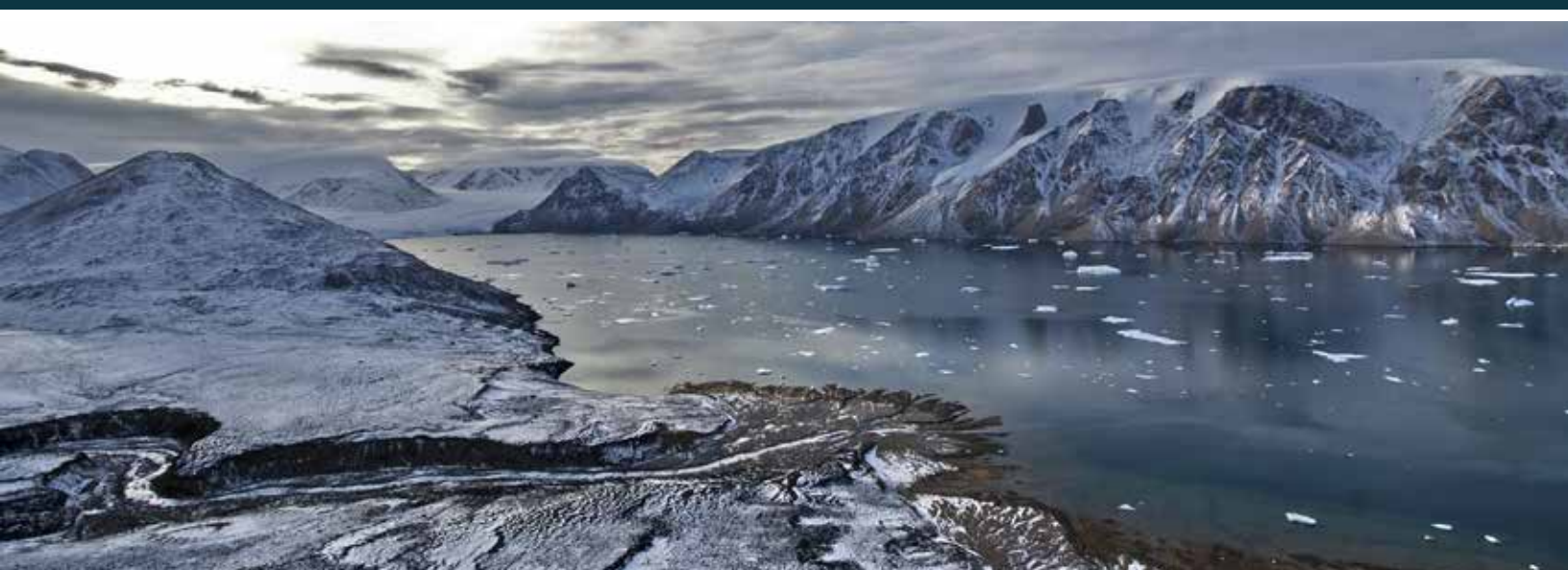


CLIMATE CHANGE

ADAPTATION RESOURCE GUIDE

Nunavut's Natural Environment



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Building *Nunavut* Together
Nunavut liuqatigiingniq
Bâtir le *Nunavut* ensemble



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MARTIN FORTIER, ARCTICNET

GOVERNMENT OF NUNAVUT



1 INTRODUCTION

Climate change is happening, as is evident from increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global sea levels.¹ In Nunavut the annual average temperature is rising twice as fast as the rest of the world.² In Nunavut specifically, many aspects of the natural environment are currently experiencing or expected to experience acute impacts of climate change, including those affecting sea ice, land and ice-based travel, protected areas, wildlife, endangered species, species distribution, and land use planning.³

Climate change adaptation is about taking action and changing behaviour to reduce the negative impacts of climate change and take advantage of new opportunities. In the context of a changing climate and its effects on the natural environment, climate change adaptation also acts as a risk-reduction mechanism to environmental changes.

This resource guide provides an easy-to-use reference base for policymakers and practitioners concerned with the natural environment in Nunavut. The goal of this resource guide is to provide an overview of the information and resources that are available to assist in incorporating adaptation-based activities and policies, recognizing climate-related vulnerabilities, and reducing risk.

2

2.1 Nunavut's Natural Environment

The Arctic ecosystem is fragile and under pressure from climate change and resource development. Work is being done to document the current state of Nunavut's ecosystem, although the size and remoteness of the area pose a challenge. Nunavut is home to numerous bird sanctuaries, wildlife sanctuaries, and territorial parks, as well as four National Parks. As changes continue to impact Nunavut's environment, conservation and protection of wildlife will continue to be a challenge, in particular for migratory birds, caribou and some marine species.

2.2 Climate Change Impacts and Projected Changes in Nunavut⁴

Climate change impacts are already being witnessed by hunters, elders, and others in Nunavut. Over the past 100 years the Arctic has experienced an average warming of 1.5°C, with regional increases between 1 and 3°C. Over the next 100 years, average temperatures are expected to increase by 5 to 7°C in Nunavut, with shorter winters, longer summers, and more extreme weather events. Many of the changes which have already been witnessed are projected to increase over time, and still more changes are projected to occur in the future. Some of the climate-related changes which have been witnessed in Nunavut thus far, or are projected to occur in the future, include changes in permafrost depth and coverage, changes in sea ice and accessibility, changes in resource access, and more.

¹ International Panel on Climate Change [IPCC], 2007

² Centre for Climate and Energy Solutions [C2ES], 2014

³ Government of Nunavut, 2011

⁴ Information on climate change impacts comes from Government of Nunavut 2003, 2005 a,b,c,d, 2011 and 2014.

LOSS OF SPECIES AND INTRODUCTION OF NEW SPECIES

- Impacts of varying severity have already been observed in range distribution, habitats, abundance, genetic diversity, behaviour and population size in both migratory and non-migratory species.
- Changes to vegetation and sea ice will have acute impacts on habitats and the distribution of species. Overall, the number of species found in Nunavut is expected to increase as southern species move northward as the climate warms.
- Loss of some species, including fish, wildlife, and plants, is a potential impact of climate change.
- The introduction of new species in Nunavut, including diseases that have not previously occurred in the territory can have a negative effect on existing populations.
- Changes have already been observed in range of distribution, habitats, abundance, genetic diversity, and behavior of animal and plant species. Wildlife is an essential component of the traditions, culture, economy, and diet in Nunavut.
- Loss of some species, including fish, wildlife, and plants, is a potential impact of climate change that directly impacts traditional activities.

WILDLIFE, PLANTS AND PHYSICAL HEALTH

- The introduction of new species in Nunavut, including diseases that have not previously occurred in the territory can have a negative effect on existing populations.
- Changes have already been observed in range of distribution, habitats, abundance, genetic diversity, and behavior of species. For instance, polar bears may be reduced or cease to exist in some areas, while other areas may experience and increase in polar bear numbers.
- Inuit hunters and community members have witnessed new species.
- Wildlife is an essential component of the traditions, culture, economy, and diet in Nunavut.

SEA AND SEA ICE

- Reduced ice cover, changes to salinity, and increased acidity are all projected impacts of climate change.
- Changes to marine species are likely to result from changes to the ocean ecosystem.
- Impacts to sea ice coverage and stability have serious implications for traditional methods and pathways of travel, and on traditional harvesting and livelihood activities.

PERMAFROST

- As permafrost thaws, it weakens the ground structure, which speeds the process of erosion and slumping, and can cause landslides.
- Changes in landscape due to permafrost thaw, slumps, and heaves may make migratory routes difficult for animals.
- Landslides due to permafrost thaw can impact water quality in lakes.

3 ONLINE RESOURCES

The list of resources in this section is not comprehensive; however it does include those which were identified as the most applicable for Nunavut's natural environment. The resources listed are all available online and include publications, websites, online tools, and case studies.

3.1 Publications and Websites

3.1.1 Nunavut-specific Publications and Websites

This section includes a list of resources specific to Nunavut or produced in Nunavut that provide information on climate change and the natural environment.

- Title:** Nunavut Climate Change Centre
Agency: Government of Nunavut, Climate Change Section
Summary: The Nunavut Climate Change Centre (NC3) is a web-based climate change resource centre intended to provide current climate change information relevant to Nunavummiut. It was developed with the Government of Nunavut (GN) Department of Environment.
Link: <http://www.climatechangenunavut.ca/>
- Title:** The Dynamics of Human-Sea Ice Relationships: Comparing Changing Environments in Alaska, Nunavut, and Greenland
Agency: National Snow & Ice Data Center
Summary: From 2006-2010, a community-based sea-ice monitoring project was carried out, called Siku-Inuit-Hila (Sea Ice – People – Weather) in three Arctic communities, including Clyde River, Nunavut. This project was part of a larger investigation of the relationship between humans and sea ice. Among other topics, it examined the characteristics of sea ice, changes in human ice use patterns over time, changes to sea ice and its features critical to human use, human responses to changes in sea ice, societal impacts of sea ice changes, and implications for future change, impacts, and adaptation.
Link: http://nsidc.org/research/projects/Gearheard_Human_Sea_Ice_Relationships.html
- Title:** Community Climate Change Adaptation Action Plans
Agency: Government of Nunavut and Canadian Institute of Planners
Summary: Community Climate Change Adaptation Action Plans were developed for Arviat, Cambridge Bay, Clyde River, Hall Beach, Iqaluit, Kugluktuk, and Whale Cove. These plans contain many useful tools and resources, including hazard maps and recommendations for adaptations with respect to extreme weather events. In conjunction with these adaptation plans, a Nunavut Toolkit for Climate Change Adaptation Planning was developed for use in other communities for the development of their own community climate change adaptation plans.
Link: <http://www.climatechangenunavut.ca/en/resources/publications>
<http://www.planningforclimatechange.ca/wwwroot/Docs/Library/CIPReports/NUNAVUT%20TOOLKIT%20FINAL.PDF>
- Title:** Northern Biodiversity Program
Agency: Multiple
Summary: The Northern Biodiversity Program is a collaborative research initiative that aims to document change in Canada's north using arthropods as barometers of environmental change.
Link: <http://northernbiodiversity.wordpress.com/tag/nunavut/>

- Title:** Coastal Hazard Assessment for Adaptation Planning
Agency: C-Change
Summary: A working paper outlining a Coastal Hazard Assessment for Adaptation Planning in Iqaluit was published in 2011, describing a variety of changes, hazards, and ongoing adaptation projects within the community, with attention to the impacts of extreme weather events.
Link: http://www.coastalchange.ca/images/stories/Documents_Tab/workingpaper23_hatcherforbes_manson_2011.pdf
- Title:** Community Climate Change Hazards Mapping Projects
Agency: Government of Nunavut with community and academic partners
Summary: Community Climate Change Hazards Mapping projects have been or are being undertaken in a number of Nunavut communities as part of the Nunavut Climate Change Partnership. The goal is to create hazards maps for communities as a useful tool for planners and engineers in Nunavut. The projects involve evaluating existing and potential landscape hazards and the impacts that climate change may have on infrastructure and resource development in communities.
Link: <http://gov.nu.ca/eia/news/climate-change-community-consultations>
<http://geoscan.nrcan.gc.ca/starweb/geoscan/servlet.starweb>
<http://arviat.tv/compendium-of-research/2011/item/290-arviat-research-climate-change-hazard-mapping-nunavut>
- Title:** Assessing permafrost conditions in support of climate change adaptation in Pangnirtung, Nunavut
Agency: Nunavut Climate Change Partnership
Summary: The Nunavut Climate Change Partnership provides a dataset entitled Assessing permafrost conditions in support of climate change adaptation in Pangnirtung, Nunavut, in PDF format. This data is intended to provide a tool in support of economic development through infrastructure maintenance and community planning.
Link: <http://data.gc.ca/data/en/dataset/d29bf844-b480-5e6a-9d40-0b0781e8299d>
- Title:** Permafrost Monitoring
Agency: Government of Nunavut & Natural Resources Canada
Summary: The Government of Nunavut partnered with Natural Resources Canada to install permafrost monitoring sites across Nunavut. These sites are currently generating ongoing information on the thermal conditions of the ground to depths of 15 metres, and will provide baseline information required for engineering design and community planning.
Link: <http://climatechangenunavut.ca/en/project/nunavut-permafrost-monitoring-network>
- Title:** Sea-level Projections for Five Pilot Communities of the Nunavut Climate Change Partnership
Agency: Nunavut Climate Change Partnership
Summary: The Nunavut Climate Change Partnership released a report in February 2011 entitled Sea-level Projections for Five Pilot Communities of the Nunavut Climate Change Partnership. This report provides estimates of the range of sea-level change expected in the next 90 years for five communities in Nunavut. These projections are intended to contribute to discussions on the possible impacts of projected sea-level change and potential mitigation measures that could be implemented at each community.
Link: <http://geoscan.ess.nrcan.gc.ca/cgi-bin/starfinder/0?path=geoscan.fl&id=fastlink&pass=&search=R%3D288019&format=FLFULL>

3.1.2 Northern Publications and Websites

This section includes a list of resources specific to the Circumpolar North or produced in the Circumpolar North that provide information on climate change and the natural environment.

- Title:** Effects of Climate Change on the Canadian Arctic Wildlife
Agency: ArcticNet
Summary: This study focuses on northern ecosystems and the shifts and transformations that are happening related to climate change. There are a number of publications related to this study that are listed on the webpage.
Link: http://www.arcticnet.ulaval.ca/research/summary.php?project_id=45
- Title:** Managing the Risks: A Guide for Arctic and Northern Communities
Agency: Centre for Indigenous Environmental Resources (CIER)
Summary: The Centre for Indigenous Environmental Resources (CIER) provides a guide entitled Managing the Risks: A Guide for Arctic and Northern Communities, intended to assist these communities in applying a step-by-step risk management framework to identify impacts and vulnerabilities to climate change in a local context. Included is an interactive map of summer and winter risks, several reports, and worksheets, as well as the Guide itself.
Link: <http://ccrm-cier.redrockconsulting.com/>
- Title:** Climate Telling
Agency: Health Canada
Summary: The website Climate Telling is produced as part of Health Canada's Climate Change and Health Adaptation Program. It is intended to provide a central communication hub for climate change and health-related issues in the Arctic, and intends to facilitate knowledge dissemination by accommodating multimedia research outputs and stimulating dialogue through social media platforms used universally among youth.
Link: <http://climatetelling.ca/>

3.1.3 External Publications and Websites

This section includes a list of relevant resources from other areas of Canada or other non-circumpolar countries that provide information on climate change and the natural environment.

- Title:** Guidance Manual for Local Climate Change Visioning and Landscape Visualizations
Agency: University of British Columbia
Summary: The University of British Columbia Collaborative for Advanced Landscape Planning has published a Guidance Manual for Local Climate Change Visioning and Landscape Visualizations. Climate change visioning integrates climate science with local planning, using participatory processes and "virtual reality" techniques based on digital mapping and scientific data to accelerate community awareness, help to build a constituency for change, and support decision-making for climate change options. This particular guidance manual describes how visioning has informed adaptation in communities in British Columbia, and it provides guidance on how others with access to suitable technological expertise can do the same.
Link: <http://web.forestry.ubc.ca/calp/CALP-Visioning-Guidance-Manual-V1-1.pdf>
- Title:** Canadian Parks and Protected Areas: Helping Canada weather climate change
Agency: Canadian Parks Council
Summary: This report highlights the roles of parks and protected areas in climate change adaptation and mitigation, and some of the actions taken to date to respond to the challenge of rapid climate change.
Link: <http://www.parks-parcs.ca/english/CPC%20Climate%20Change%20Report%20FINAL%20engLR.pdf>
- Title:** Climate Change and Wildlife Resources
Agency: Canadian Wildlife Federation
Summary: The Canadian Wildlife Federation has information and resources available on climate change and wildlife on their website. There is also information on loss of sea ice and other topics specific to the Arctic.
Link: <http://www.cwf-fcf.org/en/discover-wildlife/climate-change/>
- Title:** Database of Climate Change Adaptation Resources
Agency: Ouranos
Summary: A searchable database of existing climate change adaptation resources is provided by OURANOS (Consortium on Regional Climatology and Adaptation to Climate Change). This includes a search engine which is searchable by geographic region of interest, by topic of interest, and by subtheme.
Link: <http://adaptation.ouranos.ca/en/>
- Title:** A Survey of Climate Change Adaptation Planning
Agency: H. John Heintz III Centre for Science, Economics, and the Environment
Summary: A resource entitled A Survey of Climate Change Adaptation Planning has been produced by the H. John Heintz III Centre for Science, Economics, and the Environment. It provides an introductory survey of worldwide climate change adaptation efforts and a number of case studies of adaptations within Canada.
Link: http://www.tribesandclimatechange.org/docs/tribes_89.pdf



Title: Adapting to Climate Change: A Risk-Based Guide for Local Governments
Agency: Federation of Canadian Municipalities
Summary: A report entitled Adapting to Climate Change: A Risk-Based Guide for Local Governments presents a risk-based approach to adapting to climate change for planning and responses, and illustrates how the risk management process can help users determine optimum solutions to complex issues. It is intended to help local officials to identify and manage climate-related risks.
Link: https://www.fcm.ca/Documents/tools/PCP/Adapting_to_Climate_Change_a_Risk_Based_Guide_for_Local_Governments_EN.pdf

Title: Mainstreaming Climate Change Adaptation in Canadian Water Resource Management
Agency: Toronto and Region Conservation
Summary: A report was published by Toronto and Region Conservation entitled Mainstreaming Climate Change Adaptation in Canadian Water Resource Management. This document describes the current state of action of climate change adaptation in the water resource management sector in Canada, provides summaries by water issue (including infrastructure and technology), and identifies strategic opportunities to move forward.
Link: http://waterandclimate.ca/WP/wp-content/uploads/2012/11/MainstreamReport_FINAL_FORMATTED_Nov17.pdf

Title: Impacts of climate change on zoonotic disease and on food and water safety
Agency: Public Health Agency of Canada
Summary: An overview of the studied impacts of climate change on zoonotic disease and on food and water safety is compiled in a presentation entitled Climate Change and Infectious Disease Research and Surveillance Activities in Arctic Canada: Zoonotic Diseases and Food and Water Safety and Security.
Link: http://www.arcticinfdis.com/documents/2011/PHAC_ICSmeeing19Sept_final.pdf

Title: Coastal Flood Risk Assessments
Agency: Atlantic Climate Adaptation Solutions
Summary: Climate-change-related coastal flood risk assessment has been undertaken in Nova Scotia in two projects entitled Construction and Analysis of Flood Risk Maps for Select Coastal Communities in Nova Scotia, and Integrated River and Coastal Hydrodynamic Flood Risk Mapping. These risk assessments are useful in informing climate change adaptation efforts.
Link: <http://atlanticadaptation.ca/node/128>
<http://atlanticadaptation.ca/node/293>

Title: Sea-level rise (SLR) and storm surge hazard mapping
Agency: Atlantic Climate Adaptation Solutions
Summary: Sea-level rise (SLR) and storm surge hazard mapping was undertaken in Prince Edward Island to determine PEI-specific climate change scenarios and develop a publicly-accessible hazards map reflecting SLR and storm surge hazards.
Link: <http://atlanticadaptation.ca/pei-slr-hazardmapping>

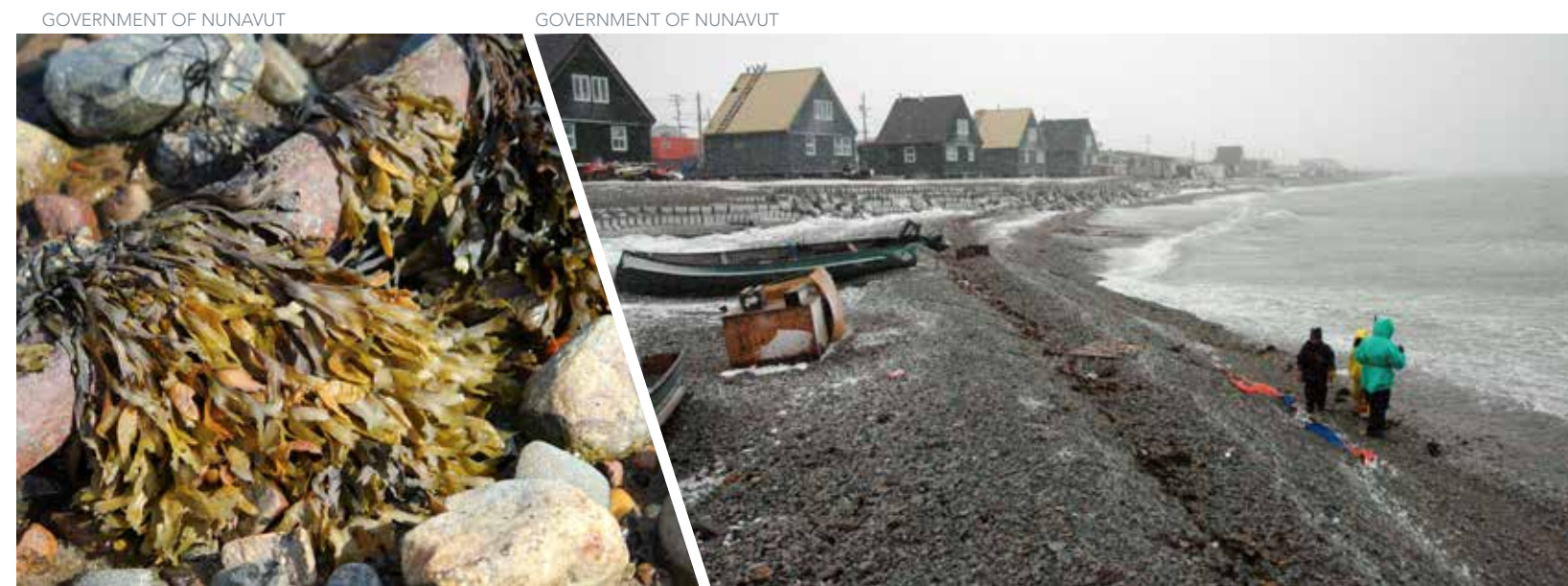
Title: Climate Adaptation Knowledge Exchange
Agency: EcoAdapt
Summary: The Climate Adaptation Knowledge Exchange (CAKE) provides a shared knowledge base and community of practice related to climate change adaptation. The CAKE website offers a number of resources, including a wide variety of case studies, a virtual library, planning tools, and a directory of people and organizations involved in climate change adaptation work.
Link: <http://www.cakex.org/directory>

Title: Canadian Communities' Guidebook for Adaptation to Climate Change
Agency: Environment Canada and the University of British Columbia
Summary: Environment Canada and the University of British Columbia have published a resource entitled Canadian Communities' Guidebook for Adaptation to Climate Change. This guidebook is especially intended for local governments and others looking for 'win-win' solutions which both reduce greenhouse gas emissions and manage risks related to climate change (e.g. more frequent heat waves, water shortages, and sea-level rise).
Link: http://www.fcm.ca/Documents/tools/PCP/canadian_communities_guidebook_for_adaptation_to_climate_change_EN.pdf

Title: Adaptation 101
Agency: Natural Resources Canada
Summary: The Natural Resources Canada Climate Change Impacts and Adaptation Directorate provides an Adaptation 101 website with information about climate change impacts, adaptation, adaptive capacity, resources, adaptation initiatives in Canada, and more.
Link: <http://www.nrcan.gc.ca/environment/impacts-adaptation/adaptation-101/10019>

Title: Coastal Climate Adaptation
Agency: National Oceanic and Atmospheric Administration (NOAA)
Summary: The National Oceanic and Atmospheric Administration (NOAA) of the United States offers a Coastal Climate Adaptation website which includes adaptation plans, action plans, case studies, strategies, guidebooks, risk assessment material, stakeholder engagement guides, training resources, and more.
Link: <http://coastalmanagement.noaa.gov/climate/adaptation.html>

Title: Retooling for Climate Change
Agency: Fraser Basin Council
Summary: A website entitled Retooling for Climate Change provides a number of useful tools, resources, and case studies of climate change adaptation. Specific sections with resources are included for infrastructure, hazards management, water, management, and more.
Link: http://www.retooling.ca/retooling_essentials.html



3.2 Case Studies & Best Practices

3.2.1 Nunavut-specific Case Studies & Best Practices

This section includes a list of case studies and best practices specific to Nunavut or produced in Nunavut that provide information on climate change and the natural environment.

- Title:** Polar Ecosystems in Transition: An interdisciplinary case study of the effects of climate change on temporal trends in contaminant accumulation, foraging ecology, and human use of polar bears
Agency: Government of Nunavut, Environment Canada & Nunavut Arctic College
Summary: A research project is being carried out by the Government of Nunavut in cooperation with Environment Canada, Nunavut Arctic College, and other partners, entitled Polar Ecosystems in Transition: An interdisciplinary case study of the effects of climate change on temporal trends in contaminant accumulation, foraging ecology, and human use of polar bears. This initiative encompasses various aspects of the impact of climate change on polar bears.
Link: <http://www.ec.gc.ca/api-ipyp/?lang=En&n=49C984AC-1>
- Title:** Case study of community-scale hazard mapping in Clyde River
Agency: Natural Resources Canada
Summary: A case study of community-scale hazard mapping in Clyde River, Nunavut, is available from Natural Resources Canada. This link describes the process of creating hazard maps for the community and its rationale.
Link: <http://geoscan.nrcan.gc.ca/starweb/geoscan/servlet.starweb?path=geoscan/fulleweb&search1=R=224608>
- Title:** Nunavut Terrain and Soil Analysis
Agency: Government of Nunavut
Summary: The Government of Nunavut Department of Community Development and Government Services released a report entitled Nunavut Terrain and Soil Analysis in 2011, which detailed the results of a study which used radar satellite images to determine terrain suitability for future development in 14 communities in Nunavut, in order to better assess climate change risks to development of these lands.
Link: http://www.climatechangenunavut.ca/sites/default/files/nunavut_terrain_and_soil_analysis_-_2011.pdf
- Title:** Reducing Vulnerability to Climate Change in the Arctic: The Case of Nunavut, Canada
Agency: Ford, J., Pearce, T., Smit, B., Wandel, J., Allurut, M., Shappa, K., Ittusujurat, H., and Qrunnut, K.
Summary: This report focuses on research conducted with two Nunavut communities, Arctic Bay and Igloolik. The report identifies key areas where policy can help Inuit reduce their vulnerability to climate change, focusing on the renewable resource harvesting sector.
Link: <http://pubs.aina.ucalgary.ca/arctic/Arctic60-2-150.pdf>
- Agency:** Pan-Territorial Adaptation Partnership
Summary: The Pan-Territorial Adaptation Partnership held a Pan-Territorial Permafrost Workshop in November 2013. This workshop brought together front-line decision makers and permafrost researchers from Nunavut, NWT, and Yukon to share knowledge, form connections and look at possibilities for adaptation in the future. Presentations and materials from the workshop are available online.
Link: <http://www.northernadaptation.ca/node/59>

- Title:** Elder's Conference on Climate Change
Agency: Nunavut Tunngavik Inc.
Summary: An Elder's Conference on Climate Change was held in March 2001 with the objective of gathering Inuit Qaujimagatuqangit and experiences of Elders concerning climate change and its effects in Nunavut.
Link: <http://www.polarnet.ca/ntilands/pdfdoc/elders.pdf>
- Title:** Qapirangajuq: Inuit Knowledge and Climate Change
Agency: Kunuk, Z. and Mauro, I.
Summary: The first-ever Inuktitut-language film on climate change, entitled Qapirangajuq: Inuit Knowledge and Climate Change was produced in 2010 as a record of the traditional knowledge and experience of Inuit elders and hunters from across Nunavut.
Link: <http://www.isuma.tv/inuit-knowledge-and-climate-change>
<http://www.capecarewellfoundation.com/carbon14/qapirangajuq-inuit-knowledge-and-climate-change/>

3.2.2 Northern Case Studies & Best Practices

This section includes a list of case studies and best practices specific to the Circumpolar North or produced in the Circumpolar North that provide information on climate change and the natural environment.

- Title:** Local Environmental Observer (LEO) Network
Agency: Alaska Native Tribal Health Consortium
Summary: The Alaska Native Tribal Health Consortium has developed a Local Environmental Observer (LEO) Network. LEOs act as the eyes, ears, and voice of environmental change in their communities, and conduct environmental monitoring which is important for understanding the risks and benefits of climate change adaptation.
Link: <http://www.anthc.org/chs/ces/climate/leo/>
- Title:** Climate Change in Nunavik and Northern Quebec
Agency: Ouranos
Summary: A project was undertaken in Nunavik and northern Quebec regarding access to land and resources in the context of climate change. This involved identification of the current ice trail network, hazardous areas, and alternate routes, and incorporated interviews with community members and elders as well as field measurements of snow quantity and ice thickness.
Link: http://www.ouranos.ca/media/publication/288_15_fiche_14_web_accAsterritoire_EN.pdf
- Title:** Traditional Knowledge Research for Increased Unpredictable Severe Weather and Travel Safety Impacts on Community Health: Tools for the Development of Adaptation Plans
Agency: Institute for Circumpolar Health Research
Summary: A community-based project entitled Traditional Knowledge Research for Increased Unpredictable Severe Weather and Travel Safety Impacts on Community Health: Tools for the Development of Adaptation Plans was carried out by the Dene Nation in NWT in cooperation with the Institute for Circumpolar Health Research. The intent of this project was to amplify the voices of the Elders, traditional harvesters, and youth so they can have a chance to elaborate their own adaptation plans. Youth developed their research skills and produced a documentary entitled "The Land of Our Future".
Link: <http://www.ichr.ca/#!/the-land-of-our-future/ci6w>

3.2.3 External Case Studies & Best Practices

This section includes a list of relevant case studies and best practices from other areas of Canada or other non-circumpolar countries that provide information on climate change and the natural environment.

- Title:** Adaptation: Linking Research and Practice
Agency: Natural Resources Canada
Summary: This chapter of the Natural Resources Canada report Canada in a Changing Climate: Sector Perspectives on Impacts and Adaptation, examines the current status of adaptation in Canada with respect to both research and practice, based on scientific and grey literature. It includes a discussion of how we have progressed and overcome barriers, as well as changes in research, engagement, and action. It also includes case studies focused on a range of issues.
Link: http://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/earthsciences/pdf/assess/2014/pdf/Chapter9-Adaptation_Eng.pdf
- Title:** Biodiversity and Protected Areas
Agency: Natural Resources Canada
Summary: This chapter of the Natural Resources Canada report Canada in a Changing Climate: Sector Perspectives on Impacts and Adaptation, summarizes the impacts of climate change on Canada's biodiversity. It describes some of the tools available to maintain and enhance ecological resilience.
Link: http://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/earthsciences/pdf/assess/2014/pdf/Chapter6-Biodiversity_Eng.pdf
- Title:** Land Use Planning Tools for Local Adaptation to Climate Change
Agency: Natural Resources Canada
Summary: Natural Resources Canada has produced a report entitled Land Use Planning Tools for Local Adaptation to Climate Change. This website outlines a number of land-use planning tools and decision-support tools for use in the Canadian context, including scenario planning, vulnerability assessment, design guidelines, and more.
Link: <http://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/earthsciences/files/landuse-e.pdf>
- Title:** Climate change and protected area policy and planning in Canada
Agency: Scott, D. and Lemieux, C.
Summary: This study provides an overview of the policy and planning implications of climate change for protected areas in Canada. It also summarizes the adaptation options that have been discussed in the conservation literature.
Link: http://www.cfs.nrcan.gc.ca/bookstore_pdfs/25752.pdf
- Title:** Vulnerabilities and Adaptation to Meteorological and Related Hazards
Agency: ArcticNet
Summary: A project was undertaken in Nunavut entitled Vulnerabilities and Adaptation to Meteorological and Related Hazards, to analyze hazards, how they impact communities, and how they will change with a changing climate, and to gather data on these hazards.
Link: <http://www.arcticnet.ulaval.ca/pdf/phase1/43.pdf>

4.1 Natural Environments Courses & Training

- Title:** Assessing the Hydrologic Impacts of Climate Change
Agency: Toronto and Region Conservation
Summary: The website Water and Climate Change Adaptation by Toronto and Region Conservation provides an e-Learning course entitled Assessing the Hydrologic Impacts of Climate Change.
Link: <http://waterandclimate.ca/WP/index.php/technical-training/web-based-elearning-course/>
- Title:** Climate Change, Wildlife & Wildlands Toolkit
Agency: US Global Change Research Program
Summary: The Climate Change, Wildlife and Wildlands Toolkit is available for formal and informal educators, as well as a version for teachers and interpreters. It is designed for classroom, or for informal education settings. The toolkit was developed to aid educators in teaching how climate change is affecting the Nation's wildlife and public lands.
Link: <http://www.globalchange.gov/browse/educators/wildlife-wildlands-toolkit>

4.2 Climate Change and Adaptation Courses & Training

- Title:** Climate Insights 101
Agency: Pacific Institute for Climate Solutions (PICS)
Summary: The Pacific Institute for Climate Solutions (PICS) offers a Climate Insights 101 online short course, intended to provide users with an in-depth understanding of climate science and related issues. Two modules on the science of climate change and mitigation have been produced, and two modules on adaptation and regional climate change impacts are upcoming.
Link: <http://pics.uvic.ca/education/climate-insights-101>
- Title:** Introductory e-Course on Climate Change
Agency: United Nations Climate Change Learning Partnership
Summary: The United Nations Climate Change Learning Partnership offers an online Introductory e-Course on Climate Change with six modules, including one focused specifically on climate change adaptation. Those who complete the quizzes accompanying each module receive a certificate.
Link: <http://unccelearn.org/>
- Title:** Various: Climate Change and Climate Literacy
Agency: Coursera
Summary: The online e-Learning platform Coursera presently offers four courses in climate change and climate literacy. These courses are entitled Global Warming: The Science of Climate Change, Climate Literacy: Navigating Climate Conversations, Climate Change, and Climate Change in Four Dimensions, and are offered by the University of Chicago, University of British Columbia, the University of Melbourne, and University of California San Diego, respectively.
Link: <https://www.coursera.org/course/globalwarming>
<https://www.coursera.org/course/climateliteracy>
<https://www.coursera.org/course/climatechange>
<https://www.coursera.org/course/4dimensions>

5 CONTACTS

5.1 Nunavut Contacts

Title: University of Chicago
Agency: Global Warming: Understanding the Forecast
Summary: The University of Chicago offers free online access to course materials to their Global Warming: Understanding the Forecast course. Though all lectures in the course are relevant to climate change science, the lectures of Chapter 12 cover emergency and disaster-related impacts of climate change.
Link: <http://forecast.uchicago.edu/lectures.html>

Title: Climate Change
Agency: Open2Study
Summary: Open2Study offers a free open study course in climate change offered through Macquarie University, which provides information about climate change impacts on food security, the economy, society, and more.
Link: <https://www.open2study.com/courses/climate-change>

Title: Leading Change and Action on Climate Change
Agency: Oxford University
Summary: Oxford University offers an online course entitled Leading Change and Action on Climate Change. This course examines climate change issues, current approaches to leadership at the local, national and global level and supports students in developing their own approach to leading change and innovation on climate change in a personal, local or professional context.
Link: <https://www.conted.ox.ac.uk/courses/details.php?id=L100-11&search=climate%20change&submitbutton=Search&multisearch=single>

Title: Certificate in Decision Making for Climate Change
Agency: Northwestern University
Summary: Northwestern University offers a Certificate in Decision Making for Climate Change in a 100% online format. This course teaches student to understand the impact of climate change and to make educated decisions about adapting to and minimizing its effects. It is intended for municipal, regional, and federal officials, environmental planners and managers, corporate and utility managers, and consultants. The course is offered in partnership with the University of Washington, University of California – Irvine, and the University of British Columbia.
Link: <http://sps.northwestern.edu/program-areas/professional-development/climate-change/>

Agency: Government of Nunavut, Climate Change Section
Summary: The Climate Change Section of the Government of Nunavut Department of Environment coordinates the online Nunavut Climate Change Centre, and provides information about climate change adaptation programs and initiatives occurring in Nunavut. The Nunavut Climate Change Centre is a web-based climate change resource centre intended to provide current climate change information relevant to Nunavummiut. It shares and distributes climate change knowledge in Nunavut and makes information more accessible to the public.

Address: PO Box 1000 Stn 1360
Iqaluit, NU X0A 0H0
Phone: 867-975-7700
Email: climatechange@gov.nu.ca
Website: www.climatechangenunavut.ca/
www.env.gov.nu.ca/node/93

Agency: Canada-Nunavut Geoscience Office (CNGO)
Summary: The Canada-Nunavut Geoscience Office (CNGO) is mandated to supply geoscience information and expertise in Nunavut in support of responsible exploration and development of mineral and energy resources, to build and maintain geoscience capacity and expertise in Nunavut, and to provide geoscience training opportunities, public outreach, and communicate awareness of earth science to Nunavummiut.

Address: PO Box 2319, 1106 Ikaluktuutiak Drive
Iqaluit, NU X0A 0H0
Phone: 867-975-4529
Email: serge.basso@nrcan-rncan.gc.ca
Website: <http://cngo.ca/>

Agency: City of Iqaluit Department of Community Economic Development
Summary: The City of Iqaluit Department of Community Economic Development is responsible for assisting the community by spearheading various community and economic development projects. The department also takes part in business development, proposal development, community-based planning, monitoring and evaluation, and organizational development.

Address: PO Box 460
Iqaluit, NU X0A 0H0
Phone: 867-979-6363 ext. 230
Email: info@city.iqaluit.nu.ca
Website: <http://www.city.iqaluit.nu.ca/i18n/english/economicdev.html>

Agency: Government of Nunavut, Department of Environment
Summary: The Government of Nunavut Department of Environment works in partnership with others to protect the environment, parks, and wildlife by promoting the sustainable use of these renewable resources.

Address: PO Box 1000 Stn 1300
Iqaluit, NU X0A 0H0
Phone: 867-975-7700
Email: environment@gov.nu.ca
Website: <http://env.gov.nu.ca/programareas/wildlife>
<http://env.gov.nu.ca/programareas/parksandspecialplaces>

GOVERNMENT OF NUNAVUT PARKS

GOVERNMENT OF NUNAVUT PARKS



Agency: Nunavut Research Institute (NRI)
Summary: The Nunavut Research Institute, a part of Nunavut Arctic College, acts as a gateway to research and technology development initiatives in Nunavut. NRI develops and promotes traditional knowledge, science, and technology as key local resources. It also shares information on research projects, provides advice on research funding programs, and assists in the development of proposals to research funding agencies.
Address: PO Box 1720 Building 959
Iqaluit, NU X0A 0H0
Phone: 867-979-7280
Website: www.nri.nu.ca

5.2 Government Agencies

Agency: Aboriginal Affairs and Northern Development Canada (AANDC)
Summary: Aboriginal Affairs and Northern Development Canada (AANDC) support Aboriginal and northern communities to address risks and challenges associated with climate change and to become more resilient through its Climate Change Adaptation Program (CCAP). In its first three years, this program funded more than 90 projects in 80 communities.
Address: Climate Change Adaptation Program
25 Eddy Street, 10th floor
Gatineau, QC K1A 0H4
Phone: 819-953-2590
Email: adaptation@aandc-aadnc.gc.ca
Website: www.aadnc-aandc.gc.ca/eng/1329158189051/1329158264671

Agency: Government of the Northwest Territories, Climate Change Unit
Summary: The Climate Change Unit of the Government of the Northwest Territories Department of the Environment and Natural Resources provides information and coordinates action on climate change. They provide the Northwest Territories Climate Change Network, a web-based tool that provides a resource for members to share information, make contacts, and promote action on climate change in the Northwest Territories.
Address: PO Box 1320
Yellowknife, NT X1A 2L9
Phone: 867-873-7654
Email: climatechange@gov.nt.ca
Website: www.nwtclimatechange.ca/nwt-climate-change-network

Agency: Government of Yukon, Climate Change Secretariat
Summary: The Climate Change Secretariat is a branch of Environment Yukon, Government of Yukon. They coordinate the Yukon's government-wide response to climate change, form partnerships, coordinate activities and develop climate change policies and strategies.
Address: PO Box 2703 (V-205)
Whitehorse, YT Y1A 2C6
Phone: 867-456-5543 or 1-800-661-0408 ext. 5544
Email: climatechange@gov.yk.ca
Website: <http://www.env.gov.yk.ca/air-water-waste/climatechange.php>

Agency: Natural Resources Canada
Summary: Natural Resources Canada (NRCan) is the federal department responsible for natural resources, energy, minerals and metals, forests, earth sciences, mapping, and remote sensing. It works to ensure the responsible development of Canada's natural resources and builds and maintains an up-to-date knowledge base of the Canadian land mass and resources. The Impacts and Adaptation program at Natural Resources Canada includes programs such as the Adaptation Platform and the Regional Adaptation Collaboratives (RACs) program. Within the RACs, areas of focus for the individual collaboratives include flood protection (British Columbia), drought and flood planning (Prairies), extreme weather risk management (Ontario), and many more. The role of the collaborative is to develop knowledge, tools and networks to support practitioners and decision-makers in addressing climate change issues now and in the future.
Email: adaptation@nrcan.gc.ca
Website: www.nrcan.gc.ca/environment/impacts-adaptation
www.nrcan.gc.ca/environment/impacts-adaptation/regional-initiatives/collaboratives/10633

Agency: Environment Canada
Summary: Environment Canada (EC) is the federal department responsible for protecting the environment, conserving the country's natural heritage, and providing weather and meteorological information to keep Canadians safe and informed
Address: 10 Wellington, 23rd Floor
Gatineau, QC K1A 0H3
Phone: 819-997-2800 or 1-800-668-6767
Email: enviroinfo@ec.gc.ca
Website: www.ec.gc.ca

GOVERNMENT OF NUNAVUT



5.3 Climate Change Organizations

- Agency:** Adaptation to Climate Change Team (ACT), Simon Fraser University
Summary: The Adaptation to Climate Change Team (ACT) is the only think tank initiative on the topic of climate change adaptation in Canada. Among other roles, it publishes research reports identifying policy and resource opportunities to bridge theory and action in support of sustainable adaptation.
Address: Simon Fraser University
#3551, 515 West Hastings Street
Vancouver, BC V6B 5K3
Phone: 604-671-2449
Email: adapt@sfu.ca
Website: <http://act-adapt.org/about/>
- Agency:** Arctic Institute of Community-Based Research
Summary: The Arctic Institute of Community-Based Research (AICBR) facilitates and promotes community-based, northern-led health research activities aimed at improving the health of indigenous and non-indigenous Northerners.
Address: 308 Hanson Street
Whitehorse, YT Y1A 1Y6
Phone: 867-668-3393
Email: info@aicbr.ca
Website: www.aicbr.ca
- Agency:** Arctic Institute of North America, University of Calgary
Summary: The Arctic Institute of North America works to advance the study of the North American and circumpolar Arctic through the natural and social sciences, the arts and humanities. They also acquire, preserve and disseminate information on physical, environmental and social conditions in the North. Their website is home to the Arctic Science and Technology Information System (ASTIS) database, which contains records describing publications and research projects about northern Canada and the circumpolar Arctic.
Address: 2500 University Drive NW, ES-1040
Calgary, AB T2N 1N4
Phone: 403-220-7515
Email: arctic@ucalgary.ca
Website: www.arctic.ucalgary.ca
- Agency:** ArcticNet
Summary: ArcticNet is a Network of Centers of Excellence of Canada that brings together scientists and managers in the natural, human health, and social sciences with their partners from Inuit organizations, northern communities, federal and provincial agencies, and the private sector. The central objective of ArcticNet is to contribute to the development and dissemination of the knowledge needed to formulate adaptation strategies and national policies to help Canadians face the impacts and opportunities of climate change and modernization in the Arctic.
Address: Pavillon Alexandre-Vachon, Room 4081
1045, avenue de la Médecine, Université Laval
Québec, QC G1V 0A6
Phone: 418-656-5830
Email: arcticnet@arcticnet.ulaval.ca
Website: <http://www.arcticnet.ulaval.ca/aboutus/rationale.php>

- Agency:** Canadian High Arctic Research Station
Summary: The Canadian High Arctic Research Station (CHARS) will be a research station in Canada's Arctic with the goal of advancing Canada's knowledge of the Arctic in order to improve economic opportunities, environmental stewardship, and quality of life.
Phone: 819-953-1160
Email: chars-srcea@aandc-aadnc.gc.ca
Website: www.science.gc.ca/default.asp?lang=En&n=74E65368-1
- Agency:** Canadian Polar Commission
Summary: The Canadian Polar Commission is Canada's primary knowledge agency. It is a point of contact with the Canadian and international polar scientific communities. It encourages and facilitates cooperation and collaboration in polar knowledge and works with partners to determine scientific and other priorities.
Address: 2464 Sheffield Road
Ottawa, ON K1B 4E5
Phone: 613-998-8127
Email: mail@polarcom.gc.ca
Website: www.polarcom.gc.ca
- Agency:** Climate Change Adaptation Research Group, McGill University
Summary: The Climate Change Adaptation Research Group is based in the Department of Geography at McGill University. Most of the research activities carried out by the group focus on climate change vulnerability and adaptation among Indigenous populations and stakeholder engagement in adaptation planning, with several past and present research projects taking place across Nunavut.
Website: <http://www.jamesford.ca/>
- Agency:** ICLEI Canada – Local Governments for Sustainability
Summary: ICLEI Canada – Local Governments for Sustainability is an international organization of local governments and local government organizations that are committed to sustainable development. They provide a variety of services, including technical consulting, training and information services. They have worked with many Canadian communities to develop adaptation plans.
Address: 401 Richmond Street W., Studio 204
Toronto, ON M5V 3A8
Phone: 647-728-4308
Email: iclei-canada@iclei.org
Website: <http://www.iclei.org>
- Agency:** International Institute for Sustainable Development (IISD)
Summary: The International Institute for Sustainable Development is an international public policy research institute for sustainable development. The IISD focuses on adaptation, risk reduction, climate change and energy, economics, amongst other diverse topics. They host a number of initiatives, including the Community-based Risk Screening Tool – Adaptation and Livelihoods.
Address: 161 Portage Ave. East, 6th floor
Winnipeg, MN R3B 0Y4
Phone: 204-958-7700
Email: info@iisd.org
Website: www.iisd.org

REFERENCES

Agency: Northern Climate Exchange, Yukon Research Centre, Yukon College
Summary: The Northern Climate Exchange (NCE) is a part of the Yukon Research Centre at Yukon College which provides a credible source of information, develops shared understanding, promotes action, and coordinates research on climate change in Yukon and across Northern Canada.
Address: PO Box 2799 500 College Drive
Whitehorse, YT Y1A 5K4
Phone: 867-668-8862
Website: http://www.yukoncollege.yk.ca/research/programs/northern_climate_exchange

Agency: Ontario Centre for Climate Impacts and Adaptation Resources, Climate Change Adaptation Community of Practice
Summary: A Climate Change Adaptation Community of Practice, through the Ontario Centre for Climate Impacts and Adaptation Resources (OCCIAR), is an interactive online community that provides a space for policymakers, researcher, and practitioners from across the country to share information and communicate with others in the field of climate change adaptation. OCCIAR also has a number of resources available at their website.
Address: 935 Ramsey Lake Road
Sudbury, ON P3E 2C6
Email: amorand@mirarco.org (Climate Change Adaptation Community of Practice)
Website: <http://www.climateontario.ca>
<https://www.ccadaptation.ca/en/landing>

Agency: Pacific Institute for Climate Solutions (PICS)
Summary: The Pacific Institute for Climate Solutions (PICS) is a knowledge network hosted and led by the University of Victoria that integrates multi-disciplinary approaches to climate change. Its mandate is to develop innovative climate solutions, seek new opportunities for positive adaptation, and lead the way to a vibrant, low-carbon economy.
Address: PO Box 1700 Stn CSC
Victoria, C V8W 2Y2
Phone: 250-853-3595
Email: pics@uvic.ca
Website: www.pics.uvic.ca

Centre for Climate and Energy Solutions (C2ES), 2014. Global Warming and the Arctic: FAQs. Centre for Climate and Energy Solutions, <http://www.c2es.org/science-impacts/basics/faqs/arctic> [accessed September 2, 2014].

Government of Nunavut, 2003. Nunavut Climate Change Strategy. Government of Nunavut, Iqaluit, NU, 27pp., <http://env.gov.nu.ca/sites/default/files/Climate%20Change%20Full%20English%20low.pdf> [accessed August 15, 2014].

Government of Nunavut, 2005a. Inuit Qaujimajatuqangit of Climate Change in Nunavut: A sample of Inuit experiences of climate change in Nunavut: Baker Lake and Arviat, Nunavut. Government of Nunavut, Iqaluit, NU, 52pp., http://env.gov.nu.ca/sites/default/files/kivalliq_english.pdf [accessed August 15, 2014].

Government of Nunavut, 2005b. Inuit Qaujimajatuqangit of Climate Change in Nunavut: A sample of Inuit experiences of recent climate and environmental changes in Clyde River, Pond Inlet, Resolute Bay, Grise Fiord, Nunavut. Government of Nunavut, Iqaluit, NU, 37pp., <http://env.gov.nu.ca/sites/default/files/North%20Baffin%20English.pdf> [accessed August 15, 2014].

Government of Nunavut, 2005c. Inuit Qaujimajatuqangit of Climate Change in Nunavut: A sample of Inuit experiences of recent climate and environmental changes in Pangnirtung and Iqaluit, Nunavut. Government of Nunavut, Iqaluit, NU, 33pp., <http://env.gov.nu.ca/sites/default/files/South%20Baffin%20English.pdf>.

Government of Nunavut, 2005d. Inuit Qaujimajatuqangit of Climate Change in Nunavut: Literature review and gap analysis of Inuit Qaujimajatuqangit on Climate Change in the Kitikmeot Region, Nunavut. Government of Nunavut, Iqaluit, NU, 31pp., http://env.gov.nu.ca/sites/default/files/kitikmeot_english_smaller.pdf.

Government of Nunavut, 2011. Upagiatqavut: Setting the Course: Climate Change Impacts and Adaptation in Nunavut. Government of Nunavut, Iqaluit, NU, 32pp., http://env.gov.nu.ca/sites/default/files/3154-315_climate_english_sm.pdf [accessed August 15, 2014].

Government of Nunavut, 2014. Climate Change in Nunavut: An overview of major scientific findings and local observations about climate change in Nunavut. Nunavut Climate Change Centre, <http://climatechangenunavut.ca/en/understanding-climate-change/climate-change-nunavut> [accessed August 15, 2014].

Intergovernmental Panel on Climate Change (IPCC), 2007. Climate change 2007: Synthesis report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Geneva, Switzerland, 104pp., http://www.ipcc.ch/publications_and_data/ar4/syr/en/mains1.html [accessed August 15, 2014].



