

## ATULIQTUQ: ACTION AND ADAPTATION IN NUNAVUT



### CLIMATE CHANGE ADAPTATION ACTION PLAN FOR IQALUIT



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ATULIQTUQ: Action and Adaptation in Nunavut is a collaborative project of the Government of Nunavut, the Canadian Institute of Planners, Natural Resources Canada and Indian and Northern Affairs Canada. The Climate Change Adaptation Action Plan for Iqaluit was prepared by John Lewis and Kate Miller with the support of their employers Intelligent Futures and the Cowichan Valley Regional District.

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## **Executive Summary**

Like all communities in the Arctic, Iqaluit is facing challenges related to climate change now and will see increasing impacts in the future. The Atuliqtuq project of the Nunavut Climate Change Partnership is an important step to understanding climate change and building capacity in communities to adapt. The objective of the Iqaluit team for this climate change adaptation project was twofold: integrate the issue of climate change adaptation into the update of the City of Iqaluit General Plan and initiate a process of information sharing and collaboration on climate change amongst institutions, organizations, groups and individuals in Iqaluit.

Climate change has the potential to impact Iqaluit in a number of areas including buildings, roads, water supply, wastewater treatment and waste disposal. These are some of the areas that were addressed through the General Plan update. Additional impacts on the community, including emergency response, economic development, access to the land and sea and traditional hunting practices will all require adaptation to the impacts of climate change as well.

This report identifies specific impacts of climate change on Iqaluit, but also highlights ways in which the community can begin to collaborate to effectively respond and adapt to this new and ever-changing challenge. With its size and diversity, Iqaluit is unique in Nunavut and therefore experiences some unique challenges in its context. The number and diversity of actors in the community requires a focused and intentional approach to collaboration to ensure that the capacity to adapt to climate change grows over time and creates a strong and resilient community.

As an issue that crosses institutional boundaries and responsibilities, climate change is a multi-dimensional challenge and therefore requires a multi-dimensional response. While this process represents an important step, it is essential to recognize that building the community's capacity to respond to climate change requires continual sharing of information, collaboration and relationship-building. In this way, Iqaluit can be as adaptive as possible to the growing impacts of climate change.

## **Project Background and Acknowledgements**

The Atuliqtuq project of the Nunavut Climate Change Partnership is a collaborative project between the Government of Nunavut (GN), Natural Resources Canada (NRCan), Indian and Northern Affairs (INAC), and the Canadian Institute of Planners (CIP). Five communities in Nunavut have been chosen for the second phase of a pilot project to develop climate change impact and adaptation plans – Iqaluit, Arviat, Whale Cove, Kugluktuk, and Cambridge Bay. The first phase of the project considered the communities of Hall Beach and Clyde River. In each of the communities two planners with CIP worked in close collaboration with Government, NRCan and university scientists and the community to develop climate change plans. Climate change issues under consideration include landscape changes, changes to water supplies, and coastal stability.

The team for the Iqaluit climate change adaptation project was Kate Miller, M.Sc., MCIP, LEED AP, Manager, Regional Environmental Policy, Cowichan Valley Regional District and John Lewis, MCIP, M.E.Des., President of Intelligent Futures.

This project was made possible with support from many organizations and individuals in Iqaluit, each of whom brought invaluable perspectives to the project.

Special thanks to:

- City of Iqaluit - Michele Bertol, Senior Director, Planning and Lands, for her collaborative approach in integrating climate change adaptation into the General Plan update process; Meagan Leach, Director of Engineering and Sustainability, for her support during our visits and in the development of our adaptation workshop.
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- Natural Resources Canada - David Mate and Don Forbes for their contributions of the most up to date scientific research.
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- Fotenn Consultants – Michelle Armstrong and company for gracefully allowing us to mesh our climate change adaptation work into the General Plan process.
- Arif Sayani for the use of his photographs in this report and the project poster.



# Climate Change in Iqaluit



## **Climate Change in Iqaluit**

The world's use of carbon fuels and its effect on global climate, is no longer being debated, how it is changing and how fast the effects will be felt is being explored in many communities around the world. Growing deserts, sea-level rise impacts on coastal communities and the effects of a warming arctic are some of the immediate issues that come to mind. These issues however, are complex and will require a variety of strategies for both attempting to reduce the ongoing human damage to the earth's climate (mitigation) and adapting to the variety of changes that will inevitably occur (adaptation).

### **Mitigation**

Mitigation is typically focused on the reduction of activities which are greenhouse gas emitting and thus have climate altering effects – primarily energy generation, heat, electricity and transportation - these are major issues for the north and critical components of a coordinated climate action plan for the territory. This cluster of activities, programs and strategic responses for a northern environment and the territory are currently being facilitated by the Government of Nunavut. Many of these initiatives and strategies are at a much larger scale than possible at the community level and will hopefully provide much needed long-term capacity and infrastructure for all the communities in Nunavut. However, their relationship to how the communities are able to adapt is important. Becoming more energy resilient and exploring other forms of energy bridges both climate mitigation and some forms of adaptation, that is, finding other ways to accomplish some of our necessary needs.

### **Adaptation**

If mitigation is about reducing the effects of climate change by reducing or stopping the activities that produce greenhouse gases, ADAPTATION is responding to the changes that will inevitably occur. Mitigation and adaptation are both necessary and complementary strategies to cope with the climate change challenge. If mitigation is about CARBON, then adaptation is about COMMUNITIES. Resiliency is about creating strong communities, which can adapt to a wide variety of changes. This is not something new to northern communities who have had a long history of adaptation. The science and the information regarding climate change and its impacts is changing quickly. Much of the information is technical or “held” in some way by various organizations. What will be necessary no matter how much science or technical information is available are ways for the communities that are affected to have good organizational and communications structures so that information and responses can be shared quickly and effectively.

As scientists continue to study the issue of anthropogenic climate change, it is becoming increasingly apparent that the arctic regions are subject to some of the greatest environmental changes on the planet. If climate model forecasts are accurate, future changes to the fragile arctic environment will continue to intensify.

A framework for creating livable and climate RESILIENT communities depends on a process that is founded on these ten guiding principles:

1. Choose to be enabled
2. Establish high expectations
3. Embrace a shared vision
4. Collaborate as a regional team
5. Align and integrate efforts
6. Celebrate innovation
7. Connect with community advocates
8. Develop local government talent
9. Promote shared responsibility
10. Change community for the better.

While reducing greenhouse gases is essential, there are already enough built-up greenhouse gases in the atmosphere that even if we were to stop all global emissions today, we would still see a variety of impacts. Therefore, communities need to be ready to adapt to the immediate and long-term impacts and vulnerabilities as a result of climate change. Some of these changes are already being seen at a local level.

There are currently substantial gaps in local data on climate-related impacts such as limited information on building design or performance or detailed permafrost mapping and ground temperature monitoring, sea level gauges, or organized repositories for elevational differences for wind and temperature. Iqaluit and its citizens need to be both responsive and strategic in planning for change. The specific detailed information may not be currently available but the general issues and impacts can be assumed with some level of certainty.



## **Changes specific to Iqaluit**

A substantial amount of research is currently underway in the Arctic by a wide variety of institutions and research facilities. Much of the research is on specific issues or climate-induced effects and follows a traditional and important science process – that of separating the science from public policy to ensure its objectivity. Due to the very nature of academic research, potentially significant information may not be translated to an applied context given the research timelines, peer reviews and limited publishing or reporting out to the communities.

The City's Climate Change Impacts Project<sup>1</sup> summarized many of these external research projects as well as developing its own climate scenarios with 29 temperature and precipitation scenario runs from the seven General Circulation Models. As each of the models distinguishes climate in different ways, the IPCC suggests that the output from all the models should be used to develop a regional projection. All of the model runs project increases in mean annual and seasonal temperature.

## **Climate Normals for Iqaluit - Station A**

The following tables summarize data recorded at the Environment Canada Iqaluit Station A (63° 45'N, 68° 33' W, elevation 33.5 m) – Canadian Climate Normals for temperature, precipitation and wind values 1961-1990.<sup>2</sup>

## **Climate change scenarios projection for temperature by 2010-2039, 2040-2069**

The median projection for temperature in the 2010-2039 downscaling runs is an annual increase of 1.8° Celsius, with a lower and upper range of 1.3 – 2.4° Celsius over baseline climate. The greatest seasonal increase in temperature is projected for winter.

The median projection for temperature in the 2040-2069 period is an annual increase of 3.1° Celsius, with a lower and upper range of 2.5 – 4.3° Celsius over baseline climate. The greatest seasonal increase in temperature is projected for winter.

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<sup>1</sup> Neilson, D. *The City of Iqaluit's Climate Change Impacts, Infrastructure Risks & Adaptive Capacity Project*, 2007

<sup>2</sup> [www.climate.weatheroffice.ec.gc.ca](http://www.climate.weatheroffice.ec.gc.ca)

## Precipitation by 2010 – 2039

The median projection for precipitation is an annual increase of 6%, with a lower and upper range of 0 – 9% over baseline climate. Winter has a greater median increase in precipitation than all other seasons.

## Sea level rise

As glaciers melt, adding to the volume of the oceans, and the temperature of the oceans rise, causing sea-water to expand, the level of the oceans will generally rise. Sea level increases around the world will not be distributed evenly, and will differ from location to location because of:

- the reduced gravitational attraction of large ablating (shrinking) ice masses, which causes adjacent water levels to be reduced (sea-level fingerprinting).
- local vertical land motion – caused by the land rebounding (rising) from the last ice age when the land subsided due to the weight of glacial ice, and by tectonic movement.
- spatial variability in the thermal warming and expansion of the oceans.

Globally, sea level is projected to rise in the coming decades but the range of projections and their effects on coastal areas vary significantly. Nunavut has particularly large spatial variations in the distribution of melt water and in the Earth's vertical land motion response to ice sheet and glacier mass changes.

For Iqaluit, sea level is projected to rise less than the globally averaged amount of projected sea-level rise. This is a consequence of Iqaluit's proximity to the Greenland ice sheet, and strong negative sensitivity to Greenland mass balance through the sea-level fingerprinting phenomenon.

The current assessment of the probable range of sea-level change for Iqaluit at the year 2100 relative to 2010 (relative to present mean sea level) was provided by the NRCan research team with the following potential ranges (values are rounded to the nearest 5 cm):

Sea-level change will probably not be less than (cm)	Sea-level change will probably not be more than (cm)
0	70

The wide range of estimates for sea-level change expected in the next 90 years, ranging from no change to 70 cm sea-level rise, will have a wide potential range of impacts on the shoreline and the infrastructure adjacent to it including: docking facilities, waste discharge areas, and the community's ongoing access to the shorelines and beach activities. Each of these issues will have a variety of potential adaptation measures that could be implemented over time.

Ongoing research at local and global levels will lead to revised sea-level projections and may provide tighter bounds (less uncertainty) on projected sea-level change in the future.

### **Coastal stability**

In addition to sea-level changes, coastal stability is influenced by the frequency and intensity of extreme events, such as major autumn storms. Indirectly, changes to the extent and duration of sea ice, such as the time of autumn freeze up, can also make the coastline more exposed if more storms occur over open water, allowing waves to form. There is little information on waves in Frobisher Bay, but the beaches along the waterfront and at the cemetery point to the effects of occasional wave action. Because much of the shoreline is hard rock, erosion is limited. On the other hand, the stability of the tidal flats and the numerous boulders on them is unknown and could be negatively affected by changing wave conditions. If a storm were to occur on an extreme high tide, there is a potential for flooding and wave damage to low-lying shorefront properties.

### **Storm water management**

Increased precipitation and variability in temperature will affect storm water generation and infiltration throughout the community, affecting infrastructure and community access to the land and increasing hazards.

As a component of this project NRCan and its research partners have been reviewing climate related environmental impacts in each of the projects communities and, where possible, undertaken specific research related to community environmental impacts. This underscores the importance of a continuing partnership with the communities and the science teams as critical components of the development of long term and resilient adaptation to uncertainty.

During the summer of 2009 the planning team and scientists from NRCan and Université Laval worked together in the field during a brief visit. More detailed work is being conducted in Iqaluit in 2010 to develop a more refined permafrost and sea-level rise/coastal erosion assessment for the community. They are working with the City staff and the Nunavut Research Institute. This

information will be of immediate use to the City's planning and engineering departments and will be integrated into the City's General Plan and developing sustainability plan framework In the future.

Early comments from research staff indicate potential issues for the City of Iqaluit and the Territorial infrastructure which surrounds it, in particular the airport complex, fuel storage infrastructure, corrections facilities, and hospital facilities. The commitment of research staff to undertake field studies here will likely have long lasting effects on the community and Nunavut as it will effectively mean a partnership with Nunavut Research Institute and the Nunavut Arctic College.



## The Iqaluit Context

*“Priority is a function of context.”*

- Stephen R. Covey

## Understanding context

While climate change is a global phenomenon, it inevitably lands in a specific context. The impacts described in the previous section are location-specific, but the capacity to respond is also dependent upon the local circumstances. The levels that local organizations and institutions are able to achieve their mandate, adapt to a changing environment and collaborate with other actors in the community are essential aspects of responding to climate change. Within Iqaluit, two key factors of the local context must be understood when discussing climate change adaptation - the diversity of actors in the community and the capacity issues that organizations and institutions face.

## A growing capital city

Iqaluit has experienced significant growth since becoming a capital city - furthering its position as the largest community in Nunavut. According to the 2010 City of Iqaluit General Plan projections, the population could reach over 11,000 by 2022, up from today's population of 6,184. As the capital city of Nunavut, there is a significant presence of three levels of government in Iqaluit - Federal, Territorial and Municipal. Additionally, Iqaluit is the economic hub of the eastern Arctic, creating a more diverse local economy than other communities in Nunavut.

All of these factors feed into a central theme - there is a multiplicity of important actors in Iqaluit. While this contributes to the vibrancy of the community and the opportunities that exist, it also creates many “silos” within the community. As climate change impacts so many elements of community life, this is an important consideration for understanding how to adapt to these changes.

## Workforce issues

There are a number of factors that influence how organizations and institutions can respond to an issue as complex as climate change. In many areas - especially the public sector - there are high levels of vacancies. Positions see frequent turnover as employees continually move to new positions. Individuals frequently move from

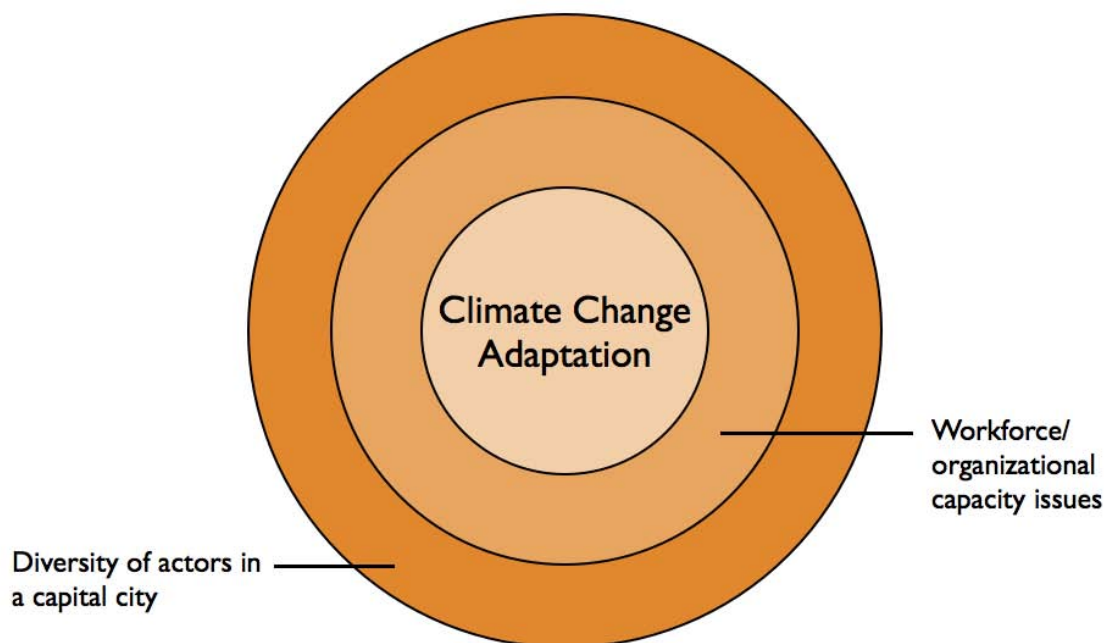
***“The public service (in Nunavut) is operating under capacity, with 20 percent of the jobs still vacant. In some departments, job vacancies exceed one-third.”***

***- Canadian Geographic, January/February 2009***

southern Canada to gain significant short-term experience and then return to the south within a few years. This situation often leads to people dealing with large workloads and making it difficult to commit to a new issue such as climate change. High turnover also means that it is difficult to build momentum on an issue, not only when people move south, but when they move to other organizations. All of these factors have a significant impact on the capacity of the organizations and institutions in Iqaluit to fulfill their existing mandates, let alone address an emerging issue such as climate change.

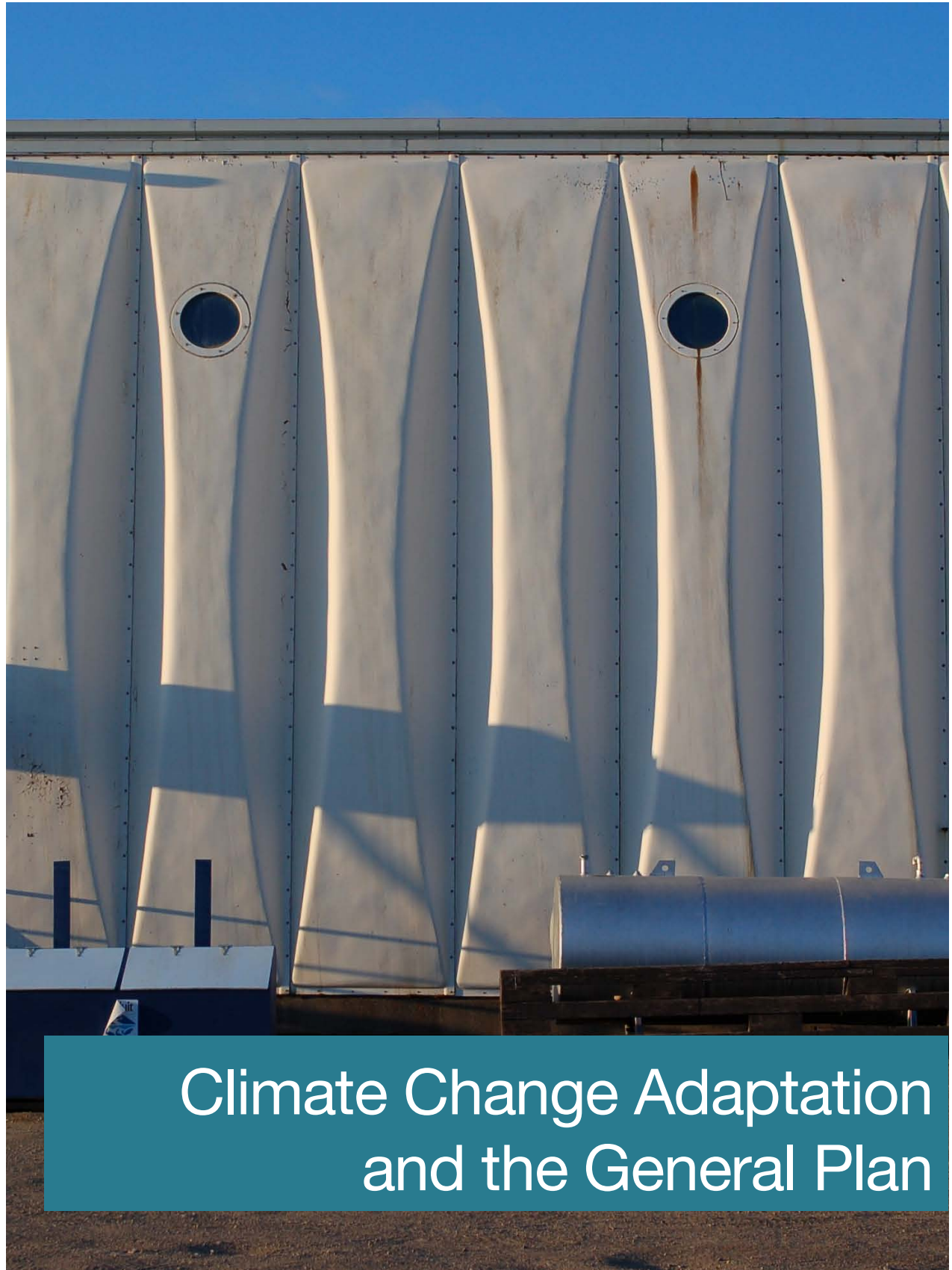
### Responding within context

In the context of the emerging, long-term and complex impacts that climate change will have on Iqaluit, there are a number of serious challenges to adapting to climate change. These include the diversity of actors and their roles and responsibilities, the diversity of activities within the community and significant workforce capacity issues. Any proposed solutions to climate change must work within this unique context and attempt to build capacity over time.



*Solutions to climate change must recognize the key issues in the context of the community in Iqaluit*





# Climate Change Adaptation and the General Plan

## Integrating Climate Change into the General Plan

Integration of climate and environmental management based language throughout the newly revised General Plan was an important component of this program. The plan now includes integrative language on climate change adaptation and some specific requirements for development throughout the documents. As improved data becomes available, climate change adaptation can be further integrated into these documents as part of future updates.

Based on the current level of information the city's priority adaptation options are those which:

- Address a high priority impact
- Address long term planning decisions for significant structures
- Provide benefits in the absence of climate change; and provide information to further enhance the City's understanding on infrastructure vulnerabilities and climate change risks.

*"Adapting to climate change will be an issue in Iqaluit for decades to come. The update of our General Plan was an opportunity to begin integrating this critical issue into the most important guiding policy of how we build our community. We recognize that this is an important step, but really represents the beginning of a longer process of understanding and adapting to climate change. As new information becomes available, we will be increasingly able to respond in ways that will make Iqaluit more resilient in the future. Like Iqaluit, every community in Nunavut will need to respond to climate change in their General Plans. The key is taking that first step."*

- Michèle Bertol, Senior Director, Planning and Lands, City of Iqaluit

Issues that will need additional exploration over the life of the plan include:

### Buildings

- With an increase of the active layer of permafrost, many existing building foundations could experience structural damage.
- With a change in weather patterns such as extreme storm events, more extreme temperature variations, increased humidity in snow and more rain, buildings will be more susceptible to weathering and moisture damage.
- Warmer temperatures will decrease heating requirements, reduce insulation needs and extend the construction season.
- Some waterfront buildings are vulnerable to flooding at extreme high tides or under storm-surge conditions and minimum foundation levels may need to be established.

## **Roads**

- As roads have an average temperature higher than the original surface, warmer air temperatures may amplify seasonal frost effects and cause differential settlement, embankment deformation and slope instability.
- Studies show that paved roads are less tolerant to differential settlement than unpaved roads. With the increase in paved roads in Iqaluit, this is an issue to monitor as the active layer underlying the roads becomes more dynamic.
- Some waterfront roads are subject to flooding under extreme high-water conditions today and this problem will become more severe with a rise in sea level.

## **Water Supply System**

- Changes in permafrost will have implications for both existing and new underground piping.
- Warmer air temperatures could cause surface evaporation of the City's water supply and could eventually reach temperatures that allow algae and other micro-organisms to grow, thereby compromising water quality.
- Increased rainfall could potentially put the municipal water supply at risk by washing contaminants and soil into the reservoir.

## **Wastewater Treatment System**

- Increased precipitation, in the form of heavy rainfall, could overwhelm the system and cause failure or overflow. This could contaminate adjacent water bodies.

## **Waste Disposal System**

- Increase in the active layer of permafrost could lead to changes the freeze-thaw cycle, drainage and water flow around the landfill. Design and operation of the landfill needs to take this into consideration.

Recommendations based on the review of existing documents as well as visits to the City and discussions with City staff resulted in the recommendations included in the following sections below, however not all the recommendations were included at this time in the City's General Plan. It is hoped that over time as both comfort with the issues grows and specific information is developed, more of the general components will be addressed. The General Plan has a scheduled

review on a five year cycle or sooner if the assumptions of the plan (or new information) are deemed to have changed substantially.

Additional information is required relative to:

- permafrost conditions and potential thaw settlement;
- sea-level rise, particularly relative to impacts on coastal geomorphology and the lower city settlement area;
- projected changes to wind and snow drift in the upper projected settlement areas.

The NRCan science team visits in 2010 will add greatly to this current data gap.

Recommendations included the following language:

### ***A community that adapts to the impacts of climate change***

*Impacts on the arctic as a result of climate change include increases in temperature and precipitation, permafrost warming and thaw, decrease in sea ice, substantial and unknown changes to sea levels and increased extreme weather events. While these are only some of the impacts of climate change in the Arctic, these are the most central as they relate to the General Plan for the City of Iqaluit. Other associated changes to the community related to climate change include increased population and servicing pressures as the City becomes an ever increasing entry point for others to access the territory for economic development, research and settlement. The city will also continue to function as the territorial capital and model for other communities.*

*While it is important to adopt technologies and practices that reduce the level of greenhouse gas emissions, there is sufficient evidence that climate change-related impacts will be felt for decades to come, even if global emissions were to completely cease immediately. With that in mind, it is important to look at adaptation as it relates to climate change. Adaptive capacity is defined as a community's ability to cope with or adjust to climate change impacts and risks. In building adaptive capacity, communities develop practical means to cope with climatic uncertainties and reduce vulnerability.*

*In the coming years, it will therefore be essential for the City to clearly understand these changes and be prepared to respond quickly and effectively. Of critical importance is the need to obtain information on how changes in the climate are specifically impacting Iqaluit. This will help to inform decisions and build the adaptive capacity of the community.*

- *Continue to study the impacts of climate change in Iqaluit*

- *Adopt policies that recognize the long-term impacts of climate change*

### **Study the impacts of climate change in Iqaluit**

*The City of Iqaluit will develop mechanisms to study and monitor the impacts of climate change on the community. The City will work with the community to obtain and share this information in order to build the knowledge base and adaptive capacity of the community over time. The General Plan will pursue these goals through the following actions:*

- *Continue to refine and confirm areas of climate change impacts to be studied.*
- *Study the effects of climate change on permafrost stability within the city*
- *Map and monitor storm water and drainage patterns affecting the city*
- *Map and monitor wind and storm patterns, particularly as to how they relate to the built environment and transportation*
- *Work with research institutions and others to map and monitor the coastal environment for trend changes particularly with respect to sea level changes.*
- *Identify partners – including citizen groups, the development community, community organizations and other orders of government – interested and capable of contributing to ongoing monitoring of climate change impacts.*
- *Communicate findings of the monitoring programs with the community, partners and other orders of government in order to build widespread understanding of the impacts and the adaptive capacity of the community.*

### **Adopt policies that recognize the long-term impacts of climate change**

*The City of Iqaluit should take a precautionary approach to development by taking into account the best knowledge available on climate change impacts into its decision-making. By developing a system of monitoring, the City will increasingly build its knowledge base over time and will be able to develop more policy that builds the adaptive capacity of the community. The General Plan will pursue these goals through the following actions:*

- *Integrate climate change considerations – including permafrost melt, sea level rise or relative land level rise, increased temperature, precipitation and extreme weather events – into the design, location and operation of key infrastructure.*

- *Adopt best practices related to climate change in the arctic on the development of municipal infrastructure and private development.*
- *Partner with developers to develop a permafrost and building impacts database to collect data on building requirements and ongoing impacts related to ground stability or building design. Or require it as a function of a development permit.*

### **Open space designation**

*As data on sea level rise becomes available, Council should review the information and restrict or modify development in areas prone to the impacts of sea-level rise, including, flooding, storm surges and impacts on infrastructure, and the beach area. The level of uncertainty in the NRCan sea level report makes this rather challenging to communicate and interpret effectively for the timescale of planning documents at this time.*

*Data on sea level rise relative to the communities shoreline is uncertain, however based on the precautionary principle the city should consider developing a shoreline development zone as a potential additive buffer in the future. Given the current rate of uncertainty which at this point indicates that sea level will increase throughout the planning windows.*

### **Infrastructure policy considerations**

*The impacts of climate change puts a specific risk on infrastructure. Like most arctic communities, Iqaluit's infrastructure has been designed and built using standards based on past climate data. Recent changes in climate have caused significant damage to infrastructure, as it is exposed to conditions it was not originally designed to withstand. With projected increases in climate variability and extreme events, damage to infrastructure is expected to increase exponentially. Of particular concern for arctic infrastructure are changes in permafrost, the frequency and severity of extreme weather events, precipitation, the coastal environment and ultraviolet radiation levels.*

*Based on research and consultation, a decrease in the permafrost layer was identified as the most significant climate-related concern for Iqaluit's infrastructure. The following may be particularly at risk: buildings with shallow foundations; buildings, roads and buried pipes along steep south-facing slopes and/or in areas of high snow accumulation; any building or road in areas of poor drainage where water may pool; and the landfill and former waste disposal sites.*

*The following infrastructure may be vulnerable to other climate change impacts: buildings or piping in poor condition due to age, absence of regular maintenance, out-dated design or over-extended use; infrastructure located along the coast which may be susceptible to damage from flooding or*

*storm surges; the drainage system which may be impacted by changes in precipitation; and the City's water supply.*

- *All new municipal infrastructure shall be designed and constructed to specifications that withstand projected changes in climate over their expected design life and meet sustainable development standards.*
- *City outfalls should be designed to fall outside the range in tidal variability*
- *All municipal and private infrastructure shall be monitored for climate induced changes on a regular basis with summary report provided to the city.*

### ***Infrastructure and land use needs assessment and ongoing monitoring***

*Given the complexity of the governance structures and the relatively young nature of the various Territorial and City functions there are a number of areas in which the city might consider important and useful information to collect or consider managing. Clearly there are issues of capacity and priorities to consider, nevertheless these may be necessary in time as the city develops. The information here will serve as key analytical tools for future planning considerations.*

*These include:*

- *Developing building codes and standards*
- *Meeting energy needs of a growing community*
- *Detailed surficial mapping*
- *Permafrost monitoring*
- *Coastal process monitoring*
- *Commercial and institutional permafrost reports*
- *Ongoing inspection and review of key city sites*
- *Performance monitoring*
- *Impact of water services and conservation*
- *Sewage management*
- *Steep slope development*



- *Stormwater management*
- *Transportation infrastructure*
- *Servicing infrastructure*
- *Emergency infrastructure*
- *Contaminated sites management*

### **Development guidelines**

*The City has developed a very user friendly set of development guidelines regarding subdivision design, building design and sitting/orientation, which for the most part are focused on the construction Industry and new development.*

- *Consider developing related documents and programs on energy efficiency and incentive programs, water conservation requirements, for retrofits of existing and substantial residential development and infrastructure,*
- *Demonstration or pilot projects, research projects or subsidies for innovative development projects,*
- *Working with federal and territorial partners to limit the import of unnecessary waste into the community.*
- *Consider adopting measures to reduce the construction waste going into the landfill and consider recycling program for building materials.*

### **Ownership and linkages**

*The City and other partner organizations need to consider how they develop programs and communication materials in such a way that the active community participation in climate related planning is encouraged, fostered and facilitated. The goal should be on inclusion and ongoing dialogue outside of the plan review process. The City "owns" the plan and is legally responsible for its implementation. The community is imbedded in the plan.*



## The Importance of Information

As outlined earlier, there are a number of impacts that climate change will bring to Iqaluit. There is no organization, agency or group that is singularly responsible for responding and adapting to climate change. Rather, a number of actors within Iqaluit have knowledge to contribute and can take action - sometimes individually and sometimes collaboratively. Within this context, sharing information becomes a vital element in both understanding the impacts of climate change and in coordinating effective adaptive responses.

As part of this project, an initial scan was conducted in addition to a stakeholder workshop to identify the organizations that potentially have a role to play in helping the community adapt to climate change. These include:

Organizations identified as having a role to play in Iqaluit's adaptation to climate change	
<ul style="list-style-type: none"> <li>• Amarak Hunters and Trappers Organization</li> <li>• Canada Mortgage and Housing Corporation</li> <li>• Community Elders</li> <li>• City of Iqaluit - Economic Development Department</li> <li>• City of Iqaluit - Engineering and Sustainability Department</li> <li>• City of Iqaluit - Planning and Lands Department</li> <li>• Government of Nunavut - Community and Government Services</li> <li>• Government of Nunavut - Department of Economic Development and Transportation</li> <li>• Government of Nunavut - Department of Environment</li> <li>• Government of Nunavut - Health and Social Services Department</li> <li>• Government of Canada - Coast Guard</li> <li>• Government of Canada - Department of Fisheries and Oceans</li> </ul>	<ul style="list-style-type: none"> <li>• Government of Canada - Environment Canada</li> <li>• Government of Canada - Indian and Northern Affairs Canada</li> <li>• Government of Canada - Natural Resources Canada</li> <li>• Government of Canada - Transport Canada</li> <li>• Nunavut Eastern Arctic Shipping Inc. Nunavut Sealink &amp; Supply Inc.</li> <li>• Nunavut Impact Review Board</li> <li>• Nunavut Planning Commission</li> <li>• Nunavut Research Institute</li> <li>• Nunavut Tunngavik Inc.</li> <li>• Nunavut Wildlife Management Board</li> <li>• Qulliq Energy Corporation</li> <li>• Royal Canadian Mounted Police</li> <li>• Shipping Companies</li> <li>• Canada-Nunavut Geoscience Office</li> </ul>

This list is not assumed to be completely comprehensive but is useful in illustrating the incredible diversity of actors that have a role to play and the complexity of understanding what actions and

initiatives each is undertaking or plans to undertake. This situation highlights the need for mechanisms for information sharing. Through numerous interviews during this process, it became clear that the sharing of information - both within organizations and across organizations - is a significant obstacle today in Iqaluit. The cross-cutting nature of climate change only serves to exacerbate this issue.

By observing activities in Iqaluit, listening to key stakeholders and considering the context, a number of assumptions were made for the development of a tool to assist in the sharing of information. These were:

- People are extremely busy
- Any solution should help individuals do their work, not make new work
- Any tool should be accessible and easy to use
- Shared information should be stored in a centralized location
- Adaptation is about relationships as much as information

It was decided that if these assumptions were considered in the development of an information sharing tool, then this solution would be a beneficial first step in understanding the big picture of climate change adaptation in Iqaluit and potentially lead to increased collaboration over time.

### **Mind Map: A collaborative information-sharing tool**

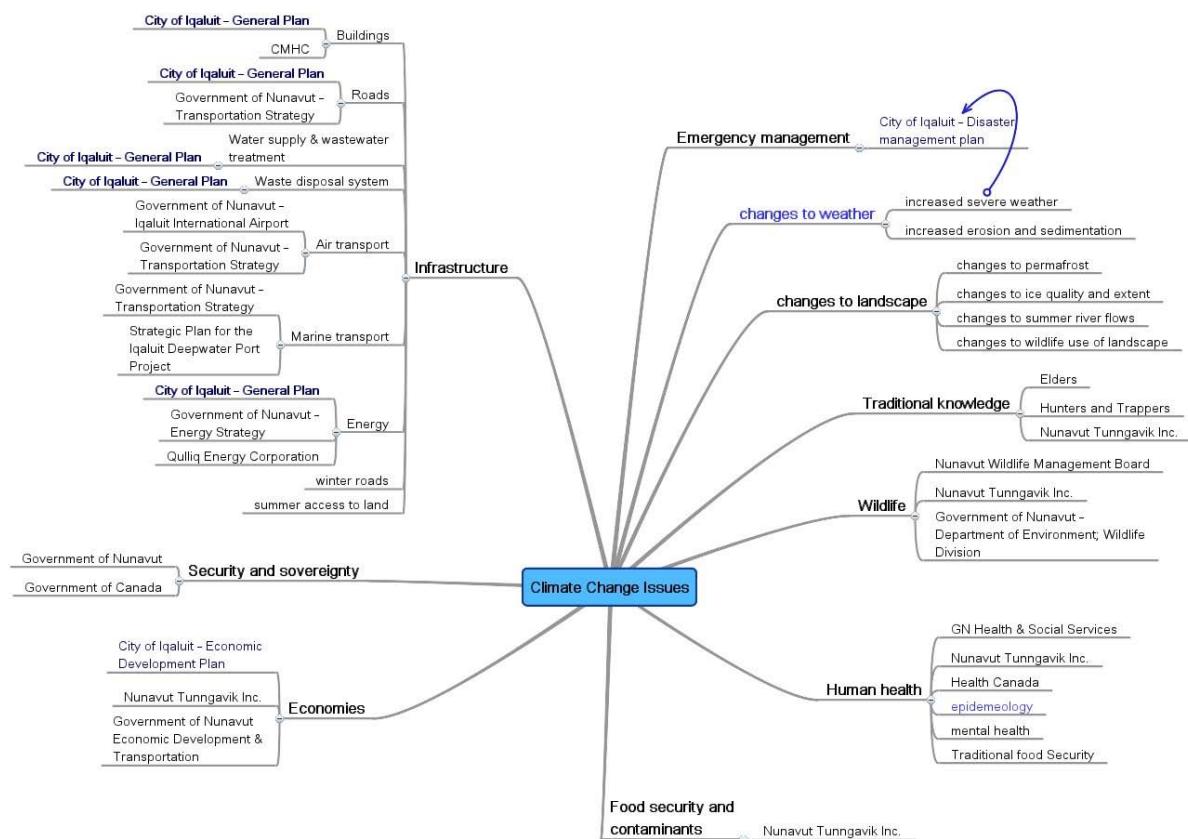
Using an online mind-mapping tool called Mindmeister ([www.mindmeister.com](http://www.mindmeister.com)), a visual representation of the impacts of climate change in Iqaluit was created, showing the various actors that have a role to play along with their respective plans and documents. As a web-based tool, this has the benefit of not sitting within a particular organization or being assigned to one particular individual, which recognizes the cross-cutting nature of climate change, but also the fluid nature of the workforce in Iqaluit and the frequent changing of positions as discussed earlier in this report.

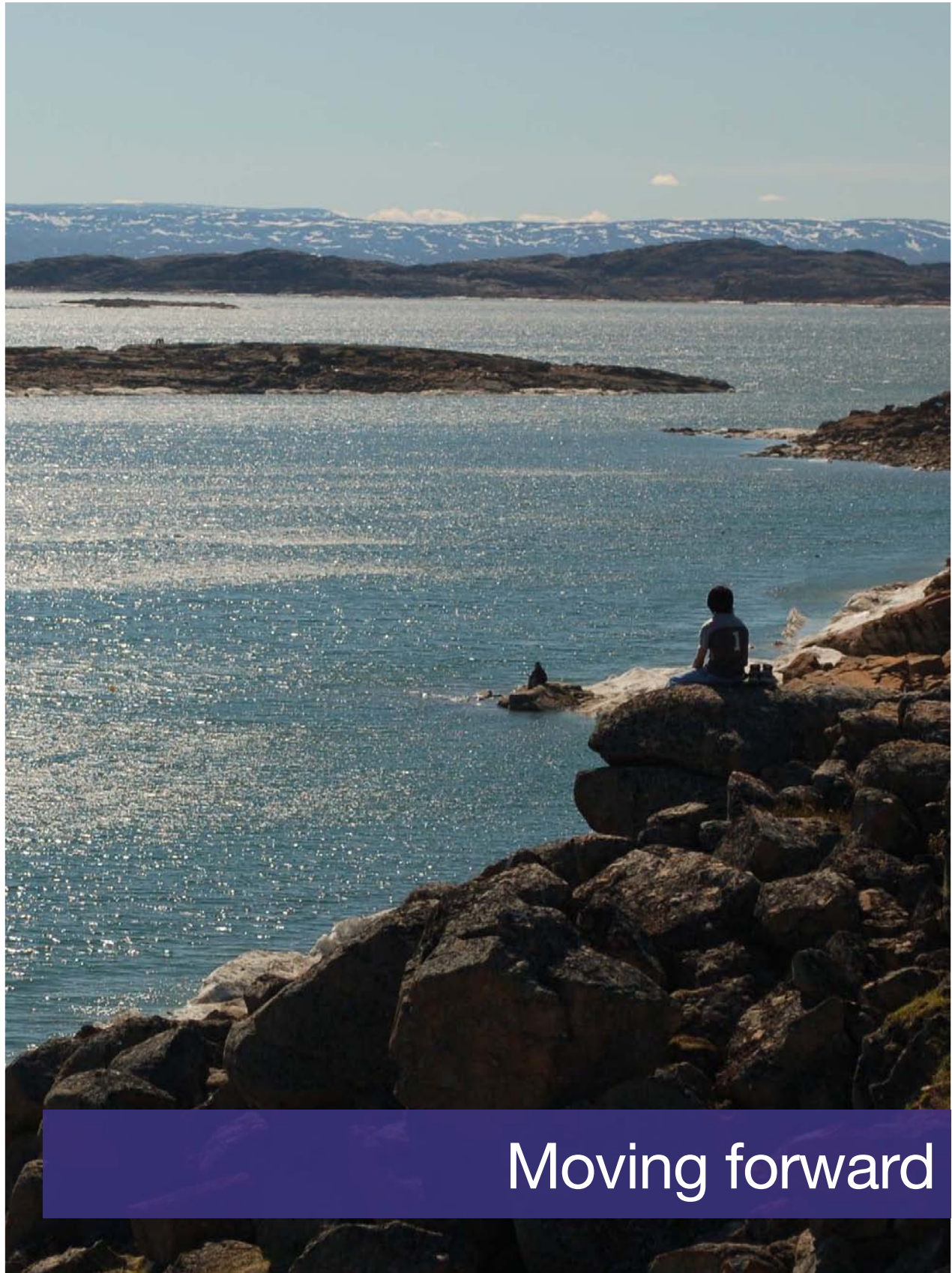
Participants of the May 2010 workshop have all been given access to Mindmap to build more information into the tool and help improve the understanding of community actors. If used, this tool can have the benefit of:

- Ease of access to current plans and documents
- Understanding of current and future activities of community actors
- Recognition of complementary initiatives - leading to more efficient and effective efforts
- Improved working relationships within the community



A snapshot of the Mindmap tool is shown below:





Moving forward

## The imperative for collaboration

The diversity of actors in Iqaluit, challenges of the workforce and wide-ranging impacts of climate change all reinforce the need to build the collaborative capacity of Iqaluit in order to increase the adaptive capacity of the community over time. The Mindmap tool described in the previous section represents only an initial step towards this end. Shared information is a foundation on which the organizations and institutions in Iqaluit can understand the actions in the community, which opens up opportunities for effective collaboration and alignment across sectors. This will all contribute to increased adaptive capacity of the community to address climate change. The figure below summarizes this process.



*Building the collaborative capacity to adapt to climate change requires a multi-step process.*

Underlying this entire process is the necessity to build working relationships. The workforce issues outlined earlier in this report make relationship-building more difficult, yet more essential. A concerted focus on building relationships across organizations and institutions will be necessary for Iqaluit to adapt to climate change over time.

*“Collaborating is ultimately about relationships, and relationships do not thrive based on a rational calculus of costs and benefits but rather because of genuine caring and mutual vulnerability. Building the capacity to collaborate is hard work and demands the best of people, particularly when it involves people from different organizations (or even different departments within a larger organization) with different goals and with little history of working together – maybe even with histories of distrust and antagonism. In particular, we have found that building this capacity rests on three capabilities: convening, listening and nurturing shared commitment.”*

- Peter Senge, et al., *The Necessary Revolution*

## Initiating collaboration

In order to begin collaborating, an organization or group of organizations must be willing to commit to bringing actors in the community together. Coming out of the May 2010 workshop, the Government of Nunavut Department of Environment has committed to hosting an information-sharing workshop in the fall of 2010. This is an important initial step and allows for the early growth of communication and understanding in the community. This initial meeting should include a schedule of future meetings to build continuity for the group.



It should be noted that bringing actors together does not necessarily require formal agreements, contracts or an elaborate terms of reference. Rather, the process of collaborating can be built upon the following principles:

- Focus on information-sharing
- Allow for flexibility of participants
- Look for areas of shared interest amongst actors
- Limit the administrative requirements of the group
- Regularly provide updates - of new initiatives, of new learning, of new resources

These principles will provide a shared starting point, while allowing for flexibility as new information and collaborative relationships emerge. Additionally, a flexible and adaptable process of collaboration makes it easier for newcomers to join and contribute, further addressing the capacity issues discussed earlier in this report.

### **Integrating into existing initiatives**

As discussed earlier, climate change cuts across sectors and actors. This means that there is no singular response to adapting. As a result, climate change needs to be integrated into the plans, policies and decision-making of many groups and organizations in Iqaluit. Early opportunities include:

- Iqaluit General Plan implementation
- Iqaluit Sustainable Community Plan
- Iqaluit Economic Development Plan
- Government of Nunavut Climate Change Plan

These processes can utilize the existing tools and resources available in Iqaluit to address climate change adaptation through the Mindmap tool. In addition, the information-sharing group described above can be an excellent resource and act as a forum for engagement to bring a breadth of knowledge and perspective to these respective initiatives. Through this kind of collaboration, the Iqaluit community will be able to adapt to the challenges of climate change much more effectively in the years to come.

WARMING OF THE CLIMATE SYSTEM IS UNEQUIVOCAL, AS IS NOW  
EVIDENT FROM OBSERVATIONS OF INCREASES IN GLOBAL AVERAGE AIR  
AND OCEAN TEMPERATURES, WIDESPREAD MELTING OF SNOW AND ICE,  
AND RISING GLOBAL AVERAGE SEA LEVEL.

*IPPC Fourth Assessment Report*