



UNIKKAAQATIGIIT:

PUTTING THE HUMAN

FACE ON CLIMATE CHANGE



PERSPECTIVES FROM

NUNAVIK COMMUNITIES





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Throughout these workshops, a number of recommendations, requests for more resources and increased communication and information dissemination were made. These concerns, along with current adaptive measures, are discussed further in the final section “Going Forward” which aims to define some of the ways that the residents of these Nunavik communities would like to respond to the challenges posed by climate and other forms of environmental change.

This report shows the importance and need of examining this issue from both the point of view of the region and from that of the individual community, since not all environmental changes affect each area in the same way. From these findings, the proper course of action and appropriate resources can be directed to the areas of concern that the people of Nunavik feel are the most pressing. Finally, this report was written in anticipation that these environmental observations, as well as Inuit needs and priorities, will be taken into account by decision-makers at the local, regional, national, and even international levels.

### 3.0 INTRODUCTION

Evidence of global warming is projected to become most apparent first in Arctic and sub-Arctic regions. Rising temperatures have already created a variety of changes in the environment, and these changes are expected to intensify. Some of these shifts include changes in the characteristics of the ecosystems that have supported traditional Inuit activities and life for centuries. Cycles and movements of migrating animals, a decrease in the period when it is safe to travel on the land and on the ocean, reduced access to certain natural resources, and the destabilization of trails have all become growing challenges for Inuit in the last few decades.

As residents of the higher latitudes and users of the land and its natural resources, Inuit possess unique and specialized knowledge about the land. They are sensitive to the effects of climate change emerging in the North. Inuit are closely

observing all weather conditions, ice conditions, changes in flora and fauna, and physical changes to the landscape. Some of these changes are affecting their livelihood and culture, and affecting the subsistence and trapping economies that dominate Northern communities.

In the past 30 years, and in the past decade in particular, Inuit have been confronted with very difficult challenges to the ways they interact with the environment. This report looks at the observed changes that are taking place in the region of Arctic Quebec (Nunavik, Canada), an area that covers 507,000 square kilometers and is comprised of 14 Inuit communities that lie along the coasts of Ungava Bay, the Hudson Strait and Hudson’s Bay, and the responses by the people living in these communities to these changes. This report represents a synthesis of information expressed at a series of community workshops held in three Nunavik communities during the period of 2002-2003. The workshops aimed at helping communities document their observations of environmental and climate change, the impacts these changes were having on aspects of Inuit community and individual life and what is already being done or could be done in response to these changes to minimize impacts and take advantage of whatever opportunities these changes may represent today and in the future.



Figure 1: Map of Nunavik



## 4.0 METHODS

### 4.1 Pre-Workshop Methods

For all community workshops, standard methods were adopted and used. The workshop team included representatives from KRG, the Université Laval and ITK. The team prepared written materials prior to the workshops outlining several exercises that could be used during the workshop to gather community observations of climate change and to develop a set of potential community indicators for monitoring change and climate change impacts. These exercises drew from participatory analysis and planning techniques including Participatory Rural Appraisal (PRA)<sup>1</sup> and Objectives Oriented Project Planning (ZOPP)<sup>2</sup>. ZOPP and PRA encourage participation by everyone at a workshop, allowing a community to identify and analyze its own issues.

Pre-workshop meetings with research team members and regional representatives helped to:

1. plan the workshops;
2. discuss objectives (overt and covert);
3. review the proposed workshop methodology;
4. adapt the methods as appropriate; and
5. plan training for regional and community representatives.

The facilitators agreed that an approach where all workshop participants – community members, regional representatives and facilitators – would be co-investigators in the process.

<sup>1</sup>Robert Chambers of the University of Sussex pioneered the PRA approach over twenty years ago. He has written extensively on its use in promoting local input into project planning and implementation. See for example Chambers, R. 1997 *Whose Reality Counts? Putting the First Last*. Intermediate Technology Publications, London.

<sup>2</sup>The ZOPP technique was developed by the German development agency GTZ. ZOPP is an acronym for Ziel Orientierte Project Planning (see ZOPP: An Introduction to the Method. 1987 Deutsche Gesellschaft Für Technische Zusammenarbeit (GTZ) GmbH, Frankfurt, Germany)

The workshops were intended to be a dynamic learning process for all, where everyone had an opportunity to investigate the issue of climate change and its meaning to their community. There would be an emphasis on animating a two-way exchange of information and perspectives on climate change.

To facilitate the commitment to co-investigation, the project team prepared a list of guidelines to follow during the workshops:

1. **Have fun!** The experience of learning and sharing knowledge with each other will be insightful and enriching.
2. **Appropriate Activities.** Try to choose activities that are most appropriate for the people you are working with. Not all of the activities will necessarily be useful or practical for every group.
3. **Be flexible.** The group or community may already have their own methods and techniques for sharing information. These ideas can be shared at the beginning of the workshop and incorporated as the group sees fit.



Figure 2: Nunavik participant reviewing observations on environmental change



#### 4.2 During The Workshop

Each workshop began with a series of opening questions related to the groups' hopes and expectations for the workshop. The group was then asked to record on cue cards the changes they have noticed and heard about in and around their community associated with the environment, weather, climate, and so on. These observations were recorded one per card, and following the exercise were posted together on the wall in the meeting room for general discussion and to be viewed by all participants. All changes were reported to have taken place primarily within the last 10-15 years.

After the observations were placed in groups and participants reviewed them on the walls, adjusted the groupings and had a chance to add more observations to the lists, the group reviewed the observations to discuss the associated impacts they are experiencing as a result of these changes. These were discussed from the participants' personal perspectives as well as the views of the importance of the changes for their families and community.

After discussing the effects of the changes that have been observed, workshop groups discussed what could be done by individuals and communities to adapt or cope to these changes. Sometimes there were already things being done in the community to adapt to environmental changes, and many of these were noted. Participants were also asked to discuss who they wanted to know about their climate and environmental change observations, from local officials to international organizations.

The groups identified who should be told about these workshops in order to respond to the issues raised and to be aware of what concerns etc. exist within the communities on this issue. The final presentation of the workshops was directed at providing information to the participants as to how their observations were connected to initiatives at the regional, national and international levels on climate change in Indigenous communities.

#### 4.3 Summarizing Workshop Observations

Throughout the course of the Nunavik workshops, hundreds of observations were recorded. Observations raised repeatedly during the workshop process and by more than one of the workshop groups were generally deemed the *most* important or *most* prevalent in that community, and were recorded as such. The remainder of this document aims to:

1. Highlight and discuss observations that are significant in all Nunavik communities (Sections 4.1 and 4.3). These are observations that indicate high priority concerns for all Nunavik residents, and should command significant future attention from scientific and governmental bodies.
2. Highlight and discuss observations that are unique to each Nunavik community (Section 4.2). Issues that are distinct to certain communities may be overshadowed by the collective concerns of the region. By isolating concerns specific to each community, the aim is to better understand the differences that belie the varying priorities within Nunavik. One example is the contrast in difficulties in drying meat between Ivujivik and Kangiqsujuaq. Residents in Ivujivik have reported a more intense heat from the sun and have seen meat drying times shorten considerably in this community. In fact, people have to be careful not to burn or dry meat out in Ivujivik. Kangiqsujuaq residents, in contrast, have found that the time required to dry meat in their community has actually slowed and it now takes longer to dry meat properly.

It is important to note that this report depicts only a synopsis of the observations discussed throughout the Nunavik workshops. If an observation does not appear here it is not necessarily because it is not considered a significant indicator of environment or climate change to Inuit in that area. The individual workshop reports for each community should be referred to in order to get a more complete picture of the environmental changes taking place in that community and the required adaptations that residents reported were needing to be developed.



Overall, methods employed throughout the workshop process aimed to flesh out an honest representation of the intricate and unique climate change observations distinct to each community, and to give life to some of the real impacts that climate change is having on the people of Nunavik. Due to the participation of the Nunavik residents who took part in the community workshops, the detailed documentation of each community's observations, based on the rich and valuable Inuit knowledge, has been recorded and is accessible for referral by local, regional, national and international bodies.

## 5.0 OBSERVATIONS

The following sections (5.1, 5.2 and 5.3) describe the results of the three Nunavik workshops. Section 5.1 summarizes all regional concerns and observations that were raised several times within each workshop and by all three communities. When warranted, some attention is also given to observations that were discussed in at least two of the three communities. Concerns that are unique to certain communities are discussed in section 5.2. Section 5.3 specifically presents a summary and discussion of the observations of bird species made at the workshops.

It may or may not yet be proven that some of the changes reported by the people of Nunavik are actual results of global warming, but even without scientific corroboration of their direct link to climate change, these observations are



Figure 3: Sundog in the community of Kangiqsuujuaq

extremely valuable and represent legitimate data of change and matters of genuine concern to these communities. They should be viewed as sound and compelling statements that describe the Nunavik environment and the environmental changes that are taking place.

### 5.1 Regional (Common) Concerns

The following environmental changes have affected all three communities participating in workshops in Nunavik (Table 1). As a whole, these observations and their effects should be given high priority and consideration when deciding what action and research is needed to aid in the adaptation, mitigation, and monitoring of environmental changes. It is important to realize that although these changes are felt throughout Nunavik, their effects can be very different given the economies, priorities, and values of each individual community. Whenever possible, attention is paid to the different effects and adaptations that each community expressed during their workshop.

#### *Changes to Weather:*

**Warmer winters and cooler summers** have been observed within all the Nunavik communities. Shorter winters and faster spring thaws were also observed. Overall, the three communities commented that weather has become much more unpredictable. People now feel unsure predicting the weather. Some weather elements, such as winds and clouds, which were once used to accurately predict future weather patterns, can no longer be relied upon. In Puvirnituq, oncoming bad weather used to be predicted by a red and hazy sunset. This prediction pattern can no longer be consistently used.

More people are reporting more severe sunburns because the heat and intensity of the sun has increased today. In Ivujivik, the **sun's heat and intensity has increased** in March and April in particular. More intense heat is also causing **earlier spring thaws**. This was mentioned in both the Puvirnituq and the Ivujivik workshops. The warmer sun in Ivujivik has actually considerably sped up the drying



## Table 1: Summary of Shared Concerns

All Nunavik communities reported the following environmental changes taking place in their area:

<b>Changes to Weather</b>	<ul style="list-style-type: none"> <li>• Winters are warmer and shorter.</li> <li>• Summers are less warm.</li> <li>• Weather is less predictable overall.</li> <li>• Sun is more intense now.</li> <li>• Less snow and rain.</li> <li>• Thunderstorms at different times of year; fewer incidences of thunder and lightning in some areas.</li> <li>• Stronger winds.</li> </ul>
<b>Changes to Landscape</b>	<ul style="list-style-type: none"> <li>• Ice is thinner.</li> <li>• Earlier spring break-up of ice.</li> <li>• Delayed fall freeze-up of ice.</li> <li>• Permafrost is thinner in some areas; permanent snow packs have decreased.</li> <li>• Lower water levels.</li> <li>• Landscape changes have taken place that affect travel.</li> </ul>
<b>Changes to Land and Vegetation</b>	<ul style="list-style-type: none"> <li>• Berry plants are producing fewer berries.</li> <li>• Land is changing (drier, eroding and "growing").</li> </ul>
<b>Changes to Fauna</b>	<ul style="list-style-type: none"> <li>• Decreases in numbers of certain species.</li> <li>• More polar bears.</li> <li>• Char are skinnier and flesh is changing from red to yellow.</li> <li>• Pollution is more common in fish and other animals.</li> </ul>
<b>Changes to Insects</b>	<ul style="list-style-type: none"> <li>• More black flies that bite.</li> </ul>
<b>Increased Stress and Awareness</b>	<ul style="list-style-type: none"> <li>• Travel has become more difficult.</li> <li>• Concern about pollution levels/ contaminants (hydroelectric development).</li> <li>• Concern for human health with these changes.</li> </ul>

process of meat and people now have to be careful not to burn or dry their meat out too much when they hang it out in the sun. Food in the camps also spoils much faster now because of the warm sun and more food has to be thrown out as a result. Animals are also affected by the warm sun. Caribou, for example, are noticeably thinner because their food has dried out and they are eating less.

Earlier spring break-up of ice is also occurring in Kangiqsujuaq but residents from this community did not observe increased intensity of heat from the sun as was reported in Ivujivik and Puvimituq. In fact, residents from Kangiqsujuaq have observed cooler temperatures in the summertime and reported that it is taking

them longer to make *misirak*, dry caribou and dry beluga.

In addition to similar seasonal temperatures observed, all three communities noted **changes in snowfall and total snow cover**. Kangiqsujuaq and Puvimituq residents have noted that in general, they get less snow than they used to. In Ivujivik, there is less snow on the land in the winter and snow comes later in the season. The **quality of snow and the loss of permanent snow packs** were also mentioned in the community workshops as being a noticeable change. In Ivujivik it was noted that snow doesn't pack as well as it used to, it melts faster, is of a different consistency and blows away whereas before it used to pack well and could



be used to build igloos. Near this community, there used to be areas of snow all year round on Mansell Island and on hills by the town. Now these areas melt in the summer and they are not there consistently throughout the year anymore. In Kangiqsujaq, ash-like or darker snow has been seen in the springtime. This community has also seen a decrease in permanent snow packs. Those in Puvirniq have noticed that sleds don't slide as easily as they used to on soft snow and they have reported changes in the quality of soft snow.

Participants at the workshops also commented on the **decreased levels of rain** observed in their areas. Because of these decreased levels, all three communities have also seen **lower freshwater levels** in their respective areas.

Both Kangiqsujaq and Puvirniq have noticed that they are seeing **fewer incidences of thunder and lightning** in their communities. Residents from Ivujivik, in contrast, commented on the fact that they are experiencing rainstorms of increased intensity today. Ivujivik residents also see thunderstorms in their area at **different times of the year**. There are now thunderstorms in spring in Ivujivik and thunderstorms are occurring much later in the year now than they have in the past (at a time when snowstorms used to occur). Puvirniq residents have also noticed that the onset of thunderstorms is later in the year now, and this means there is less rain at a critical time of the year in spring. Kangiqsujaq residents have also seen storms at different times of the year, noting in particular that lightning is now seen in April.

All three communities have noticed **stronger winds** in their areas. Ivujivik residents have seen more windy days lately, and stronger winds than ever before. October and November are now windy and are no longer good times for hunting whereas before weather used to be calm in these months. Wind is said to always change direction now in this community as well. Winds around Puvirniq are also noticeably stronger now. Winds at forces of 100 km/hr are experienced today and never were felt in the past. Since the period of 1995-99, each

year after the ice breaks, the winds have been high and it is now found to be windier during the summer after the thaw than before. Historically, residents only noticed high winds in the spring and during the fall. Kangiqsujaq residents have also noticed that the wind is getting stronger in their area, in particular they are seeing more summer whirlwinds.

### **Changes to Landscape:**

Shorter winters with milder temperatures are key factors in the observation of **thinner ice**. Thinner ice was noticed in all communities. In Puvirniq, April lake ice is reported to be half as thick today as compared with 15 years ago. Sea ice thickness has also decreased in depth in this community. Kangiqsujaq residents have noticed a decrease in the depth of ice, as they no longer need to use extensions for their ice augers to drill through ice now. Saltier water was mentioned as a contributor to thin ice in Kangiqsujaq.

A thinner depth of ice contributes to **earlier and faster spring thaws of both lake and sea ice**. In Ivujivik, the ice used to melt and drift out at the end of June or beginning of July. Now it is almost gone at the mouth of the bay in late April. The community of Kangiqsujaq has seen spring thaw move from the first week of July to June. Puvirniq residents used to be able to travel by dog team on ice in July, now the ice is gone by this time.

**Later freeze-ups of ice in the fall** have also been observed in all communities. Both Kangiqsujaq and Ivujivik residents have seen the time of freeze-up move from November to December. Puvirniq has seen a greater change in the timing of the ice freeze-up. In the past, this community used to see ice in the bay in late November and it used to be frozen over by late December. Now, the freeze-up in Puvirniq occurs in late December, or even in early January.

Milder winter temperatures have also caused **thinner and melting of permafrost** in areas. Puvirniq residents have noticed that permafrost in the area is thinner and not as cold



today. Community members from Kangiqsujuaq have also noticed these changes in their area. Permafrost is melting in places and permanent snow packs on the hills are melting earlier now. Ivujivik residents have also noticed that an area on the hill that used to have ice year-round is now gone.

**Lower water levels** from decreased rainfall and less snowfall have greatly affected all communities. In Puvirnituaq, it was observed that Fat Island is higher out of the water now and that islands now exist in areas where there were never islands before. In Kangiqsujuaq, water levels all over the community are lower. Rivers and lakes are smaller, currents have become weaker and in some areas, rivers and lakes have dried up altogether. In Ivujivik, water levels in lakes and rivers were also notably lower. In the bay, this is compounded by the hydroelectric development that is also influencing the water system. In fact, in all communities, levels have become so low that **polluted drinking water** is a concern. In Kangiqsujuaq, it was mentioned that drinking water from the Municipality is browner now and boil water warnings are more frequent these days.

#### **Changes to Land and Vegetation:**

Plants are producing **fewer berries** and berries that are **smaller and drier** than before. This was observed in Kangiqsujuaq and Ivujivik in particular. Puvirnituaq residents feel that vegetation has been adversely affected by the irregularity of rain and the overall decrease in rain falling in the area. The land in Puvirnituaq was said to be “growing” and “expanding upwards.” **Drier land** is a contributing factor to decreased vegetation growth. Ivujivik residents have noticed that with low water levels, the land is dry and “lifts up in places.” In Kangiqsujuaq, there is considerably less growth of vegetation on the hills. Soil with vegetation is eroding and rolling off hills in some places as well.

#### **Changes to Fauna:**

There have been **decreases observed in numbers of certain marine species**. Puvirnituaq residents noted that marine species in

general (seals, walrus, whales) are decreasing in numbers. Both Ivujivik and Puvirnituaq residents have observed that the hydroelectric development is affecting ringed seals in their areas. In Ivujivik the number of these animals has decreased as a result of weaker currents, while in Puvirnituaq ringed seals are reported to not be as healthy today. Seal livers and meat are being found with spots on them, which is affecting the blubber of these animals and is proving fatal we think as there was a case of many seals dying along the Hudson coast in previous years

All communities have seen **changes with beluga whales** near their communities. The community of Puvirnituaq has noted that fewer beluga whales are being seen along the Hudson coast and Ivujivik residents note that beluga are coming past the community later in the fall. Kangiqsujuaq residents see fewer beluga whales in general today. In particular this community noted a change in the fall migration of beluga. Residents have noticed that fewer are coming close to Wakeham Bay now and they thought, perhaps, that they have moved to the Hudson Strait. Kangiqsujuaq residents also noted that beluga are skinnier today and that these animals, as well as seals, are found with less healthy skin now. Residents think that this may be a result of mercury or PCB poisoning.

Both Ivujivik and Kangiqsujuaq residents have observed **more polar bears** in their communities, although this was not observed in Puvirnituaq. Also, in Kangiqsujuaq polar bears have been seen in the summertime.

**Char are skinnier and the flesh is changing from red to yellow.** Ivujivik residents noted that they are finding char with more yellowish meat along both the Hudson and Ungava coasts. In Puvirnituaq, residents mentioned that the yellowish ones are not as good to eat. The fatter, red ones are preferred for eating, as they taste better. Kangiqsujuaq residents also noted that they are seeing char that are not as fat now.



**More pollution in fish** in general was noted in both Kangiqsujuaq and Puvirnituk. Community members from Kangiqsujuaq mentioned that they notice mercury and differences in some fish and other animals when they are opened up now. Those from Puvirnituk said that Elders once told them that one day they would not be eating fish from the rivers and they see this happening now because of pollution.

#### ***Changes to Insects:***

More small black flies today were reported in both Ivujivik and Kangiqsujuaq. Puvirnituk residents have noticed that there are more flies on and within the skin of caribou near their community, but there was no specific mention that black flies have increased in this area. The black flies are a concern as they bite people. Children are getting bitten more and there is worry that these insects are carrying diseases (i.e. West Nile disease) and potentially transferring these diseases to people.

#### ***Increased Stress and Awareness:***

**Weather unpredictability** is disconcerting for many community residents, but Elders in particular feel afraid that the old prediction methods are being lost. The unpredictability in weather and difficulties with weather prediction mean that **travel has become more challenging**. More people are getting stuck on the land because of the changes in the weather and difficulties with prediction. It was mentioned both in Kangiqsujuaq and Puvirnituk that young people in particular are getting stuck out on the land more often. In Puvirnituk, lower water levels are also affecting travel. Low water levels limit boat access to regular hunting areas. Because of this, hunters now have to travel further to find certain animals. In Ivujivik, people used to navigate while traveling by using the direction of snowdrifts but now that the predominant wind is changing direction and the snow is melting earlier, this method of navigation can no longer be used. Because of the inconsistent weather, high winds, earlier thaws, thinner ice and rough seas, more hunters are having to stay at home more often now, as there are fewer “good” hunting days today.

There has been a change in lifestyle in this community as a result. With less potential hunting days because of bad weather, more hunters stay home and community residents are consuming more food from the store. Less time out on the land also lessens the critical amount of time that children can be taught about the land, hunting and survival. In Kangiqsujuaq, it was mentioned in particular that people are uncomfortable going out because thinner ice is making traveling on the ice scary. Harvesting mussels is also sometimes not possible as the ice is too dangerous. Warmer weather conditions and shorter winters have also meant that hunters need to travel further distances, taking longer routes to reach places because of melted snow and thin ice. This has increased gas expenditures.

All three communities have expressed **increased levels of stress and concern about contaminants** being observed in the environment surrounding their communities. Puvirnituk residents see all weather unpredictability and weather changes as being related to pollution in the environment. There is concern that pollution has changed the ozone layer and that these changes are altering climate patterns. Ivujivik residents are worried about diseases (i.e. West Nile disease) potentially being carried by insects around their community. Since more contaminated animals are being found, Ivujivik and Puvirnituk residents are concerned that more people are eating less country foods and there is worry that more people are getting sick more often as a result. Residents from Kangiqsujuaq are also concerned about contamination issues and potential **impacts on human health**. It was mentioned that more unhealthy seals and beluga are being found now, possibly because of mercury or PCB poisoning and that caution must be used when selecting which animals to consume and which animals to discard. There is also worry in all three communities about water contamination because of low levels of rainfall. Residents from Kangiqsujuaq mentioned that they would like a better water treatment system to aid in coping with the decreased water quality seen in their area.



Both Puvirnituq and Ivujivik residents report that they have seen direct changes in their local environment because of their close proximity to the **James Bay development project**. Puvirnituq residents expressed that they see a direct link between this project, other development projects and the declining health of local animals. One example is the possible poisoning of animals due to barrels of oil leftover on the land. The residents of Ivujivik expressed concern that changes they are observing are a result of the James Bay hydroelectric development project. It was mentioned that all changes currently observed in the bay are results of this project. Weaker currents, different species of animals found there, altered ice formation and different ice break-up times were all mentioned as results of this project. Weaker currents have occurred as a direct result of the dam being built. These currents have moved some species of food for other species so it has therefore changed where the community finds certain animals. The weaker currents also mean that ice does not pack as well as it used to. Open water is now further away from the community and therefore travel time to get to seals has

increased and travel has also become more dangerous.

Since contaminants and human health are so closely linked, they are matters of utmost importance and high priority. A perceived lack of information compounds their fear. To solve this sort of problem is no simple task, but several suggestions are made in the final section of this report, “Going Forward”, such as bolstering communication and information dissemination, and creating strategic partnerships, as ways to help put people at ease and answer some of these important questions.

### 5.2 Community-Specific Concerns

Despite numerous overlapping observations and concerns in the Nunavik area (discussed in the previous section), appropriate attention should also be given to some of the unique environmental changes that have been observed in each community. These changes also have deep and significant impacts on the economies and wellness of the people that reside in Nunavik. The following are some of the environmental observations that are unique to each Nunavik community (Table 2).

 **Table 2: Summary of Community-Specific Concerns**

#### A summary of environmental concerns unique to each Nunavik community

<b>Ivujivik</b>	<ul style="list-style-type: none"> <li>• Stars and sun have changed location in the sky.</li> <li>• Altered conditions in the bay.</li> <li>• Harder rainstorms.</li> <li>• More haze in the sky.</li> <li>• Tides have changed.</li> <li>• Fish are bigger in general and there is one rare salmon sighting.</li> <li>• New insects.</li> </ul>
<b>Puvirnituq</b>	<ul style="list-style-type: none"> <li>• Caribou are sick and unhealthy.</li> <li>• Black rain.</li> <li>• Bald seals seen lately.</li> <li>• Rotation of earth is slowing.</li> <li>• Fish: Smaller, food-supply changing, fewer fish and more sick fish.</li> <li>• Insects: Butterflies, new flies and loss of one species.</li> </ul>
<b>Kangiqsujuaq</b>	<ul style="list-style-type: none"> <li>• Sky is darker blue.</li> <li>• More humid in summer.</li> <li>• Changes to marine species</li> <li>• New land animals.</li> <li>• Fish not migrating up river anymore and more capelin seen today.</li> <li>• Fewer mosquitoes.</li> </ul>



### **Ivujivik**

*Stars and sun have changed location in the sky:* There have been notable changes in the sky above Ivujivik. The big dipper in the sky has changed in location. With the change in the placement of stars in the sky, it is now harder to use them for navigation. There is also concern about the change in location of the sun. On long days, the sun seems higher up in the sky. Where the sun sets on the horizon has also changed in location and people are concerned that the earth may be tilting.

*Altered conditions in the bay:* The hydroelectric development project in James Bay has altered the strength of currents within the bay. Weaker currents do not move ice in the bay as well as stronger ones and this means that open water is further out than it used to be. Travel has become more dangerous because of these changes to the bay. Lower water currents have also changed locations of certain animal species, in particular seals and whales. These animals used to come closer to the community when open water wasn't as far out. Now that ice gets trapped in the bay the animals are found further away from the community.

*Harder rainstorms:* Despite the observation that rainfall has decreased in this community, as it has in all three communities, Ivujivik residents have observed that the force of rain is stronger and that they experience harder rainstorms now.

*More haze:* Community members of Ivujivik have noticed that they do not have as many clear days with blue skies like they used to. They find there is more haze in the sky now.

*Tides:* Ivujivik residents have noticed that tides have changed in their community. Low tides go out more and there is a slower change in tides now compared with before.

### *Fish:*

Fish in the community of Ivujivik are becoming larger again. Size of fish in this community seems to cycle. Fish observed here used to be large, then they were small for some time and now they are large again. It was also observed that there was one rare case of a salmon being caught near this community.

### *Insects:*

New insects have been seen in the community of Ivujivik. Dragonflies, large flies and little black flies that bite have all been seen recently in this community. There is concern about the potential diseases that these insects may be carrying as children are getting bitten by these insects more than before.

### **Puvirnitug**

#### *Caribou are sick and unhealthy:*

Community residents have observed the caribou population near to the community of Puvirnitug closely and have noticed many changes in the condition of these animals. Caribou are exhibiting a great many new characteristics indicating that they are unhealthy: meat along the joints of caribou is more watery, there are white spots on caribou today, there are hard spots on caribou livers now, holes in the intestines of caribou are being found and more caribou are found with their lungs stuck to their ribs. Causes behind the changes observed in caribou were thought to be the thinning ozone layer and higher levels of contaminants in their food and water. There is concern that another cause could be new and an increased number of flies on caribou laying eggs under the skin. Their diet has changed also. Community residents have noticed that caribou are not eating as much lichen and are eating more along the shores and from the garbage dump now. Both the change in diet and the increased number of caribou needing to be discarded are concerns for human health. People are losing an important healthy food option as less of these animals are eaten.



***Black rain:***

One summer a number of years ago there was an incident where rain that fell was almost black. This event is seen as the primary event that marked the set of weather changes observed in the community of Puvirnituk. Rain is seen as more irregular now and coming less frequently. Vegetation growth has been affected by irregularities in rain, in particular it was mentioned that the black rain event adversely affected vegetation.

***Bald seals seen lately:***

Despite the fact that Puvirnituk residents are seeing fewer seals in general as of late, they have noted that bald seals are being seen in higher numbers around the community of Puvirnituk today.

***Rotation of the earth is slowing:***

During discussions on the topic of the land in the community of Puvirnituk, it was mentioned that residents believed that the rotation of the earth is slowing down. Residents believe that this is affecting the weather in their area.

***Fish:***

Changes observed with fish in general around Puvirnituk include, decreases in size, decreased food supply and changes to their diet, more sick fish and less fish in general were found today. Puvirnituk residents also mentioned that warmer temperatures are causing fish caught in nets that then die, to go bad faster than before.

***Insects:***

Last year during springtime, there were lots of butterflies of different sizes seen, migrating north. The loss of one specific type of insect, a small freshwater insect, was also reported in this community. It was thought that perhaps the intense sun had an influence on the loss of this insect. More and new flies in and around caribou near Puvirnituk were also reported.

***Kangiqsujuaq***

***Sky is darker blue:***

Kangiqsujuaq residents did not observe increased intense heat from the sun, as was observed in the other two communities. They did report however, that the sky over their community is now a darker blue. This change in colour is noticeable all year round.

***More humid in summer:***

As in the other two communities, Kangiqsujuaq residents have observed cooler summer temperatures. However, in contrast to the other two communities, it was mentioned in the Kangiqsujuaq workshop that the summer months are also more humid.

***Changes to marine species:***

Following the trend of decreased numbers of marine species observed in all communities, Kangiqsujuaq residents noted specifically that numbers of bowhead whales and killer whales (orcas) near their community have decreased. Similarly, narwhals used to be seen in Ungava Bay and now they aren't seen anymore. Harbour porpoise, or dolphins, in contrast, are a new species of animal seen near this community. They are now being seen southeast of this community in the summertime. Hooded seals are also seen in and around this community, though they weren't seen here before.

***New land animals:***

Musk ox are in the community of Kangiqsujuaq now, having arrived in 1968-69. Deer were seen in the summer of 2002 for the first time and abnormal sightings of black bear were also reported in this year and more of these animals have been seen recently. Kangiqsujuaq residents reported that many new species never seen before have been seen recently in this community for the first time.

***Fish:***

Kangiqsujuaq residents noted that the fish in their community are not migrating up the river anymore due to decreased levels of rain causing



rivers to be much shallower and smaller in size. In some cases, fish are getting stranded in ice because of these conditions. Higher numbers of capelin around this community have also been noted.

*Insects:*

Residents are reporting that there are fewer mosquitoes near their community today because of the lower water levels and as lakes and rivers are drying up. This is seen as both a positive and negative impact as humans prefer fewer mosquitoes but it also means less food for fish. There was also mention that bees are present in this community, although this is not new. Smaller black flies that bite have been reported to be new to this community in recent years.

### 5.3 New and Unusual Bird Life

Both **new bird species and decreases in bird species normally seen** were reported in all the Nunavik communities. There is concern about the drop in numbers of the different types of birds and the appearance of new species. Some believe that the presence of these new types of birds is an indicator of warmer temperatures. Changes have been observed with certain bird species already present in the communities that may also be indicative of weather changes. Ravens, for example, don't have a white moustache in winter anymore indicative of frost. Though there was mention that some of the new species of birds are becoming pests, for example robins in Puvirnituq, the consensus on the presence of new bird species is that they're not causing much difference in these communities, positive or negative.

Residents also reported some observations regarding changes in the **types of geese** visiting these areas and have observed changes in the **travel patterns of geese** near their communities. Ivujivik residents reported that there are less snow geese visiting their area and these geese are skinnier now because they have to fly over the area that is occupied by the hydroelectric dam. The timing of earlier ice break-up has caused the geese-hunting season

to shorten as well in Ivujivik as access is limited to certain areas during the ice break-up period. Kangiqsujuaq residents have noticed that both snow and Canada geese migrations are now earlier in the spring near their community. Though this means that geese are harder to be found in the fall, they are more plentiful in the spring. Fewer goose eggs are now found in Kangiqsujuaq. In Puvirnituq, it has been observed that when geese lay eggs now there is less snow to cover them. This community has also noticed that molting geese are no longer found on the ice in July, as there is no longer ice in July in this community.

The following table (Table 3) highlights the new species of birds, the species that have dropped in number and those that have disappeared altogether for the three communities.

## 6.0 GOING FORWARD

### 6.1. Community Adaptations

Since the environment surrounding these communities is changing to such a large degree, residents are finding that they need to alter certain behaviours and adopt certain adaptation measures in their homes and in their communities to address these issues. There are more unhealthy animals and some with abnormalities are being found within all communities participating to workshops in Nunavik. Communities have adapted to this by being more selective in what they consume and as a result more animals are now discarded. Community members from Ivujivik mentioned how they have already attempted to adapt to changes in their local food source by exchanging food with other communities. Though this system has already been started, it was stressed that it is needed even more now.

With the increased levels of heat from the sun, Ivujivik residents reported that people are having to adapt by wearing sun block and hunters are adapting by wearing masks when out on the land. In addition, a warmer sun has changed the way that residents dry meat in the sun. Because the sun is causing meat to



**Table 3: Bird Species Observed in the Nunavik Area**

Species	Puvirnituaq	Kangiqsujaaq	Ivujivik
Snow Goose		Arrive earlier	Fewer
Canada Goose		Arrive earlier	
Grey legged Goose			New
Japanese Goose			New
European Goose			New
Red winged Blackbird			New
Burrowing Owl			New
Snowy Owl		Fewer	
Giant Sandpiper			New (once)
Sandpiper	Fewer	Gone	Gone
Robin	New	New	New
Chickadee			New
Ptarmigan	Fewer		Fewer
Common Hawk			Almost gone
Arctic Tern	Fewer	Gone	Gone
Cranes		New	
Turkey Vulture		New	
Ducks		New	
Snow Bunting		Fewer	
Plover	Fewer		
Sparrow		New	

dry out and burn sometimes, people are turning meat more often when drying it in the sun now so that it doesn't spoil. Puvirnituaq residents have adapted to the increased incidence of food spoiling because of increased temperatures by quickly protecting food underground while out on the land or in freezers when at home. Temperature changes in the community of Ivujivik have also caused some people to start

wearing rubber boots in the wintertime now, as conditions are warmer and wetter.

Unpredictability of weather patterns is a challenge in all three communities. Ivujivik residents have adapted to this unpredictability by increasing the number of cabins around popular hunting areas in an attempt to avoid people getting stranded by providing more



shelter. Cabins, in this way, also help compensate for times when it is hard to get onto the land and access regular hunting areas at regular times.

Water levels are reported to be severely affecting the quality of drinking water within the three communities. Puvirnituaq residents are finding that they are now having to use melted snow for drinking water rather than simply taking their water from lakes as was the custom in the past when out on the land.

## **6.2 Resources And Equipment**

Due to altered weather patterns and bad ice and snow conditions out on the land, more people are finding that access to certain hunting areas has become more difficult. Ivujivik residents discussed the idea of coordinating a community freezer to compensate for times when it is hard to get on the land and access regular hunting areas. Puvirnituaq residents have found that they are traveling further now to access certain species. In fact, all communities reported similar problems. The community of Kangiqsujuaq has seen gas expenditures increase as a result. Residents from Ivujivik suggested that dog teams should be brought back, as these are considered a more reliable form of transportation when confronted with troublesome weather conditions.

With low rain and water levels, Kangiqsujuaq residents have observed that rivers are shallower and fish are having troubles passing through shallow rivers that are blocked by ice in the wintertime; many are getting trapped and dying as a result. Fisheries staff have already begun working on this problem by dredging and diverting rivers and by removing large rocks from shallow rivers in an attempt to increase depth and better allow fish to pass. This community has requested more resources and equipment to help fish migrate up rivers and to solve this problem. Low water levels in all communities are also greatly affecting the quality of drinking water. Residents in Kangiqsujuaq would like a better water treatment system in town.

In one specific case in Ivujivik, there is an area about three miles from town going onto the land, where snow machines regularly break down. It was suggested that either a bridge be created for this area, or changes to the trail be made (i.e. blast rock away).

## **6.3 Communication and Information Dissemination**

Weather patterns are greatly affecting travel plans in all communities as bad snow and ice conditions are creating dangerous and unpredictable travel routes out on the land. Communities have already begun sharing information about travel conditions among community members. Elders, hunters and other community members are going on community radio stations to point out dangerous places out on the land to the rest of the community. It was emphasized however, that more needs to be done to avoid having people stranded out on the land and to better facilitate safe trips for community members on the land. It was stressed in Kangiqsujuaq for example, that whenever someone goes out hunting or fishing, they should always communicate their travel plans to someone else in the community to ensure their safety.

As weather patterns are changing so quickly and weather predictions are becoming difficult to make, particularly by Elders, there is concern that old prediction methods and knowledge about the land are being lost and that this information will not be adequately transferred to younger generations. More communication and information dissemination and exchange between generations was mentioned as key processes needed to help teach children about life on the land. Residents from Ivujivik were concerned particularly that children are not having as much opportunity now to learn about the land as they are in school on a much more regular basis. More cabins out on the land can help to better facilitate these learning practices.

ATV use is negatively affecting land and vegetation growth in certain areas of Nunavik. Communication within communities was also mentioned with reference to this problem of land damage by ATVs. Community residents,



particularly in Kangiqsuujuaq, have reported that Hondas being driven on the land are damaging land and vegetation in some areas. Potential adaptations in light of this problem are to put up signs to communicate which areas are prone to such damage so that Honda use is limited in these areas. It was mentioned that dangerous cliffs and other areas should be marked as well.

Kangiqsuujuaq residents discussed potentially increasing information dissemination within their community regarding scarcity and health of marine mammals and other species. An example mentioned in this regard was the beluga whale. More beluga have been found that are unhealthy and as of late, beluga are also scarcer. People within the community of Kangiqsuujuaq would like more information regarding cases such as this and they would like to know more about potential impacts on the population – why are there fewer whales and why are more of them sick. Similarly, community members in Ivujivik stressed for the need to develop new and more accurate indicators for local weather changes. This community would like to see their youth, in particular, educated about these indicators.

#### 6.4 Recommendations

There is concern that development projects are adversely affecting the environment and that research on animals will have negative ramifications for animal populations within and near these communities. It is recommended,

particularly by residents in Puvirnituk, that harmful research and development projects should be stopped before greater harm is seen in the local environment. It is thought that these concerns and the potential impacts from harmful research and development projects should be communicated to the international community so that the activities causing these changes will be stopped.

Regarding the low-level water problem adversely affecting fish migrations in Kangiqsuujuaq, some community members thought that a study checking on the depth of lakes and rivers may be useful in helping better identify and then address this problem. Others however, said that they thought rivers should be left alone and the community should just wait for more rain.

Difficulties with weather prediction were mentioned in all communities as negatively impacting travel plans for many people. Kangiqsuujuaq residents would like Nunavik to be added to mainstream weather system news so that local forecasts are more readily available and more precise. This community would like these broadcasts made available to community residents via the community radio station.

In regards to the trade and transfer of foods between communities to alleviate the issue of food scarcity in some community at some times, residents of Ivujivik thought that foods should be shared and traded between community, but not bought from other regions.



Figures 4 and 5: Images from the communities of Kangiqsuujuaq and Ivujivik



## 7.0 CONCLUSION

The workshops in Nunavik elicited community perspectives on climate and environmental change in this region. Climate change is affecting many aspects of the environment in this region. In fact, it is in the Arctic regions where many of the most drastic effects of climate change are already being seen. Local temperatures rise in the face of global warming and the physical environment, vegetation, animal and human life are all affected by the resulting changes in a variety of successive steps and chain-like processes. Being the last level of the chain for many impacts, humans are forced to respond, cope and adapt to changes directly

to themselves and to those in the environment around them. As Inuit are so closely tied to the land, sea, and waters around them via the species these environments provide, and as the Arctic environment is one that is exhibiting very rapid changes in the face of global climate change, it is important to better understand Inuit and northern community perspectives on these issues and to being to work with communities to develop adaptation measures. The following diagram (Figure 6) summarizes the influence of global warming on Inuit communities.

To understand the climatic and environmental picture of the region as a whole, it was important to look at three distinct communities in

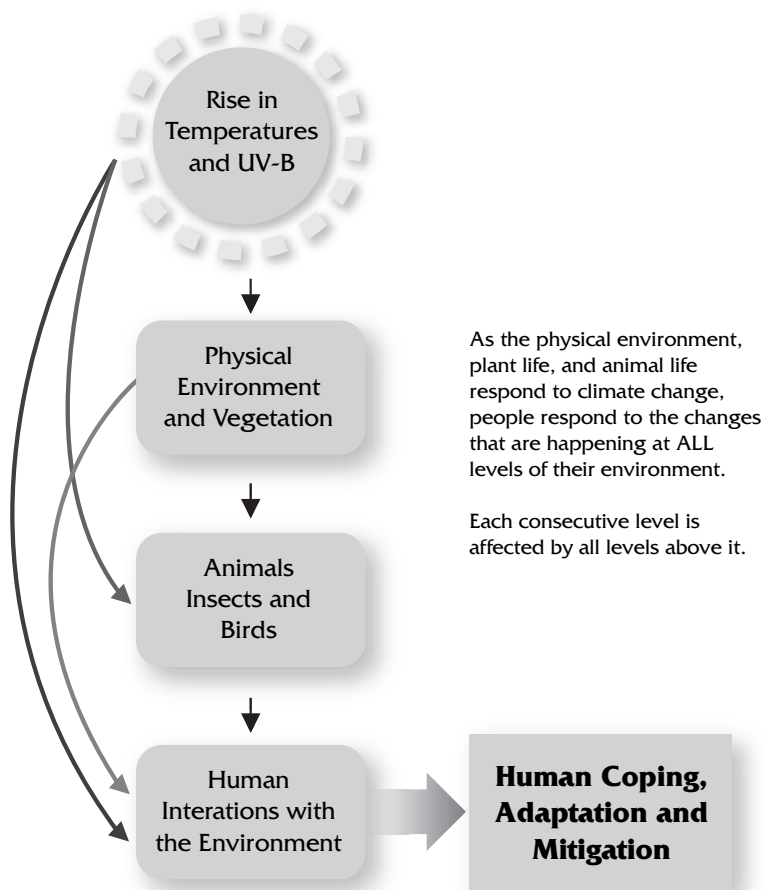


Figure 6: Influence of global warming and increased UV-B on Inuit communities.

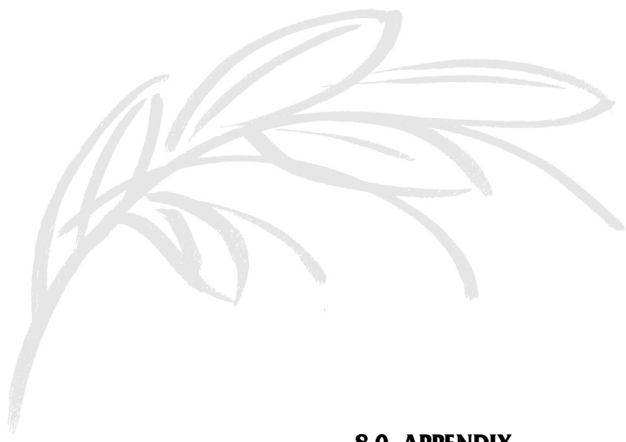


the analysis of change occurring in Nunavik. The three communities who participated in these workshops were Ivujivik, Kangiqsujuaq and Puvimittuq. Owing to the uniqueness of each community's specific location as well as to their varied proximity to each other, a comparison and contrast of differences and similarities was possible within and between communities for this report. Observations in line with this theme are presented in Section 4.0. These observations cover shared concerns between all three Nunavik communities and a short synopsis of

changes unique to each community. Further, the 'Going Forward' (Section 5.0) presents a thorough review of recommendations for future action and research as well as current or future potential adaptations to be made by these communities with regards to many of the changes observed. Based on the community workshops and perspectives expressed by residents in attendance, a summary of recommendations with regards to future research and action on the issue of climate change and community adaptations in Nunavik is presented in Table 4.

 **Table 4: Summary of Recommendations and Adaptations**

<b>Concern</b>	<b>Recommendation/Adaptation</b>
<ul style="list-style-type: none"> <li>• More unhealthy animals and animals with abnormalities found.</li> </ul>	<ul style="list-style-type: none"> <li>• Be more selective about which animals to consume.</li> <li>• Exchange food between communities.</li> </ul>
<ul style="list-style-type: none"> <li>• Increased heat from the sun and increased temperatures.</li> </ul>	<ul style="list-style-type: none"> <li>• Wear more sun block.</li> <li>• Wear masks when out on the land.</li> <li>• Turn meat more often when left out to dry.</li> <li>• Protect food underground or in freezers at home.</li> <li>• Wear rubber boots in the winter.</li> </ul>
<ul style="list-style-type: none"> <li>• Unpredictability of weather patterns.</li> </ul>	<ul style="list-style-type: none"> <li>• Increase number of cabins out on the land.</li> <li>• Use community freezer for meat.</li> <li>• Dog teams should be brought back.</li> <li>• Share info about dangerous places on the land between community members.</li> <li>• Always share travel plans with someone else when going out on the land to ensure safety.</li> <li>• Nunavik should be added to weather system news and these forecasts should be communicated to FM radio stations.</li> </ul>
<ul style="list-style-type: none"> <li>• Low water levels impacting drinking water and fish migration patterns.</li> </ul>	<ul style="list-style-type: none"> <li>• Use melted snow for drinking water rather than lake water.</li> <li>• Better water treatment system.</li> <li>• Dredge and divert rivers for fish.</li> <li>• More resources and equipment are needed.</li> <li>• A study should be done checking the depth of lakes and rivers to aid with fish migration.</li> </ul>
<ul style="list-style-type: none"> <li>• Old prediction methods and knowledge about the land are being lost.</li> </ul>	<ul style="list-style-type: none"> <li>• More communication and information dissemination between generations.</li> <li>• More cabins on the land can facilitate this learning.</li> </ul>
<ul style="list-style-type: none"> <li>• ATV use negatively affecting land and vegetation growth.</li> </ul>	<ul style="list-style-type: none"> <li>• Put up signs to mark areas prone to this damage and potentially dangerous areas also.</li> </ul>
<ul style="list-style-type: none"> <li>• Lack of information on animal health, possible impacts and potential indicators.</li> </ul>	<ul style="list-style-type: none"> <li>• Increased information dissemination to communities, particularly to youth.</li> </ul>
<ul style="list-style-type: none"> <li>• Concern about harmful development and research projects.</li> </ul>	<ul style="list-style-type: none"> <li>• These projects should be stopped.</li> <li>• Concerns and potential harmful impacts from these projects should be communicated to the international community.</li> </ul>



## 8.0 APPENDIX

 **Table 5: List of Workshop Participants**

<b>Ivujvik</b>	Mattiusi Luuku, Pauloosie Qaunnaaluk, Saviarjuk Usuarjuk, Mattiusi Iyaituk, Mary Ainalik, Johnny Qinuajuak (Interpreter/Translator), Sarah Mark-Tardif (Interpreter/Translator).
<b>Puvirnituk</b>	Nellie Nungak, Samisa Sala, Eli Kenuajuak, Tamusi Sivuarapik, Lizzie Sivuarapik, Lucassie Qumaaluk, Paulasi Kanayuk, Annie Amamatuak, Putuguk Qumaaluk, Atami Putuguk, Minnie Assapak, Matiusi Amarualik, Johnny Qinuajuak (Interpreter/Translator), Johnny Uitangak (Interpreter/Translator).
<b>Kangijsujuaq</b>	Aqujaq Qisiq, Inuluk Qisiq, Minnie Editloie, Naalak Nappalak, Tiisi Qisiq, Amamak Jaaka, Opigak Ilimasaot, Jessica Arngak, Adami Alaku, Bernie Adams, Atittuq Kiatainaq, Annie Alaku, Aloupa Kulula, Aisik Sakiagak, Markusie Qisiq (Interpreter/Translator), Betsy Etidloie (Interpreter/Translator).