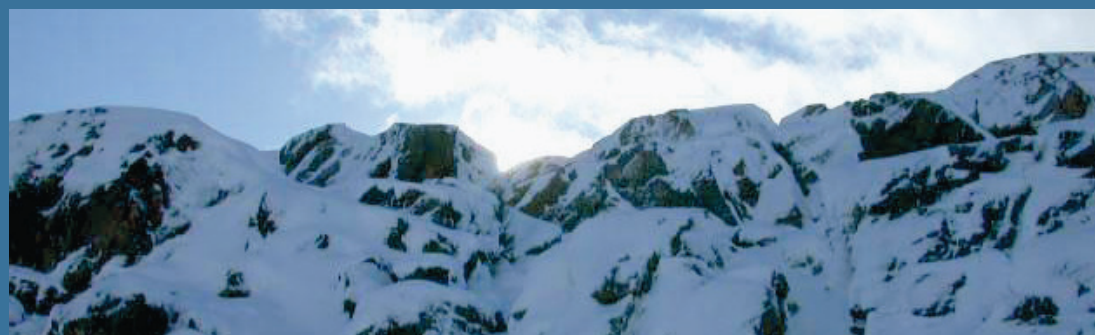




UNIKKAAQATIGIIT:
PUTTING THE HUMAN
FACE ON CLIMATE CHANGE



PERSPECTIVES FROM
NUNAVUT COMMUNITIES





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1.0 SUMMARY

During 2004-2005, workshops were carried out in three Nunavut communities to collect observations on climate change. These communities were Arctic Bay, Kugaaruk and Repulse Bay. Each workshop brought together representatives from the communities to discuss, through a series of guided discussions, the changes that the people of Nunavut are seeing in their environment, the impacts or effects these changes are having and how they have already started to adapt or how they can best respond or adapt to them in the future.

As part of a larger project, workshops were similarly held in the Inuvialuit Settlement Region, Labrador and Nunavik. A key goal of these workshops was to build local capacity to implement and carry out future environmental change workshops and research in communities in the region. In fact, in line with this goal, capacity building was successfully accomplished within the Inuvialuit portion of this project, as regional representatives there assumed greater responsibility throughout the successive workshops and in the end, were responsible for leading and facilitating the two latter community workshops themselves.

By summarizing the main concerns of three Nunavut communities, this report shows that:

- In these three communities, the heat from the sun is warmer than it used to be and in general temperatures are tending to fluctuate more in all communities.
 - The appearance of the sky over Nunavut has changed. The sky appears whiter, hazier and less blue, even on clear days today. In addition, there have been specific observations that stars, the sun and the moon have shifted location in the sky.
 - The ice has become thinner across the region of Nunavut and residents in all three communities have noticed that the ice break-up in the spring is earlier and occurring faster. This has made travel in the spring more difficult to plan for.
- All communities indicated that glaciers that used to remain throughout the year now melt more often during the summer. Despite this change, residents in Repulse Bay and Kuggaruk still reported that glaciers and “old ice” are still used as sources for drinking water.
 - Residents from all communities indicated that they are observing an increase in the number of abnormalities in caribou meat. In both Repulse Bay and Kugaaruk, residents also indicated that caribou are thinner than they used to be.

The community workshop reports show what the people of Nunavut require in order to develop further adaptation measures and to minimize the effects of climate change. These include such things as:

- Changing certain ways of doing things to adapt to changes in the environment. For example, residents in Repulse Bay are setting nets in different locations to avoid the increase in sediments that have occurred in certain parts of lakes. People in this community have similarly adapted to the increase in floating seaweed causing damage to boat engines by simply avoiding areas of water where seaweed is more present.
- Changing the times and manner of hunting because of changes observed in weather or wildlife. To accommodate for changes in the location and migration of certain animals, residents are hunting certain animals earlier in the season and have begun sharing country food between communities.
- An increase in the number of abnormalities in caribou meat has meant that people have to be more careful about the meat they are consuming and more meat is now being discarded because of changes observed in meat.
- Bringing ample supplies and equipment when traveling out on the land to ensure that people are safe if weather happens to force people to be stranded on the land.



- Faster boats and new equipment are needed in some cases, because of changes in harvesting practices as well as with the unpredictability of weather and high winds.

Throughout these workshops, a number of recommendations, requests for more resources, 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 Nunavut communities would like to respond to the challenges posed by climate and other forms of environmental change.

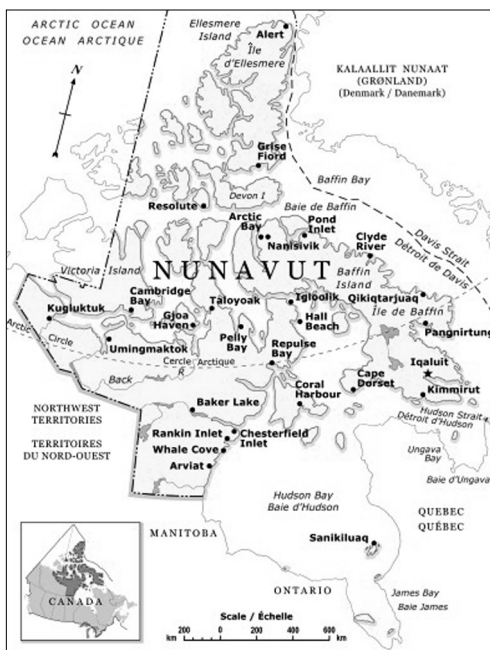
This report shows the importance and need of examining this issue from both the point of

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 Nunavut 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.

2.0 ACKNOWLEDGEMENTS

First and most importantly, the workshop team would like to thank all of the workshop participants for their involvement and for sharing their knowledge on climate and environmental changes. A full list of participants, organized by community, is provided on p. 23. Acknowledgement also goes to the three communities, Arctic Bay, Kugaaruk and Repulse Bay, for participating in the project and for providing space as well as resources for the workshops. We would like to thank these organizations for their interest and support in the workshop, the Hamlet Councils and HTO of Kugaaruk, Repulse Bay and Arctic Bay, Nunavut Tungavvik Inc. and the Nunavut Research Institute as well as the Naujat Hotel in Repulse Bay and the church in Kugaaruk for providing facilities for our meetings. Special thanks go to Lucy Immingark, Elizabeth Mapsalak, for all their work in the organization and planning of the workshops. We would also like to thank Christopher Amautinuvar, Hugh Haqqi, John Ningark, Nick Amautinuvar and Mishak Allurut for their hard work in serving as interpreters/translators for the discussions. Finally, we acknowledge those that provided the financial support for this workshop, they include Inuit Tapiriit Kanatami, and Environment Canada through the Northern Ecosystem Initiative Program. Their financial support and interest in this work is greatly appreciated.

 **Figure 1. Map of Nunavut**





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 Nunavut, Canada, an area that is comprised of 28 Inuit communities and one that covers 1,994,000 square kilometers that extends north and west from the Hudson's Bay to the North Pole, 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 Nunavut communities during the period of 2004-2005. 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.

4.0 METHODS

4.1 Pre-Workshop Methods

For all community workshops, standard methods were adopted and used. The workshop team included representatives from NRI, NTI, the Ajunnginiq Centre at NAHO, CINE at McGill University, Nasivvik Centre at Université Laval and ITK. The workshop followed similar methods as those used in workshops used to elicit this type of information on the same subject in the Inuvialuit Settlement Region and Labrador 2002-2003. Through discussion with the local research assistants, some small adaptations were made to this process and the team adapted this process further in response to the interests of the participants at the meeting.

These exercises drew from participatory analysis and planning techniques including Participatory Rural Appraisal (PRA)¹ and Objectives Oriented Project Planning (ZOPP)². ZOPP and PRA encourage participation by everyone at a workshop, allowing a community to identify and analyze its own issues.

¹Robert 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.

²The 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)



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. 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 utilized the same guidelines as those prepared and used for the ISR, Labrador and Nunavik community workshops, they are:

1. Have fun! The experience of learning and sharing knowledge with each other will be insightful and enriching.
2. 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 in that 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.

4.2 During the Workshop

Each workshop began with an opening discussion on the intent of the workshop, the consent process, the workshop group's hopes for the results and the process to be followed. In each

workshop, the group reacted to this introduction by bringing forward questions and concerns about the workshop process. At this time, participants also began by asking a number of questions to the workshop team about things they were observing in the environment and about potential causes behind these changes.

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 etc. 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. "What do these changes mean to you?" 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 par-



ticipants 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 Nunavut 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 Nunavut communities (Sections 5.1 and 5.3). These are observations that indicate high priority concerns for all Nunavut residents, and should command significant future attention from scientific and governmental bodies.
- 2) Highlight and discuss observations that are unique to each Nunavut community. 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 Nunavut.

It is important to note that this report depicts only a synopsis of the observations discussed throughout the Nunavut 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 Nunavut. Due to the participation of the Nunavut residents in the community workshops, the detailed documentation of each community's observations, based on 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 Nunavut 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 2 of the 3 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 Nunavut are actual results of global warming, but even without scientific corroboration of their direct link to climate change, these observations are 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 Nunavut 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 Nunavut (Figure 2). 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 Nunavut, their effects can be very different given the economies, priorities, and values of each individual community. Whenever



 **Figure 2. Summary of Shared Concerns**

All Nunavut communities reported the following environmental changes taking place in their area:	
Changes to Weather	<ul style="list-style-type: none"> • Weather is less predictable. • Fluctuations in temperature. • Heat from the sun is more intense today. • Inconsistent statements on seasonal temperatures. • Staying warmer longer into the fall. • More rain. • Changes in wind. <ul style="list-style-type: none"> — Warm breeze in summer. — Prevailing wind has shifted. — Stronger winds.
Changes to Landscape	<ul style="list-style-type: none"> • Thinner ice. • Spring thaw happens faster and occurs earlier. • Ice freeze-ups occur later. • Changes in the appearance of seal holes. • Glaciers that used to be around all summer melt now. • Lower water levels.
Changes to Land and Vegetation	<ul style="list-style-type: none"> • Land is changing (drier, eroding, rougher and rising). • Plants are less healthy, Fewer blueberries.
Changes to Fauna	<ul style="list-style-type: none"> • Caribou are less healthy. • More polar bears.
Changes to Insects	<ul style="list-style-type: none"> • Many new species.
Increased Stress and Awareness	<ul style="list-style-type: none"> • Unpredictable weather and travel conditions. • Concern about pollution levels/ contaminants. • Abnormalities in wildlife.

possible, attention is paid to the different effects and adaptations that each community expressed during their workshop.

Changes to Weather:

In general, weather has become very unpredictable in all of the Nunavut communities. There was concern expressed in each of the communities that elders are beginning to lose confidence in their abilities to predict weather and are becoming reluctant to provide weather predictions.

Participants from all communities made the observation that temperatures are tending to fluctuate more. In Kugaaruk these temperature fluctuations were said to be unusual and were

noticed to be occurring from one day to the next. Bigger fluctuations in temperature are occurring during the spring thaw in Repulse Bay. As is the case in Kugaaruk, these temperature fluctuations occur day-to-day and as one resident noted, temperature fluctuations also occur within the same day over a few hours time. Arctic Bay residents have noticed that when the sun sets, the temperature difference between the day and evening seems greater than it used to. In this community, it feels much colder than it used to when the sun has set.

Residents from all three communities have observed that the heat from the sun is warmer than it used to be. In Arctic Bay, it was noted especially that the mid-day sun is intense. The sun can be very hot in Kugaaruk. Residents



related the observation of heat from the sun to what they have heard about the hole in the ozone layer and global warming. Repulse Bay residents have also noticed that sunshine is more intense today and there are times when it gets very hot.

In all three communities observations made regarding seasonal temperature seemed to be quite inconsistent. This inconsistency was noticed both between communities (there were very few patterns related to temperature identified across the communities) and also within communities (residents within one community seemed to have differing opinions concerning changes noticed in the temperature by season). As noted above, there were a considerable number of residents in all three communities who have observed large and rapid fluctuations in temperature. It is possible that these fluctuations in temperature within seasons (and as noted above, sometimes even day-to-day or even within the same day) are having an impact on the overall consensus of temperature trends by season.

In Repulse Bay, it was observed that temperatures in summer have been warmer, and warm temperatures have also been occurring in winter, although one resident reported that temperatures have seemed colder in 2005. Warmer temperatures in winter were exhibited by an example from one resident who reported that a thermometer in the community has to be brought inside if the temperature goes below -37 degrees otherwise the mercury inside the thermometer will break. This workshop participant has observed that he only had to bring the thermometer inside twice in 2004 whereas in previous years he has had to bring it in many more times to prevent the mercury from breaking.

Many residents from Kugaaruk reported that winters have become colder while one resident felt that winters are not as cold. In addition, some residents expressed how spring and summer temperatures have been noticeably colder over the last few years. Residents also feel that there has been a change in the relation

of feeling cold to getting frostbite. In the past, you would feel cold and then become frost-bitten. Today, it is different. Without feeling that same cold, you still become frostbitten. In addition, it has been noted that in the past, warm outside temperatures used to have no impact on people's breathing. Now in early summer when temperatures are hot, some people have reported an increase in the amount of breathing problems.

In Arctic Bay, some residents feel that the weather is getting warmer while others feel that temperatures are colder. Some observed that it is colder in the spring and summer today while other residents felt that it is warmer in the spring today. It was consistently observed in this community that temperatures in the fall have become warmer and it is taking longer into the fall to become very cold.

While most observations of temperature by season were inconsistent within and between communities from this region, there was one consistent observation between Kugaaruk and Arctic Bay. Residents from these two communities have noticed that it is taking longer into the fall to get cold than it did in the past.

Heavier rains have been observed in Repulse Bay. Residents reported that in the past they would only see fog and light rain but since the early 1990s, the rains have become really heavy. Heavier rainfalls occur so commonly now that residents have begun expecting this. Though heavier rains weren't observed in the other two communities, Arctic Bay residents have observed more rainfall in their community. Because of the increase in rainfall, landslides have been seen in Arctic Bay in recent years.

Winds have changed quite dramatically in the different communities. In Arctic Bay, the prevailing wind has shifted from south and west to more due west. There is a strong west wind now as well as a new north wind in this community. Kugaaruk residents have also seen the prevailing wind change in their community. The prevailing wind used to come from the



west and now it's hard to tell which direction the wind comes from.

Residents from Arctic Bay have reported that they are experiencing new warm winds when they spend time on the land that they never used to experience in the past. Kugaaruk residents have also reported warmer breezes in summertime.

Winds are stronger today in Repulse Bay than they were in the past and they are also occurring more often. Similarly, in Arctic Bay, summers have become windier, with more windy days occurring more often today. In this community, it was stated that winds used to calm down before changing direction, now they continue to blow while switching direction.

Changes in the Sky:

All communities have noticed changes in the sky. Although these observations were sometimes unique, it is important to look at them together as they are similar in nature and point to the fact that the sky as a whole over Nunavut is changing quite considerably.

In all three communities the appearance of the sky itself has changed. It was stated that the sky over Repulse Bay used to appear to be like a picture, quite beautiful and very clear blue. Today, the sky looks whiter, especially in the area around the sun. Arctic Bay residents have also noticed a whiter tinge to the sky. As was stated in Arctic Bay, when it is clear and there are no clouds out, the sky used to be clear blue. Now it appears to be hazy and whitish. Similarly in Kugaaruk, it was mentioned that the sky's appearance used to be clearer and a brighter blue. Now it appears to be "dirty".

The movement path of the sun in the sky over Arctic Bay has shifted. In March, the sun used to come up east of King George Mountain and set towards the northwest. Now it appears to set further to the north. This has made the sky in March appear as it used to in April to the residents of Arctic Bay. The sun's location is also higher in the sky in this community. This

is the case in Kugaaruk as well. The sun is said to travel much higher in the sky than it used to in Kugaaruk and the sun on the horizon used to appear lower during spring than it does today. In addition, it was mentioned in Kugaaruk that the sun goes down faster in the evening than it used to in the past.

Stars have shifted location in the sky over both Kugaaruk and Arctic Bay. In fact, in Kugaaruk it was mentioned that even the moon seems to be higher in the sky than it used to be in the past. Similarly in Repulse Bay, the position of the moon was said to have shifted. In this community, the moon used to rise low and go down towards evening time. Today the moon sits very high in the sky.

Changes to Landscape:

All three communities of Nunavut noted that ice has become thinner across the region. Arctic Bay residents noted specifically that sea ice has become thinner and it has changed within the last 5 years or so. In Kugaaruk, it was observed that both freshwater and ocean ice have become thinner year round. During spring in Kugaaruk, ice used to be at a thickness of 5 or 6 feet thickness. A year ago, in 2004, the thickness of ice was only around 3 feet deep. Starting in the late 1990s in Repulse Bay, residents have noticed that sea ice has become thinner. In the 1980s in this community, ice used to be much thicker. It was also mentioned in Repulse Bay that along with the change in thickness of ice is a change in the quality. Ice used to be thicker and rough, it has become thinner and smoother.

The three communities have all observed that the ice break-up in the spring now occurs earlier and tends to happen faster. In Arctic Bay, it was noted that spring ice is softer, slushier on top and melting faster now from below. In this community, one of the rivers used to have ice remaining on it through May and June, now there is none. Ice on the beach in Arctic Bay used to take weeks to melt and now it takes only days. In Kugaaruk, spring break-up occurs earlier, faster and all at once today. In Repulse



Bay where residents have noticed snow and ice melting earlier and occurring faster, travel used to be possible in early June. In 2004, however, it was impossible to travel to Kugaaruk from Repulse Bay during the first week of June because everything had melted at that time.

Both Arctic Bay and Kugaaruk residents have noticed that along with earlier ice break-ups, ice freeze-ups are now occurring later. In Kugaaruk freeze-ups are also taking much longer in recent years. In both communities it was reported that in the past freeze-ups used to occur in early October. Today, freeze-ups happen much later, in November now. Residents from Arctic Bay did also note that it is taking longer into the fall to get cold than it did in the past and that these warmer temperatures at this time of the year are causing the later freeze-up times.

Noting the changes to ice in their communities, residents from both Arctic Bay and Kugaaruk also mentioned the changes they have observed in the appearance of seal holes on the ice. In Arctic Bay, seal holes used to appear clean and smooth along the edges. Today, the edges of seal holes appear bumpier. Kugaaruk residents have similarly noted changes in the appearance of seal holes. They are much bigger today and are out of shape or formation.

All communities noted that certain glaciers that used to remain all year now melt more often during the summertime. Arctic Bay residents reported that there are no more permanent snowfields and glaciers in areas where they used to be. Similarly, Repulse Bay residents noted a decrease in the number of glaciers that remain year-round. Residents from this community have also observed a decrease in the size of icebergs and have reported that icebergs are seen closer to shore now. In Kugaaruk, glaciers that used to remain throughout the summer are not seen as often anymore. It was stated in this community, however, that some areas of ice do still remain all year. In particular it was noted that ice that sits around the river remains year-round and is, in fact, actually bigger than it used to be.

Despite the changes observed with “old ice” in the form of glaciers and icebergs, residents from both Repulse Bay and Kugaaruk reported that this ice is still used for drinking water. Even though the icebergs are smaller and glaciers are seen less frequently, they do still exist and people do still go out and collect ice for water.

Lower water levels have been observed both in Kugaaruk and Repulse Bay. Evidence of lower water levels in Kugaaruk is provided by the increased visibility of the shoreline. In addition, certain lakes and ponds have dried up and people have reported seeing the dry bottom of lakes. Lower water levels have also been observed in rivers and the ocean near this community. Shallow water levels in Repulse Bay have meant that some creeks and rivers are drying up altogether. The sea level is also lower close to Repulse Bay. These lower water levels in this community have made traveling by boat much more difficult. In particular, a parking/docking area was discussed in detail in this community. The water level in the parking area for boats used to be deep. Now that waters are shallow, and winds have become stronger, more boats and motors are being damaged at the harbour.

Changes to Land and Vegetation:

The land is said to be changing in all three of the communities of Nunavut. In Arctic Bay, the land was described as being warmer and it was mentioned that landslides have occurred for the first time recently. Similarly, mudslides have occurred in certain areas of Kugaaruk. In addition, Kugaaruk residents have noticed that a certain area of land near Kalit River has begun eroding and residents also reported that the land in their area has become rougher. Dry land conditions have been observed in Repulse Bay and in certain areas by the seashore, the land looks as if it is rising.

Both Arctic Bay and Repulse Bay residents have observed that there are fewer berries growing near their communities today. Repulse Bay residents have noticed this trend in both blueberries and blackberries while Arctic Bay residents have only noticed this with blueberries.



Blackberries that are growing in Arctic Bay are new to the area. Arctic Bay residents indicated that berries are much drier today. Repulse Bay residents reported that blueberries are bigger than they used to be and that along with fewer berries growing inland, there is also less vegetation in general growing inland near this community. Both communities, along with Kugaaruk have also found that certain plants that used to grow, now no longer do. Concern was expressed in Kugaaruk about the health of plants today. Plants used to be healthier near this community. Kugaaruk residents are finding that plants don't bloom as well as they used to and they have noticed that vegetation is drying up and dying more often today.

Changes to Fauna:

Most comments regarding land animals in the three Nunavut communities centered on the changes observed with caribou. In Arctic Bay, the fur of caribou is thinner and residents have noticed that caribou now tend to have larger joints and testicles. Residents from Kugaaruk and Repulse Bay have also noticed many changes with caribou and both communities stated in general that caribou are not as healthy today as they used to be. There was one case highlighted in Kugaaruk where two caribou were so sick that they were deemed inedible. It is now common to see caribou that have white spots on the meat or abnormal fluids within the meat. In Repulse Bay, residents have also noticed these white spots in caribou meat. In the past these abnormalities were not seen in caribou. Some residents from Repulse Bay attributed white spots to the presence of parasites in the caribou. Kugaaruk residents also mentioned that some caribou are infected with a type of parasite. In addition, there was discussion in both Repulse Bay and Kugaaruk that caribou have become skinnier. One resident from Repulse Bay mentioned how some caribou seem to have hardly any fat left on them. Some Repulse Bay residents mentioned, however, that this is merely something that varies year to year. Residents in Nunavut have also found that the behaviour of caribou has changed. Caribou are now no longer as close to the community of Arctic Bay as they used to be.

In Repulse Bay, residents have noticed that caribou come right into the community. But residents from this community are also finding that caribou are migrating elsewhere. In addition, Repulse Bay residents have noticed that the eating behaviour of caribou has changed. Caribou are not only eating moss. They eat anything that they can find now.

Residents from Arctic Bay and Repulse Bay have noticed that there are more polar bears around their communities. Repulse Bay residents have found that polar bears are more numerous during summertime along the floe edge. In Arctic Bay, the increased number of polar bears is attributed to the fact that fewer dogs are used for hunting.

Changes to Insects:

New insects have been observed in both Repulse Bay and Kugaaruk. In particular in Repulse Bay, worms in the water, black flies and horse flies are new to this community. Repulse Bay residents felt that new insects may be coming into the community from sea-lift barges or crates from down south. They also mentioned the incidence of a forest fire in Northern Manitoba as linked to the increase in observations of certain types of insects. In Kugaaruk, a different environment in the spring was offered as one of the reasons behind the presence of new insects in this community. Along with the fact that new insects are being seen, those that were commonly observed in Kugaaruk are now seen less often. A specific kind of ant that was seen in Kugaaruk in the past is now not seen anymore. The same is true of lice and water lice. They are no longer seen in Kugaaruk, though were often seen in the past.

Increased Stress and Awareness:

It was apparent that many workshop participants feel increased levels of stress regarding the impacts that climate and environmental changes are having both on wildlife in the Arctic and on the lifestyle of Inuit. Comparing the present situation in the climate, with that in the past, there were many who noted that



changes in the environment and weather have become noticeable in their lifetimes.

Many expressed concern about how the weather and climate have become completely unpredictable. Unpredictable weather conditions mean people are less confident about being able to read the weather. Elders no longer feel comfortable providing predictions because they don't want to mislead others about the weather. Planning for travel on the land and sea has become more difficult because of increased variability in weather conditions. Faster spring thaws, thinner ice conditions as well as sudden and unexpected changes in weather all contribute to the high level of uncertainty people have when traveling. Kugaaruk residents mentioned how spring travel sometimes has to be cut short when dangerous conditions are encountered. In Repulse Bay, certain travel routes are no longer accessible due to changes in snow and ice conditions. In this community, the number of long distance trips has decreased significantly because fewer people are willing to travel over long distances when conditions are so unpredictable. In particular it was mentioned that long distance travel in May is no longer advisable (between Kugaaruk and Gjoa Haven) because the initial spring thaw no longer refreezes for a period. In Arctic Bay, residents expressed concern that weather conditions have made travel more dangerous. In this community, people have lost boats and equipment due to quickly shifting winds. More people are getting stranded out on the land during travel in Arctic Bay. Lower levels of snow have limited travel in Arctic Bay which has meant that people are relying more on stores for food today and they have been eating less country food.

Increasing levels of environmental pollution and contaminants have disconcerted many Nunavut residents. Kugaaruk residents pointed out how the Arctic ecosystem is not isolated but rather, influenced by the global climate and changes in other parts of the world. They have observed that the negative impacts in the weather and environment, such as natural disasters, have been seen world-wide. Similarly, in Repulse Bay, it was mentioned that effects from pollution

in other locations in the world have been seen locally. Questions were raised as to what specifically is causing environmental changes in the Arctic and what the main contributors to this change are. Kugaaruk residents discussed how pollution is caused by man-made objects. Some from Repulse Bay thought that oil and fuel consumption in the south was one of the contributors. It was stated that pollution particles travel in the air globally and end up in Arctic food. Smoke from an oil burning event that took place overseas has been observed in the community of Repulse Bay. Concern was expressed that this smoke has contributed to sickness in both people and wildlife in this community.

Concerns were expressed about the increase in the number of observations of abnormalities in wildlife, changes observed in migration and harvesting practices of wildlife and subsequent impacts on human health. One example of an abnormality in fish and a subsequent health impact on humans was raised in Repulse Bay. It was stated that fish now taste different, and that a whole family recently experienced allergic reactions when having eaten certain fish. Kugaaruk residents also discussed how fish are impacted by environmental pollution as well as observing that vegetation growth has been impacted by increased smog and pollution levels. In Arctic Bay, residents discussed how certain marine mammals and fish that have been found with abnormalities are no longer edible. In addition in this community, there has been a decrease in the amount of caribou being consumed, as caribou migration patterns have changed. It takes longer to hunt caribou and fewer caribou are harvested in this community. Both Kugaaruk and Repulse Bay residents have observed an increase in the amount of abnormalities found in caribou near their communities. Caribou are less healthy in general, are skinnier, have been observed to be infected with a parasite and white spots within the meat have been observed.

Discussions around pollution levels in Kugaaruk and impacts of this pollution on fish also included concern about changes in the clarity of freshwater rivers and lakes. Freshwater levels are



lower both in Kugaaruk and Repulse Bay. Lower water levels in Kugaaruk have meant that water is murkier and fish populations that come from murky lakes or rivers have been found to be whiter. It was mentioned that the dust in water is only noticed when drinking or making tea. Water used to make tea is now dark. It used to be clearer. In Repulse Bay, concern was expressed that lower sea-water levels coupled with stronger winds have contributed to damage of boats and motors at the harbor.

Residents in Nunavut would like to better understand the issues, such as pollution and global warming that are affecting and causing changes in the Arctic climate and environment. In Kugaaruk, residents were very keen to learn more about these concepts, particularly how global warming contributes to the changes they are experiencing. Questions arose in this community about how the earth is warming up and if the warming is occurring from below, within the core of the earth or from the sky.

5.2 Community-Specific Concerns

Despite numerous overlapping observations and concerns in the Nunavut 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 Nunavut. The following are some of the environmental observations that are unique to each Nunavut community (Figure 3).

Arctic Bay

Annual cycle of the sun:

The annual cycle of the sun has shifted. It feels warmer earlier in the year, at the end of February instead of towards the end of March. The darkness in the wintertime seems darker to residents than it was in the past and the first day of light after the winter darkness is now occurring earlier in February (February 3rd



Figure 3. Summary of Community-Specific Concerns

A summary of environmental concerns unique to each Nunavut community	
Arctic Bay	<ul style="list-style-type: none"> • Annual cycle of the sun. • New areas of open water. • General changes in characteristics of ice. • Specific changes in saltwater and saltwater ice. • Less snow. • Water/tide seems to be higher. • Changes in marine mammals and fish. • Thinner fur.
Kugaaruk	<ul style="list-style-type: none"> • Unusual colours on ice, water and snow. • Changes in characteristics of water and open water areas. • Darker ice. • Changes to permafrost. • More snow; Earlier snowfall; Less glare, Melting overnight. • Earth is tilting
Repulse Bay	<ul style="list-style-type: none"> • Floe edge is closer. • Characteristics of snow have changed. • Stronger winds. • More sediment in lakes. • Changes noticed with seaweed. • Increase in algae and vegetation growth in water. • Increased intensity of UV rays.



instead of February 7th). Residents know this because there is an annual community competition to guess the first day of light in the season.

New areas of open water:

There are three new areas of open water near this community in Admiralty Inlet, off of Victor Point.

General changes in characteristics of ice:

The colour of ice has changed. It is now common to see very white ice today. In addition, it is less common to see plankton sticking to the underside of ice.

Specific changes in saltwater and saltwater ice:

It was also stated that the structure and characteristics of saltwater ice have changed. It is becoming more like freshwater ice as it is not as salty today. In addition, the puddles that occur on sea ice used to be freshwater puddles, now they are salty. Saltwater has become warmer and is not seen moving within the currents on the surface of water. Instead, saltwater is reported to flow deeper in the water column.

Less snow:

There is less snow in Arctic Bay. Snowfall comes later in the year than it used to and there is less snow on the ground. The wind plays a role in the fact that there is less snow on the ground as it blows the snow away. There used to be very deep snow in this community but this has changed since the late 90s. Specifically, it was mentioned that there is less snow on the ground in May and June which makes travel on the land more difficult at this time of the year.

Water/tide seems to be higher:

In Arctic Bay, in contrast to the other two communities, the water/tide level seems to be getting higher. Residents from this community noted that levels are so high they have passed the high water mark.

Changes in marine mammals and fish:

Concern was expressed regarding the fact that since 1980, more seals that have bad

livers have been found near this community. Residents worried that perhaps climate change or pollution was affecting seals in this manner. Abnormalities have also been found in the livers of sea-run char. They are found to have white spots more commonly today.

In addition, changes were observed regarding the location of certain marine mammals near this community. Changes in the locations of narwhals and harp seals were noted by Arctic Bay residents. The new north wind blows the ice out of the bay and narwhals are no longer stranded as they used to be. An increase in boat traffic in the bay has also affected the location of narwhals. Killer whales have changed their hunting behaviour somewhat, now hunting narwhals when they used to hunt seals.

Thinner fur:

As with caribou near this community, it has been observed that the fur of wolves and foxes has become thinner.

Kugaaruk

Unusual colours on ice, water and snow:

In Kugaaruk, unnatural colours have been noticed on the surface of ice, water and snow. Confusion was expressed as to reasons behind this occurrence. Specific reports include, snow tinted red during spring and summer, tinted seal holes, yellow and black spots on lakes as well as observations of the surface of ice appearing like oil/slick.

Changes in characteristics of water and open water areas:

Kugaaruk residents have noted a number of changes to freshwater in the area around this community, along with the already reported observation that water levels have lowered. The temperature of water is warmer and the clarity of water has changed. Noting the changes in clarity of water, one participant attributed the now darker color to an increase in dust in the water. In addition, it was mentioned that open water areas that used to close up around December, now remain open for much longer.



Darker ice:

In this community it has been noticed that thin sea ice is now darker in color though it used to be crystal white.

Changes to permafrost:

Specific observations were made regarding permafrost in this community. It was observed that the active layer of permafrost is deeper and permafrost is visible in certain areas today. Changes to permafrost were also linked to the observation that the ground is dropping near this community, which was attributed to a melting from beneath. In addition, one observation was recounted that beneath a certain area of permafrost, it was not frozen at all and there was steam rising from the ground.

More snow; Earlier snowfall; Less glare;

Melting overnight:

Changes observed with snow in Kugaaruk are that in 2005 there was more snow than usual. In addition, snowfall now occurs before ice freeze-up as ice freeze-up is occurring later into the fall and snow is arriving earlier. It was also observed that snow used to be brighter, cleaner and as a result people would experience more glare from the snow. One more change observed with snow was specifically attributed to warmer temperatures. During spring, travel was possible at midnight because the snow was still hard. Now as the temperature has changed, snow is still soft at midnight and travel at this time is impossible due to these bad snow conditions and low visibility.

Earth is tilting:

Kugaaruk residents believe that the earth is tilting. They have noticed that the surface of the earth is changing and water levels have also changed and wonder if perhaps these changes might be linked to the observation that the earth is tilting.

Repulse Bay

Floe edge is closer:

It was observed in this community that the floe edge used to be a lot further away. Now it is a lot closer to the community.

Characteristics of snow have changed:

The snow was described as being different today. It is harder now. It was also mentioned that snow is melting earlier in springtime and is melting quicker.

Stronger winds:

Stronger winds now occur in this community and winds are occurring more often. Winds have become so strong that some residents have discussed the potential need for houses to be chained to the ground. It was mentioned that it is especially in early fall, during ice freeze-up when winds have become particularly strong.

More sediment in lakes:

Along with changes observed in water levels near this community and changes in vegetation growth in lakes, residents from Repulse Bay have also noticed that there is an increase in sediments in lakes.

Changes noticed with seaweed:

Many changes were noticed regarding seaweed near this community. The number of seaweed plants has increased and seaweed has been observed to be growing longer. In addition, it was observed that seaweed is floating more often today. All of the changes observed with seaweed have contributed to travel difficulties by boat.

Increase in algae and vegetation growth in water:

In Repulse Bay, it has been observed that algae growth has accelerated within the last 10 years. More plants growing underneath sea ice were also noticed in this community.

Increase intensity of UV rays:

Increased temperatures in summer and the increased intensity of UV rays from the sun are factors causing increased stress about climate and environmental change. Repulse Bay residents discussed this concern at length. It was stated that sunburns that occur are much more extreme today while in the past it was difficult even to get a tan when in the sun. Sunburns are said to be dangerous today, and more people visit the health centre in this community to



seek treatment for sunburns, and cracked lips due to sun exposure. Children need to be better protected now when in the heat and the sun. Concern was also expressed because people realize that UV rays from the sun have been linked to increasing rates of cancer.

5.3 New and Unusual Bird Life

New bird species and decreases in some bird species commonly seen were reported in all the Nunavut communities. In Arctic Bay, certain bird species are seen at different times of the year than normal now. Repulse Bay residents mentioned that they have observed certain bird species that are normally seen further south. In Kugaaruk, it was noticed that small birds, little shore birds and little songbirds that used to be around now no longer are.

Changes have been observed with certain bird species in the communities that were specifically attributed as **indicative of weather changes**. All three communities discussed behavioural changes of certain birds in relation to greater weather and environmental change. In all three communities, bird migrations have been altered. In Arctic Bay, for example, residents felt that changes in wind may be affecting bird migrations and causing birds to migrate to places they don't normally go. Repulse Bay residents discussed a specific event during the fall where certain birds were still seen in the community well past the time when they normally would have migrated south. Residents felt that these birds may have been confused by changes in the environment which caused their late migration and were concerned that some of the birds may have froze in the community because they had waited too long to migrate south. In Kugaaruk, residents felt that environmental change is a direct reason behind the decrease in numbers of small birds seen. Residents from this community also recounted an event where a bird had laid an egg under a Honda ATV vehicle. In this case this particular type of bird was not normally observed in Kugaaruk. Residents surmised that the behaviour of the bird may be different because it is not from Kugaaruk and not used to that environment.

Residents in Kugaaruk and Repulse Bay also reported observations of substantially **higher numbers of geese** visiting these areas while Arctic Bay residents have observed that geese are nesting earlier than before. In this community, this has meant subsequent changes in egg harvesting practices. Residents need to go out earlier to get eggs from nests before embryos begin forming.

The following table (Figure 4) highlights some new species of birds, some changes in behaviour, some species that have dropped or risen in number and some species that have disappeared altogether.

6.0 GOING FORWARD

6.1 Community Adaptations

As the Arctic environment is changing, communities and individuals are finding that certain behaviours and measures need to be adopted so that different aspects of climate and environmental change can be adapted to. In all three communities of Nunavut where workshops were held, residents are finding ways to adapt to certain aspects of environmental change.

In Repulse Bay, where the quality of freshwater bodies has been impacted by increased sedimentation and an increase in seaweed, residents indicated that they are adapting to these changes by avoiding areas where changes have occurred. In the case of increased sedimentation in lakes affecting where nets can be set, residents are setting their nets elsewhere. Increased growth of seaweed and an increased amount of floating seaweed have made landing a boat more difficult on the shore. Residents are adapting by trying to avoid seaweed and detouring around areas with large amounts of seaweed to prevent the damage of engines when boating.

As travel has become more dangerous due to the unpredictable nature of weather and environmental change in the Arctic, many are adopting adaptation measures in the face of dangerous travel conditions. Kugaaruk residents are finding that they have to return home early



Figure 4. Bird Species Observed in the Nunavut Area

	Kugaaruk	Repulse Bay	Arctic Bay
Snow Geese	More	More	Nesting Earlier
Canada Geese	More	More	Nesting Earlier
Ravens	More in Winter		
Swans	More		
Ptarmigans	Fewer		
Arctic Terns	Fewer		Gone
Arctic Jaegers	Fewer		
Sparrows		More	
Seagulls			New
Ivory Gulls			Change in Feeding Area
Swallows		New	
Small blackbirds			New
Small birds	Fewer		
Waterfowl (Ducks)	Fewer	More	
Shorebirds	Gone		
Songbirds	Gone		

in spring when travel is particularly dangerous. In addition, residents from this community tend to adjust travel routes depending on where safe terrain is. Travel on rough terrain is avoided, as is the setting up of camps in unsafe areas. Because certain areas on the land are safe for long periods of time and others are not, some people are finding that they need to search for safer camp locations. Camping out on the land was also discussed in the community of Repulse Bay. When a sudden blizzard occurs in this community, residents tend to camp and wait out the blizzard before traveling home or further out on the land.

Changes in the time and manner of hunting are also adaptation strategies employed by many in the face of certain environmental

changes. In general, in Arctic Bay, it was stated that hunting seasons and times have needed to be adjusted in response to the increasingly unpredictable nature of weather and temperatures. As a specific example, it was mentioned in this community that a certain amount of the narwhal quota number has been shifted from the spring to the summer hunt to adapt to worsening ice conditions in spring and more difficult conditions for a successful hunt. Arctic Bay residents also discussed how hunters are now more selective in choosing hunting locations because of increased winds creating difficulties out on the land. Repulse Bay residents are finding that hunting times have to be adjusted. In this community, because residents are finding that seals are less fatty and sink when shot, residents try to avoid



hunting seals when the seals are very thin and more likely to sink. More seals are harvested during times throughout the year when retrieval is easier. Also in this community, since smaller sized fish taste better, residents try to find smaller size fish when fishing as an adaptation to the general observed trend of increased fish size. In the community of Kugaaruk, residents are adjusting hunting and fishing seasons in a way to maximize their efforts. When the ice is thin and travel by sea is impossible, residents travel on the land. Similarly when ice is dangerous to travel on, residents from this community go out fishing instead of out seal-hunting to take advantage of safe conditions on the land.

Adaptations have also needed to be made when faced with observed changes in migration patterns and characteristics of wildlife brought on by wider environmental change. All communities have been finding an increase in the number of abnormalities and unhealthy characteristics in animals, in particular in caribou throughout the region. Adapting to this change, residents from both Arctic Bay and Kugaaruk have found that they have to be more selective of the meat they are consuming. In addition, because of the amount of changes they are seeing in animals, residents have to choose not to consume and discard more animals than they had to in the past. Arctic Bay residents have also begun exchanging country food with other communities to ensure that food is available at times of the year when country food in Arctic Bay is scarce. Residents from this community are also finding that they need to adapt egg harvesting practices to better synchronize with the geese migration that is occurring earlier in this community. Egg harvesting has to occur earlier, to ensure that eggs are harvested before embryos start developing.

6.2 Resources and Equipment

When traveling out on the land as the weather has become more unpredictable, residents are finding they need to take precautionary measures to ensure safe travel. As was stated in Repulse Bay, residents are ensuring that they

bring ample supplies and equipment with them in case unpredictable weather necessitates being stranded on the land. It was mentioned specifically in this community that residents are ensuring to bring warm clothing, extra lighters and matches, a first-aid kit and a Coleman stove so that hot food and beverages can be made.

Environmental change has also meant that differences in travel equipment are required. Residents in Arctic Bay noted that changes in snowfall and snow conditions mean that four-wheelers are being used more now and subsequently more ATVs are being purchased. Similarly, igloos are much harder to build because of decreases in snow, which has meant that tents are used more for shelter now. In Repulse Bay, since spring travel has become almost impossible, residents have discussed how it would be nice to have flights scheduled directly between communities (i.e. Gjoa Haven – Repulse Bay – Kugaaruk). In addition, with the sun's increased intensity and the wind's increased strength resulting in higher incidences of wind and sun burns in this community, residents are building boxes onto kamotiks to protect children from sun and wind exposure.

Faster boats are necessary in Repulse Bay and Arctic Bay to help in the face of changes brought on through environmental change. Repulse Bay residents discussed the need for faster boats because of changes in both seal and beluga hunting practices. Since belugas have become more elusive in this community, residents are finding that faster boats along with larger hunting parties are required to harvest beluga. As seals have become less fatty, residents are finding that they tend to sink more easily when shot before hunters are able to retrieve the animals. Faster boats are required to catch seals before they sink into the water. In Arctic Bay, higher and more frequent winds mean that periods of calmness on the water are shorter. Bigger and faster boats are needed to deal with these changes in winds. Cabins are also being used to help protect against higher wind conditions in this community.



Strong winds coupled with lower water levels in Repulse Bay have meant that there is more boat and harbour damage. Residents discussed how either an improvement to present docking facilities or movement of the docking facilities during low tide is needed to protect against this damage.

In Repulse Bay, snow-machines were mentioned as equipment used for adaptation to travel difficulties. Because long distances can be traveled in a short amount of time on snow-machines, there is less need for overnight travel when they are used. As the participant from Repulse Bay went on to state however, the use of snow-machines also means that people can get lost in a short amount of time. Thinner ice conditions have meant that skidoos cannot be used at certain times of the year now, because heavy skidoos can easily fall through thin ice. In Kugaaruk, residents mentioned how travel by dog team has a greater assurance of safety.

GPS receivers and satellite images are other types of equipment used to help navigate changes in ice conditions. As was stated in Arctic Bay, these technologies are used to detect moving ice at the floe edge. Similarly it was pointed out in Repulse Bay that these types of technology are useful tools for hunters in that they help reduce the need for search and rescue operations. As Repulse Bay residents went on to mention however, these technologies do not completely eliminate the risk associated with travel on the land. Residents from this community stressed that the use of traditional tools/skills can reduce hunters' vulnerabilities to sudden weather changes.

6.3 Communication and Information Dissemination

Increased communication is another way people in Nunavut are adapting to certain changes in environmental conditions. In Arctic Bay, hunters communicate amongst themselves to pass on information about weather and travel conditions on the land. In particular, residents mentioned

that exchange of information is useful to make travel safer at the floe edge. In this community, hunters are even communicating with hunters from nearby communities to find out about conditions that are occurring near these other areas (i.e. Pond Inlet and Igloolik). Residents from Repulse Bay also discussed how communication between communities is useful to find out about weather on the land and sea. In this case, residents specifically discussed how radio communications are used to help warn hunters about bad weather and communicate with other communities. Repulse Bay residents were quick to point out however that sometimes winds and weather change so suddenly that it's difficult to respond in time, even with the use of these communication technologies.

The need for increased communication and information dissemination were also discussed in the Kugaaruk workshop. Specifically it was discussed that the community would like to create a central office to coordinate efforts and concerns at the community level and to then communicate these concerns to the scientific community. In particular the observations of tinted colors on water, ice and land were one area where this communication was suggested as perhaps being useful. Residents noted that it might be helpful to send specimens of these changes (i.e. snow or stream specimens) to a scientific lab to find out if dangerous chemicals are causing these changes and for the specimens to be examined by scientific means.

6.4 Recommendations

Some of the discussion in the workshops about adaptations, resources and equipment as well as the increased need for communication led to community level recommendations on how some of these changes could be achieved. In Kugaaruk for example, where an increased level of communication with the scientific community was discussed as one alternative in better understanding some of the changes occurring in the environment, it was recommended that a central coordinating office in this community be established. This central office would be



useful as it would be one central location to accumulate all of the concerns people are having regarding change within the environment. It was suggested that people could report changes they are observing in the environment and abnormalities in wildlife to the office. With the goal of sharing what is happening at the community level, this office could also facilitate a dialogue with the scientific community to better understand these changes. Finally, it was suggested that this central office could provide leadership in helping to clean up the pollution within the community itself.

Kugaaruk residents acknowledged that they, themselves at the community level, need to take responsibility about their own contributions to climate change and pollution. It was suggested that residents should acknowledge that fuel and exhaust from snow machine and motorized vehicle use is a contributor at the community level. A recommendation was that the use of these harmful technologies should be reduced, although it was also acknowledged that for some within the community it would be very difficult to personally commit to reducing the use of travel vehicles. It was also recommended that what would be the best for the community would be to use convenient technologies that would not contribute to environmental damage. Finally, on this note, it was also suggested from this community that both national and international environmental strategies are needed.

Similar discussions regarding negative aspects of technology occurred within the Repulse Bay workshop, although the negative aspect of using technologies discussed in this community were less about pollution to the environment and more about the fact that technologies do not completely eliminate the risk of dangerous travel conditions. It was suggested in this community that residents should rely more strongly on Inuit Qaujimagatuqangiit (IQ) to predict weather patterns and less on new technologies such as weather station forecasts.

Other examples of recommendations within Nunavut communities, included the recommen-

dation from Arctic Bay that with the increase in the number of people getting stranded on the land and having difficulties with travel, the Coast Guard should stay around longer and patrol the area for longer. In this community, as there is a certain problem with boat traffic affecting the presence of narwhal near the community, it was also suggested that hunters and elders should communicate more about boat traffic with the goal of getting narwhal to come closer to the community.

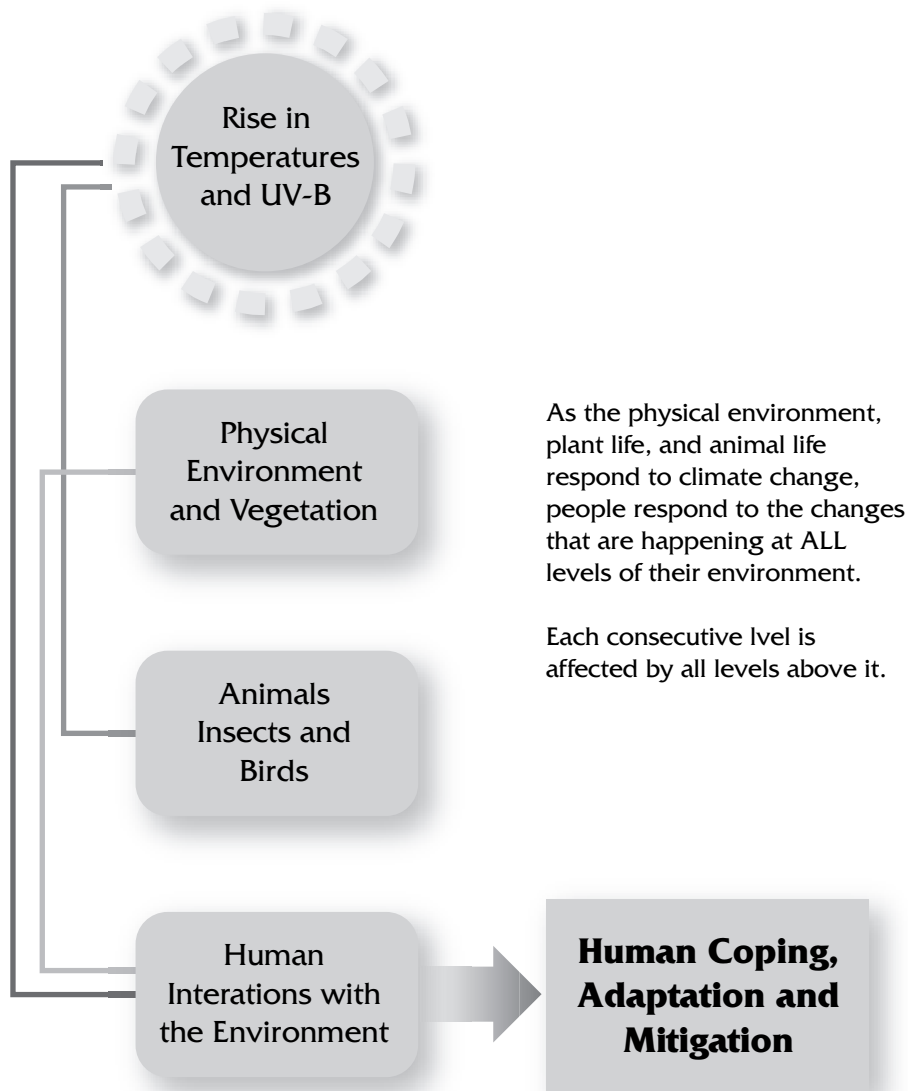
7.0 CONCLUSIONS & RECOMMENDATIONS

The workshops in Nunavut 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 5) 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 the analysis of change occurring in Nunavut. The three communities who participated in these workshops were Arctic Bay, Kugaaruk and Repulse Bay. Owing to the uniqueness



Figure 5. Influence of Global Warming and Increased UV-B on Inuit Communities





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 5.0. These observations cover shared concerns between all three Nunavut communities and a short synopsis of changes unique to each community. Further, the 'Going Forward' section 6.0 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 Nunavut is presented in Figure 6.

 **Figure 6. Summary of Recommendations and Adaptations**

Concern	Recommendation/Adaptation
Changes in wildlife: Changing migration patterns; lower fat content in some animals; abnormalities in wildlife; changes in size of fish.	<ul style="list-style-type: none"> • Adjusting hunting times and methods to better match the changing migration patterns and other changes in wildlife. • Using faster boats to help adapt to changes with harvesting seals and beluga. • Being more selective of animals caught and consumed. • Exchanging country food between communities.
Unpredictability of weather patterns and difficulties with travel.	<ul style="list-style-type: none"> • Cutting trips short and returning home early. • Adjusting travel routes and camp locations to safe areas. • Using camps as shelters and waiting out storms and other unpredictable weather. • Being more selective of hunting locations (i.e. away from high winds). • Bringing ample supplies and equipment for the chance occurrence of being stranded on the land. • Increase in use of ATVs and tents because of changes in snow conditions. • Using bigger and faster boats and cabins to help cope with high winds. • Building boxes on kamotiks to help protect children against wind and sun exposure. • Using GPS and satellite images to help navigate ice conditions. • There is a need to still use traditional tools and skills when coping with sudden weather changes. • Increased communication between hunters about changes in weather and travel routes. (use of radio communications). • Coast guard should patrol areas more frequently.
Not enough knowledge at the community level about causes behind changes in the environment.	<ul style="list-style-type: none"> • Creation of a central office to coordinate efforts and concerns at the community level. • This office could then communicate to the scientific community and act as facilitator between community and scientists in exchange of info.
Need for clean-up at the community level.	<ul style="list-style-type: none"> • This central office could also coordinate community clean-ups. • Reducing the use of harmful technologies and looking to use convenient technologies that are not harmful to environment. • National and international environmental strategies are needed.



8.0 APPENDIX

 **Figure 7. List of Workshop Participants**

Arctic Bay	Kaujak Pauloosie, Joseph Kautaq, Atagutak Ipeelee, Lisha Qavavauq, Mucktar Akumalik, Daniel Iqaqrialu, Lisha Levi, Olayuk Kigutikakjuk, Sam Ipirq, Rhoda Tooloogak, Bertha Tatatuapik, Joseph Omadlah, Leah Oqallak, Mary Tatatoapik, Mishak Allurut (Interpreter/Translator).
Kugaaruk	Otto Apsaktaun, Guy Kakkianiun, Gino Akkak, Barthelemy Nirlungayuk, Christian Nalungiaq, Jose Angutingunierk, Columban Pujuardjuk, Charlie Niptayuk, Makabe Nartok, John Ningark (Interpreter/Translator), Nick Amautinuvar (Interpreter/Translator).
Repulse Bay	Cecelia Angotialuk, Donat Milortok, David Tuktudjuk, Elizabeth Mapsalak, Sata Kridlapik, Alice Nanorak, Peter Manik, John Ivalutanar, Honore Aglukka, Jennifer Kadjut, Joni Kringayark, David Numiqtaqtuq, Christopher Amautinuvar (Interpreter/Translator), Hugh Haqpi (Interpreter/Translator).

