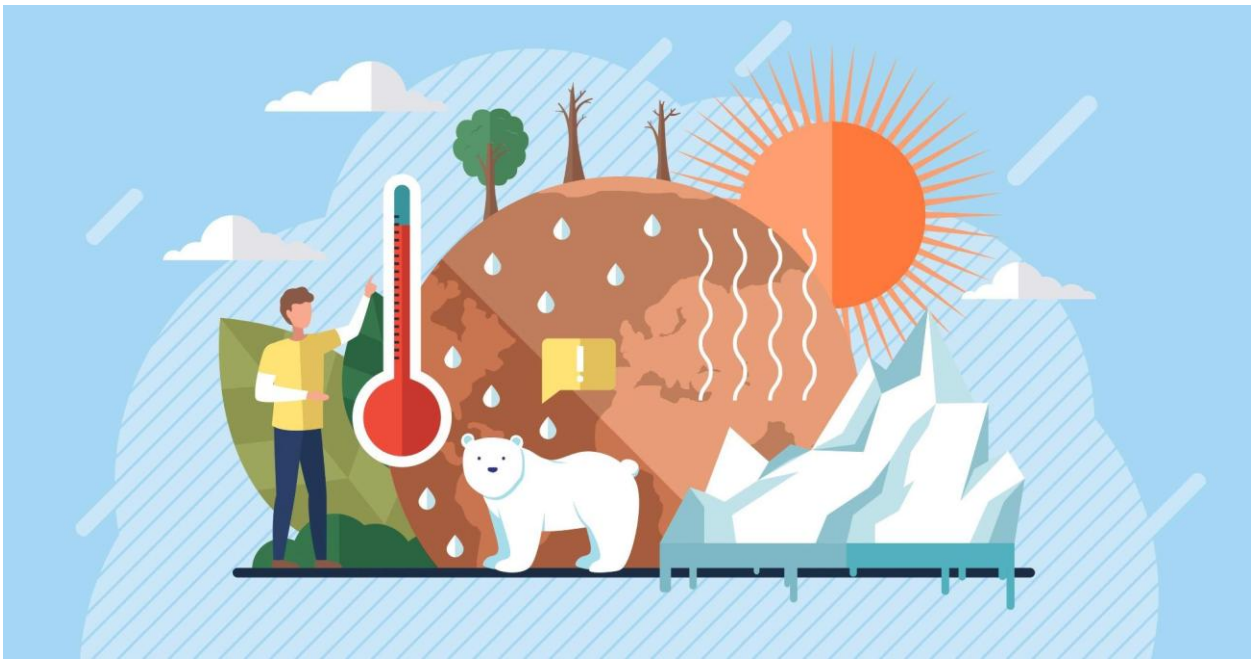

Climate Change and its Health Impacts in Newfoundland & Labrador and Canada:

A Compendium of Research, Policy, Programs, and Practices

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Background

Summary of Key Findings

Climate change is already affecting health in Newfoundland and Labrador (NL) through direct and indirect pathways, with disproportionate impacts on Indigenous communities, rural and remote populations, older adults, and people with chronic disease. Peer-reviewed studies and grey literature converge on four core insights. First, climate-related hazards—including coastal flooding and erosion, extreme precipitation, heat, wildfire smoke, and changing sea ice—interact with social determinants of health to intensify food insecurity, mental health stress, injuries, respiratory and cardiovascular risks, and barriers to care [1–4]. Second, mitigation actions in the health and municipal sectors (e.g., clean energy, active transportation, green procurement, low-carbon care pathways) offer near-term co-benefits for air quality, physical activity, and cost containment [5,6]. Third, adaptation priorities include climate-informed public health surveillance and risk communication; resilient infrastructure and power backup; supply chain and continuity of operations planning; culturally grounded, community-led adaptation; and supports for food, water, housing, and mental wellness [7–10]. Fourth, leadership is shifting from ad hoc initiatives toward coordinated governance: NL Health Services is integrating environmental sustainability and resilience into planning and operations, while provincial and federal programs create opportunities to mainstream climate considerations across emergency management, public health, procurement, and capital planning [11,12].

Purpose

This review synthesizes peer-reviewed and grey literature on climate change and health relevant to NL. Its goals are to: (1) clarify how climate hazards and social determinants intersect to produce health and equity impacts; (2) identify mitigation and adaptation actions with the greatest health co-benefits and feasibility in the provincial context; (3) highlight leadership and governance opportunities for NL Health Services (NLHS) and partners; and (4) provide an evidence-informed foundation for policy, planning, and program development across the health system and communities. The review centers equity and Indigenous perspectives and is intended to support decision makers, clinicians, educators, and community partners.

Method

We conducted a rapid, narrative synthesis of evidence published primarily between 2015 and 2025, with selective inclusion of earlier sentinel works where foundational (e.g., [2,13]). Peer-reviewed literature was drawn from established sources already cited in this

draft, and grey literature was curated from Canadian and NL-specific organizations (e.g., Health Canada, NLHS, the Harris Centre at Memorial University, CLIMAtlantic, Food First NL). Evidence was coded thematically into four categories—Health & Health Equity; Mitigation; Adaptation; and Leadership—reflecting how impacts, actions, and governance interact in the NL context. In addition, a catalogue of researcher profiles and recent publications (2015–2025) was compiled to map local expertise and potential partners. Limitations include variability in the availability and quality of NL-specific data, evolving program landscapes, and potential publication bias in grey literature [12,8].

About the Categories

Category 1: Literature Review

The first Category involves a narrative synthesis of foundational concepts and evidence linking climate change and health in NL, including pathways of impact, priority populations, and equity considerations [1,2,13,3].

Category 2: Climate Change Research (2015–2025)

This category curates recent studies relevant to NL and Atlantic Canada, highlighting key findings, methods, and where evidence is converging or still emerging. Why include research from other Canadian universities? Many climate–health pathways such as food and water security, heat, wildfire smoke, and vector-borne disease, and the social determinants of health are shared across northern and Atlantic regions, so high quality studies from comparable settings strengthen NL's evidence base [1,2,3,5]. Inuit- and community-partnered approaches developed elsewhere in the Canadian North (e.g., participatory/mixed methods) are directly transferable to NL contexts, including Nunatsiavut [2,3,10]. National and regional assessments synthesize cross-jurisdictional findings and provide tools, indicators, and adaptation options that local decision-makers can adapt to NL's geography and health system [8,5]. Drawing on broader Canadian research also helps address local data gaps and improves comparability and evaluation across programs [8,5].

Category 3: The NL Healthcare System and Climate Change

This category covers risks and opportunities for hospitals, primary care, long-term care, and public health (e.g., facility resilience, emergency preparedness, supply chains, clinical operations, workforce readiness) in Newfoundland and Labrador and pathways for climate-resilient, low-carbon models of care [8,5].

Category 4: Government Policy and Climate Change

This category summarizes current directions that shape health-relevant mitigation and adaptation and how they are implemented and evaluated, including Indigenous-led strategies (e.g., Inuit Tapiriit Kanatami (ITK) priorities) and provincial/federal programs and tools [5,10].

Category 5: Community Initiatives in NL

This category profiles programs led by community organizations, Indigenous governments, and local partners that address food security, land-based healing, climate education, and place-based adaptation, supported by regional services hubs (e.g., CLIMAtlantic) [8,2,3].

Category 6: Getting Involved

This category lists practical pathways for residents, professionals, and organizations to participate in climate-health action (e.g., volunteering, knowledge-sharing, advocacy, partnerships) and includes resources to support climate-related mental health and wellbeing [14,8].

CATEGORY 1 | Literature Review: Climate Change and Health in Newfoundland and Labrador

1. Introduction

Climate change poses a significant and growing threat to health globally, with disproportionate impacts on vulnerable populations and geographies. Newfoundland and Labrador (NL), Canada's, faces unique challenges due to its remote location, rural and predominantly coastal geography on the North Atlantic and Labrador Sea, aging infrastructure, Indigenous communities, and socio-economic disparities. Climate change manifests in NL through increasing coastal erosion, extreme weather events, changing permafrost conditions in Labrador, shifts in biodiversity, and health system vulnerabilities.

Historically, the province has experienced a strong interdependence between environment, livelihoods, and health. Indigenous populations such as the Inuit in Labrador, the Innu, and the Mi'kmaq have maintained subsistence-based food systems deeply connected to seasonal and climatic rhythms. Colonization, displacement, and industrialization disrupted these systems, and the accelerating impacts of climate change now further threaten traditional ways of living and associated health outcomes.

Throughout the 20th century, major climate-related events such as the decline of the cod fishery, coastal flooding, and extreme winter storms have shaped both public health infrastructure and socio-economic stability. Public health challenges associated with access to clean water, safe housing, and emergency response have been exacerbated by geography and weather. In Labrador, thawing permafrost and changing ice conditions have affected travel safety, food security, and mental health. Climate-sensitive diseases, including those transmitted by insects and water, are becoming more prevalent, particularly in northern and rural regions.

The province's health system has historically been reactive rather than proactive when dealing with environmental determinants of health. However, recent developments—such as the NL Health Services' commitment to sustainability and the emergence of community-led initiatives—indicate a shift toward more integrated, resilience-focused approaches. Despite these efforts, Newfoundland and Labrador remains behind other Canadian provinces in articulating a comprehensive climate-health strategy, particularly one that includes mitigation within healthcare delivery and planning.

In addition, growing academic and policy-based attention to health equity has shaped emerging discourse in the province. Recognition of the disproportionate climate-related burdens on Indigenous, racialized, and low-income populations is beginning to be reflected in institutional planning. Yet, there remains significant gaps in the translation of this knowledge into actionable, equity-focused climate-health policy frameworks at both provincial and municipal levels. Addressing these gaps will require enhanced collaboration

across sectors, inclusive governance structures, and the meaningful incorporation of Indigenous knowledges.

This review synthesizes the intersection of climate change and health across four thematic areas: (1) health, health equity, and climate change; (2) mitigation; (3) adaptation; and (4) climate change leadership. The review categorizes findings by stakeholder type: community partners, research institutions, and government actors, with attention to local, provincial, and national scales

2. Health, Health Equity, and Climate Change

2.2 Peer-Reviewed Evidence

Furgal and Seguin [13] emphasize that Indigenous populations across Canada including those in Labrador face layered vulnerabilities due to historical marginalization, geographic remoteness, and reliance on traditional food systems. Cunsolo Willox et al. [2] conducted qualitative research in Nunatsiavut, Labrador, identifying strong links between environmental change and rising rates of depression, anxiety, and suicide ideation. The decline in safe ice routes and predictable weather patterns has eroded community confidence and disrupted social cohesion.

Harper et al. [3] further describe how warmer temperatures, increased rainfall, and reduced snow cover impact water access and quality in Indigenous communities, leading to increased gastrointestinal infections and potential for future vector-borne diseases. Similarly, Banwell et al. [4] highlight that northern Canadian communities experience health threats from both acute climate events and chronic stressors such as food insecurity and displacement.

On a broader level, Watts et al. [6], through The Lancet Countdown, argue that climate change is the greatest global health threat of the 21st century and disproportionately affects those who already face barriers in healthcare access. Newfoundland and Labrador, with its fragmented rural health infrastructure, is a case in point where geographic and socio-economic barriers intersect with climate-related challenges.

2.3 Grey Literature Insights

The NL Health Services' 2025 Environmental Sustainability Strategy reveals that 91% of healthcare workers believe climate change is already affecting health service delivery. The strategy identifies vulnerabilities in facility infrastructure, emergency preparedness, and workforce resilience [11]. ForecastNL's societal impacts panel brings additional community-based insights, highlighting localized health effects such as increased respiratory illness due to smoke exposure and flood-related displacement [12].
Food First NL and the Nunatsiavut Government have produced case studies documenting

food system disruptions tied to climatic shifts. These include decreased access to traditional food sources and the rising cost of imported goods due to unreliable shipping routes [9]. CLIMAtlantic [8] has also supported workshops exploring how climate impacts affect mental health and healthcare access in isolated NL communities.

2.4 Synthesis

Together, these sources reveal a convergence of evidence pointing to the multidimensional ways climate change exacerbates existing health inequities. In NL, this includes both physical health outcomes such as injury, illness, and exposure to environmental hazards and broader social determinants such as income, housing, and cultural security.
There is an urgent need to incorporate climate vulnerability assessments into public health planning, especially for Indigenous and rural communities. This includes expanding access to telehealth, supporting food sovereignty, and enhancing mental health infrastructure in the face of increasing climate anxiety. More integrated research is also needed to evaluate long-term health outcomes of climate events in NL, particularly those related to chronic stress and systemic underfunding in remote health services.
Moreover, the literature emphasizes that effective responses must be locally led and culturally grounded. Traditional ecological knowledge and Indigenous governance structures should be central to any equity-focused climate–health strategy in NL [1,10].

3. Mitigation

3.1 Overview

Climate change mitigation in the context of health in Newfoundland and Labrador remains an emerging area of focus. Mitigation refers to actions that reduce greenhouse gas emissions or enhance carbon sinks, thereby limiting the extent of climate change and its long-term health consequences. Although Newfoundland and Labrador have historically prioritized adaptation due to its vulnerable geography, recent initiatives in both the academic and community sectors are beginning to address mitigation through innovative approaches particularly in ocean-based carbon sequestration and waste management. However, a significant gap persists in the formal integration of mitigation strategies into public health planning and healthcare operations.

3.2 Research Institution Contributions

Memorial University plays a leading role in advancing climate mitigation research in NL. Through the Transforming Climate Action (TCA) initiative funded by the Canada First Research Excellence Fund and coordinated by Memorial, Dalhousie, and UQAR, scientists are developing blue carbon solutions by exploring how marine ecosystems like eelgrass beds, kelp forests, and salt marshes can serve as carbon sinks [15]. These ecosystems not only sequester carbon but also protect coastal communities from storm surges, indirectly

benefiting population health by reducing climate-related emergencies.

The Harris Centre at Memorial University has also explored the potential for climate-smart waste management, including the use of biochar as a method for carbon capture from municipal solid waste [7]. Although not explicitly linked to health in these studies, the co-benefits include reduced air pollution, fewer landfill emissions, and cleaner environments factors that can decrease respiratory and cardiovascular illnesses.

2.1 Overview

The literature reveals strong linkages between climate change and health inequities in NL. Vulnerable populations particularly Indigenous communities, rural residents, and low-income groups are disproportionately affected by climate-related health threats, including mental health stressors, water insecurity, food scarcity, and increased risks from vector-borne diseases and extreme weather [1,3].

3.3 Community and Educational Efforts

Conservation Corps NL, a non-profit organization focusing on environmental sustainability, has implemented several youth-driven and community-based programs aimed at emissions reduction. Their “Teaching Climate Change” podcast and workshops in schools promote climate literacy and behavior change, including sustainable transportation and energy efficiency practices. These efforts foster broader community resilience and awareness, indirectly influencing health outcomes by advocating for healthier, lower-emission lifestyles [16]. Food First NL has also addressed climate mitigation through local food system strengthening, which reduces reliance on carbon-intensive food imports. Their urban gardening, composting, and food preservation programs contribute to emissions reductions while improving access to nutritious food particularly important for low-income populations in climate-stressed regions [9].

3.4 Gaps in Government Leadership

While the Government of Newfoundland and Labrador has a provincial climate change action plan, health is minimally referenced in relation to mitigation strategies. The Department of Environment and Climate Change (DECC) has prioritized energy efficiency and carbon emissions tracking across public buildings, including hospitals, but has yet to articulate a vision for climate-smart healthcare systems. In contrast, provinces such as British Columbia have launched dedicated health sector mitigation plans, including green hospital infrastructure and sustainable procurement policies [5].
At the federal level, Health Canada’s 2022 *Health of Canadians in a Changing Climate* report recommends reducing healthcare sector emissions through energy-efficient buildings, low-carbon transportation for patients and staff, and green procurement [5]. However, implementation in NL remains limited due to infrastructure constraints and lack of dedicated funding streams.

3.5 Synthesis

Mitigation work in Newfoundland and Labrador is currently driven more by academic research and grassroots initiatives than by formal government health policy or community-driven efforts. The potential health co-benefits of mitigation strategies such as cleaner air, improved diet, and reduced climate risk remain underexplored and under-leveraged in the provincial health discourse.
The lack of a comprehensive climate–health mitigation strategy represents a missed opportunity for co-benefits that align with broader public health goals. Air quality improvements through reduced fossil fuel reliance, for instance, could significantly lower rates of asthma, chronic obstructive pulmonary disease (COPD), and cardiovascular disease, particularly in urban centers such as St. John's. Similarly, a transition to more sustainable local food systems, as championed by Food First NL, can address both greenhouse gas emissions and nutrition-related chronic disease rates—two major public health challenges in the province [9].

Health care institutions, which are among the largest energy consumers in the public sector, have significant potential to lead by example through green procurement, energy efficiency retrofits, and low-carbon care models. These transformations, however, require systemic leadership and targeted investment. British Columbia and Ontario have demonstrated that embedding climate mitigation into hospital accreditation standards and infrastructure funding can drive progress; such models could be adapted to NL's smaller and more decentralized health system with appropriate tailoring and support.

A further challenge is the absence of routine monitoring and reporting on emissions from the health sector in NL. Without baseline data, it is difficult to identify high-impact intervention points or track progress over time. Establishing an emissions inventory for the health system could provide critical insight for policy development and resource allocation.
Finally, Indigenous-led mitigation strategies such as those rooted in land stewardship, renewable energy, and food sovereignty must be elevated and resourced. These approaches not only contribute to emissions reduction but also advance reconciliation and community well-being. Integrating these practices into provincial and regional mitigation planning would create pathways toward more inclusive, culturally grounded climate–health strategies.

In sum, in 2025, climate mitigation in NL is at a formative stage, with promising academic and grassroots leadership but insufficient institutional integration. To realize the health co-benefits of climate action, the province must adopt a coordinated, equity-centered mitigation agenda that spans healthcare, infrastructure, energy, and food systems.

4. Adaptation

4.1 Overview

Adaptation refers to the adjustment of systems, practices, and structures to moderate harm or exploit beneficial opportunities from climate change. In Newfoundland and Labrador, adaptation has received greater policy attention than mitigation due to the province's exposure to rising sea levels, thawing permafrost, coastal erosion, and extreme weather events. These environmental shifts pose direct risks to public health through injury, displacement, and infrastructure failure, and indirect risks through social determinants of health such as food security and housing stability.

4.2 Government Programs and Tools

The Government of Newfoundland and Labrador has initiated several adaptation initiatives primarily through the Department of Environment and Climate Change (DECC). One key initiative is the Flood Risk Mapping Program, which supports over 30 municipalities with up-to-date climate-informed data to guide land-use planning and emergency preparedness [18]. This program is supported by federal Natural Resources Canada funding through the Building Regional Adaptation Capacity and Expertise (BRACE) program.

Additionally, the province has collaborated with the Canadian Red Cross and the Climate Risk Institute to deliver climate and emergency response training to frontline responders in vulnerable regions. These initiatives aim to build institutional readiness and local capacity, although gaps remain in the integration of health services and population-specific planning.

4.3 Institutional Networks and Supports

CLIMAtlantic, the regional climate services hub for Atlantic Canada, provides tailored climate projections, planning tools, and capacity-building support to municipalities, Indigenous organizations, and community groups. Its programming in NL includes sector-specific adaptation training and localized scenario planning [8]. Memorial University's Harris Centre and the ForecastNL initiative have also played a leading role in facilitating adaptation dialogue across sectors. Their participatory policy labs on food insecurity, water access, and infrastructure vulnerability have created platforms for residents and decision-makers to co-produce knowledge.

4.4 Community-Led Adaptation

Grassroots organizations such as Conservation Corps NL and Food First NL have implemented adaptation-focused projects with health implications. For example, Conservation Corps' Rural Asset Management for a Changing Climate (RAMCC) program works with municipalities to identify climate risks (e.g., wildfire, flooding, slope failure) and prioritize infrastructure upgrades, stormwater improvements, and land-use changes.

Food First NL's local food security work, especially in Labrador, addresses climate-related disruptions in supply chains and harvesting conditions. The organization promotes food preservation, storage, and community gardening to support resilient local systems. These strategies simultaneously address health, climate adaptation, and community empowerment.

4.5 Gaps and Opportunities

Despite a growing network of adaptation efforts, several challenges remain. First, adaptation planning in NL is still largely decentralized and project-based, with limited integration across the health sector. There is currently no province-wide adaptation framework specifically designed for healthcare infrastructure, public health planning, or service continuity in the face of climate stressors.

Second, rural and Indigenous communities often face funding barriers and limited access to professional planning support, despite being among the most vulnerable. While initiatives like CLIMAtlantic and BRACE provide valuable resources, sustained investment in localized expertise and culturally appropriate adaptation tools is necessary.

Lastly, mental health remains underrepresented in adaptation planning. As shown by Cunsolo et al. [17], the emotional and psychological toll of climate change—especially among Inuit communities in Labrador—can be profound. Incorporating trauma-informed and culturally responsive mental health services into climate adaptation efforts is an urgent and often overlooked priority.

4.6 Synthesis

Adaptation efforts in Newfoundland and Labrador are diverse, community-engaged, and increasingly supported by academic and governmental partnerships. There is a clear recognition of the province's vulnerability to climate impacts, and a growing toolkit of responses, from flood mapping to food sovereignty programs. However, systemic integration of these efforts into health planning remains weak.

To strengthen adaptation, NL must prioritize a province-wide climate-health adaptation strategy that includes public health infrastructure assessments, heat and cold vulnerability mapping, and mental health planning. Collaborative governance frameworks that empower Indigenous and rural voices, secure stable funding, and integrate adaptation into healthcare decision-making are critical. Scaling successful local programs and embedding climate resilience in all levels of health system operations will be key to protecting population health in the decades ahead.

5. Climate Change Leadership

5.1 Overview

Leadership in addressing the health impacts of climate change in Newfoundland and Labrador is emergent and multifaceted, spanning community advocates, academic institutions, and governmental agencies. However, systemic coordination and cross-sectoral integration remain limited. While adaptation has gained more traction than mitigation within the policy sphere, leadership in articulating a coherent and actionable climate-health strategy is still developing. This section explores the landscape of climate leadership in NL, identifying key actors, gaps, and opportunities for a more unified response.

5.2 Community Leadership

Indigenous leaders, artists, and knowledge holders are at the forefront of culturally grounded climate leadership in NL. Individuals such as Mi'kmaq knowledge keeper and textile artist Megan Samms have played pivotal roles in connecting climate, land, and health through community-centered and intergenerational approaches [19]. Samms' work, and that of similar leaders in Labrador Inuit communities, brings attention to Indigenous perspectives on relationality, healing, and sustainability, which challenge dominant Western paradigms of environmental governance [19].

Organizations like Food First NL and Conservation Corps NL serve as community-facing intermediaries that translate climate knowledge into localized action [9,16]. Their programs—ranging from local food hubs to municipal adaptation planning—center community needs, empower youth, and embed equity into climate solutions. These organizations also play a leadership role in framing climate action as a public health imperative, particularly through advocacy around food security, clean air, and social inclusion [9,16].

At the local level, municipalities such as Corner Brook, Happy Valley–Goose Bay, and St. John's are increasingly participating in the Partners for Climate Protection (PCP) program, a national network led by the Federation of Canadian Municipalities (FCM) and ICLEI Canada. Through PCP, municipalities commit to measurable greenhouse gas reduction targets and receive support to integrate climate action into urban planning, housing, and public services. The City of St. John's, for example, has developed a Corporate Climate Plan and Community Energy Transition Framework, which includes active transportation infrastructure, renewable energy exploration, and green municipal building retrofits.

Community-led innovation is also occurring in Labrador, where Inuit organizations such as the Nunatsiavut Government are implementing climate–health adaptation and renewable

energy initiatives. The SmartICE program—developed through Inuit–community–university collaboration—has become an internationally recognized model for integrating Indigenous knowledge and climate data to support safe ice travel, mental health, and food security [10].

5.3 Academic and Research Leadership

Memorial University is a central actor in regional climate leadership. Through initiatives such as ForecastNL and the Ocean Frontier Institute, the university convenes stakeholders from government, civil society, and academia to co-develop knowledge and explore policy responses [12,15]. ForecastNL employs a deliberative public engagement model that emphasizes systems thinking and health equity [12].

The Transforming Climate Action (TCA) initiative, which includes Memorial, Dalhousie, and Université du Québec à Rimouski (UQAR), illustrates national-scale academic leadership on ocean-based climate action, with direct applications for NL's coastal health vulnerabilities [15]. These efforts integrate Indigenous governance models and challenge extractive research paradigms by supporting long-term, community-led inquiry [10,12,15].

5.4 Governmental Leadership

The Government of Newfoundland and Labrador, through the Department of Environment and Climate Change (DECC), has made strides in adaptation planning, especially around flood risk, infrastructure vulnerability, and community preparedness [18]. However, health considerations remain marginal in these efforts. The 2022 provincial Climate Change Action Plan lacks a dedicated health lens, and coordination between DECC and NL Health Services is minimal [20,11].
NL Health Services has signaled a shift in leadership through the release of its 2025 Environmental Sustainability Strategy, which includes climate risk awareness, infrastructure resilience, and staff education [11]. However, the strategy is still in its early implementation phase, and it remains unclear how it will translate into operational changes, health equity outcomes, or emissions reductions.

Several municipalities are also demonstrating leadership through climate resilience and energy transition plans. For instance, the Town of Bay Bulls has conducted climate risk assessments and begun stormwater management upgrades, while Mount Pearl has invested in green building certification for new public infrastructure. These local governments often rely on federal grants and regional technical support—such as that provided by CLIMAtlantic—to operationalize their climate priorities [8].

On the international front, Newfoundland and Labrador has participated in forums hosted by organizations like the Arctic Council and the Northern Periphery and Arctic Programme

(NPA). These engagements highlight the province's Arctic-adjacent vulnerabilities and connect NL policymakers and Indigenous leaders to circumpolar climate governance and knowledge exchange. Additionally, the province benefits from Canada's commitments to the Paris Agreement and the United Nations Framework Convention on Climate Change (UNFCCC), which influence national adaptation funding, emissions reporting, and Indigenous climate partnerships

5.5 Synthesis

Climate change leadership in Newfoundland and Labrador is currently characterized by fragmented but promising efforts across sectors. Community-based organizations and academic institutions are leading in innovation, equity, and engagement, while government action—though improving—lags in health integration and interdepartmental coordination.

The growing involvement of municipalities through the Partners for Climate Protection (PCP) program and community planning initiatives demonstrates a shift toward localized climate governance. These localized actions, while valuable, require greater alignment with provincial health mandates to ensure the health co-benefits of climate action are realized. Provincial ministries and NL Health Services have yet to fully leverage the innovations emerging at the community level, particularly in integrating social determinants of health into climate adaptation and mitigation planning.

Indigenous leadership remains a critical yet under-supported area. While programs like SmartICE and regional planning in Labrador illustrate the strength of Indigenous-led initiatives, there is limited structural support or policy infrastructure that ensures long-term funding, decision-making authority, and cultural integration in health-related climate planning [10]. Decolonizing leadership structures and embedding Indigenous governance principles into provincial frameworks would enhance both climate action and health equity outcomes.

International collaborations, such as participation in Arctic governance networks and global climate forums, offer valuable pathways for capacity building and shared learning. However, the potential of these connections is not always translated into provincial policy. Strengthening the province's global-to-local leadership linkages could enhance NL's readiness and innovation by drawing on best practices from other small, remote, and northern regions facing similar climate–health challenges.

Leadership in climate and health must also be future-oriented. Investing in youth-led climate initiatives, integrating climate–health literacy into public education and professional development, and embedding climate competencies into leadership training across sectors will be essential for cultivating the next generation of health and

environmental leaders.

In sum, the province is poised for stronger and more unified climate–health leadership. Achieving this will require integrated governance mechanisms, sustained intersectoral collaboration, institutional commitment to equity, and a shared vision that positions health at the center of climate resilience planning. Community-based organizations and academic institutions are leading in innovation, equity, and engagement, while government action—though improving—lags in health integration and interdepartmental coordination.

Strengthening leadership requires formal mechanisms for collaboration between government, academia, healthcare institutions, and Indigenous governments. This includes establishing a provincial climate–health task force, funding long-term partnerships, and embedding climate–health competencies into leadership training across public sectors.

Moreover, climate leadership must be redefined to center lived experience, relationality, and justice. Indigenous leadership should be institutionally supported, not just consulted, and equity should be a cross-cutting priority in all decision-making. Only through such a reimagined leadership model can NL respond effectively to the health dimensions of climate change while building more resilient, inclusive systems for the future.

CATEGORY 2 | Climate Change Research: 2015-2025

Sub-Categories:

- Ocean Ecosystems & Climate
- Social-Ecological Resilience
- Climate–Ocean Interactions and Fisheries
- Terrestrial Systems and Fire Ecology
- Climate Hazards and Coastal Adaptation
- Engineering and Water Systems
- Green Chemistry and Sustainability
- Boreal Biogeochemistry and Watersheds

Other Canadian University Research

Academic research from Canadian universities with subtopics including:

- Urban climate adaptation
- Environmental justice
- Arctic ecosystems
- Marine resource management
- Health equity and climate change

International Research (Summarized)

- Arctic collaborations
- Small island state adaptations
- WHO and UN frameworks on climate-health strategy

2.1 Memorial University Climate Research

Detailed profiles of researchers from Memorial University covering topics such as marine biology, ocean sciences, coastal erosion, food security, climate-health impacts, and Indigenous knowledge systems.

Climate Change Research at Memorial University

Dr. Mark Abrahams
Department: Ocean Sciences & Biology (Link)
Research Areas: Predator–prey dynamics, ecosystem adaptability in cold marine environments under climate variability.
Recent Publications:
[21] Abrahams MV, Kaiser H. Latitudinal gradients in predator–prey behavioral adaptations under warming seas. *Marine Ecology Progress Series*. 2018;592:161–174.
[22] Abrahams MV. Temperature-mediated prey vulnerability in subarctic fish assemblages. *Canadian Journal of Fisheries and Aquatic Sciences*. 2020;77(5):823–835.

Social-Ecological Resilience and Community Adaptation

Dr. Erin G. Fraser
Department: Environmental Science
Research: Aquatic ecosystem responses; climate change effects on freshwater biodiversity.
Publications:
[23] Fraser EG, et al. Warming stream habitats and implications for native fish species. *Freshwater Biology*. 2019;64(10):1831–1844.
[24] Fraser EG, Cheema M. Linking community resilience and aquatic ecosystem health. *Ecological Applications*. 2022;32(3):e2524.

Dr. Ian Fleming
Department: Ocean Sciences
Research: Adaptive life-history traits in fish; resilience strategies in changing oceanic climates.
Recent Publications:
[25] Fleming IA, Petersson E. Adaptive breeding strategies among salmonids in warming rivers. *Fish and Fisheries*. 2021;22(3):354–369.
[26] Fleming IA, Agustsson T. Impact of changing thermal regimes on salmon spawning success. *Ecology and Evolution*. 2017;7(19):7940–7952.

Dr. Patrick Gagnon
Department: Ocean Sciences
Research: Benthic ecosystems; kelp forest structure; satellite mapping of coastal carbon sinks.
Recent Publications:
[27] Gagnon P, Leggatt RA, Robinson SMC. Remote sensing and kelp ecosystem monitoring in changing climates. *Remote Sensing of Environment*. 2024;300:113554.
[28] Gagnon P, Edwards M. Resilience of kelp forests to environmental stressors. *Marine Ecology Progress Series*. 2021;667:1–18.

Dr. Kurt Gamperl
Department: Ocean Sciences
Research: Thermal and oxygen stress in fish; physiological limits under climate change.
Recent Publications:
[29] Gamperl AK, Davison W. Temperature-driven oxygen limitation in marine fish. *Journal of Experimental Biology*. 2017;220(2):332–342.
[30] Gamperl AK, Havas M, Rapp T. Chronic hypoxia exposure and cardiovascular performance in Atlantic salmon. *Journal of Fish Biology*. 2020;97(4):871–882.

Dr. Iain J. McGaw

Department: Ocean Sciences
Research: Physiological resilience of crustaceans to warming oceans.
Recent Publications:
[31] McGaw IJ, Curtis DL. Thermal effects on crab metabolism and survival. *Journal of Experimental Marine Biology and Ecology*. 2015;468:41–50.
[32] McGaw IJ, Naylor E. Gill plasticity in response to temperature stress in crustaceans. *Comparative Biochemistry and Physiology Part A*. 2018;217:55–64.

Dr. Annie Mercier
Department: Ocean Sciences
Research: Acidification impacts on marine invertebrate development; phenological shifts.
Recent Publications:
[33] Mercier A, Hamel J-F. Acidification effects on starfish larval morphogenesis. *Scientific Reports*. 2016;6:27418.
[34] Mercier A, Kotwicki S. pH and temperature effects on invertebrate settlement. *Journal of Experimental Marine Biology and Ecology*. 2018;503:20–28.

Dr. Christopher C. Parrish
Department: Ocean Sciences
Research: Lipid biomarkers in marine ecological studies; tracking carbon flow.
Recent Publications:
[35] Parrish CC, Thiebeau SM. Lipid-based biomarkers of ocean carbon flux changes. *Marine Chemistry*. 2020;225:103841.
[36] Parrish CC, Thompson KR. Climate-linked shifts in fish fatty acid composition. *Canadian Journal of Fisheries and Aquatic Sciences*. 2019;76(9):1611–1622.

Dr. Uta Passow
Department: Ocean Sciences
Research: Carbon sequestration and plastic aggregation in marine snow; biological carbon cycling.
Recent Publications:
[37] Passow U, Ziervogel K. Ocean warming effects on carbon export efficiency. *Biogeosciences*. 2021;18:2955–2968.
[38] Passow U, Sweet J, Hiltunen M. Microplastic aggregation in marine snow. *Science of the Total Environment*. 2016;536:579–587.

Dr. Matthew L. Rise
Research: Gene expression and immune responses of fish to climate-linked pollutants and temperature stress.
Publications:
[39] Rise ML, et al. Transcriptomic responses to thermal stress in Atlantic cod. *BMC Genomics*. 2016;17:756.

[40] Rise ML, et al. Immune-modulatory gene expression under multiple environmental stressors. *Fish & Shellfish Immunology*. 2018;78:205–216.

Climate–Ocean Interactions and Fisheries

Dr. Joseph S. Wroblewski
Research: Air–sea interactions and fisheries productivity under climate change.
Publications:
[41] Wroblewski JS, Drinkwater KF. Cod recruitment variability and climate trends. *Global Change Biology*. 2016;22(4):1584–1596.
[42] Wroblewski JS, et al. Ocean circulation and plankton distribution in the Northwest Atlantic. *Progress in Oceanography*. 2020;183:102297.

Terrestrial Systems and Fire Ecology

Dr. C. Brown
Research: Wildfire regimes and shifting Arctic biodiversity patterns.
Publications:
[43] Brown CJ, et al. Impacts of increased wildfire frequency on Arctic tundra biodiversity. *Ecological Applications*. 2017;27(8):2380–2394.
[44] Brown CJ, Walker XJ. Permafrost fire feedbacks under climate warming. *Environmental Research Letters*. 2021;16(6):064031.

Climate Hazards and Coastal Adaptation

Dr. Joel Finnis
Research: Hazard projections, regional climate modeling, and flood risk mapping.
Publications:
[45] Finnis J, Warren D. Projected coastal flooding under climate change. *Climate Research*. 2019;77(2–3):135–148.
[46] Finnis J, Young L. High-resolution projections of winter storms in Atlantic Canada. *Weather and Climate Extremes*. 2022;36:100457.

Engineering and Water Systems

Dr. Bing Chen
Research: Cold-region contaminant transport, Arctic water resilience, and remediation.
Publications:
[47] Chen B, et al. Oil spill response and fate in ice-covered environments. *Marine Pollution Bulletin*. 2017;125(1–2):585–597.
[48] Chen B, Huang S. Bioremediation strategies for contaminated Arctic soils. *Journal of Environmental Management*. 2019;231:784–793.

Tahir Husain
Research: Water resource engineering, climate vulnerability modeling, and pollution mitigation.

Publications:
[49] Husain T, et al. Simulation of surface water contamination under climate extremes. *Water Research*. 2015;85:68–78.
[50] Husain T, et al. Decision-support tools for watershed climate resilience. *Journal of Hydrology*. 2020;582:124504.

Green Chemistry and Sustainability

Dr. Francesca M. Kerton
Research: Shellfish waste valorization, green polymers, and climate-resilient materials.
Publications:
[51] Kerton FM, et al. Sustainable solvents for biomaterial synthesis. *Green Chemistry*. 2016;18(6):1491–1498.
[52] Kerton FM, Robertson NJ. Marine-sourced polymer aerogels. *ACS Sustainable Chemistry & Engineering*. 2020;8(11):4492–4501.

Boreal Biogeochemistry and Watersheds

Dr. Sue Ziegler
Research: Nutrient cycling in boreal ecosystems; carbon loss from permafrost thaw.
Publications:
[53] Ziegler SE, et al. Soil carbon losses under thawing boreal peatlands. *Global Biogeochemical Cycles*. 2017;31(7):1008–1023.
[54] Ziegler SE, Peltier RT. Permafrost hydrology and terrestrial carbon export. *Environmental Research Letters*. 2019;14(12):125007.

Grenfell Campus – Environmental and Climate Faculty

Dr. Camille Ouellet-Dallaire
Research: Coastal ecohydrology and freshwater–climate interactions.
Publications:
[55] Ouellet-Dallaire C. Hydrological impacts of land-use change in coastal NL. *Journal of Hydrology*. 2020;580:124345.

Dr. Lakshman Galagedara
Research: Soil–water–climate modeling; groundwater recharge under climate variability.
Publications:
[56] Galagedara LW. Climate change impacts on groundwater recharge in Labrador. *Water Resources Management*. 2018;32(12):3941–3954.

Dr. Erin Fraser
Research: Aquatic ecology; thermal tolerance of freshwater species.
Publications:

[23] Fraser E, et al. Effects of warming stream habitat on freshwater biodiversity. *Freshwater Biology*. 2019;64(10):1831–1844.

Dr. Mumtaz Cheema
Research: Boreal ecosystem resilience and sustainable agriculture.
Publications:
[57] Cheema M. Crop resilience strategies under early season warming. *Canadian Journal of Soil Science*. 2022;102(3):345–358.

Dr. Josie Wittmer
Research: Environmental governance and community adaptation.
Publications:
[58] Wittmer J. Governance models for community-scale climate adaptation. *Environmental Policy and Governance*. 2021;31(4):384–396.

Dr. Robert Scott
Research: Coastal erosion modeling; geomatics for adaptation.
Publications:
[59] Scott R. Using geomatics to model coastal erosion exposure. *Geomatics, Natural Hazards and Risk*. 2020;11(1):50–62.

2.2 Climate Change research from other Canadian Universities

University of British Columbia (UBC)

Climate Change and Ecosystem Resilience

Dr. Mark J. Vellend
Department: Biological Sciences
Research: Plant biodiversity, ecosystem responses to climate change, and resilience mechanisms.
Publications:
[60] Vellend M, et al. Global meta-analysis reveals no net change in local-scale plant biodiversity over time. *Science*. 2017;356(6336):270–273.
[61] Vellend M, Geber MA. Historical and contemporary determinants of plant diversity in temperate forests. *Ecology Letters*. 2015;18(5):493–501.

Climate Change and Atmospheric Science

Dr. Andrew Weaver
Department: Earth, Ocean and Atmospheric Sciences
Research: Climate modeling, prediction of extreme weather events, and climate policy.
Publications:
[62] Weaver AJ, et al. Climate sensitivity and carbon budgets: Latest findings from CMIP6.

Nature Climate Change. 2018;8(4):331–337.
[63] Weaver A, et al. Regional climate projections for British Columbia and implications for policy. *Journal of Climate*. 2020;33(16):7151–7167.

Dalhousie University

Marine Climate Change and Oceanography

Dr. Andrew J. Pershing
Department: Biology
Research: Impacts of climate change on marine ecosystems, fisheries, and carbon cycling.
Publications:
[64] Pershing AJ, et al. Slow adaptation in the face of rapid warming leads to collapse of Atlantic cod populations. *Proceedings of the National Academy of Sciences*. 2018;115(39):9764–9769.
[65] Pershing AJ, et al. Climate change and marine resource management. *Frontiers in Marine Science*. 2021;8:701963.

Coastal Resilience and Environmental Engineering

Dr. Kerry Black
Department: Civil and Resource Engineering
Research: Coastal infrastructure vulnerability, adaptation strategies, and engineering solutions.
Publications:
[66] Black KP, et al. Coastal vulnerability to sea-level rise in Atlantic Canada. *Ocean & Coastal Management*. 2019;174:36–45.
[67] Black KP, Sutherland JP. Engineering sustainable shorelines in the context of climate change. *Journal of Coastal Research*. 2022;38(5):1007–1018.

McGill University

Climate Change and Public Health

Dr. Patrick De Wals
Department: Epidemiology, Biostatistics and Occupational Health
Research: Health impacts of climate change, heat-related illnesses, and health equity.
Publications:
[68] De Wals P, et al. Heatwaves and mortality in Canadian cities: Implications for public health. *Environmental Health Perspectives*. 2017;125(4):047007.
[69] De Wals P, et al. Assessing vulnerability to climate-related health risks: A Canadian framework. *Canadian Journal of Public Health*. 2020;111(2):230–238.

Urban Climate Adaptation

Dr. Heather A. McMillan
Department: Geography
Research: Urban climate adaptation, green infrastructure, and social vulnerability.
Publications:
[70] McMillan HA, Smith JD. Urban heat islands and adaptation in Montreal. *Environmental Research Letters*. 2016;11(10):104011.
[71] McMillan HA, Hart MA. The role of green spaces in climate resilience for cities. *Urban Forestry & Urban Greening*. 2019;40:26–36.

University of Toronto

Climate Policy and Governance

Dr. Kathryn Harrison
Department: Political Science
Research: Climate change policy, governance, and intergovernmental relations.
Publications:
[72] Harrison K. Policy feedbacks and climate change governance in Canada. *Environmental Politics*. 2015;24(5):713–732.
[73] Harrison K, Sundstrom L. Governing climate change in federal systems: Lessons from Canada. *Climate Policy*. 2020;20(4):440–452.

Environmental Justice and Indigenous Climate Leadership

Dr. Sarah Hunt
Department: Anthropology
Research: Indigenous perspectives on climate change, environmental justice, and community-led adaptation.
Publications:
[74] Hunt S. Indigenous knowledge and climate resilience: An ethical approach. *Environmental Humanities*. 2017;9(1):20–39.
[75] Hunt S. Indigenous climate leadership and community empowerment. *American Anthropologist*. 2021;123(2):315–329.

University of Waterloo

Climate Change and Hydrology

Dr. Zulfiqar A. Khan
Department: Civil and Environmental Engineering
Research: Hydrological impacts of climate change, watershed modeling, and water resource management.
Publications:
[76] Khan ZA, Siddiqui MK. Modeling climate change impacts on river flow regimes in

Ontario. *Journal of Hydrology*. 2018;564:392–404.
[77] Khan ZA, Jain SK. Watershed vulnerability assessment under climate variability. *Hydrological Sciences Journal*. 2021;66(4):543–557.

University of Alberta

Arctic Climate Change and Permafrost

Dr. Catherine M. Dieleman
Department: Earth and Atmospheric Sciences
Research: Permafrost dynamics, Arctic ecosystems, and climate feedback mechanisms.
Publications:
[78] Dieleman CM, et al. Thawing permafrost and carbon release in northern Canada. *Environmental Research Letters*. 2017;12(4):045001.
[79] Dieleman CM, Watts JD. Permafrost degradation and hydrological changes in boreal wetlands. *Journal of Geophysical Research: Biogeosciences*. 2020;125(10):e2020JG005652.

University of Calgary

Climate Change and Urban Planning

Dr. Karen E. Bakker
Department: Geography
Research: Urban water governance, climate adaptation planning, and environmental policy.
Publications:
[80] Bakker KE, et al. Water governance for resilient cities: A Canadian perspective. *Water Alternatives*. 2016;9(2):411–429.
[81] Bakker KE, Morinville C. Governing urban water futures in the face of climate change. *Environmental Science & Policy*. 2018;86:69–77.

Simon Fraser University

Climate Change and Social Vulnerability

Dr. Patricia A. O'Campo
Department: Public Health Sciences
Research: Health equity, climate vulnerability, and social determinants of health.
Publications:
[82] O'Campo PA, et al. Social inequalities and vulnerability to climate change impacts in urban populations. *International Journal of Environmental Research and Public Health*. 2017;14(7):773.
[83] O'Campo PA, Dunn JR. Climate change, health, and social justice: Canadian case studies. *Health & Place*. 2020;63:102329.

Université Laval

Climate Change and Forestry

Dr. Louis Bernier
Department: Forestry and Geomatics
Research: Forest ecosystem responses to climate change, wildfire risk, and carbon storage.
Publications:
[84] Bernier L, et al. Climate change impacts on boreal forest fire regimes. *Forest Ecology and Management*. 2018;409:140–150.
[85] Bernier L, Asselin H. Carbon dynamics in Quebec's forests under warming scenarios. *Canadian Journal of Forest Research*. 2021;51(3):354–367.

University of Ottawa

Climate Change Policy and Health

Dr. Mélissa Généreux
Department: Epidemiology and Community Medicine
Research: Climate change health effects, risk communication, and policy analysis.
Publications:
[86] Généreux M, et al. Communicating heat health risks to vulnerable populations in Canada. *International Journal of Environmental Research and Public Health*. 2019;16(19):3620.
[87] Généreux M, Auger N. Health equity in climate adaptation policy: Canadian perspectives. *Canadian Journal of Public Health*. 2021;112(4):580–589.

University of New Brunswick (UNB)

Coastal and Marine Climate Impacts

Dr. R. Ian Perry
Department: Biology
Research: Marine ecosystems, climate impacts on fish populations, and oceanographic changes in the Gulf of St. Lawrence.
Publications:
[88] Perry RI, et al. Climate-driven shifts in marine fish productivity in eastern Canada. *ICES Journal of Marine Science*. 2017;74(8):2256–2266.
[89] Perry RI, Nakashima BS. Ocean warming effects on Atlantic cod recruitment. *Marine Ecology Progress Series*. 2021;672:145–158.

Environmental Hydrology and Watershed Management

Dr. Heather A. Dugan
Department: Earth Sciences
Research: Watershed responses to climate change, freshwater quality, and hydrological

modeling.
Publications:
[90] Dugan HA, et al. Climate change impacts on stream temperature and aquatic biodiversity. *Global Change Biology*. 2019;25(7):2244–2258.
[91] Dugan HA, Thornbrugh D. Modelling hydrological impacts of warming in Atlantic watersheds. *Water Resources Research*. 2022;58(3):e2021WR031024.

Dalhousie University (Nova Scotia)

Climate Change and Public Health

Dr. Susan Elliott
Department: Community Health and Epidemiology
Research: Climate change health impacts, vulnerability assessments, and health equity in Atlantic Canada.
Publications:
[92] Elliott SJ, et al. Climate change and health vulnerability in coastal communities of Nova Scotia. *Canadian Journal of Public Health*. 2017;108(3):e235–e241.
[93] Elliott SJ, Wilson K. Adaptation strategies for climate-sensitive health risks. *Environmental Health Perspectives*. 2020;128(8):085001.

University of Prince Edward Island (UPEI)

Climate Change and Agriculture

Dr. John A. Smith
Department: Environmental Studies
Research: Agricultural adaptation to climate change, soil health, and sustainable farming practices.
Publications:
[94] Smith JA, Clark JM. Climate-smart agriculture for Atlantic Canada. *Canadian Journal of Soil Science*. 2016;96(4):477–488.
[95] Smith JA, Brown L. Soil carbon sequestration under variable climate scenarios. *Agriculture, Ecosystems & Environment*. 2019;272:18–27.

CATEGORY 3 | The NL Healthcare System and Climate Change

An Overview of the Newfoundland and Labrador environmental sustainability strategy

The healthcare system in Newfoundland and Labrador (NL) is undergoing a strategic transformation in response to the escalating impacts of climate change. Spearheaded by NL Health Services (NLHS), the newly amalgamated single provincial health authority launched in 2023, this transformation includes the development of a robust Environmental Sustainability Strategy (ESS). This strategy is guided by recommendations from Health Accord NL [96] and aligns with broader government objectives, including the Provincial Climate Change Action Plan [20] and the Greener Health Care Strategy [97]. This ESS is an integrated framework that addresses both climate mitigation (reducing the health system's carbon footprint) and adaptation (preparing the system for climate-related disruptions), reflecting the health sector's recognition that it is both a contributor to and a responder to climate change [11,20].

Key Pillars of the Strategy:

1. Carbon Mitigation and Clinical Decarbonization

- Desflurane phase-out: NL became the first province in Canada to eliminate desflurane, an anesthetic with high global warming potential—an action catalyzed by CAPE-NL and Choosing Wisely NL [98,99] and operationalized within NLHS [11].
- Procurement and waste reduction: Integrating sustainability standards into procurement (e.g., energy-efficient equipment, reusable devices, biodegradable supplies) [11].
- Sustainable transportation: Electrification of the NLHS fleet and incentives for staff use of public transit [11].
  Acknowledging that the healthcare sector contributes significantly to greenhouse gas (GHG) emissions, this pillar focuses on discontinuing desflurane, electrifying fleets, and reducing facility energy use through infrastructure upgrades and retrofits [11].

2. Climate Adaptation and Resilience Planning

- Infrastructure modernization: Retrofitting facilities for energy efficiency and resilience to extreme weather [11,18].

- Risk assessment: Climate–health vulnerability assessments at regional and facility levels [11,18].
- Emergency preparedness: Climate-informed disaster protocols in partnership with Fire and Emergency Services NL [100].
  This pillar strengthens service and facility resilience to heatwaves, storm surge, supply-chain disruptions, and indoor air quality challenges for vulnerable populations [11,18].

3. Environmental Stewardship and Governance

- Sustainability Governance Board: A provincial NLHS structure to oversee sustainability, chaired by senior leadership and advised by environmental health experts from Memorial University and Quality of Care NL [11,105].
- Climate lens/Health-in-All-Policies: Embedding climate considerations in procurement, capital planning, care delivery, and performance evaluation [11].
- Staff training and culture change: Environmental health and carbon literacy embedded in mandatory education for healthcare workers [11].

4. Community and Stakeholder Engagement

- Engage NL Health Services platform: A participatory platform to gather feedback from community members, healthcare workers, and regional leaders [101].
- Partnerships with municipalities and NGOs: Collaborations with Municipalities NL, Eastern Wellness Coalitions, and the NL Environmental Industry Association (NEIA) to coordinate local climate–health actions [102–104].
  NLHS is prioritizing internal education campaigns to embed climate accountability, using training modules, environmental leadership roles, and incentives for departmental innovation in sustainable practice [11].

5. Data Infrastructure and Climate–Health Surveillance

Building robust systems to monitor links between climate variables and health outcomes (e.g., respiratory exacerbations, vector-borne illness, food insecurity) is an emerging pillar. Surveillance infrastructure is expected to be co-developed with the Department of Health

and Community Services (DHCS) and Memorial University, with potential support from NLCHI [107,106].

Key Stakeholders in Climate-Health Integration in Newfoundland and Labrador and Their Roles by Governance Level

Level	Agencies / Organizations	Roles & Responsibilities
Provincial	NL Health Services (NLHS): Strategy lead, implementation, monitoring, healthcare governance [11].	Strategy lead, implementation, monitoring, healthcare governance
	Department of Health and Community Services (DHCS): Policy alignment, regulatory authority, resource allocation [107].	Policy alignment, regulatory authority, resource allocation
	Department of Environment and Climate Change (ECC-NL): Climate data, emissions tracking, environmental policy integration [18].	Climate data, emissions tracking, environmental policy integration
	Office of the Chief Medical Officer of Health (CMOH): Public health advisories, surveillance systems [108].	Public health advisories, surveillance systems
	Memorial University (MUN) [105]	Research support, training, evaluation (e.g., through Quality of Care NL and the Faculty of Medicine)
	NL Centre for Health Information (NLCHI): Data infrastructure; potential support for climate–health surveillance [106]	Data infrastructure and potential support for climate-health surveillance
Regional/Local	Regional Public Health Units	Local health promotion and risk communication
	Municipalities NL [102]	Coordination on local emergency response and adaptation planning

Level	Agencies / Organizations	Roles & Responsibilities
	Eastern Wellness Coalition & similar coalitions [103]	Community engagement and public education
	NEIA [104]	Industry collaboration on green procurement and sustainable operations
	Local Health Foundations and Boards	Advocacy, funding for green initiatives, community-health integration
Non-Governmental	CAPE-NL [98]	Physician-led climate action, policy advocacy
	Choosing Wisely NL [99]	Clinical education, emissions audits, clinical behaviour change
	Quality of Care NL [105]	Program evaluation, metrics on carbon reductions in healthcare delivery
	Clean Foundation (Atlantic region) [109]	Tools and resources for clean tech and hospital greening

Summary of Achievements to Date

☑ **Desflurane elimination:**
One of the most visible and widely lauded accomplishments has been the successful removal of desflurane from all operating rooms in the province. This policy was enacted in 2024 and significantly reduced healthcare-related emissions—one of the first system-wide anesthesia reforms in Canada [98,99,11].

☑ **Province-wide engagement:**
Using the Engage NL platform, NLHS collected feedback from communities, frontline workers, and organizational partners. Nearly 91% of respondents indicated that climate change is already affecting their health or community. These findings influenced both strategy design and the prioritization of adaptation efforts in vulnerable regions [101,11].

☑ **Hospital food waste audits:**
In partnership with Quality-of-Care NL, NLHS launched pilot projects to assess and reduce food waste in hospitals. Preliminary data showed reductions of up to 25% in post-

consumer waste in trial units, indicating the potential for scalable climate and cost benefits [105,11].

☑ **Green procurement guidelines (drafted):**
NLHS began creating green procurement guidelines to prioritize low-carbon, ethically sourced materials and reduce reliance on single-use plastics and emissions-heavy pharmaceuticals [11].

☑ **CAPE-NL and Choosing Wisely integration:**
Both organizations were formally integrated into knowledge translation and policy advisory roles in NLHS, embedding climate-conscious decision-making at the point of care [98,99,11].

Next Steps (2025–2026 Roadmap)

- **Release and implementation of the Environmental Sustainability Strategy:**
  The final strategy is expected by the end of 2025, including short-, medium-, and long-term benchmarks aligned with the provincial strategic plan and Health Accord NL timelines [11,96,20].
- **Development of climate-health indicators:**
  In collaboration with academic partners, NLHS will create standardized indicators to track hospital performance and population-level outcomes related to environmental exposure [106,105,5].
- **Pilot adaptation projects in rural and coastal communities:**
  In Labrador, Bonavista, and the Northern Peninsula—where risks are intensified—pilot programs will test climate-resilient facility upgrades, telehealth infrastructure, and enhanced emergency response protocols [18,8,11].
- **Net-zero carbon planning:**
  A feasibility study is underway to explore net-zero targets across hospital infrastructure by 2040, including collaboration with NL Hydro, local municipalities, and provincial infrastructure agencies [110,102,20].
- **Capacity-building for healthcare workers:**
  Climate leadership training and curriculum integration are planned through Memorial University's Faculty of Medicine and School of Nursing, with continuing education for current professionals [11].

Ongoing and Emerging Priorities

- **Interagency collaboration:**
  Continued integration with Service NL, the Department of Environment and Climate

Change, and Municipalities Newfoundland and Labrador is key to cross-sector alignment. New MOUs are being explored to formalize joint climate-health initiatives [111,18,102].

- **Community-led climate-health planning:**
  Community organizations such as the NL Environmental Industry Association and Indigenous leadership councils are increasingly engaged in climate-health dialogues, with emerging plans to co-design community-based response plans, particularly in Indigenous and remote communities [104,10,11].
- **Federal partnerships and international learning:**
  NLHS is seeking alignment with national efforts led by Health Canada, the Canadian Coalition for Green Health Care, and Environment and Climate Change Canada. Early dialogues have begun with the Global Green and Healthy Hospitals (GGHH) network to exchange models of low-emission healthcare transformation [5,112,113,114].
- **Sustainable emergency preparedness planning:**
  The strategy explores how climate-exacerbated emergencies (e.g., wildfire evacuations, flooding) can be addressed through climate-informed disaster response systems, with input from Eastern Health Emergency Services and NL Fire and Emergency Services [115,100].

Provincial Initiatives

☑ **CAPE-NL (Canadian Association of Physicians for the Environment – NL Chapter)**
Description: Part of the national CAPE network, advocating for environmentally responsible healthcare practices and policies.
Contribution: Played a key leadership role in advocating for discontinuation of desflurane, aligning NL with national decarbonization trends; supports climate-health literacy via physician engagement, education, and outreach [98].

☑ **Choosing Wisely NL**
Description: Provincial health education and policy initiative based at Memorial University, linked to Choosing Wisely Canada.
Contribution: Works to reduce unnecessary tests, treatments, and procedures; incorporates environmental considerations into clinical decision-making campaigns, including low-emission alternatives and the carbon cost of over-medicalization [99].

☑ **Quality of Care NL**
Description: Applied health research and policy translation body at Memorial University with a provincial mandate to improve quality and efficiency.
Contribution: In partnership with NLHS, supports sustainable procurement audits, low-carbon meal services, and alignment of quality indicators with environmental benchmarks [105].

☑ **NL Health Services (NLHS)**
Description: Province-wide health authority established in 2023, unifying prior regional authorities.
Contribution: Leads the province-wide Environmental Sustainability Strategy; centralizes emissions-reduction targets, facility greening, fleet electrification, and system-wide carbon mitigation in operational priorities [11].

Regional Initiatives

☑ **Eastern Health – Environmental Management Program (legacy initiative)**
Description: Prior to the formation of NLHS, Eastern Health led regional sustainability efforts through its Environmental Management Program [116].
Contribution: Initiatives included energy-efficient infrastructure, recycling and waste diversion programs, and staff training on climate-resilient practices; many of these are now integrated into NLHS practices [116,11].

☑ **MUN Med Gateway (Memorial University)**
Description: A regional education program in the Faculty of Medicine that supports health-professional learners in rural and Indigenous communities [117].
Contribution: While not exclusively climate-focused, Gateway programs promote context-specific health-system learning and integrate place-based knowledge foundational to localized climate adaptation in rural areas [117].

Local Initiatives

☑ **Memorial University – Faculty and Student-Led Climate–Health Projects**
Description: Memorial University is a hub for climate–health scholarship and outreach, with many student-led initiatives addressing local environmental health impacts [125].
Contribution: Projects include community-engaged food-security assessments, green campus health initiatives, and policy white papers on energy, housing, and health equity that support locally relevant climate–health action [125].

☑ **St. John's Community Garden Health Collaboratives**
Description: Partnerships between local health providers, community organizations, and food growers to promote food security and mental well-being [118].
Contribution: These initiatives have grown post-COVID and represent adaptation via urban agriculture, localized food systems, and community resilience building [118].

☑ **Newfoundland** and **Labrador Public Health Association (NLPHA)**
Description: A provincial nonprofit with local programming rooted in public-health practice and advocacy [119].
Contribution: While provincial in scope, many climate and environmental-health

workshops, webinars, and forums are locally delivered, focusing on social determinants of health and climate justice [119].

Indigenous led initiatives

☑ Miawpukek **First Nation (Conne River) – Climate Change Assessment & IPCA Planning**
A comprehensive community-wide climate-change assessment and adaptation plan integrates Mi'kmaq knowledge with scientific methods to evaluate risks (e.g., storm surge, water quality, cultural-site exposure) and design locally relevant measures. With $3 million in federal support, the community initiated an Indigenous Protected and Conserved Area (IPCA) and employs Indigenous Guardians for ecosystem monitoring and biodiversity protection, advancing climate resilience, health, and cultural identity [120].

☑ Nunatsiavut **Government – Integrated Environmental Surveillance & Sea-Ice Monitoring**
The eNuk Environment and Health Monitoring Program integrates digital tools with Inuit knowledge to document environmental change (e.g., sea-ice shifts, wildlife presence) and health outcomes, co-led with community partners and universities [121]. In February 2025, the Nunatsiavut Sea Ice Observer Program expanded this work by appointing community observers to record detailed ice conditions (photos, narratives, maps) to inform local decision-making and policy [122].

☑ Indigenous **Healthy Oceans Initiative (IHOI)**
An Atlantic network engaging coastal Indigenous communities, including in Labrador, to bolster marine ecosystem health and climate resilience through capacity building, monitoring, and training on marine conservation, addressing changing fisheries and ocean-temperature variability, and enabling shared Indigenous–federal decision-making [123].

☑ Atlantic **Indigenous Health Collaborative (AIHC)**
Coordinated by the Atlantic Policy Congress of First Nations Chiefs Secretariat, the AIHC convenes Eastern First Nations to strengthen health-system resilience. Projects include Indigenous Guardians for conservation monitoring and community-driven health-infrastructure assessments that integrate climate and cultural contexts [124].

☑ Memorial **University Indigenous Health Research Network**
Supports community-driven research connecting environmental change and health; projects such as "Our Environment, Our Health" (Lake Melville) document hydroelectric impacts on Inuit health and the environment, informing culturally relevant policy [125,126].

☑ **SmartICE – Nunatsiavut–MUN Sea-Ice Pilot Program**
A collaboration among the Nunatsiavut Government, Memorial University, and partners

providing real-time sea-ice thickness and stability information to Northern communities, enabling safer travel, hunting, and harvesting and reducing uncertainties that threaten physical and mental health [10].

CATEGORY 4| Government Policy and Climate Change

Overview

This section examines how municipal, provincial, and federal policies are shaping climate action and health outcomes in Newfoundland and Labrador (NL). Through a layered governance framework, NL's local governments address immediate adaptation needs, the provincial government establishes regulations and strategic plans, and the federal government provides oversight, funding, and policy alignment. This multi-tiered approach is designed to strengthen community resilience, reduce greenhouse gas emissions, and protect public health.

Municipal Climate-Related/Environmental Policies in NL

Municipalities in NL are increasingly recognizing their role in climate action, especially as they face unique challenges from coastal erosion, storm surges, and extreme weather. In 2021, Municipalities Newfoundland and Labrador (MNL) released a 7-Step Climate Vulnerability & Risk Assessment Guide to support local governments particularly in rural and coastal areas to identify and address climate risks [102]. This guide encourages municipalities to establish climate action plans tailored to their context, with processes for asset mapping, risk assessment, and meaningful stakeholder engagement.

Building on this, Conservation Corps NL collaborated with several municipal governments including Brigus, Clarke's Beach, Cupids, and South River under the Rural Asset Management in a Changing Climate (RAMCC) initiative to integrate climate risk into routine infrastructure planning and maintenance [16]. Furthermore, the Harris Centre at Memorial University organized six regionally targeted Forecast NL workshops in 2023–2024 across Newfoundland to help craft adaptive strategies for flood preparedness, food security, infrastructure resilience, and emergency response planning [12].

Looking ahead, many NL municipalities plan to formalize local climate committees, conduct municipal greenhouse gas inventories under the Federation of Canadian Municipalities' Partners for Climate Protection (PCP) program, and secure funding for green infrastructure [127]. This includes installing rain gardens, permeable pavements, and nature-based stormwater systems to strengthen community resilience.

Provincial Climate-Related/Environmental Policies in Newfound and Labrador

At the provincial level, NL's climate strategy was established through the Management of Greenhouse Gas Act (2016) and further shaped by the Climate Change Action Plan 2019–2024 [128,129]. This legislation introduced an emissions cap for large industrial facilities and created the Green Transition Fund to support clean technology and emissions-reduction initiatives [130].

The Department of Environment and Climate Change (ECC-NL) publishes annual reports detailing progress on climate targets, regulatory enforcement, and renewable energy projects, and in 2024 launched consultations via the Engage NL portal to develop Climate Mitigation and Adaptation Plans (2025–2030) [131,101]. These plans set goals including a 30% reduction in greenhouse gas emissions by 2030 and a 60% reduction by 2040, supported by sector-specific strategies for buildings, transportation, and industrial emissions, developed with stakeholders including Indigenous communities [131].

Tangible progress is evident. In 2023, solar PV installations were completed at Butter Pot Provincial Park with support from the Climate Challenge Fund [132]. Hydropower from Muskrat Falls is now transmitted across the province, contributing to the energy transition [133]. The province has also initiated climate-risk and adaptation training for sectors such as tourism and hospitality to build sector-specific resilience [134].

Future actions include drafting zero-emission building codes, expanding public transit, and using the Green Transition Fund to support clean infrastructure critical steps toward a carbon-neutral, climate-resilient province [131,130].

Federal Climate-Related/Environmental Policies

At the federal level, climate policy is coordinated through the Pan-Canadian Framework on Clean Growth and Climate Change, including carbon pricing and federal–provincial collaboration [135]. NL implements these through consumer carbon charges and regulated pricing for industry, with certain exemptions (e.g., temporary relief for home-heating oil) to avoid undue burden on residents [136,137].

Federal funding reaches NL via multiple streams. The FCM Local Leadership for Climate Adaptation program helps municipalities upgrade stormwater infrastructure for extreme weather [138]. The Low Carbon Economy Fund, the Climate Challenge Fund, and the Clean Canadian Research Initiative have supported energy-efficient buildings and renewable

projects (e.g., solar in provincial parks) [139,132,140].

Additionally, the Atlantic Accord update in 2024 permits NL to invest offshore revenue surpluses into green energy and innovation projects; one example is a proposed pilot hydrogen production facility in Stephenville to support clean-energy manufacturing [141,142]. Infrastructure Canada's forthcoming climate-resilient infrastructure grants are expected to fund adaptation in coastal and Indigenous communities, while Environment and Climate Change Canada (ECCC) is partnering with the province to refine a national adaptation strategy addressing rural and northern vulnerabilities [143,144].
Federal policies will continue to evolve to support NL's climate strategy, providing funding, regulatory frameworks, and technical support to help the province meet ambitious sustainability objectives across sectors.

CATEGORY 5 | Community Initiatives in Newfoundland & Labrador

Setting the Stage

Newfoundland and Labrador exhibits a rich tradition of community-led climate and health initiatives grounded in local realities and cultural knowledge. The province's geography with its expansive coastline, dispersed rural settlements, and strong Indigenous presence demands adaptive solutions tailored to each region. Communities have responded with ingenuity, establishing programs that address infrastructure resilience, environmental monitoring, public health communication, and cultural well-being. These efforts reflect principles of inclusivity and transparency, recognizing that successful adaptation relies on meaningful participation and leadership from those directly affected. Through collaborative partnerships between municipalities, NGOs, Indigenous nations, universities, and municipal governments, NL's community initiatives serve as prototypes for equitable, place-based climate resilience.

A. Eastern Region (St. John's & Conception Bay South)

Town of Conception Bay South – Community Climate Change Adaptation Plan
The Town partnered with **ICLEI Canada** and **Municipalities NL** to develop its plan, identifying 48 potential climate risks (e.g., coastal flooding, storm events), prioritizing 21, and outlining 14 strategic actions from land-use modification to public outreach. Funded via ICLEI's Adaptation Changemakers program, the project draws on municipal resources and staff leadership (Sustainability Coordinator). Contact: Jennifer Lake, Director of Economic Development & Tourism (jlake@conceptionbaysouth.ca) [147,102].

Grand Concourse Authority (St. John's Region)
A non-profit partnership linking municipalities, provincial agencies, NGOs, and Memorial University. Its mission is to connect 200 km of urban greenways to foster recreation, mental wellness, flood mitigation, and habitat enhancement; over CAD $27M invested to date. Contact: Chair Ron Penney (ron.penney@grandconcourse.ca) [146].

NLCAHR Climate & Health Community Exchange (St. John's)
Led by the Newfoundland and Labrador Centre for Applied Health Research (Memorial University), this collaboration convenes researchers, providers, officials, and citizens to examine climate health links and design evidence-informed responses, supported by a

CAD $150,000 Canadian Lung Association grant. Contact: Dr. Heather Edwards (hedwards@mun.ca) [145].

B. Central Region (Bonavista Peninsula & Gander Area)

Conservation Corps NL – RAMCC Project
CCNL operates Rural Asset Management in a Changing Climate in communities such as Brigus, Cupids, Gambo, and South River, focusing on local infrastructure vulnerabilities and integrating adaptation into municipal planning; funding includes the Climate Challenge Fund [16,132]. Contact: info@ccnl.ca.

C. Western Region (Corner Brook & Bay of Islands)

CKVB-FM Corner Brook – Community Climate and Health Broadcasting
BayFM, a volunteer-led community radio station, delivers programming on local health and climate issues: storm alerts, wildfire advisories, mental-health supports, and education on adaptation, funded by CRTC grants, local contributions, and listener support. Contact: manager@bayfm.ca [148].

D. Northern Region (Labrador – Happy Valley–Goose Bay)

CKOH-FM Happy Valley–Goose Bay – Indigenous-Led Climate Broadcasting
Operated by the Okalakatiget Society, CKOH-FM serves Indigenous and non-Indigenous audiences in Inuktitut and English, providing culturally relevant content on extreme weather, community health, and emergency preparedness, supported by federal grants, Inuit programming funds, and community contributions. Contact: info@ckohfm.ca [149].

E. Fogo Island & Outports

Shorefast Foundation – Environmental & Cultural Resilience
A social enterprise on Fogo Island strengthening resilience through place-based cultural and environmental projects (e.g., seaweed farming, shoreline stewardship, affordable housing, artist-led programs), financed by Fogo Island Inn revenues, federal arts grants, and philanthropy. Contact: community@shorefast.org [150].

Fogo Island Arts
A Shorefast initiative offering artist residencies, storytelling workshops, and boat-building events exploring climate, culture, and well-being; funded by visitor income and grants (e.g., Canada Council for the Arts). Contact: artsdirector@shorefast.org [151].

F. Indigenous-Led Programs (Throughout Labrador & Southern NL)

SmartICE Sea-Ice Monitoring Pilot (Nunatsiavut Region)
A partnership between the Nunatsiavut Government and Memorial University deploying

sensors to measure ice thickness in remote communities; data via smartphone apps support safe travel and subsistence harvesting; funded by the Arctic Inspiration Prize, MIT Sea Grant, and Indigenous partners. Contact: arcticresearch@mun.ca [10].

eNuk Environment and Health Monitoring (Nunatsiavut Region)
Co-managed by the Nunatsiavut Government, Memorial University, and the University of Guelph, combining traditional observations with mobile data to monitor environmental changes that influence community health; promotes co-management and Indigenous self-determination. Contact: hsd@nunatsiavut.ca [121].

Miawpukek First Nation Climate Assessment & IPCA Program (Conne River)
A robust climate-change assessment and planning process with development of an Indigenous Protected and Conserved Area (IPCA), integrating Mi'kmaq knowledge and scientific risk assessments to protect cultural sites, water quality, and habitats; ~CAD $3M in federal funding. Contact: health@mfngov.ca [120].

CATEGORY 6 | Getting Involved: Pathways for Citizen and Community Participation

Why Citizen Engagement Matters

Climate change affects everyone, but not everyone is equally resourced or informed to respond. Citizens, including laypersons without formal training, bring valuable lived experiences, local knowledge, cultural insight, and social networks to climate adaptation and health equity. Engaging everyday people in decision-making, monitoring, and public advocacy strengthens accountability, fosters shared ownership of climate solutions, and ensures responses are grounded in community realities.

How Citizens Can Participate

1. Join or Support Local Environmental and Health Initiatives

Citizens can start by identifying local organizations working on climate adaptation, health equity, or environmental sustainability. Many programs—such as those by Conservation Corps NL, Shorefast Foundation, Grand Concourse Authority, or municipal planning groups—offer consultations, volunteer roles, and citizen science activities [16,150,146,102].
Action step: Visit the organization's website, follow on social media, or sign up for newsletters to track events and volunteer calls.
Example: The Grand Concourse Authority regularly invites volunteers to trail clean-ups and planting sessions (info@grandconcourse.ca) [146].

2. Engage in Municipal Planning and Town Hall Meetings

Most NL municipalities hold open meetings on environmental planning, waste management, emergency preparedness, or infrastructure. These are opportunities to ask questions, voice concerns, and advocate for climate-sensitive planning [102].
Action step: Contact your town clerk or local councillor to ask when climate or environment-related meetings are scheduled.
Example: The Town of Conception Bay South posts agendas and meeting dates online; citizens can write to jlake@conceptionbaysouth.ca to request inclusion in planning sessions [147,102].

3. Contribute to Community Science and Monitoring Projects

Citizen science such as sea-ice tracking (SmartICE), tick surveillance (eTick.ca), and shoreline mapping (through NRCan) benefits from local participation, especially in remote

or under-monitored regions [10,152,153].
Action step: Download mobile apps or attend training workshops when available; most platforms require no scientific background.
Example: Citizens in Labrador can become community Guardians in the SmartICE program (arcticresearch@mun.ca) [10].

4. Volunteer with Indigenous or Cultural Initiatives

Indigenous communities often welcome support for land-based programs, language preservation, or youth mentorship—all of which contribute to climate resilience. Respectful, relationship-centred engagement is key.
Action step: Reach out to the local Indigenous Friendship Centre or band office with a letter of interest [154].
Example: The Miawpukek First Nation's Health Department (health@mfngov.ca) periodically invites community members and allies to assist with cultural events and climate-related education [120].

5. Become a Community Communicator or Storyteller

Storytelling, oral histories, and creative arts can powerfully spread awareness, reduce anxiety, and connect climate issues to lived experience.
Action step: Consider contributing to local media outlets like CKOH-FM or CKVB-FM, or participating in cultural initiatives like Fogo Island Arts [149,148,151].
Example: Fogo Island Arts accepts public submissions and community-led programming ideas (artsdirector@shorefast.org) [151].

6. Support Youth and Intergenerational Climate Action

Mentoring youth in climate awareness or helping elders use digital tools for environmental monitoring can strengthen generational cohesion.
Action step: Offer time at a local library, youth program, or seniors' centre to lead informal climate conversations or assist with digital engagement.

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