# CLIMATE CHANGE AND HEALTH & WELL-BEING IN CANADA=S NORTH: SUMMARY DOCUMENT

**Report on the**
**Public Health Planning Workshop on Climate Change and Health & Well-being in the North**

**July 6-7, 2002**
**Yellowknife, NWT**

Health Canada Santé Canada

# CLIMATE CHANGE AND HEALTH & WELL-BEING:

# A POLICY PRIMER FOR CANADA'S NORTH

**Climate Change and Health Office**
**Safe Environments Programme**
**Healthy Environments and Consumer Safety Branch**
**Health Canada**

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# CLIMATE CHANGE AND HEALTH & WELL-BEING: A POLICY PRIMER FOR CANADA'S NORTH

## Executive Summary


Climate Change in Canada's North

Scientists, governments and international bodies have recognized that greenhouse gas accumulations in the atmosphere are changing the global climate, and will affect the environment and human health and well-being. The range of potential health effects from this phenomenon is quite broad. Some communities, such as those in Canada's North, are already observing significant changes in local climates and ecosystems and will be more vulnerable than others to these changes for social/cultural reasons (dependence on the lands), geographic reasons, due to health status or because of limited resources.

Health Canada has identified eight significant direct and indirect climate change induced health issues which are expected to increase in the future in this country (chart below). Northern communities will face many of these health effects as climate change increases. They include health and well-being issues related to increased smog episodes, heat waves, water-and food-borne contamination, vector-borne diseases, stratospheric ozone depletion and extreme weather events. These effects are expected to be particularly severe for vulnerable populations such as children, the elderly, the poor, disabled people, immigrant populations, Aboriginal Canadians and populations living in the North. A host of broad socio-economic issues related to climate change are also of considerable concern including changed determinants of health and well-being, vulnerability of community economies and the health and social risks of climate change mitigation actions.

## CANADA'S HEALTH IMPACTS FROM CLIMATE CHANGE AND VARIABILITY

| Health Issues | Examples of Health Vulnerabilities |
|---|---|
| **Temperature-related morbidity and mortality** | **- Cold and heat related illnesses**<br>**- Respiratory and cardiovascular illnesses**<br>**- Increased occupational health risks** |
| **Health effects of extreme weather events** | **- Damaged public health infrastructure**<br>**- Injuries and illnesses**<br>**- Social and mental health stress due to disasters**<br>**- Occupational health hazards**<br>**- Preparedness and population displacement** |
| **Air pollution-related health effects** | **- Changed exposure to outdoor and indoor air pollutants and allergens**<br>**- Asthma and other respiratory diseases**<br>**- Heart attacks strokes and other cardiovascular diseases**<br>**- Cancer** |
| **Water- and food-borne contamination** | **- Enteric diseases and contamination** |
| **Vector-borne infectious diseases** | **- Changed patterns of diseases caused by bacteria, viruses and other pathogens carried by mosquitos, ticks and other vectors** |
| **Stratospheric ozone depletion and increased exposure to ultra-violet radiation** | **- Skin damage and skin cancer**<br>**- Cataracts**<br>**- Disturbed immune function** |
| **Population vulnerabilities in rural and urban communities** | **- Seniors**<br>**- Children**<br>**- Poor health**<br>**- Low income and homeless**<br>**- Traditional populations**<br>**- Disabled**<br>**- Immigrant populations** |
| **Health and Socio- Economic Impacts on Community Health and Well-being** | **- Changed determinants of health and well-being**<br>**- Global burden of disease**<br>**- Vulnerability of community economies**<br>**- Health co-benefits and risks of GHG reduction technologies** |

Efforts are underway in Canada to better understand the causes and long-term patterns of climate change and climate variability, and to reduce greenhouse gas emissions through the development and use of cleaner technologies. However, the first mitigation efforts will not totally eliminate the risks of climate change. Even if the provisions of the Kyoto Protocol are fully met by all participating countries, the date at which $CO_2$ will double in the atmosphere will simply be pushed back, but this will still occur. Canada will have to cope with, and adapt to, the many climate-related environmental changes which have already begun, particularly in the North, and which will affect the future health and well-being of Canadians. Close cooperation and information sharing among public health groups in the North in efforts to adapt to climate change will contribute to the building of strong and healthy communities in this region and will support the growth of the economic, social and health infrastructures required for a 21st century northern society.

Health Canada has organized a **Public Health Planning Workshop on Climate Change and Health & Well-being in the North (July 6-7, 2002)** involving policy analysts and practitioners from federal health programs, territorial Ministries of Health, Aboriginal groups, community health programs, and health non-governmental organizations in the North. **The purpose of this document** is to provide participants of the workshop with information on some of the observed changes to local climates and ecosystems occurring in the North and the possible health effects of climate change for people residing in these communities and to begin discussions on potential public health adaptation measures.

Assessing the Impacts of Climate Change on Human Health

Sound adaptation policies should be based on knowledge of the impacts of climate change, the sensitivity and vulnerability of Canadians to it and existing options for adaptation that are effective in reducing the risks. If northern communities are to develop effective public health policies and strategies that will help people cope with climate change, researchers and policy-makers in this region need to fully assess the likely public health implications of climate change and variability at regional and local levels.

Managing the Risks to Human Health and Well-being from Climate Change in Canada's North

People living in Canada's North need to be ever vigilant in their efforts to build strong and vibrant communities and improve the general health status of all who live in this region. Adaptation to the health effects of climate change and variability involves the management of a number of risks to health and well-being and will need to respond to both positive impacts (e.g., greater shipping access, increased hunting season) and negative impacts (e.g., changes in ice distribution and stability which will have impacts on wildlife and human travel) of this phenomenon.

Both government and non-governmental groups in Canada's North should begin integrating such considerations into public health promotion and protection activities through adaptation initiatives because of the following considerations:

- Climate change cannot be totally avoided.

- Anticipatory and precautionary public health adaptation is more effective and less costly than forced, last-minute, emergency adaptation or retrofitting.
- Climate change may be more rapid and more pronounced than current estimates suggest. More unexpected events that could have serious health and well-being impacts are possible.
- Immediate public health benefits can be gained from better adaptation to climate variability and extreme atmospheric events.
- Climate change brings public health opportunities as well as threats. Future benefits can result from climate change if planning begins now.

Public Health Planning Workshop on Climate Change and Health & Well-being in the North

The Public Health Planning Workshop will be held July 6-7, 2002 in Yellowknife, Northwest Territories and will involve invited representatives including chief medical officers of health, public health practitioners, key federal partners, public health organizations, and Aboriginal health partners. The meeting will seek to:

- Increase awareness in the health community of the vulnerabilities and potential impacts from climate change on the health of citizens in the North.
- Identify climate change impacts, current vulnerabilities and the need for public health adaptation measures.
- Identify opportunities for collaboration between northern health partners and define Health Canada's role in supporting the collaboration.

Moving Forward

The results of the Public Health Planning Workshop will help the Climate Change and Health Office (CCHO) at Health Canada identify its role in collaboratively assessing and managing the health & well-being issues in Canada's North by providing a new mechanism, or identifying an existing one, for cooperation among a wide range of governmental and non-governmental health partners. It will also do this by linking with the Vulnerable Populations Health Issue Research Network (HIRN) on scientific knowledge development issues for this region.

CCHO will continue to facilitate the development of health and well-being adaptation strategies for the North after the workshop by providing the following services:

- Inventory of climate change and health funding sources.
- Inventory of potential public health adaptation measures and current activities.
- Bibliography of public health adaptation literature.

- Facilitate climate change and health science and policy research activities.
- Facilitate development of public health education and outreach materials by and for the use of community health organizations.
- Facilitate the integration of health and well-being issues into the National Climate Change Process (NCCP).

## Introduction

Climate Change is already affecting Canada and the country's North will experience greater climatic changes than the other regions of the country. As the northern climate warms, there will be wide-ranging ecosystem impacts such as permafrost melting, changes in wildlife migration patterns and increases in sustainable fish and game harvests for some species. Across the country, northerners are building strong communities through an emphasis on new economic opportunities such as ecological and cultural tourism, while maintaining an emphasis on traditional activities such as hunting and fishing and the production of arts and crafts. The health & well-being of northern populations will be affected as people try to adapt to the climate by changing their traditional and cultural practices, and by attempting to maintain and expand the economic, social and health infrastructures required for a 21st century northern society. The complex, large-scale environmental changes which have already begun will require greater understanding and early adaptation measures, including in the public health sector.

As part of this effort, Health Canada has organized a **Public Health Planning Workshop on Climate Change and Health & Well-being in the North (July 6-7, 2002)** involving policy analysts and practitioners from federal health programs, territorial Ministries of Health, Aboriginal groups, community health programs, and health non-governmental organizations in the North.

**The goal of the workshop** is to build awareness of climate change and health issues among public health authorities in Canada's North, provide information about the development of *Canada's Climate Change and Health Impact Assessment Guidelines* and begin addressing priority health issues which will help the people living in northern communities successfully adapt to climate change. **The purpose of this document** is to provide participants of the workshop with information on some of the observed changes to local climates and ecosystems occurring in the North and the possible health effects of climate change for people residing in these communities and to begin discussions on potential public health adaptation measures.

## Climate Change in Canada's North

Scientists, governments and international bodies have recognized that greenhouse gas accumulations in the atmosphere are changing the global climate, and will affect the environment and human health and well-being.[1] The range of potential health effects from this phenomenon is quite broad. Some communities, such as those in Canada's North, will be more vulnerable than others, for social/cultural reasons (dependence on the lands), geographic reasons, due to health status or because of limited resources. For the purposes of this document Canada's North is defined as the Territories, Nunavik, Labrador and the northern part of Canada's provinces. Much is already being done to better understand the causes and long-term patterns of climate change and climate variability in Canada and to begin responding to them.

[1]McMichael et al., 1996; Inter-governmental Panel on Climate Change, 1996.

Canada is a northern country and therefore is expected to experience faster warming due to climate change than are countries farther south. Average temperatures over Canada have increased more than 1°C in the past century with the largest increases in the central, northwest and northern regions. At the same time, there were decreases in temperature in the furthest eastern regions. There will also be an increase in climate variability and we can expect more extremes of weather events. Much of central and northern Canada is projected to experience a mean temperature increase of 5°C, or more, by the second part of this century while the waters off the coast of Labrador and Newfoundland and nearby coastal areas are projected to continue cooling. The rest of Canada, including most of the larger communities, is in the 3°C to 5°C temperature rise range.[2]

Climate change is having an effect on natural ecosystems in all parts of Canada's North. Canada's Third National Report on Climate Change (2002) which can be viewed at http://www.climatechange.gc.ca/english/3nr/toc.html documents the effects of climate change in the western Canadian Arctic.[3] This region has warmed by about 1.5°C over the past 40 years, while the central Arctic has warmed by about 0.5°C. The Third National Report highlights a number of projected physical changes for northern Canada including:

- Changes in the extent and thickness of Arctic sea ice.
- Ice-rich sediments and permafrost are thawing and coastal erosion is increasing. This would greatly reduce ground strength which may induce landslides, increase sediment contribution to rivers and reduce or eliminate the ability of earth materials to support buildings and transportation facilities.
- Altered distribution and introduction of some plant and animal species. The appearance of southern species such as Pacific salmon and robins in the Arctic for the first time in memory, as cited by traditional knowledge research.
- More open water along coastlines in winter and spring, making hunting more hazardous.
- Melting of permanent snowpacks in Yukon for the first time in thousands of years.
- Increases in sustainable fish harvests for most populations in the Arctic and for northern freshwater populations while general decreases for Pacific (e.g., southern salmon, cod), and Atlantic marine and southern freshwater populations (e.g., trout, whitefish, grayling).

People living in communities throughout Canada's North are also reporting changes they have observed in the local climate and surrounding ecosystems. For example, the report *Inuit Observations on Climate Change* which draws on observations by the Hunters and Trappers Committee of Sachs Harbour documents the problem of Arctic climate change to communicate it to Canadian and international

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[2] Bruce et al., no date.

[3] Also see Aynslie Ogden, "Climate Change in the Circumpolar North: Summit and Sustainable Technology Exposition - Program & Abstracts", Whitehorse, Yukon, March 19-21, 2001.

audiences.[4] At the Elders Conference on Climate Change held in March, 2001 in Cambridge Bay, Nunavut, a number of observations were made by participants regarding changes in the climate. And in Nunavik and parts of Labrador in the eastern Arctic, significant changes to the water resources, food sources and other components of specific ecosystems have been reported. Some of the observations made by northern residents in these reports follow; they illustrate the wide range and complex nature of the climate change effects northerners are witnessing.

*Inuit Observations on Climate Change*[5]

- The climate has become unpredictable; the landscape unfamiliar.
- Winter sea ice is thin and broken, making travel dangerous for hunters.
- Fall storms have become frequent and severe, making boating difficult.
- An influx of flies and mosquitos are making life difficult for humans and animals.
- In waters close to Sachs Harbour, salmon have been caught for the first time.
- Building foundations are shifting from the melting permafrost.

*Elders Conference on Climate Change*[6]

- Winters are getting shorter, summers are getting longer.
- We are losing the ice in our glaciers and fiords. Permafrost is melting. We see vegetation growing where ice used to be.
- The sun's rays are increasing; Inuit need stronger suntan lotion.
- We now see birds and wildlife that we have never seen here before. Ravens are everywhere, Snow Geese are too numerous.
- Heavier winds can be dangerous. Because of Global Warming we could become subject to catastrophes like hurricanes.
- Caribou meat tastes different now and there are concerns about contaminants and diseases. Caribou hides are thinner.
- Fall ice forms later and may not be safe to travel on until Christmas.

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[4]As well, a workshop organized by ITK, IRC, IISD and CHUQ "Arctic Climate Change: Observations from the Inuvaliut Settlement Region" was held in Tuktoyaktuk from January 28-29, 2002.

[5]Graham Ashford and Jennifer Castleden, "Inuit Observations on Climate Change", International Institute for Sustainable Development, June 2001. Also see, "Climate Change and Adaptation Strategies for Canada's Northern Territories: Final Workshop Report", February 27-29, 2000, Yellowknife, N.W.T., Prepared for Natural Resources Canada and Environment Canada by GeoNorth Ltd., June, 2000.

[6]"Elders Conference on Climate Change", Cambridge Bay, Nunavut, March 29-31, 2001.

- Water levels are getting lower.
- More ships are traveling through the Northwest Passage, due to the lower ice coverage in recent years.

*Nunavik and Labrador*[7]

- Lower levels of water in some rivers and some brooks and lakes have dried up.
- Ice break-up is earlier and ice seems thinner now.
- More sick caribou seen.
- Little snow on the ice now.
- Glaciers in the north are melting.
- More fierce fall storms.
- Change in weather patterns - get unpredictable mild weather.
- Land is much drier.

**Human Health & Well-being Impacts of Climate Change**

Efforts are underway in Canada to better understand the causes and long-term patterns of climate change and climate variability, and to reduce greenhouse gas emissions through the development and use of cleaner technologies. However, the first mitigation efforts will not totally eliminate the risks of climate change. Even if the provisions of the Kyoto Protocol are fully met by all participating countries, the date at which $CO_2$ will double in the atmosphere will simply be pushed back, but this will still occur. Canada will have to cope with, and adapt to, the many climate-related environmental changes which have already begun, particularly in the North, and which will affect the future health and well-being of Canadians.

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[7] C.M. Furgal et al., "Climate Change and Health in Nunavik and Labrador: What we Know from Science and Inuit Knowledge". February, 2002.

considerable concern including changed determinants of health and well-being, vulnerability of community economies and the health and social risks of climate change mitigation actions.[8]

[8] For an examination of climate change and health issues in Nunavik and Labrador see C.M. Furgal et al., "Climate Change and Health in Nunavik and Labrador: What we Know from Science and Inuit Knowledge", February 2002.

## CANADA'S HEALTH IMPACTS FROM CLIMATE CHANGE AND VARIABILITY

| Health Issues | Examples of Health Vulnerabilities |
|---|---|
| **Temperature-related morbidity and mortality** | **- Cold and heat related illnesses<br>- Respiratory and cardiovascular illnesses<br>- Increased occupational health risks** |
| **Health effects of extreme weather events** | **- Damaged public health infrastructure<br>- Injuries and illnesses<br>- Social and mental health stress due to disasters<br>- Occupational health hazards<br>- Preparedness and population displacement** |
| **Air pollution-related health effects** | **- Changed exposure to outdoor and indoor air pollutants and allergens<br>- Asthma and other respiratory diseases<br>- Heart attacks strokes and other cardiovascular diseases<br>- Cancer** |
| **Water- and food-borne contamination** | **- Enteric diseases and contamination** |
| **Vector-borne infectious diseases** | **- Changed patterns of diseases caused by bacteria, viruses and other pathogens carried by mosquitos, ticks and other vectors** |
| **Stratospheric ozone depletion and increased exposure to ultra-violet radiation** | **- Skin damage and skin cancer<br>- Cataracts<br>- Disturbed immune function** |
| **Population vulnerabilities in rural and urban communities** | **- Seniors<br>- Children<br>- Poor health<br>- Low income and homeless<br>- Traditional populations<br>- Disabled<br>- Immigrant populations** |
| **Health and Socio- Economic Impacts on Community Health and Well-being** | **- Changed determinants of health and well-being<br>- Global burden of disease<br>- Vulnerability of community economies<br>- Health co-benefits and risks of GHG** |

| | |
|---|---|
| | **reduction technologies** |

The health effects of climate change on northerners will vary within the region. There are considerable differences in patterns of warming, precipitation and extreme events. Some areas or population groups in the North may be able to adapt to these changes more easily than others.

The Climate Change and Health Office (CCHO) at Health Canada is the focal point for the Government of Canada for health and climate change issues. The role of the CCHO is to collaboratively facilitate the development of health policies for assessing and managing the risks to health from climate change and climate variability. The CCHO also facilitates the development in Canada of a foundation of interdisciplinary evidence to support development of public health adaptation strategies to respond to the effects of climate change. In addition, it facilitates open dialogue that includes all stakeholders, as well as access to the knowledge generated by these activities.

**Climate Change and Health Knowledge Development**

Sound adaptation policies should be based on knowledge of the impacts of climate change, the sensitivity and vulnerability of Canadians to it and existing options for adaptation that are effective in reducing the risks. If northern communities are to develop effective public health policies and strategies that will help people cope with climate change, researchers and policy-makers in this region need to fully assess the likely public health implications of climate change and variability at the regional and local levels.

In March 2001, Health Canada hosted, in partnership with the Canadian Climate Impacts and Adaptation Research Network (C-CIARN) of Natural Resources Canada, the *First Annual National Health and Climate Change Science and Policy Research Consensus Conference* involving a wide spectrum of national and international researchers and policy analysts. By identifying current gaps in knowledge, the conference produced a climate change and health research agenda to guide future scientific efforts.[9] An important component of this research agenda concerns identifying the effects of climate change on vulnerable groups such as residents of Canada's North.

Group vulnerabilities in local communities

*Aboriginal Populations*

[9] "First Annual National Health and Climate Change Science and Policy Research Consensus Conference: How Will Climate Change Affect Priorities for Your Health Science and Policy Research? - Summary Document", Health Canada, Ottawa, March 13-15, 2001. http://www.hc-sc.gc.ca/hecs-sesc/hecs/climate/seminar.htm

Aboriginal people form the majority of residents living in Canada's North which is expected to be a region that experiences relatively greater climatic changes over time. Many communities in the North may be highly vulnerable to the effects on human health & well-being from environmental disruptions such as a loss of wildlife and other resources. Hunters and trappers and other peoples living off the land may be especially vulnerable in this regard. The needed financial, technological, institutional and knowledge-based resources for rapid adaptation is quite limited for some of these communities. Such vulnerabilities are also shared by Aboriginal populations living in other locations in Canada.

*Elderly*

The elderly constitute one of the sub-populations that is particularly vulnerable to the effects of climate change. The proportion of elderly residents in Canada, including the North, is expected to rise in the coming decades. Aging is often accompanied by chronic illnesses that may increase susceptibility to infectious diseases or to extreme environmental conditions (e.g., weather events, smog, water contamination). Poverty, which increases with age among the elderly, may add to this group's risk from severe weather.

*Children*

Children are one of the sub-populations that is particularly vulnerable to the effects of climate change (e.g., increased temperature and smog, water contamination, infectious diseases, etc). The factors that may affect children's special vulnerability to possible future climate change include poverty, housing conditions, education, access to medical care, and children's susceptibility to environmental hazards because of their size, behavior and the fact that they are growing and developing. In many northern communities young people represent one of the fastest growing age groups.

*Low- Income Individuals*

Poverty is a risk factor for illnesses and deaths related to climate change because low-income individuals are more likely to live in areas with poor housing, have a lower capacity to cope with difficult conditions, have less money to buy adequate food, have a greater reliance on local food sources and may have less access to health care. Some communities in Canada's North are lower income and lack adequate access to healthcare services to respond to the effects of climate change.

*Individuals who are ill*

People with existing health conditions such as cancer, AIDS, obesity, and diabetes may be more susceptible to water-borne and vector-borne diseases and to physical stresses, such as those experienced during cold spells, floods, or severe storms. Adequate protection from those stresses is important and depends upon access to sanitation, adequate housing conditions, safe drinking water and proper health care services.

Key research needs related to the issue of vulnerable populations includes development of a comprehensive approach to identify and address climate change impacts and adaptation problems facing vulnerable populations. In addition, standardized data collection is needed so that a baseline can be established to determine the relationship between weather and health and who is vulnerable in various regions such as the North. Specific priority research questions also exist including: What will vulnerable communities in areas such as the North look like in twenty to thirty years? How will future environmental changes affect the social and economic disparities that exist today? What health indicators do we need to explore the relationships between climate change and health & well-being? Who is best qualified to assess the impacts of environmental change on population health and well-being?

Knowledge development priorities identified in the climate change and health research agenda will be made available to various research funding agencies in Canada in future rounds of calls for proposals. The products of this research are available to public health decision makers in Canada, including participants of the *Public Health Planning Workshop on Climate Change and Health & Well-being in the North* (July 6-7, 2002) in their collaborative efforts to address the risks to human health & well-being from climate change.

**Climate Change and Health Impact and Adaptation Assessment Guidelines**

All countries will have to adapt to changing climatic conditions. Therefore, further exploration of the potential impacts of climate variability and change on the health of citizens in various countries and regions is required. Signatory nations to the United Nations Framework Convention on Climate Change (UNFCCC) are obliged to conduct regular national assessments of the impacts of climate change, including those on human health, every seven years and to report the results to the UNFCCC. Such assessments can be of help to national, territorial and Aboriginal governments in Canada in identifying, assessing and managing the risks to human health and well-being which may result from climate change and climate variability.

In 2000, Health Canada, the World Health Organization (WHO), and the United Nations Environment Programme (UNEP) committed to developing generic tools and methods for use by national environmental health agencies. The first workshop on the preparation of guidelines to assess the health impacts of climate change - *Climate Change and Health Impact Assessment Guidelines* -was convened by WHO and Health Canada in Victoria, Canada in February 2001. A second workshop was convened by WHO and Health Canada in Geneva, Switzerland in March, 2002 to review the first draft and discuss next steps for the development of the guidelines. Applied/practical assessments conducted according to these guidelines will identify the likelihood and potential magnitude of impacts to human health and well-being, resulting from climate change and climate variability. They will complement and integrate other related activities[10] such as

[10]See Aynslie Ogden et al. "State of Knowledge Assessment for Climate Change Impacts in Northern Canada", Northern Climate ExChange. (www.taiga.net/nce) and the Arctic Monitoring and

the Arctic Climate Impact Assessment which is an international project of the Arctic Council and the International Arctic Science Committee, to evaluate and synthesize knowledge on climate variability, climate change, and increased ultraviolet radiation and their consequences (www.acia.uaf.edu).

In Canada, the guidelines will be implemented by federal, provincial, territorial and Aboriginal governments, specifically health departments, with support from academic and research institutions, economic sectors, non-governmental organizations, health and social organizations, traditional knowledge experts, health service providers and other relevant stakeholders.

Following the applied assessment, each government health and social service authority in the North will be equipped with the necessary information to properly assess the capacity of their public health infrastructure to respond adequately to climate change impacts on health, and to plan and strengthen their public health infrastructure where gaps or opportunities are identified. Current public health programmes may be additionally stressed by climate change, and may need to be modified. Alternatively, policy makers may simply need to account for climate change and variability in future health and social planning.

**Managing the Risks to Human Health and Well-being from Climate Change in Canada's North**

People living in Canada's North are very active in efforts to build strong and vibrant communities and improve the general health status of all who live in this region.[11] Adaptation to the health effects of climate change and variability involves the management of a number of risks to health and well-being. Of particular importance for decision makers is the identification of how vulnerable specific communities and regions of Canada are to the possible effects of climate change. This depends on a number of moderating factors such as population density, level of social, economic and technological development, local environmental conditions, knowledge of, and relationship to the surrounding environment, pre-existing health status (including nutritional status and lifestyle habits), the quality and availability of health care services and public health infrastructure.[12]

Adaptation efforts, which refer to public health actions, measures, strategies and policies that offset or reduce the effects of climate change and variability on human health and well-being, will need to respond

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Assessment Programme, "Arctic Pollution Issues: A State of the Arctic Environment Report", Oslo, Norway, 1997 (www.grida.no/amap) The Canadian Climate Impacts and Adaptation Research Network (C-CIARN) lead by Natural Resources Canada is also involved in climate change monitoring and reporting activities in Canada's North.

[11]For example, see "Health Summit 99: Proceedings and Final Recommendations", October 28-30, 1999, Whitehorse, Yukon.

[12] C.M. Furgal et al., 2002.

to both positive impacts (e.g., greater shipping access, increased hunting season) and negative impacts (e.g., change in ice distribution and stability which will have impacts on wildlife and human travel). The adaptive capacity of communities to minimize the negative impacts and take advantage of the opportunities will be critical in the future.[13] Adaptive capacity refers to the ability to prepare for hazards and opportunities in advance and to respond or cope with the effects.[14] In Canada's North there is some variation among communities with regard to their capacity to adapt to the health impacts of climate change. However, some funding programs currently exist (see
Annex 1) to alleviate some of the cost pressures related to adaptation measures. Also, many of the needed adaptive policies are "no-regrets" actions or those that would benefit northern communities for a variety of reasons and not just because they respond to the effects of climate change (e.g., strengthened public health infrastructure).

Both government and non-governmental groups in Canada's North should begin integrating such considerations into public health promotion and protection activities through adaptation initiatives because of the following considerations:[15]

- Climate change cannot be totally avoided.
- Anticipatory and precautionary public health adaptation is more effective and less costly than forced, last-minute, emergency adaptation or retrofitting.
- Climate change may be more rapid and more pronounced than current estimates suggest. More unexpected events that could have serious health and well-being impacts are possible.
- Immediate public health benefits can be gained from better adaptation to climate variability and extreme weather events.
- Climate change brings public health opportunities as well as threats. Future benefits can result from climate change if planning begins now.

Annex 2 provides examples of adaptation strategies that northern communities might explore to reduce the risks to human health and well-being from climate change.

**Roles and Responsibilities - Building Collaborative Partnerships**

The wide range of health issues associated with climate change requires the cooperation of a range of individuals and groups in the North, especially at the local level where many of the public health programs are delivered. Responsibility for human health and well-being issues in the North involves agreements and cooperation among territorial health and social services departments, chief medical officers of health, public

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[13] C.M. Furgal et. al. 2002.

[14] IPCC, 2001.

[15] Adapted from Burton, 1996.

health practitioners such as community nurses, key federal partners, public health organizations, and a range of Aboriginal health partners with responsibility for regional health boards and community health programs.

Existing, or new mechanisms for cooperation among public health practitioners need to be identified to facilitate the integration of climate change considerations into public health policies in northern communities. As a first step, some of the key activities faced by the responsible public health authorities in responding to climate change include the following:

- Coordination and linkage of the public health decision makers and practitioners in the North to provide greater visibility and understanding of the issues and needs.
- Participate in climate change impact and adaptation assessments related to human health and collaborate with the research community for their support of the assessment process.
- Strategy for integrating climate change considerations into a range of relevant public health policies to manage the risks to Canadians.
- Provide a mechanism for community involvement in impacts and adaptation policy development and in the identification of priority public health adaptation actions.

The CCHO at Health Canada will continue to facilitate the development of health and well-being adaptation strategies after the workshop by providing the following services:

- Inventory of climate change and health funding sources.
- Inventory of potential public health adaptation measures and current activities.
- Bibliography of public health adaptation literature.
- Facilitate climate change and health policy research activities.
- Coordinate development of public health education and outreach materials to increase awareness of the issues and possible solutions.
- Facilitate the integration of health and well-being issues into the National Climate Change Process (NCCP).

Close cooperation and information sharing among public health groups in the North in efforts to adapt to climate change will contribute to the building of strong and healthy communities in this region and will support the growth of the economic, social and health infrastructures required for a 21st century northern society.

# ATTACHMENTS

**Annex 1:** **List of Funding Sources**

**Annex 2:** **Preliminary List of Climate Change and Health & Well-being Adaptation Measures for Northern Communities**

**Annex 1**

## List of Funding Sources

| Name | Description | Sponsor |
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| Brighter Futures | Multifaceted program with an Aboriginal component designed to foster the health and social development of children, particularly young children at risk. The Aboriginal component is designed to assist First Nations and Inuit communities in developing community-based approaches to managing mental health and child development programs. | Health Canada, First Nations and Inuit Health Branch<br><br>http://www.hc-sc.gc.ca/fnihb/cp_questions.htm |
| Building Healthy Communities | Designed to assist First Nations and Inuit communities in developing community-based approaches to managing mental health-crisis management. It also addresses critical gaps in mental health services and programs and provides crisis intervention, aftercare and training for care givers and community members to deal with crisis. | Health Canada, First Nations and Inuit Health Branch<br><br>http://www.hc-sc.gc.ca/fnihb/cp_questions.htm |
| Community Health Prevention and Promotion | The program offers a broad range of community-based activities that enhance the health and well-being of First Nations and the Inuit. The activities are focused on health promotion and injury/illness prevention and include such programs as maternal and infant health, child health, school health, adolescent health and elder health. | Health Canada, First Nations and Inuit Health Branch<br><br>http://www.hc-sc.gc.ca/fnihb/cp_questions.htm |

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| Community Nutrition | Nutrition expertise is provided to support First Nations and Inuit achieve optimal levels of nutritional health, and it is in place at the national and regional levels to provide advice, promotion and education focused on nutrition-related health and social issues. | Health Canada, First Nations and Inuit Health Branch<br><br>http://www.hc-sc.gc.ca/fnihb/cp_questions.htm |
| Environmental Health Program | This program serves as a primary line of defense against environmental and occupational diseases, contaminants and injuries; identifies hazards, risk assessment, risk communication and prevention. The components include water quality, air quality, food quality, waste treatment and disposal, soil quality, safety and occupational health, prevention and outbreak management of environment and occupational diseases, environmental assessments, and pest control. | Health Canada, First Nations and Inuit Health Branch<br><br>www.hc-sc.gc.ca/ehp/ehd/ |
| First Nations and Inuit Health Information System | This program is designed to contribute to the development of a First Nations and Inuit Health Infostructure, and to provide First Nations and Inuit communities with the basic infrastructure and capacity to track and manage health issues on par and in cooperation with other systems accessible to other client groups. | Health Canada, First Nations and Inuit Health Branch<br><br>http://www.hc-sc.gc.ca/fnihb/cp_questions.htm |

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| Population Health Fund | Funds national projects that apply a population health approach to addressing priorities for one or more of the three life stages: childhood and adolescence, early to mid-adulthood and later life.<br><br>Some priorities include: creating optimal conditions for the healthy development of young children, creating safe, supportive and violence-free physical and social environments, and action on the leading causes of preventable illness and death. | Health Canada<br><br>www.hc-sc.gc.ca/hppb/phdd/funding/index.html<br><br>Population Health Approach<br>Health Canada<br>Tunney's Pasture<br>A.L. 1908C1<br>Ottawa, Ontario<br>K1A 1B4<br><br>Fax: (613) 952-5310 |
| Climate Change Action Fund - Public Education and Outreach Program | The goal of the CCAF Public Education and Outreach Program is to build public awareness and understanding about climate change and provide Canadians with the information they need to take action to reduce greenhouse gas emissions and adapt to climate change. Open to non-profit, non-governmental organizations, First Nations, community groups, government agencies (all levels), and businesses and industries. | Climate Change Secretariat<br><br>www.climatechange.gc.ca<br><br>Climate Change Secretariat<br>55 Murray Street, Suite 600<br>Ottawa, Ontario<br>K1N 5M3<br>Phone: 613-943-2671<br>Fax: 613-943-2694<br>E-mail: ccaf@climatechange.gc.ca |

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| Climate Change Action Fund - Impacts and Adaptation | The goal of the CCAF Impacts and Adaptation Program provides funding for targeted research to better understand Canada's vulnerability to climate change, both regionally and by social and economic sector, and to provide information necessary for the development of adaptation strategies.<br><br>Eligible recipients include members of Canadian organizations such as: educational and academic institutions; government agencies (federal, provincial, territorial, regional, municipal); businesses and industries and their professional associations; not-for-profit, non-governmental organizations;<br>community groups (aboriginal communities or organizations, voluntary groups, community organizations, associations and institutions). | Adaptation Liaison Office<br><br>www.adaptation.nrcan.gc.ca<br><br>Adaptation Liaison Office<br>Natural Resources Canada<br>601 Booth Street, Rm 115<br>Ottawa, Ontario K1A 0E8<br><br>Phone: 613-943-0650<br>Fax: 613-992-0190<br>Email: adaptation@nrcan.gc.ca |
| EcoAction Fund | Projects must result in positive, measurable environmental benefits and build public awareness of priority environmental issues such as clean air, climate change, clean water and species at risk.<br><br>Open to non-profit, non-government groups. | Environment Canada<br><br>www.ec.gc.ca/ecoaction<br><br>ecoaction@ec.gc.ca<br><br>Inquiry Centre<br>351 St. Joseph Boulevard<br>Hull, Quebec<br>K1A 0H3<br>Phone: 819-997-2800 or 1-800-668-6767<br>Fax: 819-953-2225<br>E-mail: enviroinfo@ec.gc.ca |

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| Moving on Sustainable Transportation Program | Supports projects that produce the kinds of education, awareness and analytical tools needed to make sustainable transportation a reality.<br><br>Open to non-profit, non-governmental organizations, community organizations, labour organizations, businesses (if non-profit in nature) and industries and their associations. | Transport Canada<br><br>http://www.tc.gc.ca/Programmes/Environnement/SRTD/menu.htm<br><br>Office of Environmental Affairs<br>Sustainable Development Division<br>Transport Canada<br>330 Sparks Street,<br>Place de Ville, Tower C, 18th Floor<br>Ottawa, Ontario K1A 0N5<br><br>Phone (613) 998-6607<br>Fax (613) 993-8674<br>E-mail: MOST@tc.gc.ca |
| North American Fund for Environmental Cooperation (NAFEC) | Supports community-based projects in Canada, Mexico and the United States that promote the goals and objectives of the Commission for Environmental Cooperation including (1) environment, trade and economy, conservation of biodiversity (2) pollutants and health (3) law and policy.<br><br>Grants up to $40 000. | Commission For Environmental Cooperation<br><br>www.cec.org<br><br>North American Fund for Environmental Cooperation c/o<br>North American Commission for Environmental Cooperation<br>393 St. Jacques West, Suite 200<br>Montreal, Quebec<br>H2Y 1N9<br><br>Phone: (514) 350-4357<br>Fax: (514) 350-4314<br>E-mail: NAFEC@ccemtl.org |

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| Canadian Rural Partnership Pilot Project Initiative | Supports rural Canadians as they pursue creative community-based responses that promote strong, sustainable community development in rural and remote areas.<br><br>Open to rural residents, stakeholder organizations, community development associations and rural non-profit organizations.<br><br>Funding is $3M over 2000-2002 period. | Agriculture and Agri-Food Canada<br><br>www.rural.gc.ca<br><br>The Rural Secretariat Room 4112, Sir John Carling Bldg. Ottawa, Ontario<br>K1A 0C5<br>Phone: (613) 759-7112<br>Fax: (613) 759-7150<br>E-mail: rs@em.agr.ca |
| Canadian Agricultural Rural Communities Initiative | Supports rural Canadians with projects which respond to the needs of the agriculture and agri-food sector in such areas as agricultural production, marketing of agricultural products, food safety, research and development of new products and processes and farm management.<br><br>Open to rural residents, stakeholder organizations, community development associations and rural non-profit organizations. | Agriculture and Agri-Food Canada<br><br>www.agr.ca/carci/<br><br>The Rural Secretariat<br>Room 4112, Sir John Carling Bldg.<br>Ottawa, Ontario<br>K1A 0C5<br><br>Phone: (613) 759-7112<br>Fax: (613) 759-7150<br>E-mail: rs@em.agr.ca |
| Tree Canada Foundation | Provides education, technical assistance and financial support to encourage Canadians to plant and care for trees in an effort to help reduce the harmful effects of carbon dioxide emissions.<br><br>Open to any group that is planting trees for non-commercial purposes. | Natural Resources Canada<br><br>www.treecanada.ca<br><br>Tree Canada Foundation<br>220 Laurier Avenue West, Suite 1550<br>Ottawa, Ontario, K1P 5Z9<br><br>Phone: (613) 567-5545<br>Fax: (613) 567-5270<br>E-mail: tcf@treecanada.ca |

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| Green Municipal Enabling Fund | The Green Municipal Enabling Fund (GMEF) is a $25 million Fund that provides grants to support feasibility studies. Operating from 2000 to 2005, GMEF expects to support up to 150 studies a year to assess the technical, environmental and/or economic feasibility of innovative municipal projects. Grants cover up to 50 per cent of eligible costs to a maximum grant of $100,000. | Federation of Canadian Municipalities<br><br>www.fcm.ca<br><br>Federation of Canadian Municipalities<br>Green Municipal Funds<br>24 Clarence Street<br>Ottawa, Ontario<br>K1N 5P3<br><br>Phone: (613) 241-5221, ext 355<br>Fax: (613) 244-1515<br>Email: greenfunds@fcm.ca |
| Green Municipal Investment Fund | GMIF is a $100 million permanent revolving fund that supports the implementation of innovative environmental projects. Through GMIF a municipal government or its partner can borrow at competitive rates for up to 15 per cent (exceptionally 25 per cent) of capital costs. GMIF can also provide loan guarantees. Project payback periods may range from four to ten years.<br><br>GMIF expects to support 15 to 20 projects a year. | Federation of Canadian Municipalities<br><br>www.fcm.ca<br><br>Federation of Canadian Municipalities<br>Green Municipal Funds<br>24 Clarence Street<br>Ottawa, Ontario<br>K1N 5P3<br><br>Phone: (613) 241-5221, ext. 355<br>Fax: (613) 244-1515<br>Email: greenfunds@fcm.ca |

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| National Child Benefit Program | This joint initiative provides families with the supports and services, outside of social assistance, they need to provide a better life for themselves and their children.<br><br>Provides the flexibility and variability for First Nations and Aboriginal communities to design and develop innovative, community-based programs that are culturally relevant and responsive to their specific and unique needs. | Department of Indian Affairs and Northern Development<br><br>www.ainc-inac.gc.ca/<br><br>Children's Programs<br>Social Policy and Programs Branch<br>INAC<br>19th floor, 10 Wellington Street<br>Hull, Quebec<br>K1A 0H4<br><br>Phone.: (819) 997-8146<br>Fax: (819) 953-9139 |
| Technology Partnerships Canada | Technology Partnerships Canada (TPC) is a technology investment fund. TPC advances and supports research, development and innovation in: environmental technologies; enabling technologies (advanced manufacturing and processing technologies, advanced materials processes and applications, applications of biotechnology, and applications of selected information technologies); aerospace and defense. | Industry Canada<br><br>http://tpc.ic.gc.ca<br><br>Technology Partnerships Canada<br>Industry Canada<br>10th Floor<br>300 Slater Street<br>Ottawa, Ontario<br>K1A 0C8<br><br>Phone: 1-800-266-7531<br>Fax: (613) 954-9117<br>E-mail: tpc@ic.gc.ca |

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| Federal Government Infrastructure Program | In partnership with provincial, territorial and local governments and the private sector. Infrastructure Canada will help to renew and build the physical infrastructure that supports and connects our economy, our communities, our culture, and our country.<br><br>Commits $2.65 billion over six years to projects that support clean air and water, transportation and affordable housing. | Treasury Board Secretariat<br><br>http://publiservice.tbs-sct.gc.ca/<br><br>Phone: 1-800-622-6232<br>E-mail: ino-bni@tbs-sct.gc.ca |
| Supporting Communities Partnership Initiative | The program helps communities strengthen their capacity to address the needs of their homeless population; and to improve the social, health and economic well-being of people who are homeless.<br><br>Not-for-profit organizations, individuals, and municipal governments are eligible to receive funding. Public health and educational institutions may be eligible for funding, with the agreement of the provincial or territorial government. | Human Resources Development Canada<br><br>www.hrdc.gc.ca/homelessness<br><br>National Secretariat on Homelessness<br>Human Resources Development Canada<br>Place du Portage II<br>165 Hôtel de Ville Street, 8th floor<br>Hull, Quebec<br>K1A 0J2 |
| New Search and Rescue Initiatives Fund | Funds projects that will improve the National Search and Rescue Program.<br><br>Funds projects in six categories: further integration of the National Search and Rescue Program; development of Search and Rescue data and information; prevention; research and development; volunteers; and response. | National Search and Rescue Secretariat<br><br>www.nss.gc.ca/NIF<br><br>Contact: Kristina Walker<br>E-mail: kristina@nss.gc.ca |

**Annex 2**

**Preliminary List of Climate Change and Health & Well-being Adaptation Measures for Northern Communities**

| Health Issue in the North | Public Health Adaptation Action |
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| Air/Water Quality<br>- allergens/asthma<br>- indoor air<br>- flooding<br>- scarce resources<br>- toxic substances<br>- food supply<br>- drought<br>- water-and food-borne diseases | • Environmental/pollution management (ambient/indoor air, water, toxics), development and enforcement of standards (e.g., cooking and heating indoors)<br>• Energy efficiency policies (e.g., standards for home appliances, commercial lighting, and commercial HVAC, improvements in residential and commercial new buildings).<br>• Water demand and use reduced through increased efficiencies of its delivery and utilization<br>• Introduce incentives/alternatives to switch to natural gas heating from wood stoves.<br>• Water transportation system adjusted to accommodate melting permafrost<br>• Education about proper storage/handling of food in warmer temperatures<br>• Education about proper nutrition, contaminant exposures, alternatives to traditional foods that are not readily available<br>• Monitoring air quality, dust and allergens<br>• Monitoring wind patterns and how they affect contaminants |

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| Air/Water Quality | • Water control structures redesigned to handle greater variability of precipitation, including a possible increase in the intensity of extreme events (e.g., increase size of storm drains, culverts, bridge openings, increase absorbing capacity of urban landscape, storm sewer protection/maintenance programs)<br>• Encourage subwatershed planning<br>• Public awareness about impacts of climate change and public health adaptation strategies (e.g., water shortages)<br>• Disaster Preparedness (flood preparation, infrastructure renewal = dams, training, volunteer recruitment, public education, emergency response coordination, resource allocation)<br>• Use climate forecasting in water planning (e.g., planning and development of major infrastructure - reservoirs, transport networks, safety improvements at airports, floodways)<br>• Include climate change and health considerations in environmental impact assessments<br>• Monitoring of water levels, ice cover and stream flows |

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| Vector-borne Infectious Diseases<br>- vector-borne diseases<br>- imported food<br>- immigration<br>- severe weather events | • Increased information about greater stresses from infectious diseases which could become endemic to Canada or are brought to Canada by travelers/immigrants.<br><br>• Strengthen public health infrastructure related to the monitoring and control of infectious diseases (e.g., expanded access to medical care, health information capacity, enhanced private well water testing, food surveillance and inspection etc.).<br><br>• Improved vaccinations and drugs services to combat infectious diseases.<br><br>• Enhanced disease control, information dissemination, investigation and consultation, development of standards and communicable disease control guidelines.<br><br>• Enhanced field epidemiology and surveillance skills training, improved epidemiological methods/models and improved disease surveillance systems.<br><br>• Integration of climate change and health considerations into food import handling and regulatory activities.<br><br>• Reporting by hunters and wildlife departments of animal health and diseases |

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| Vulnerable Populations<br>- Aboriginal Peoples<br>- children<br>- disabled<br>- homeless/poor<br>- immigrants<br>- seniors<br>- rural and urban health | • Review and revise population health assessment practices to allow for the identification of communities and individuals which are more at risk to the effects of climate change.<br><br>• Land use planning. Coastal Zones - the risks associated with inundation and storms might be managed by using protective structures, restrictive land use zoning including setbacks and encroachment limits, development of new wetlands, adoption of building code provisions for structures located in vulnerable areas, and insurance programs for storm damage.<br><br>• Land use planning. Perma-frost - risks of future perma-frost melting should be included in new construction design and location.<br><br>• Emergency preparedness, strengthen emergency communications, flood preparation, infrastructure renewal, training, volunteer recruitment, public education, emergency response coordination.<br><br>• Improve data availability for northern regions related to environmental and health status.<br><br>• Identification and development of indicators for climate change and health at the community level to monitor changes in the relationship of the environment and northern ecologies with human health.<br><br>• Diversify power supplies (extreme weather events).<br><br>• Examine public infrastructure and make adjustments to ensure public safety (e.g., dams and weirs, flood channels, dykes, pipelines, land stabilization works, transmission towers, communication devices and channels, etc.).<br><br>• Strengthen public health infrastructure (e.g., expanded access to medical care for specific populations including preventative and primary care, disability services, immigrant population services, Aboriginal services, Children services, rural services).<br><br>• Improved vaccinations and drugs services to combat infectious |

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| Vulnerable Populations | • Improved housing and sanitation practices to combat infectious diseases for vulnerable populations.<br>• Use climate forecasting in all sorts of planning.<br>• Integration of climate change and human health considerations into current health information initiatives including the First Nations Regional Health Survey and the First Nations and Inuit Health Information System.<br>• Integration of climate change and health policy/actions related to vulnerable groups into efforts to revise and update public health-related legislation or regulations in the North in order to increase the profile of public health, increase enforcement, and strengthen disease surveillance.<br>• Strengthen the Arctic Land Fast Ice Advisory and Warning Service which rescues hunters on ice floes that are at sea.<br>• Develop contingency relocation plans in case of sea level rise or permafrost melt.<br>• Improved housing and public buildings (e.g., insulation and guidelines).<br>• Capacity building to enable public health authorities in the North to address climate change issues.<br>• Incorporate traditional knowledge and observations of climate change into local planning. |

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| Extreme Weather Events (Storms, Ice Storms, Floods, Hail, Tornadoes) | • Create or enhance disaster preparedness plans<br>• Create or enhance emergency response plans (e.g., planning for the combat of infectious diseases that arise after natural disasters), adequate medical supplies for injuries and illnesses.<br>• Storm shelters<br>• Land use planning. (e.g., coastal zones - the risks associated with inundation and storms might be managed by using protective structures, restrictive land use zoning including setbacks and encroachment limits, development of new wetlands, adoption of building code provisions for structures located in vulnerable areas)<br>• Construct strong seawalls<br>• Fortify sanitation systems<br>• Improve extreme weather advisories/early warning systems<br>• Modify building codes<br>• Cost sharing mechanisms for compensation and adaptation initiatives |
| Extreme Temperatures (Heat, Cold) | • Implement or enhance weather watch/warning systems<br>• Improved housing and public buildings (e.g., insulation, guidelines)<br>• Implement education campaigns (e.g, appropriate clothing)<br>• Install high-albedo materials for roads<br>• Cold Weather Response Plans (e.g., identification of potential shelters, both public and private, (community centres, libraries) and areas where there are large numbers of seniors, use of a temperature index, declaration of cold emergency and response plan, hostels/shelters asked to stay open, city nursing staff to visit people at risk) |

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| Stratospheric Ozone Depletion by Greenhouse Gases (Increased Exposure to UV Radiation) | • Education campaign about dangers of UV Radiation<br>• Appropriate clothing and sunglasses<br>• Stronger sunscreens/lotions |
| Health & Socio-Economic Disruptions (Loss of Natural Resources or Income; Community & Health Infrastructure Damage, Population Displacements) | • Insurance programs and compensation arrangements<br>• Enhanced diversity in economic development programs<br>• Increased monitoring and surveillance of wildlife migration patterns, fish habitats, permafrost and ice thickness and ecosystems that are a part of the traditional ways of Inuit and Aboriginal life.<br>• Strengthen community resilience and health through community based health programs (e.g., nutrition, infectious diseases, family support, home care etc) |

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Northern Shoreline


Ice Melting in Canada’s North