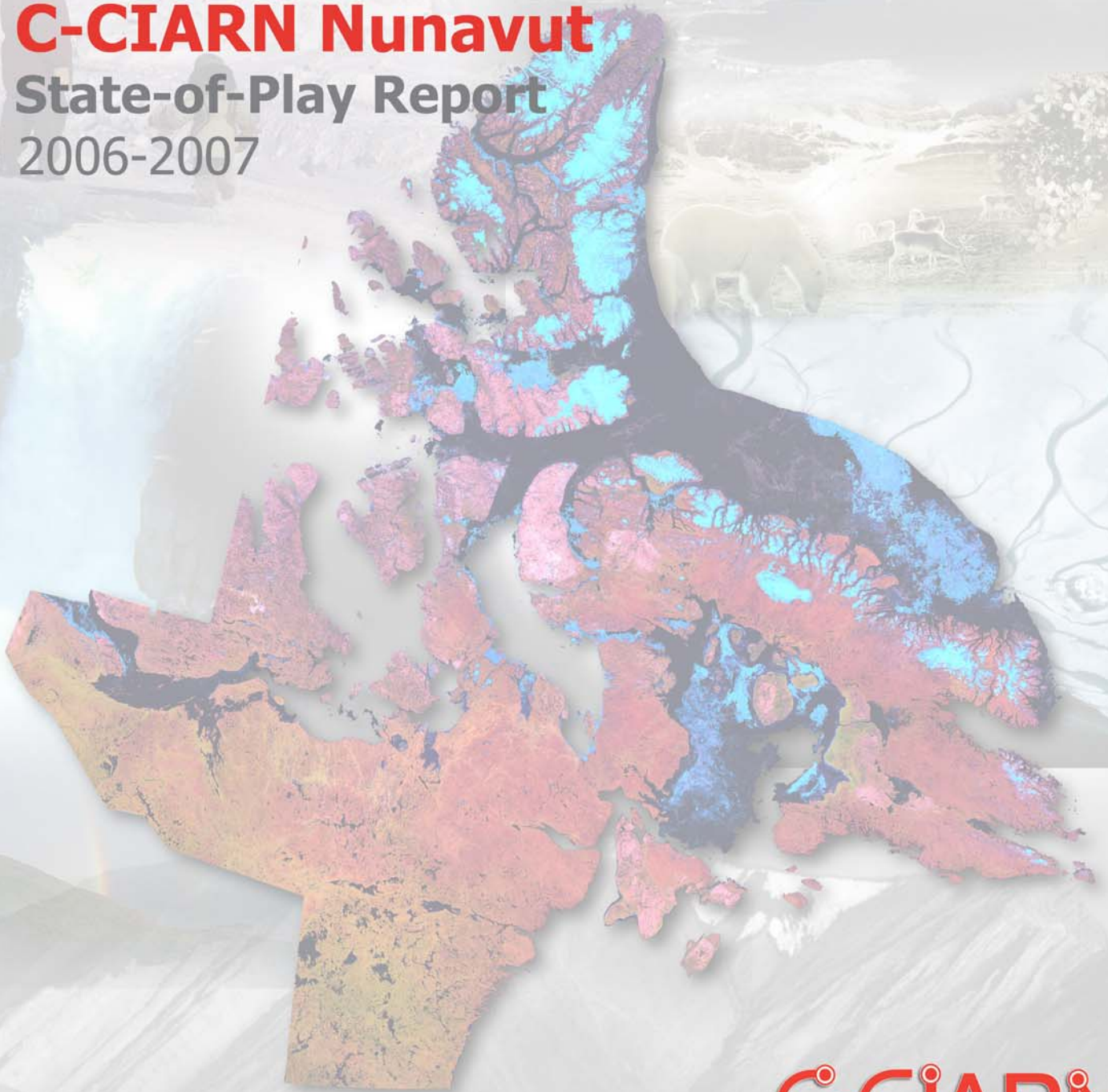




# **C-CIARN Nunavut** State-of-Play Report 2006-2007



# C-CIARN Nunavut – State-of-Play Report

*The Status of Climate Change Impacts and Adaptation  
from the Perspective of C-CIARN – Nunavut*

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## Preface

In the last year of C-CIARN's mandate (July 2006-June 2007), each C-CIARN office was asked to write a report summarizing their perspectives on the state of climate change impacts and adaptation within their region or sector.

The resulting State-of-Play reports identify, from the point-of-view of C-CIARN, the key climate change impacts, as well as the key stakeholders and adaptation decision-makers (including how these stakeholders/decision-makers were most successfully engaged) of each representative region and sector of Canada. The reports also include a description of the important research questions which, from the perspective of C-CIARN, need to be answered, as well as the steps that need to be taken to both increase the level of engagement on the issue and to facilitate the decision-making that is needed to reduce vulnerability, across Canada, to the impacts of climate change.

It is anticipated that the State-of-Play reports will serve as a valuable point of reference for climate change impacts and adaptation initiatives carried out across Canada, post-C-CIARN.



# 1. Introduction

Established in 2002 and hosted thereafter by the Nunavut Research Institute in Iqaluit, Nunavut, the Nunavut office of C-CIARN North serves as a networking and coordination hub for research and information sharing related to climate impacts and adaptation in Nunavut. C-CIARN Nunavut has provided a range of coordination services to more than 40 research scientists and upwards of 200 stakeholders (community members, resource and environmental managers, etc.) engaged in climate impacts and adaptation research and decision making in Nunavut.

Some of the major accomplishments of C-CIARN Nunavut during our five years in operation include:

- 13 in-person meetings of the C-CIARN Nunavut Advisory Group. Advisory group meetings serve as an important venue for Nunavut agencies involved in climate impacts and adaptation to share information on their various initiatives and discuss opportunities for collaboration, to identify climate impacts and adaptation research gaps pertinent to Nunavut, and review/develop C-CIARN Nunavut activities;
- Completion of an inventory of climate change research in Nunavut for 1997-2004 that highlights the thematic and geographic distribution of projects to identify potential knowledge gaps;
- Completion of an Inuktitut glossary of climate change terminology to facilitate

translation of climate change research results to Nunavut community residents;

- Completion of a survey of local observations and perceptions of climate change impacts and adaptation in Nunavut and of community perspectives on the role of scientific research in building adaptive capacity to deal with climate change;
- Coordination of public lectures, information sessions and school outreach initiatives in several Nunavut communities to help increase awareness of climate impacts and adaptation issues in Nunavut and raise the profile of C-CIARN;
- Provision of information materials and advice to Nunavut Inuit organizations to develop community consultations on climate change impacts and adaptation;
- Presentation and/or dissemination of C-CIARN information to a broad range of Nunavut stakeholders at regional workshops, planning meetings, conferences, and consultation sessions;
- Contribution for a Nunavut case study to the C-CIARN national publication ***“Adapting to Climate Change: An Introduction for Canadian Municipalities”***;
- Review of the Arctic Climate Impact Assessment overview report, and participation in strategic planning to develop and disseminate ACIA results in northern communities;

- Initiation of a collaborative wind assessment project with the city of Iqaluit and McGill University Atmospheric Sciences department to help city planners better evaluate and manage surface wind exposure and hazards at a new subdivision in Iqaluit, Nunavut (see <http://www.taiga.net/ciarn-north>);
- Referral and networking support to over 40 impacts and adaptation researchers seeking collaborators and/or research partners in Nunavut;
- Technical support, referrals and assistance to more than 10 Nunavut community groups developing research proposals and/or seeking research partners to undertake community-based impacts and adaptation project;
- Contribution to developing a research plan and methodologies for a project examining municipal infrastructure vulnerability and adaptive capacity in Iqaluit; and
- Contribution to the development of a C-CIARN North poster for the National Impact and Adaptation Assessment.

## 2. Key Climate Change Impacts in Nunavut

Through networking and consultations with stakeholders, C-CIARN Nunavut has documented a range of environmental and socio-economic impacts from climate change that are already being felt in Nunavut. However, measuring the scope

and consequences of these impacts and/or attempting to rank them in terms of their importance is problematic given the lack of data and criteria for this purpose and recognizing that many impacts are interdependent and/or act in synergy with each other.

Some of the impacts in Nunavut that appear to be most 'pressing', i.e. those which the stakeholders consulted by C-CIARN Nunavut have expressed significant concern about, are summarized below:

### 2.1 Reduction in the extent, duration, and thickness of sea ice

Later freeze-up and earlier break up of sea ice, and reduced ice thickness and stability, have been attributed to wide spread socio-economic impacts in Nunavut. Recent studies confirm that since the 1970s, Western Hudson Bay has experienced a progressively longer ice free period in response to climate warming, and that the body condition and population size of Western Hudson Bay polar bears (which must fast during the ice free period) is declining as a result (Stirling and Parkinson 2006).

Inuit hunters from across Nunavut are reporting that sea ice is thinner, less stable and less predictable, making travelling and hunting on the sea ice far more dangerous than in the past. Unusual ice conditions have been linked to an increased number of hunter accidents and fatalities throughout Nunavut in recent years. Ice conditions have become so variable that hunters can no longer rely on traditional methods to assess ice safety, and even the most experienced hunters are increasingly

vulnerable to accidents while hunting and travelling (C-CIARN North 2006).

The reduced ice extent and duration have also restricted hunters' local access to important harvesting areas, which in turn may have decreased the availability of seasonal traditional foods for some communities (C-CIARN North 2005). Reduced ice thickness and sudden break up has also negatively affected Nunavut's only sea ice based commercial turbot fishery in Davis Strait that utilizes the ice as a platform for long line fishing. Valuable turbot fishing equipment and catch were lost in several locations due to early, unexpected sea ice break-up in Davis Strait representing a significant economic loss for local fishers.

The longer open water period, however, has allowed for a longer boating season and extended the period during which goods may be delivered to Nunavut communities via supply ship at much lower cost than air freight transport. Potential economic benefits and negative environmental consequences associated with future shipping through the Northwest Passage should it become seasonally ice free in summer, are a popular topic for discussion among stakeholders and policy makers.

## **2.2 Increasingly variable, unpredictable, and extreme weather**

Residents of many communities in Nunavut have reported that increased weather variability and unpredictability is one of the most obvious and alarming climate changes of recent years. Storms develop more rapidly than they used to; winds begin, die down and shift direction

suddenly and without typical warning; wind storms are stronger and occur more frequent (especially in fall) than in the past (Gearheard 2006, unpublished data).

The direction of prevailing winds has also reportedly changed, which in turn has affected the distribution and stability of sea ice causing increased hazards for hunters. Stronger wave energy due to heavier winds and reduced sea ice extent is reportedly causing more extensive and frequent damage to small vessels docked at community harbours in Nunavut. Local docking facilities offer little protection from wave and wind exposure (C-CIARN North, 2005; 2006). Rough waters caused by sudden and unpredictable winds are also reportedly making travel by boat more hazardous. Wind storms are reportedly increasing in frequency and strength, causing more frequent and severe damage to community infrastructure (e.g. houses, office buildings, and power lines). Stronger winds have also reportedly changed the patterns of snow accumulation, making it more difficult to build emergency shelters and rendering travel by snow-mobile to key hunting areas more difficult in some communities.

Several Nunavut communities are also experiencing heavier winter snow fall, causing increased snow loading on houses and greater accumulation on local roads resulting in concerns for safety and access. At least one municipality has been forced to increase its budget for snow removal (C-CIARN North 2005). Heavier winter snow accumulation, coupled with an increase in rain on snow events resulting in icing of the tundra, is believed to have

caused a 70% decline in the population of High Arctic Peary Caribou.

### **2.3 Permafrost Loss and Terrain Instability**

A deepening of the permafrost active layer and changes in the freeze-thaw cycle has apparently caused building foundation “ad-freeze piles” (foundations buried in permafrost) in at least 5 Nunavut communities to sink and/or jack, necessitating the use of deeper foundation piles. The terrain in one Nunavut community is believed to be no longer able to sustain ad-freeze piles prompting speculation that the local permafrost has disappeared altogether (Nunavut Housing Corporation 2006). Infrastructure managers in Nunavut are responding to the design challenges posed by changing environmental conditions, for example, by designing public housing dwellings to accommodate heavier snow loading. The Nunavut Association of Municipalities passed a motion in 2005 calling on the Nunavut Government to invest resources to assess the implications of climate change for Nunavut communities and to ensure that community infrastructure is made more resilient to changing environmental conditions.

## **3. Key Stakeholders**

The key decision-makers that must be engaged in order for adaptation decisions to be made to reduce vulnerability to key climate change impacts include:

- Government of Nunavut climate change coordinator (Dept. of Environment) responsible for developing GN programs on climate change adaptation and mitigation
- Senior officials in Nunavut Government (dept. Community Government and Services), Nunavut municipal governments, responsible for community disaster management planning, hunter compensation, and for local search and rescue activities
- Wildlife and Fisheries Managers in Federal and Territorial government agencies, Inuit Land Claims organizations, and community-level authorities collectively responsible for monitoring and assessing the status of Nunavut’s wildlife and fisheries resources and for developing, administering and monitoring legislation and regulations to manage harvests (e.g. developing harvest quotas and the timing of allowable harvests) in light of changing environmental conditions:
  - Canadian Wildlife Service-Nunavut
  - Fisheries and Oceans-Nunavut
  - Wildlife Service of the Government of Nunavut

- Inuit Wildlife Secretariat (Nunavut Tunngavik Incorporated)
- Nunavut Wildlife Management Board
- Nunavut's three regional Wildlife Boards
- Community Hunter and Trappers Organizations)
- Senior Nunavut Department of Health officials (program directors, doctors, policy makers), and community health field staff (nurses, health representatives), responsible for the prevention, treatment, and assessment of health problems associated with exposure to increased UVB and other changing environmental conditions and hazards.
- Engineers, architects, and senior community planners in the Nunavut Housing Association, Nunavut Housing Corporation, Nunavut Association of Municipalities, and the Territorial Department of Community and Government Services, responsible for design, construction, and maintenance of municipal houses, buildings, roads, pipelines, and other infrastructure (airstrips, roads, water/sewer, municipal waste disposal and landfill). Private developers contracted to build and maintain homes, public buildings, and municipal infrastructure should also be engaged.
- Nunavut Association of Municipalities and Nunavut Association of Municipal Administrators
- Members of the Nunavut Legislative Assembly
- Academic researchers in key Canadian and American Universities, and major research networks (e.g. ArcticNet) engaged in conducting climate impacts and adaptation science in Nunavut, and who are increasingly called upon to produce policy-relevant science outputs.
- Educational institutes and programs including Nunavut High Schools and the Nunavut Arctic College's Environmental Technology Program
- Territorial economic planners, community economic development officers, regional business development agencies, and chambers of commerce
- Representatives from Nunavut's Fishing and Mining Industries (e.g. Baffin Fisheries Coalition, Mining companies with active or prospective projects)
- Parks and Protected area managers in the Territorial and Federal Government
- Managers in the Nunavut Environmental Impact Review Board, Nunavut Land Use Planning Commission, INAC (Water resources) and Nunavut Water Board responsible for environmental assessment, land use and water planning and management in a changing environment

## 4. Strategies for Stakeholder Engagement

Various strategies have been employed to engage the C-CIARN Nunavut stakeholder community. Focused face to face meetings (e.g. advisory group meetings) and consultative workshops (e.g. National Assessment consultations) that allow for discussion and dialogue have been most effective in soliciting Nunavut stakeholder input to planning and networking on impacts and adaptation. Small face to face meetings, convened opportunistically, between researchers and stakeholders who have common interest and desire to collaborate have produced very successful outcomes in the form of new projects.

Written self administered questionnaires and surveys (e.g. to elicit stakeholder priorities and perspectives) have not worked well in Nunavut. Nunavut radio and print media have not been utilized to the extent possible as a tool for awareness raising and engagement. Web-based tools such as the online workshop series have proven effective at engaging the southern Canadian and international research community, but have not attracted much interest in Nunavut. E-mail list-servers have been useful in disseminating information broadly to government agencies, Inuit organizations and regulatory bodies, but may not be appropriate for engaging community groups.

Presentations have proven effective in engaging community-level audiences, students and teachers. C-CIARN North Newsletters contain useful information and have been circulated widely to Nunavut stakeholder groups but have not elicited

much response. Engagement efforts have never been evaluated formally or systematically to determine their relative effectiveness.

Improving and expanding engagement in the future will require ongoing efforts to organize and/or attend face to face meetings with various stakeholder networks to present new information, and engage in further dialogue on I and A issues and needs. The fact that adaptation mainstreaming is already occurring in Nunavut at many levels (and that adaptation involves measures and actions not typically linked to climate change) should be better communicated to stakeholders.

The very high turnover of personnel in Nunavut Federal and Territorial government agencies and Inuit organizations will continue to make it difficult to maintain a core group of informed engaged stakeholders who can help promote C-CIARN and the impacts and adaptation issue more broadly in Nunavut. Identifying high level politicians (e.g. the Nunavut Minister of Environment) willing to serve as champions for the impacts and adaptation issue in Nunavut would certainly help secure further buy-in from under and un-engaged stakeholders.

The print and radio media can and should be utilized more effectively for public awareness raising and information dissemination. ***The increase in climate impacts and adaptation research activity in Nunavut (and Yukon and NWT) during International Polar Year, March 2007-March 2009 will offer unprecedented opportunities (which should be fully exploited) to expand researcher***

***engagement, obtain valuable new information for decision makers, and generally raise the profile of climate change impacts and adaptation issues in the North.***

## 5. Engaged Stakeholders

Key stakeholders in Nunavut are already undertaking a variety of activities in support of climate change adaptation.

Activities include:

- community consultations on adaptation needs (e.g. elders workshops convened by Nunavut Tunngavik Incorporated);
- initiating and/or collaborating on impacts and adaptation research (Arctic Bay youth group partnering with Guelph to conduct community vulnerability assessments);
- developing new adaptation policy frameworks (e.g. Government of Nunavut, Environment Department climate change adaptation policy for Nunavut); and
- adjusting existing policy structures to reduce vulnerability (e.g. recent decision by the Nunavut department of Community Government and Services to raise compensation awards for hunters who lose equipment as a result of environmental hazards).

Nunavut stakeholders have taken action for various reasons:

- in response to the increased incidence of tragic accidents attributed to environmental change and variability;
- at the invitation of non-resident researchers and policy makers;
- in response to local, national and international media coverage;
- as a result of new adaptation tools being made available (e.g. provision of user friendly satellite images of sea ice for use by hunters in Pond Inlet); and
- in response to pressure from local constituencies.

### 5.1 Outstanding Needs of Stakeholders

Engaged stakeholders have commented that the climate change information and scenarios are generated through scientific research are often too generalized, and not at the appropriate time scale, for use in local adaptation planning and decision making in Nunavut. Global climate models project average conditions (e.g. temperature/precipitation) but do not provide projections for the magnitude and frequency of extreme events at the sub-regional level which stakeholders need for sound defensible planning.

Another problem raised by stakeholders is that research scenarios project conditions 20, 50 years in the future while stakeholders generally plan for 3-5 year cycles. Some decision makers use information on past “historic” conditions (rather than future states) to plan for the future. Developing more information for decision makers on current climate impacts and short and

medium term climate variability (5-10 years) is critical.

## 6. Unengaged Stakeholders

Unengaged Stakeholders in Nunavut largely need to be convinced that they will receive tangible benefits and avert significant costs and hardship by investing in climate adaptation planning and resiliency building.

Industry stakeholders (mining, fisheries and tourism) have been the least engaged to date in Nunavut and should be the focus of future outreach efforts to expand the C-CIARN stakeholder network.

## 7. Unanswered Research Questions

Critical research topics that need to be addressed in order to advance the understanding of climate change impacts and adaptation responses within Nunavut include:

- Collection of detailed community-specific data on demographic composition (e.g. stability, turnover), and aspects of local economies and social structures that will determine how, and to what extent, Nunavut communities are likely to be affected by, and respond to, changing environmental conditions (Duerden 2004). Communities within the same region will experience different levels of disruption from identical climate changes due to differences in local socio-economic conditions and sensitivities;
- Case studies of community response to extreme weather event hazards (e.g. Pangnirtung wind storm, Fall 2006) to assess disaster and emergency response readiness capabilities and identify necessary improvements;
- Assessment of UVB exposure in Nunavut communities and documentation of related health impacts (sunburn, cornea damage, skin disorders, immune suppression, etc.) to identify exposure minimization options;
- Assessment of impacts on drinking water quality and availability due to climate related change;
- Monitor and assess changes in marine fish abundance and distribution related to changing climate, and evaluate implications for marine fisheries development;
- Development of management options for fish populations that take into account future productivity and sustainable yield under climate change scenarios;
- Evaluation of the potential for “failure” of existing roads, buildings, buildings, water-sewer lines due to the combined affects of changing environmental hazards and other factors (e.g. aging infrastructure);
- Sampling and analysis to develop maps of community permafrost conditions and techniques to model terrain thaw sensitivity/stability in support of land use planning and development;
- Studies to define the current status, trends, health conditions, of key marine mammal populations (e.g. small whales)

in order to establish benchmarks against which climate change impacts can be measured and assessed; and

- Ongoing monitoring of wildlife populations believed to be impacted by changing environmental conditions (e.g. Western Hudson Bay polar bears; High Arctic Peary caribou).

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