NWT Climate Change Leadership Summit: A Call to Action

Proceedings Report

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Co-sponsored by Ecology North and the Dene Nation with support from:

the NWT Federal Council, the NWT Rural Team, Rural Secretariat – Agriculture and Agrifoods Canada, Indian and Northern Affairs Canada, GNWT Environment and Natural Resources, Natural Resources Canada, Environment Canada, GNWT Transportation, GNWT Industry, Trade and Investment, Canadian North and the World Wildlife Fund.

Special thanks to Francois Paulette, Fort Fitzgerald for blessing the Summit and Chief Charlie Neyelle, Deline for blessing next steps.

Ecology North & the Dene Nation

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Executive Summary

Ecology North and the Dene Nation organized the NWT Climate Change Leadership Summit to inform leaders in the NWT about climate change impacts and to discuss adaptations. Adaptation was defined as learning how to live with the impacts of climate change through adjustments and modifications to lifestyles and in society in general.

The two-day Summit was the first of its kind in the NWT. It brought together more than 100 community, regional, territorial and federal leaders and resource people from throughout the NWT and elsewhere in Canada and the circumpolar world. The Summit used a variety of media and processes to expose leaders in the NWT to the many facets of climate change. The Summit report summarizes the thoughts, concerns and follow-up needs of leaders in the NWT.

Climate Change in the NWT

The climate is warming faster in the NWT than in most other parts of the world. Some impacts of a warmer climate in the sub-Arctic are: earlier loss of snow cover in the spring; earlier break-up and later freeze-up of river and lake ice; thawing of permafrost and land instability; disappearing wetlands and nesting sites and wildlife habitat; shorter winter road seasons; more summer storms; and greater potential for forest fires. In the Arctic, impacts of a warmer climate include: degradation of sea ice and negative impacts for ice dependent species; longer periods of open water and more storms reaching shore; and thawing of permafrost and land instability.

Although it is not possible to predict all of the impacts that will occur, climate change will affect everyone in some way. Northerners will be living with climate change impacts for a long time because some of the effects cannot be reversed. Climate change impacts are happening to a greater degree and faster than scientists anticipated. Impacts are likely to be irregular and sudden rather than follow a smooth progression from one state to another. The rapidity of climate change in the north means greater vulnerability to impacts. Reducing greenhouse gas emissions is important, especially for our future. Adjusting to impacts of climate change in ways that also reduce the cause of climate change is the most effective action. Adaptation plans should be local to regional in nature to best respond to climate variations. Traditional knowledge can help northerners adapt to climate change but climate change policies that are part of public policy at all levels of government, are also needed.

Impacts on Wildlife and Renewable Resources and Possible Adaptations

The warming of the climate could affect water systems and water quality in the NWT. Permafrost degradation can compound these effects. Both will result in additional contaminant concerns such as from mercury. Forests could be affected by changing water levels and instability created by melting permafrost. The threat of forest fires might also increase and

forests could be more vulnerable to insect infestations. Although caribou have adapted to climate conditions in the past, climate change may be happening too fast for the herds to adapt to the affects of, for example, deeper snow, sporadic freeze-thaw conditions, the potential for more insects, and different vegetation.

Environmental assessment processes, forest fire suppression policies, land claim legislation, protected areas, land use plans, and especially risk management strategies are tools that can be used to manage the impacts of climate change on wildlife and renewable resources. The effectiveness of these tools can be improved with active participation and use, information sharing, long term monitoring, community-based research, and balancing traditional and scientific knowledge. Northerners can also reduce stresses on caribou and other wildlife populations by altering land uses, protecting important areas, and reducing their demands (e.g. shifting or diversifying to alternatives), on these resources. Leaders in the NWT can encourage and support community members to track the changes occurring around them and to work together to find ways to manage and adapt to them.

Impacts on Traditional Economy and Well-Being and Possible Adaptations

Northerners are moving away from country foods and life on the land to take a place in the growing industrialized NWT economy. At the same time, the challenge of replacing country foods with healthy store bought choices could mean that northerners will experience higher rates of cancers, diabetes and other diseases that are stimulated by nutrition-poor diets. Climate change may compound these risks as well as increase exposure to solar radiation, infectious disease, social conflicts, or fears and uncertainties associated with learning to live with different realities.

If people just observe changes but don't share and act, responses to climate change impacts may be too late or inappropriate. Every community and region should have monitoring and response systems in place to address climate change impacts. Economic diversity is another way to adapt to climate change. Education, collective and inclusive actions, and technologies are also ways to cope with climate change. Elders' wisdom, knowledge and experience coping with change means they have an important role in helping northern communities to manage and adapt to climate change. Community members who choose to live simply and in harmony with Mother Earth also have much to contribute. But each of us has a personal responsibility to manage and adapt to climate change and to minimize our footprint on Mother Earth.

Impacts on Industrial Development and Infrastructure and Possible Adaptations

Permafrost is thawing and beginning to disappear particularly in the southern NWT. The resulting sinking, slumping and erosion of terrain has wide ranging implications for

infrastructure planning including building design and maintenance, waste disposal, water quality, runways and roads. The impacts of thawing permafrost also pose potential safety and financial risks.

Research, education and improving uses of such tools as environmental assessment processes strengthen the capacity to manage and adapt to climate change impacts. A climate change research/engineering centre in the NWT would be a good way to share multi-disciplinary and traditional knowledge and technologies to support northerners to learn to live with climate change. For example, the centre could share waste disposal techniques used by municipalities with the mining industry in the management of mine tailing ponds. Similarly, techniques used to stabilize airstrips built on permafrost could be shared to improve highway construction methods. Managing and adapting to climate change also requires (i.e. a regulatory need) less reliance on fossil fuels and investment in a long-term alternative energy strategy that champions viable 'clean' energy options.

Impacts on Community Infrastructure and Possible Adaptations

Climate change has the potential to severely increase financial, safety and liability issues associated with building and maintaining community infrastructure. These conditions may increase the potential for litigation. Some communities in the NWT are already experiencing serious problems related to water sources or treatment processes, solid waste facilities and sewage lagoons, roads, tank farms, local cemeteries, buildings or utilidor systems. While communities are doing their best to address climate change impacts, reactions tend to be fragmented, 'trial and error' measures.

Risk management techniques, community research and consistent language are ways to share knowledge and promote collaboration to better manage and adapt to climate change. Addressing the affects of climate change on community infrastructure could also be facilitated by incentives and taxation. Establishing a climate change engineering/research centre would also be helpful. The centre could support research and develop much needed codes and guidelines for example, for new buildings, effluent, snow loading, and infrastructure inspections. Partnerships with the insurance industry might also be a way to address liability issues arising from climate change impacts to community infrastructure.

Adaptation Planning

Adapting to climate change impacts should be part of all community decisions and involve local citizens. Climate change adaptation planning is similar to land use and sustainability planning processes. There are numerous resources, tools and technical solutions available to guide adaptation planning. Climate change adaptation plans should:

- √ Make best use of local resources.
- √ Recognize uncertainty.

- √ Give the highest priority to potential impacts.
- √ Use clear, consistent language.
- √ Focus on collaboration, openness and sharing.
- √ Apply best practices.
- √ Engender hope.
- √ Seek to both mitigate and adapt.

Community and Regional Priorities

Leaders in the NWT have several concerns about climate change impacts. With knowledge gained at the Summit, they have more confidence to champion efforts to manage and adapt to these impacts. They know that it is important to share information in their communities and raise the profile of climate change. They also know that they must encourage community members to share responsibility for addressing this issue but more tools and financial investment are needed to support local efforts to manage and adapt to climate change. Leaders are committed to working to strengthen connections with the land and with elders in order to help communities to better understand and cope with climate change. They also want to work with governments, industry and other communities to share experiences, implement legislation and regulations, and seek local solutions. Using new technologies and designs, and linking these innovations with traditional knowledge will also bolster efforts to manage and adapt to climate change. A central climate change centre would support communities and regions to take action to manage and adapt to climate change.

In Closing

Leaders in the NWT and resource people were pleased with the Summit. They agreed that:

1. Climate change is here and it is serious. Leaders didn't know this before coming to the Summit.
2. They need to share information about climate change in their communities so others can understand and cope with this reality.
3. Everyone must work together and get busy on next steps including having more education and planning workshops to help northerners to learn to live with climate change.

April 2007

Learning to Live with Climate Change.

Climate change is here. This reality is presented in Ecology North's discussion paper, *Standing Up to Climate Change – Northern Problems and Possibilities* (2006) and the Dene Nation's video on climate change. Ecology North and the Dene Nation wanted to inform leaders in the NWT about climate change and provide a forum to discuss how to adapt to it. With these intents in mind, the NWT Climate Change Leadership Summit was designed so leaders in the NWT could:

- √ learn important information about the impacts of climate change in the NWT.
- √ find out what is being done to reduce the impacts of climate change.
- √ hear northern success stories about managing and adapting to the impacts of climate change.
- √ discuss next steps and actions to support communities, regions and others in the NWT to plan for, manage and adapt to climate change.

By attending the Summit, it was anticipated that leaders in the NWT would:

- √ be more knowledgeable about climate change impacts and how they can reflect this understanding in community and regional plans and initiatives.
- √ have clear direction on the next steps to take to develop plans and initiatives to manage and adapt to climate change.
- √ lead and champion actions to plan for, manage and adapt to climate change.

The NWT Climate Change Leadership Summit was the first of its kind. It brought together more than 100 community, regional, territorial and federal leaders and resource people from throughout the NWT and elsewhere in Canada and the circumpolar world (see page30 for a list of participants).

How the Leadership Summit was Organized.

The NWT Climate Change Leadership Summit was organized to encourage new thinking, language, and actions to address climate change. It focused on adaptation and planning so that northern communities can learn to live with climate change while still working to diminish the negative impacts. The Summit also sought to build on northerners' history of resiliency and capacity for adaptation and to highlight the many initiatives underway to guide and support efforts to manage and adapt to climate change.

The Summit was designed to expose leaders in the NWT to the many facets of climate change. The first day of the two-day Summit focused on impacts, while the second was on adaptations (see agenda, pages 35-39.). The Summit involved:

- presentations from experts and leaders from throughout the circumpolar world and from elsewhere in Canada.
- three facilitated small group sessions that brought leaders together with knowledgeable resource people to talk about one of four themes identified in the Standing Up to Climate Change discussion paper, and to consider regional priorities for managing and adapting to climate change.
- sharing thoughts and perspectives and making commitments to follow-up.
- films on climate change, evening tours of energy efficient buildings, an evening discussion on wind energy and another on maintaining well-being in a time of climate change.

How this Report is Organized.

This document is organized as a proceeding report and generally follows the Summit agenda. This report focuses on the small group discussions rather than on formal presentations. Formal presentations are referenced on page 40. These presentations may be downloaded from the C-CIARN North website at:

http://www.taiga.net/c-ciarn-north/summit2007/index.html

or requested directly from Ecology North via e-mail (doug@ecologynorth.ca), telephone (867-873-6019) or facsimile (867-873-6149).

This Summit is About Hope and Action.

With these words, **Rachel Crapeau,** Yellowknives Dene First Nation Lands and Environment Committee, set the stage for the Summit (see presentation references, page 40). Northern leaders can take strength from past generations and their remarkable ability to adapt to changes in the environment. Northerners' history of innovation, adaptation and resiliency provides a solid foundation for managing and adapting to climate change. "*This Summit can become an inspiration for others, and a watershed in the north's approach and attitude to climate change."*

Michael McLeod, Minister of Environment and Natural Resources, Government of the NWT, encouraged leaders in the NWT to begin planning for climate change adaptations. The Government of the NWT plans to release the NWT Greenhouse Gas Strategy within the next few months. The Strategy recognizes the need to respond to climate change impacts. It also provides a foundation for pursuing upcoming work to develop an Impacts and Adaptation Plan.

Bob Bromley, co-founder of Ecology North, said that northerners will be living with the effects of climate change for a long time because these effects cannot be reversed even if greenhouse gas emissions are reduced now. Northerners of all ages and from all walks of life in our

communities will feel the impacts of climate change. We need to learn to live with climate change. Everyone has a role in managing and adapting to climate change. Adaptations that require the burning of fossil fuels are not good solutions. They make the problems of climate change worse. The best adaptations are actions that also mitigate the causes of climate change.

The Science of Climate Change

Bob Kochtubajda, a scientist with Environment Canada, explained that the average global surface temperature has increased by ~0.6 degrees Celsius in the last century (see presentation reference, page 40). Temperature increases are unevenly distributed around the world. Some regions are warmer and others are colder. The Arctic and the sub-Arctic are warming faster than most other parts of the world.

Our knowledge of known influences on climate and the interconnectedness of global climate systems help us to predict climate change. Still, no matter how good our science is, uncertainties remain. Close relationships to the natural environment mean that Inuit and First Nations are among the first people to be affected by climate change. They are also in a good position to observe, monitor and help others to understand the impacts of climate change.

The Language of Climate Change:

- Greenhouse gases: carbon dioxide, methane and other exhaust gases that are mainly created by burning fossil fuels such as oil, gas or coal.
- Greenhouse effect: the result of greenhouse gases that keep the sun's heat within the earth's atmosphere and cause the earth to get warmer.
- Climate change: a shift in regional climatic trends over a set period of time as demonstrated by the average temperature, precipitation, humidity, and other weather indicators, and caused by such natural factors as the sun, volcanic eruptions, and geologic change, and by such human factors as an over-abundance of greenhouse gas emissions, particulate matter, ozone depletion, and changes in land use.
- Global warming: overall climatic trends around the world.
- Renewable energy: energy sources that won't run out (e.g. wind and sun) or can be replaced (e.g. trees).
- Non-renewable energy: energy sources that run out or cannot be replaced (e.g. fossil fuels).
- Mitigation: actions to diminish or eliminate the causes of climate change.
- Adaptation: learning how to live with the impacts of climate change through adjustments and modifications to lifestyles and society in general.

Some anticipated impacts of climate change in the sub-Arctic are: earlier loss of snow cover in the spring; earlier break-up and later freeze-up of river and lake ice; thawing of permafrost and land instability; disappearing wetlands and nesting sites for migratory birds; shorter winter road seasons; more summer storms and greater potential for forest fires. In the Arctic, anticipated impacts of climate change include: degradation of sea ice and negative impacts for ice dependent species such as seals and polar bears; longer periods of open water and more storms reaching shore; and thawing of permafrost and land instability.

John Stone, a Carleton University scientist, explained that surface temperatures in the Arctic have warmed twice as fast as elsewhere in the world over the past century and during recent decades (see presentation reference, page 40). Recent evidence suggests that melting of Greenland's glaciers on the coastal margins of the continent is accelerating. The extent of Arctic sea ice is declining at an alarming rate and may result in the elimination of thick, multi-year ice within 50 years. It is possible that by 2050 the permafrost area in North America could decrease by as much as 35%. Permafrost thawing may cause major releases of methane, a natural source of greenhouse gases. This would result in further warming. Vegetation in the north will become

more lush, plentiful and diverse. The affects of climate change are happening to a greater degree and at a greater rate than scientists anticipated.

The impacts of climate change are likely to continue and unlikely to be reversed. Impacts will likely be irregular and sudden rather than follow a smooth progression from one state to another. The rapidity of climate change in the north means greater vulnerability to impacts. The impacts of climate change in the north should be a warning to the rest of the world.

While reducing greenhouse gas emissions is important, in the North adaptation is becoming imperative in coping with the expected impacts of climate change. Adaptation plans should be regional in nature to best respond to local climate variations. Nation-wide master plans may not adequately reflect local or regional variations and may be inappropriate or ineffective for particular parts of the country. Traditional knowledge can help northerners adapt to climate change but climate change policies that are integrated with, and embedded in public policy at all levels, are also needed. Climate change is a societal issue, not just an environmental issue.

"It's too easy to blame fossil fuels… there are other factors out there in the world… do scientists ever look at those sources for impacts?… We can't only blame fossil fuels, but we need to run our cars, and if we don't want fossil fuels, then we're going to need a different resource to run operations" (Summit participant).

Climate Change in the NWT – Impacts and Adaptations

Duane Smith, President of Inuit Circumpolar Council Canada, cited several examples of climate change impacts in Inuit homelands across the circumpolar world. **Bill Erasmus**, Dene National Chief, shared insights into the impacts of climate change in Denendeh. Both leaders agreed that climate change affects every aspect of northern life and everyone. They urged other leaders to engage rather than disengage in action on this important issue and to work together to manage and adapt to climate change. They stressed the importance of Inuit and First Nations involvement in addressing the impacts of, and making adaptations to climate change. Inuit and First Nations have histories of resiliency, and knowledge of and reverence for the natural environment. These qualities are extremely helpful for managing and adapting to climate change.

Through small group discussions with resource people, leaders in the NWT focused on four themes to consider the impacts of climate change and ways to deal with these impacts.

1. Wildlife and Renewable Resources

Impacts

The NWT has an abundance of water. While people in the north make relatively few demands on northern water systems, climate change and conditions outside the NWT will likely impact many of the major rivers in the north. The Mackenzie River, for example, is part of a complex basin that is influenced by a range of factors outside the north. As the climate warms, spring break-up is earlier. Whether water levels will be higher is unknown but if the risk of flooding increases, low lying areas such as the Mackenzie River delta would be most vulnerable. Later in the year, river flows and water levels are expected to drop to lower levels than in the past due to the longer period of ice-free runoff. This could disrupt fall barging operations on the Mackenzie River or create problems at ferry and ice road crossings. Fluctuating water levels might also affect the production of hydropower for example, on the Snare River system.

As the earth warms, precipitation, evaporation and transpiration are all expected to increase. The NWT might become wetter at certain times of the year, but much higher rates of evaporation will likely mean that the climate will become drier overall. Spring break-up will come earlier and fall freeze-up later. Changing freeze-up and break-up patterns can create uncertainties and affect the movement of people and animals.

A warmer climate will cause permafrost to thaw. Melting permafrost will contribute to the flooding of wetlands and displace important wildlife habitat. Food sources that are under water may be a reason why, for example, bison in Fort Providence area are expanding their range. Permafrost degradation also contributes to land erosion and slumping, and the release of sediments into rivers and lakes. Sediments increase turbidity, negatively affect water quality and can impact on aquatic life. Melting permafrost can lead to unstable or sinking terrain that uproots, drown or causes trees to lean (e.g. drunken forests). Melting permafrost also releases methane that is more potent than carbon dioxide. This can increase warming in the north.

An overall warmer, drier climate combined with more violent summer thunderstorms increases the potential for a longer and more intense forest fire season, with more severe and larger fires. This pattern has not yet developed in the NWT. In fact, the NWT has recorded a decline in forest fires in recent years, likely due to more precipitation than in the past. Forest fires increase transpiration because vegetation that normally holds water has been removed and moisture is more quickly absorbed back into the atmosphere. If climate change brings earlier and drier spring seasons, forest regeneration and planting initiatives may be more intensive and productive after a fire. A warming climate could also alter the composition of northern forests, changing them from primarily coniferous forests to deciduous forests. Warmer and drier conditions in summer months could cause dehydration and death of certain tree species but increase forest productivity overall.

A warming climate will likely diminish the length of time that trees are frozen and increase the susceptibility of trees to insect infestations. Insects usually controlled by cold temperatures such as the spruce budworm, spruce bark beetle, mountain pine beetle, and the forest tent caterpillar, could pose some threat to northern forests. But because the north has no extensive tracks of pine trees and temperatures are still sufficiently low to induce insect die-off, northern forests may escape these harmful diseases. Still, there are concerns that the pine beetles that are damaging forests from British Columbia through to eastern Canada, could move into the northern boreal forest and damage trees in the NWT.

Caribou are very sensitive to climatic conditions. Even though caribou have dealt with changes in the past, climate change in the north today may be happening too fast for caribou to easily adapt. Later freeze up, warmer winters with more snow, sporadic freeze-thaw conditions and earlier springs impact on caribou migration, calving and food sources. For example, deeper snow and more freeze-thaw cycles make movement and digging for food more difficult, require greater expenditures of energy, and overall, reduce access to food. Warmer temperatures also expose caribou to more insects, parasites and diseases. Insects can disrupt foraging and migration patterns and contribute to malnourished and underweight animals, and low reproduction and survival rates. A warming climate will alter vegetation, likely displacing important food sources such as lichens and mosses. When these conditions persist, caribou are very vulnerable. Since predator and prey populations typically follow one another, a decline in caribou herds will also affect wolf populations.

"The interconnectedness of all life systems are kind of overwhelming"(Summit participant).

Adaptations

Environmental assessment and regulatory processes are among the tools available to manage the impacts of climate change on wildlife and renewable resources. The effectiveness of these processes could be improved by:

- increasing awareness and participation in them.
- pressing such bodies as the inter-provincial-territorial board for the Mackenzie Basin into service, for example, to address the impacts of the northern Alberta tar sands on water systems in the NWT.
- taking a cumulative rather than a project-specific approach to assessing the significance of proposed developments.
- increasing monitoring and enforcement of environmental assessment and regulatory requirements.

Forest fire suppression policies and risk management strategies are valuable tools for managing the impacts of climate change on northern forests. Currently, fires that threaten communities and infrastructure are the highest priority for suppression. Fires that threaten traditional wildlife and harvester travel routes, calving areas, important habitats, trap lines, and industrial developments

in remote areas, are among the other priorities that northerners want to see reflected in fire suppression and risk management strategies. Further, there is a need for fire suppression policies to balance input provided by elders and other local residents with input from forest ecologists and other scientists. The local nature of climate change impacts and the central role of forests in the natural and human worlds mean all voices need to be heard. Elders, other community members and forest management personal need to actively engage in respectful and inclusive discussions to evolve forest fire suppression policies and risk management strategies that reflect best traditional and scientific practices. Learning to live with the greater risk of forest fires might also include strategies for enhancing conditions for new species to take root and ensuring that there are more resources for 'on-the-ground' fire crews.

Northerners can't stop climate change but we can reduce the negative impacts on caribou populations. This can be done by: 1) recognizing that caribou need space to adapt to climate change, and 2) reducing stresses on the herds so the caribou have more capacity to cope with and adapt to climate change. Examples of measures that northerners can implement to enhance the capacity of caribou to adapt to climate change are:

- √ protect relief areas for caribou to minimize the impacts of insects (e.g. places on the land that are windy would be a priority for fire suppression and protection).
- √ protect areas that traditionally don't have as much snow so that caribou can get the food they need.
- √ reduce caribou harvests.
- √ educate younger people so hunting methods don't compound stresses (e.g. don't cause increased exertion).
- √ shift local harvesting to other species (e.g. moose, deer, muskox) such as the people on Banks Island have done.
- √ subsidize the cost of food so people can afford to purchase healthy alternatives to caribou meat.
- √ ensure land uses don't disturb the caribou especially during calving (e.g. stagger industrial operations so as to minimize their intensity).
- √ stop publishing information locating the herds so as to dissuade hunting, tourists and other human disturbances.
- √ monitor seasonal conditions and immediately respond to changes occurring (e.g. if caribou are skinny then we need to do something to help them over the winter).

Understanding the stresses of industrialization on caribou and other wildlife populations is important. For example, mining activity throughout the range of the Bathurst caribou herd may be a significant source of stress. Because climate change may increase the vulnerability or cause significant changes in the northern ecosystem, northerners need to be more proactive in understanding the dynamics and impacts of various types of activities. In addition to using environmental assessment processes to manage and adapt to the impacts of climate change, northerners can make stronger linkages between traditional knowledge and technology, and use

the full force of land claim legislation. For example, under the Tlicho agreement, the Tlicho people have the power to regulate the harvest of caribou and other wildlife on Tlicho lands. The Tlicho Government is currently considering a reduction in caribou harvests. Similar authority exists in other land claim regions in the NWT and Nunavut.

The Protected Areas Strategy (PAS) is a tool for managing and adapting to climate change impacts although that is not its main purpose. PAS is a collaborative effort of groups from NWT communities, who use traditional and scientific knowledge, to protect culturally, socially, scientifically and ecologically diverse or representative areas. For example, the people of the Deh Cho want to protect the approximately 25,000 km^2 area known as Edéhzhíe, an area that includes the Horn Plateau, Horn River, Mills Lake and Willowlake River. While PAS doesn't stop climate change, it can help with mitigation and adaptation because it creates spaces for wildlife and people to adapt to changes. For example, if large protected areas exist then there is greater opportunity to recover biodiversity that might be lost in a forest fire.

Land use plans are also an important tool for managing the impacts of climate change. These plans can create the space or allow time to enable the natural environment to adapt to changes. Land use plans can for example, work together with land use legislation or protected areas to regulate certain types of activities or protect special places or vulnerable species. In the Tlicho Region, the Tlicho Government has interim protection on some areas and has imposed a moratorium on development until such a time as the Tlicho land use plan is completed.

Sharing information through a wide variety of media is a main tool for managing and adapting to climate change. Leaders attending this Summit can bring information back to their communities. They can encourage and support community members to note changes occurring around them and to work together to find ways to manage and adapt to climate change. Informal activities of this nature need to be supported by more formal research programs.

Currently, managing and adapting to the impacts of climate change on for example, water systems, caribou, fish populations, and forests is hampered by the lack of long-term, monitoring data for some components of the environment and in some cases, the expertise to interpret and communicate data (e.g. on fish quality). While governments are endeavouring to collect data, financial resources, particularly for research that integrates both scientific and traditional knowledge, are scarce. Lack of resources is a barrier for communities. For example, the community of Fort Good Hope is establishing an institute that will do research on a range of issues that are important to the community. The community sees this as a way to monitor, understand and empower local people to cope with change and influence the decisions that affect them. Research conducted at the local level can also build bridges between traditional and scientific knowledge and influence public policy, especially if local researchers are connected to a diverse array of government, non-government and industry groups within and outside the community.

"… we can't impose our thoughts and processes on another nation. Each nation has valuable traditions and knowledge that should be respected" (Summit participant).

1. Traditional Economy and Well-Being

Impacts

The northern economy is rapidly becoming industrialized. Today northerners are encouraged to work in mines or on the proposed pipeline rather than in traditional harvesting activities. Many choose the industrial wage economy because with money and technology earning a living is 'quicker and easier'. This attitude has crept into traditional harvesting practices and severed reverence for the natural environment. Climate change compounds the growing disconnect with the land. For example, drought in southern Canada that effected rivers in the NWT may be the reason for the following comment. "*This spring the Slave River broke up April 26, the earliest we had ever seen, so when the water went down it stayed low, and by October it was the lowest we had ever seen it….. A friend had trouble getting to his trap line, three days travel there and three days back, getting his snowmobile stuck in overflow. That made him frustrated, he gave up trapping for a month because of this"*(Summit participant).

The shift away from the traditional economy and consumption of renewable resources impacts diets, physical health and emotional well-being. Whether due to lack of time on the land or the impacts of climate change, northerners see fewer ducks and geese, and are aware that the caribou are in decline. The firmness and texture of fish are changing. Where people used to view loch liver and caribou heart as delicacies and sources of nutrients, many now fear that internal organs are contaminated. It is expensive to replace country foods with healthy store bought foods, if healthy alternatives are available at all. The increased incidence of colorectal cancer in the NWT has been linked to a shift away from healthy country foods to less healthy store bought foods. Less consumption of healthy country foods could mean that northerners will experience higher rates of cancers, diabetes and other diseases. Climate change may exacerbate these risks.

Climate change may contribute to multiple health stresses as a result of more exposure to solar radiation, infectious disease, social conflicts due to the uneven distribution of climate change effects, or fears and uncertainties associated with learning to live with climate change. These stresses are revealed through fears expressed about natural disasters seen on television or changes on the land. They are also revealed in responses to proposed oil and gas developments: 'what's going to happen to the permafrost?' 'if there are any problems from the pipeline, will it affect our health, the animals and insects all the way down the food chain?' or 'the more fossil fuels that come out of the ground, the more sickness there will be in the future.' Northerners worry about insects bringing viruses into the north that they have no resistance to. They worry that industrialization is driving climate change and killing the natural cures and medicines that Mother Earth has provided for generations. The concerns of northerners have been validated by experiences elsewhere in the world.

"The traditional person has a simple way to see the world. We see the world, feel the world, think about the world, and lastly, there is action, we act on it. So when industry comes in here, they don't look at this model. They come in here having already decided what they are going to

do it. The Dene on the other hand will do the reverse. The industry will first do, then think, then feel and if they get to it, then they will see" (Summit participant).

Adaptations

Some diseases emerging elsewhere in the world seem to affect animals first. The same pattern might be expected in the north. If people just observe changes but don't share and act on the observations, it may be too late to respond to climate change impacts on well-being and the traditional economy. A 'sentinel system' for observing and sharing information about change is a good way to manage and adapt to climate change. Every community should have monitoring systems and a process for responding to changes. Monitoring and response systems need to be supported in NWT communities, and at the regional and territorial levels.

"*If something is going to be happening, the animals are going to be the first one to know*" (Summit participant).

Economic diversity is a way to adapt to climate change. While northerners may welcome the comforts of an industrialized wage economy not all northerners want to work in mines or in oil and gas development. Many northerners including youth want to live simply and honour traditions that help them make healthy connections with the land and others, and take only what they need to survive. In the NWT, economic diversity might include agricultural activities such as greenhouses and gardens or raising animals, and cultural and eco-tourism activities. Economic diversity is an objective of the Deh Cho land use plan. Using alternative energy sources such as thermal, wind and solar energy are other ways to diversify local economies. Grassroots, community initiated projects are the most effective ways to diversify the economy, encourage self-sufficiency, and reduce dependence on fossil fuels. The Whati Sustainability Project is a good example of a grassroots project.

"*People are coming to see how we use a whole fish, a whole tree, a whole animal. This is the new market we need to look into. Big game hunting is something we need to get away from. We should not encourage it. Instead, more and more people are looking for tours where they can learn the traditional ways*" (Summit participant).

Education about climate change today and environmental change that happened in the past can help northerners to make better choices, and manage and adapt to climate change. Education as part of school curricula, public media or other venues can be fostered from sharing traditional knowledge, and building a sense of identity, connection and hope. Collective and inclusive responses to climate change strengthen the capacity of people to adapt. They bridge gaps in lifestyles, languages, traditions and technologies that separate youth and elders, and fragment human networks and relationships. Using technologies such as the Internet is a way to share information quickly and cheaply, and to forge connections among individuals and groups.

"*We will continue to adapt, so I want to find out how were able to do that in the past*"(Summit participant).

Our Elders Have An Important Role in Climate Change Adaptation.

"So when we talk about the tools on how to minimize the impacts of climate change, one of the tools we go to are the elders. The elders are a huge book to us, a source of who we can go to. What we are talking about today, we have known about for generations" (Summit participant).

"Elders are a tool to this knowledge. Especially today, they hold back their stories, their dreams, their prophecies because they are afraid people might think they are wacky and won't be valued" (Summit participant).

"I was told (by the elders) when I was young, that they are going to find riches up this way in this area, diamonds, rocks, all over the north and people are going to come up here and go crazy because of money" (Summit participant).

"The elders, when they are asked questions, they prefer to be asked a direct question. You can't beat around the bush, talking about the question you are trying to ask. The individual that has come there for advice will wonder if the elder is good for anything because they are not answering" (Summit participant).

"*Yesterday it was said that the elders are always with us. All races came from the land, maybe now we have to share our elder's knowledge between all cultures. It is very important in this day and age to share, so we can manage this new environment"* (Summit participant).

"I go back to what the elders taught me. The best way to remember is through singing and song. When you hear music you just want to hear the language. I am always going back to the elders for more education" (Summit participant).

"Things are going by so fast that we have become so self centred, you think only about yourself and rarely visit your neighbour. That needs to change. A lot of times when we come to these workshops, we say we need to work together and we truly do. Truly understanding each other, listening to each other. I like the way that first lady made that presentation about adaptation from inside out, community first. I like what she's doing, getting community people involved. By the time they are finished the people themselves will feel ownership…"(Summit participant).

Taking personal responsibility and demanding that elected leaders take responsibility for managing and adapting to climate change are key to addressing this important issue. Each of us must be aware of our own habits and patterns and be willing to change. We also need to work with and support others, and be inclusive in our actions and decisions. We need to value all members of our communities particularly those who choose to live simply and in harmony with Mother Earth. We also need to pay attention to the experiences, knowledge and prophecies of our elders.

"I don't like to see people suffer, the social issue are the people on the streets. We see signs on the streets, our own sisters or brothers, we are too busy running around with the world ticking so fast, we can't say hello. That's why we need to get back on the land" (Summit participant).

3. Industrial Development and Infrastructure

Impacts

Simply defined, permafrost is ground that is below zero degrees. In the NWT permafrost areas vary widely but are typically represented by peat lands and ground embedded with ice. Permafrost is thawing and beginning to disappear particularly in the southern NWT. This has implications for infrastructure planning including building design and maintenance, waste disposal, water quality, runways and roads.

Permafrost thawing causes the ground to slump and release sediments into lakes and rivers. Air photos show that the incidence of slumping in some areas of the NWT has doubled in recent decades. Permafrost thawing is responsible for shorter ice road seasons, potholes and slumping of all-weather roads. An example is the rolling effect of the old Highway 3 between Yellowknife and Behchoko, a road that was built in an ice rich permafrost area. Degradation of permafrost is also related to the frequency of water quality (or boil water) advisories, an indicator of the sediments in northern water systems. Contamination of groundwater, a growing concern in northern communities, is also related to melting permafrost. Permafrost degradation can be stimulated by accumulations of snow or vegetation on the surface of capped waste disposal sites. These materials insulate the ground, prevent cooling, and contribute to permafrost decay.

Adaptations

Managing and adapting to the impacts of climate change on industrial development and infrastructure require observation, monitoring and sharing experiences and remedies. The GNWT Department of Transportation recognizes the value of others' experiences and has brought staff together to catalogue problem areas and share observations and remedies. Collecting and analysing data over a long period of time strengthens the capacity to understand and manage change.

Sharing experiences facilitates linkages between traditional and scientific knowledge. Dialogue involving different disciplines or sectors of society can also encourage sharing of technologies and improve the capacity to allocate appropriate resources to support alternative designs and technologies. For example, passive technologies such as thermo-siphons used to stabilize permafrost in the mining industry in Yellowknife, may offer alternatives to decaying wooden pilings in Inuvik. Using new technologies, different ice-road construction techniques and building permanent structures across streams and rivers have extended the life of public winter roads and can have the same effect on ice roads serving the mining industry. Design features that stabilize airstrips built on permafrost, were incorporated into the rebuilding of NWT Highway 3. These features include wider embankments, decreased slopes, and priority to keeping the shoulders insulated and water off the road. Lessons from managing waste disposal sites in municipalities are being applied in the mining industry to manage mine tailing ponds. In this

regard, tailing ponds are kept free from snow and vegetation build-up; structures are kept as flat as much as possible; and efforts are made to smooth the slopes.

Reducing reliance on fossil fuels is a basic action that industry, governments and individuals can take to mitigate and adapt to climate change. Seeking replacement energy options that generate less carbon dioxide (CO_2) emissions such as natural gas, wind energy, solar or hydropower, requires collaborative action to build on the experiences of others and lessons from the past. In the NWT, wind energy may be appropriate for some communities but not for others. For those communities where it is appropriate, we need to recognize that attitudinal, historical or political issues are often greater barriers than technology. We also need to recognize that producing wind energy in the NWT is challenged by: 1) lack of trained personnel to work with this technology, and 2) lack of monitoring data to determine the most viable sites for wind energy production. (An evening of the Summit was dedicated to an exploration of wind energy. These presentations are referenced on page 40)

To reduce reliance on fossil fuels, northerners need to focus on developing proven alternatives and invest in a long-term alternative energy strategy rather than only pursuing short-term pilot projects. To this end, northerners need to lobby senior levels of government to support the development of alternative energy sources that are appropriate for the north. Some suggest that this lobby effort should call for the reinvestment of resource royalties in the development of a long-term alternative energy system for the north.

Improving use of environmental assessment processes can facilitate efforts to address climate change impacts on industrial developments and infrastructure. For example, under the precautionary principle contained in the Canadian Environmental Assessment Act , consideration may be given to climate change in environmental assessments in two ways: 1) how a project will contribute to greenhouse gas emissions, and 2) how a project will be impacted by climate change. While these considerations may not cause a project to be rejected for reasons of climate change, project proponents might be required to reduce greenhouse gas emissions, consider alternative energy sources or make other adaptations.

Adaptations to climate change may be made easier with a broader view of industrial development and infrastructure in planning and assessment processes. In this regard, northerners tend to agree that project-specific approaches do not serve their best interests especially given the relationships between industrialization and climate change. Some people also suggest that a broader industrial development plan should be developed that considers for example, the consolidation of developments in a main corridor (e.g. roads, natural gas pipeline, oil pipeline, etc.) rather than spreading industrial activity throughout the north.

Research and public education are fundamental to enabling northerners to recognize that we are on the front-line of climate change impacts. To support climate change awareness and

adaptations, a climate change research or engineering centre should be established in the NWT. The centre could be a focal point for multi-disciplinary work to support northerners to learn to live with climate change.

4. Community Infrastructure

Impacts

Climate change has the potential to severely increase the costs of building and maintaining community infrastructure. Safety and liability concerns may also increase. New safety and liability issues could lead to changes in the insurance industry and the potential for more, and more costly litigation processes.

Community water quality impacted by permafrost melting, spring run-off, erosion and flooding, may require new water sources or treatment processes to address damages to water intake systems, increased turbidity, and less potable water. Sinking or slumping land due to permafrost degradation could increase the potential for odours and contamination from solid waste facilities and sewage lagoons, and cause serious drainage and surface degradation issues on NWT roads. Managing these impacts may require new treatment strategies and facilities, different designs and construction materials, and maintenance and repair strategies. Disappearing permafrost can also affect the stability of tank farms, local cemeteries and contribute to the failure or cracking of pilings and foundations. Permafrost degradation also contributes to movement in buildings and utilidor systems, and increases public health and safety risks. Currently, an estimated 100 metres of the 16.9 km of utilidor system in Inuvik is at risk of failure due to permafrost thawing.

Higher winds and more precipitation in winter will cause additional snow loading and stresses on buildings and other community infrastructure. This will reduce the lifespan of buildings and add to liability and safety issues. Warmer winter temperatures may mean lower energy costs but a shorter winter road season or barging season may increase the costs of municipal operations in remote locations where materials and fuels must be airlifted.

Warmer temperatures and increased precipitation offer the potential for more hydropower production. However, the impacts of anticipated increases in evaporation rates and annual levels of runoff, make it difficult to project the effects on water levels. Planning for the future will need to accommodate these uncertainties. The recent failure of a dike at the Snare hydro plant is an example of the unexpected challenges that may arise. Increased precipitation and/or the presence of warm moist air conditions in the early winter may contribute to frost build-up on transmission lines. These conditions have been observed in the north in recent years. This affects the power supply and increases the costs of line maintenance (e.g. due to patrolling of lines and using helicopters to knock hoarfrost off lines).

"Climate change should never be seen as stand-alone issue"(Summit participant).

"Every community decision should consider climate change" (Summit participant).

Adaptations

The world's eyes are on the north and the way that we manage and adapt to climate change. At the present time, communities are doing their best to understand and react to climate change impacts. To a large extent, reactions are fragmented, 'trial and error' measures that underscore the lack of understanding of climate change impacts on community infrastructure. Adaptations tend to include relocation and remediation measures, design revisions (e.g. to alter spacing, accommodate pads, wedges or screwjacks, adjust crawl spaces), and efforts to use alternative construction materials, energy sources and water systems. Long-term, predictable funding together with incentives or taxes that encourage more responsibility for managing and adapting to climate change would be helpful to NWT communities. Improving the inspection regime and encouraging better building and maintenance practices and designs could also help communities to address climate change impacts. Consistently using clear, plain language to promote understanding of climate change impacts can also foster collaborative adaptations because more people are aware that they share common problems.

"If we knew what would happen in local areas, we could plan" (Summit participant).

Communities lack capacity to do research and the resources to consider the broad range of adaptations that might be available to address climate change impacts or safety and liability issues. To support management and adaptation of climate change impacts on community infrastructure, a climate change engineering/research centre and clearinghouse is needed. The centre could produce or assemble research on adaptations for example, on waste disposal, sewage treatment, paving materials, road and housing designs, construction materials and liability and safety issues. The centre could also serve as a focal point for developing much needed codes and guidelines to assist communities to manage and adapt to climate change impacts (e.g. new municipal effluent guidelines, snow loading criteria, building codes, design conditions, road and building inspections standards and guidelines). The centre might also be a focus for work to develop alternative energy technologies, foster climate change partnerships, and fund community-based innovations and research.

"We should share knowledge like we used to" (Summit participant).

Risk management techniques are often very appropriate for managing and adapting to climate change impacts on community infrastructure. While these techniques do not eliminate risks, they can help communities cope with the uncertainties associated with climate change. Risk management techniques also provide opportunities for decision makers to involve community members in planning and implementation. Adopting risk management techniques might also provide an opportunity for NWT communities to work with the insurance industry to consider mutually beneficial approaches to addressing climate change impacts.

Addressing Climate Change in the North - Success Stories

Chief Gary Harrison, Chair of the Arctic Athabaskan Council, spoke to the need to reinvest revenues from non-renewable resource extraction in alternative energy sources. "*We need to have local ownership of resources and the revenues from these resources should help to develop renewable energy sources. We need to move towards hydrogen technology and use it locally for our energy needs.*" The Energy Summit in Alaska planned for October 2007, provides an opportunity for indigenous northerners to advocate for a central role in evolving alternative energy sources.

Michael Westlake of the Canadian Climate Impacts and Adaptation Research Network (C-CIARN) in Yukon highlighted several initiatives in that jurisdiction to understand, manage and adapt to climate change. These include forest management activities, research needs surveys, climate change and risk management assessments, and work toward a Yukon climate change research and cold climate innovation centre (see presentation reference, page 40).

In the NWT, the focus of the four-year old Whati Sustainability Community Project is a small, local hydro plant. This community-based and supported initiative is a model for its potential to replace fossil fuels, reduce energy costs and improve air quality. The community of Whati is now sharing its knowledge and innovations with neighbours in the community of Gameti.

In Inuvik, the Gwich'in invested in a heat recovery project and in facilitating the conversion of several local buildings from diesel fuel to natural gas. The Gwich'in have found that seeking alternative energy solutions is frequently challenged by the lack of information from which to monitor change, and the extent to which individuals and communities are prepared to do what is necessary to promote renewable energy.

In Deline, the elders are among those who have considered hydropower as an alternative source of energy for their community. They worry however, that hydropower on the nearby Bear River may negatively impact aquatic life or produce flooding and other negative impacts that have been associated for example, with HydroQuebec's development in the James Bay Region. These are reasons that the community has not moved forward on this option. Solar power and wind have also been considered due to the generally high winds in the area.

Adaptation Planning in the North

In 2003, the Government of Nunavut completed the Nunavut Climate Change Strategy. The Strategy was based on several regional traditional and community knowledge studies and observations. It seeks to control and reduce greenhouse gas emissions, identify and monitor climate change, and develop adaptation strategies. Information on adaptation planning in Nunavut communities is provided in Jackie Bourgeois' presentation (see presentation reference, page 40).

The Government of Yukon's climate change strategy focuses on greenhouse gas reduction and adaptation mainly within government. The Government of the Northwest Territories (GNWT) will complete revisions to the 2001 greenhouse gas strategy before beginning work on a climate change impacts and adaptation strategy. However, various GNWT department/agencies are conducting research to consider the adaptations needed to address permafrost and sea ice degradation, and potential risks for northern forests. These departments will be working collaboratively with northern communities and organizations to address climate change impacts.

"Adaptation planning is a holistic event that no order of government can do themselves"(Summit participant).

"*It is agreed that no matter what we do, impacts will still occur, which is why adaptation is so important. Think to the future: what are the most important things that we need to think about now*?"(Summit participant).

NWT leaders considering the impacts of climate change, particularly with respect to community infrastructure, are clear that adaptation is part of all community decisions and should involve local citizens. The framework or approach to planning for climate change adaptation is transferable from any number of disciplines. In the Caribbean and in Ontario, a risk assessment framework is used to target vulnerable areas, assess possible risks and strategize to manage and monitor risks. Land use and community sustainability plans developed in some NWT and Nunavut communities provide other frameworks for climate change adaptation planning.

Whatever the framework used, climate change adaptation planning needs to:

- √ Recognize that it is not possible to know or predict everything but do the best with what is known and be prepared to change.
- √ Give the highest priority to people, resources and infrastructure most likely to be impact.
- √ Use clear, consistent language to promote understanding and communication.
- √ Focus on collaboration, openness to change and new ideas, and sharing traditional and scientific knowledge.
- √ Apply best management practices to complement and strengthen adaptation plans.
- √ Remember that the best actions involve mitigation and adaptation.

Adaptation planning needs to engender hope and make best use of available tools. In most cases, it is a matter of becoming conscious of climate change and taking practical, 'doable' action to address it. There are numerous resources, tools and technical solutions available to help. Of primary importance is recognizing and building on the strengths in our own communities; engaging youth; and looking at ways to live more simply and 'thread more lightly on Mother Earth'.

"*We've got some really good past experiences. For example, Gwich'in land use planning is no different than the adaptation approach that Nunavut is taking. The plans give certainty to developers but involve people in these decisions. A long term strategy is needed to address climate change*" (Summit participant).

"We should observe the animals for changes in their behaviour because it probably indicates changes in their environment"(Summit participant).

"This is a very delicate, important and stressful time for people in the north. There's lots of work that is being done in the Valley region, but climate change and resource development are likely going to come at the same time. We are overwhelmed by the information out there, and we need regulations in place to govern resources and help communities. But it seems like there are very few regulations that are out there… The communities need help coming up with adaptation plans, and they need it now"(Summit participant).

Moving Forward – Community and Regional Priorities

Leaders in the NWT met in geographically similar areas to consider climate change impacts of greatest concern, actions needed and their next steps as champions and leaders.

Beaufort-Delta

Concerns

In Aklavik, flooding has been a concern for decades. Flooding can threaten human lives as well as impact wildlife and community infrastructure. In recent years, increased precipitation has led to concerns about flooding, changes to vegetation and increases in flies and mosquitoes. Tsiigehtchic has three main concerns: 1) safety issues associated with riverbank erosion; 2) changing freeze-up and break-up patterns, and river ice conditions that impact human travel and harvesting activities and create potential liabilities (e.g. movement of the landings at the Arctic Red ferry crossing); and 3) the appearance of different bird, fish and animal species and the uncertainty this creates (e.g. polar bear, blue heron, steel head salmon and albino loche). In Inuvik, the main concern is permafrost thawing and the resulting impacts on local infrastructure. Sewer systems and roads are particular concerns. In Tuktoyaktuk, erosion of the Beaufort Sea shoreline continues despite significant investment to arrest it. While coastal erosion may be temporarily halted near the community, erosion is occurring elsewhere along the shoreline. The community expects that the local school and graveyard may have to be moved.

Actions and Next Steps

Leaders in Tsiigehtchic know that they must talk to governments and others about their concerns and plan for ways to manage and adapt to climate change impacts. They know that climate change impacts must be an integral part of revised community and capital plans. Leaders in Tsiigehtchic know they have much to learn from others. For example, experiences in Fort Smith dealing with riverbank erosion including the social costs associated with (re)dislocation, would be instructive to leaders in Tsiigehtchic.

Inuvik leaders agree that other communities' experiences are important but they also know that solutions can be found locally. In Inuvik, some residents feel that the lay-out of the community is incompatible with the natural drainage system likely because local people weren't an integral part of the town's design. Similarly, portions of the Dempster Highway that are now problematic were built against the advice of the elders because the engineers thought they knew better. Inuvik leaders will encourage all levels of government to respect the advice and wisdom of local residents in climate change adaptations.

Leaders from Tuktoyaktuk also know that they are living with the consequences of bad or failed planning. When the community was developing in the 1970s, more priority was given to industry than to local needs. Today the community has a subdivision several kilometres away from the rest of the population and this challenges the efficiencies of municipal services. Leaders in the community recognize the need to learn from past experiences.

Next steps for Beaufort Delta champions and leaders are to focus on information sharing at the community level and raising the profile of climate change. The GNWT's 'new deal' will transfer responsibility for capital planning from the Department of Municipal and Community Affairs to communities. The transfer of decision-making responsibilities and resources will create a new opportunity for communities to heighten the profile of climate change and incorporate climate change into capital plans and other community initiatives. A 'natural step process' started in Sweden provides a guide for helping local leaders and businesses to put climate at the forefront of their local processes.

Leaders in the Beaufort-Delta want information on best practices and regular dialogue with neighbouring communities about problems and solutions associated with climate change impacts. They are aware that the Internet is a good source of information on climate change. Using the Internet is a good way to engage youth in community adaptations. The International Polar Year (IPY) is another source of information and expertise to manage and adapt to climate change impacts.

"*We have to develop a mindset of thinking globally and acting locally. We don't need to reinvent the wheel. There's so much information out there from other communities. The most unlikely spot is where you'll find the information you need"*(Summit participant).

Central Mackenzie (Sahtu and North Deh Cho)

Concerns

Leaders in the Sahtu and Deh Cho are concerned that rising temperatures will contribute to thinning ice, the potential for drought, uncertain freeze-up and break-up cycles, stronger ultraviolet rays, algae growth, unhealthy fish, erosion and slumping into the Mackenzie River and tributaries, water contamination, and drowning or drunken trees. Leaders also note the uncertainty associated with changes to wildlife habitat and migration patterns including the arrival of new species in the region. Magpies and white-tailed and mule deer are among the new species found in the central Mackenzie. Leaders are aware that mule deer carry ticks that are a serious threat to caribou and moose. Leaders in the Sahtu and Deh Cho also note that wolves are coming into communities and that the range of grizzly bears is changing. These changes could pose safety issues for regional residents.

Central Mackenzie communities are concerned about water quality and the safety of traditional food sources, particularly fish. They are worried about unusual weather activity and sudden storms, and the risk that this poses for regional residents travelling on the land. They are concerned about thawing permafrost and the effects of the proposed Mackenzie Gas Project. To lessen some impacts, regional residents are turning to different hunting and fishing areas, growing more dependent on technology (e.g. GPS and satellite phones), and seeking more education.

"Native people understand that the whole world is interconnected, each thing affects the other. (We need to) start collaborating to start heading in the other direction" (Summit participant).

Actions and Next Steps

Next steps for Central Mackenzie champions and leaders focus on lobbying government and industry to work with communities to do research and take measures to address climate change impacts. Leaders in the Deh Cho and Sahtu want to see more emphasis on 'clean' energy and more resources invested in local communities to address climate change impacts. They know that they need to encourage community members to change their habits and attitudes, use existing research, participate in educational workshops, learn about and use new technologies, and share information with others. Leaders also need to improve land use practices and advocate for better controls to prevent damages to the environment. Leaders need to be role models. They need to remember that everything is connected, and to live traditions so they are better stewards of the environment. Leaders also need to encourage people to take responsibility and reclaim their power to be self-sufficient. They need to encourage individual and collective responsibility for climate change so people do not turn inwards or turn away and become destructive and angry.

Tlicho Region including Yellowknife and the Mining Industry

Concerns

Impacts on community and industrial infrastructure due to permafrost degradation are main concerns among leaders in the Tlicho Region. A shorter winter road season, all-weather road degradation and a breach in a dike at the Snare hydro plant power project are specific examples of regional concerns. The risk of forest fires is also troublesome for the havoc and safety issues that fires raise for animals and humans. Leaders in the Tlicho Region are also concerned about the caribou. Changing habitat and climatic conditions combined with new technologies of high-powered guns, faster snow machines and the like, increase the vulnerability and stresses on caribou and other wildlife populations and threaten the Tlicho "*way of life"*. Leaders in the Tlicho also know that the people are worried about travel on the land with uncertain weather conditions and the arrival of new wildlife species such as cougars, coyotes and certain types of insects.

Actions and Next Steps

Companies in the Tlicho are using new technologies to manage thin ice conditions. For example, ice-profiling, low-pressure vehicles and ice-building technologies are being used to strengthen ice roads. Leaders in the Tlicho Region have also considered building an all-weather road. Tlicho communities and the mines working in the Tlicho Region are investing in alternative energy sources (e.g. hydropower and wind) to replace diesel and diminish reliance on winter roads. Communities are developing signage and distributing information about safer travel routes on the land.

Leaders in the Tlicho are clear that more information, discussion and investment are needed to manage the effects of climate change. Their priorities for action are: 1) reduce stress on the caribou by reducing the harvest and shifting to other species (e.g. moose and muskox); 2) integrate traditional and scientific knowledge in climate change adaptations; 3) invest in and adopt new ways and technologies to reduce greenhouse gas emissions (e.g. mini hydro, solar, wind sources); and 4) seek changes in public policy to support local adaptations to climate change.

Next steps for champions and leaders in the Tlicho are to work on the above priorities. Also, the Tlicho Government will consider changing policies and procedures with respect to land use permits (e.g. require companies using the land to use 'clean' energy/technologies). Leaders in the region will also lobby the federal government to adopt similar 'clean' energy policies; invest in developing 'clean' energy sources for the north; and work closely with communities and industry to manage and adapt to climate change.

Tlicho leaders will promote the message that everyone has to take responsibility for dealing with climate change and protecting the integrity of the environment. "*Everyone should reduce what they take from the land while it adapts…Take only what you need from the environment, rather than what you desire*." Tlicho leaders agree that a central office for climate change planning and resources is needed to support communities and others to manage and adapt to climate change. They will work toward making this office a reality.

South Slave

Concerns

Leaders from South Slave communities recognize the central role that water plays in the ecosystem. They are concerned about the changing conditions of water and water systems. Floods and fluctuating water levels are worrisome. There is fear that periodic droughts due to both natural climate variability and systematic climate change, and increasing water use by tar sand developments in northern Alberta will impact on water systems in the region more significantly in the future. Communities in the South Slave are also concerned about unpredictable weather patterns and the impacts this has for the movement of people and animals on the land, as well as the survival of various wildlife species.

Actions and Next Steps

Leaders in the South Slave are aware that some past water/water systems monitoring activities have been reduced or abandoned (e.g. the Athabasca River Basin Board). Further, southern jurisdictions and northern groups like the NWT Power Corporation don't seem to share monitoring information or research, even if it is available. Leaders want to see water management regulations and trans-boundary agreements updated to recognize the impacts of climate change on water systems. They also want to see regulations and agreements enforced. They want more baseline studies, ongoing monitoring of water levels and improved communications between the NWT Power Corporation and local communities. Ongoing dialogue and research are also needed to strengthen links between climate change and water systems, and associated impacts on wildlife populations and human activity.

The next steps champions and leaders in the South Slave can take are to lobby governments and industry for policy changes, more monitoring and accountability with respect to reducing greenhouse gas emissions and mitigating and adapting to climate change impacts. Locally, leaders can send the message that everyone has a responsibility to address climate change. They can communicate that: "w*e must only take what we need. We cannot take at the same rate we are doing right now."*

Leaders from the South Slave agree that they will promote walking, recycling, environmental sensitivity, and using renewable energy. They will take responsibility to learn more about

climate change and share their knowledge with others. Leaders in the South Slave will also work to strengthen connections with the land and with elders in order to better understand and cope with climate change. Leaders in South Slave communities will also consider establishing local climate change committees; conducting local research on climate change impacts; and developing local adaptation plans. The leaders will also advocate for a central office for climate change information, planning and implementation supports.

"In the end, the onus is on us to solve this problem"(Summit participant).

"Your mind and your heart have to be healthy and healed before you can heal the land and water" (Summit participant).

Sharing Our Commitments

In keeping with northern traditions of sharing, 45 leaders and resource people participated in the closing circle to share personal and professional commitments for taking action to plan for, manage and adapt to climate change in the NWT.

"This is something that is real and needs to be addressed. Climate change has been talked about for years, but this is the first chance we've had to get the necessary information on what could happen to our communities" (Summit participant).

Leaders in the NWT thanked the Dene Nation and Ecology North for organizing the Summit and for opening their eyes to the realities of climate change. Leaders and resource people noted that the Summit was a very good learning experience. Several commented on the high quality of the information shared by other leaders and resource people. Those who have been working on this issue for some time, felt a sense of renewal now that others understand the seriousness of climate change.

"Our cause is right and we are doing the right thing"(Summit participant).

There is a strong commitment among leaders in the NWT to share their understanding about the realities of climate change with their Councils/ organizations, communities and others. They will work hard to keep the issue front and centre in discussions. They will also work hard to get resources to help northerners manage and adapt to climate change.

Leaders are also strongly committed to encouraging and supporting people to take responsibility

for minimizing their impact on Mother Earth. They will take personal responsibility, look within themselves for solutions, and work hard to reduce what they take and use of the earth's resources. Leaders will take strength from the elders, follow their advice and work to build bridges among people with different types of knowledge. *"The elders are with us"* and there are many others also concerned about, and working to address climate change.

"Before I came here I thought it [climate change] was just a cycle...if it's a cycle, it's a pretty big cycle!" (Summit participant).

Leaders in the NWT will use a variety of media and events to explain the importance of climate change. They will work hard to involve youth and others. Many leaders would like to see more workshops on climate change and will support gatherings that follow-up on this Summit. At least one leader will be working to organize a forum for youth in the Beaufort-Delta region. Another will work with elders and young children in Aboriginal Headstart programs. Others will share Al Gore's movie *An Inconvenient Truth* with their people. Others made commitments to follow-up on elder's prophecies and to recognize the power of prayer.

Some leaders committed to encouraging other leaders to take the people back to reconnect with the land. Other leaders committed to sharing the experiences of northerners so we can help and give hope to others in world. Several resource people committed to working to influence public policy in order to support communities to manage and adapt to climate change. Another will produce a plain language guide on climate change. Personal commitments focused on "*thinking about every decision and its effect on Mother Earth."*

"We are not alone. Maybe it is the Creator's plan to force us to work together. This is a first step and we need to move forward together"(Summit participant).

Summit Participants, Presenters and Resource People

Name and Affiliation

Andrew, Frank, Chief, Tulita Band Council
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Baillargeon, Alfred, Yellowknives Dene First Nation
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Benoit, France, Ecology North
Berrub, Myra, NWT Power Corporation
Bevington, Dennis, Member of Parliament, Western Arctic
Boucher, Maurice, Aurora College
Bourgeois, Jackie, Environment, Government of Nunavut
Braden, Bill, Member of the Legislative Assembly of the NWT
Bromley, Bob, Ecology North
Brown, Terri, Dene Nation
Buckle, Annie, Aklavik Indian Band
Carpenter, Larry, Wildlife Management Advisory Committee Inuvialuit Settlement Area
Carpenter, Wade, Environment and Natural Resources, GNWT
Carr, John, NWT Association of Professional Engineers, Geologists & Geophysicists
Codille, Dolphus, Acho Dene Koe First Nation
Cook, Shirley, Dene Nation
Corriveau, Andre, Health and Social Services, GNWT
Cousineau, Greg, Dept of Transportation, GNWT
Crapeau, Rachel, Akaitcho Territory Government/Yellowknives Dene First Nation
Deneron, Dennis, Trout Lake
Desjardins, Brian, Local Government Administrators of NWT
Douglas, Al, C-CIARN Ontario
Duxbury, Pat, Mackenzie Valley Environmental Impact Review Board
Erasmus, Bill, National Chief, Dene Nation
Erasmus, Eddie, Tlicho Government
Football, Charlie , Tlicho Community Government of Wekweeti
Fowler, Aleta, Indian and Northern Affairs Canada
Freeland, Erin, Arctic Indigenous Youth Alliance
Gon, Henry , Chief, Tlicho Community Government of Gameti
Gonzalez, Yvette, Association of NWT Communities
Green, Dean, Arctic Energy Alliance

Greenland, Bobbi Jo, Gwich'in Council International
Groenewegen, Jane, Member of the Legislative Assembly of the NWT
Hamre, Karen, NWT Protected Areas Strategy
Handley, Joe, Premier of the NWT
Harrison, Gary , Chairperson, Arctic Athabaskan Council
Henry, Mark, City of Yellowknife
Huebert, Ed, DeBeers Canada Inc.
Ireland, Margaret, TthedzehK'edeli First Nation
Jackson, Lucy, A/Chief, Kashogotine Charter Community
Jasper, Jesse, Environment Canada
Jones, Larry, NWT Housing Corporation, GNWT
Jumbo, Dolphus, Chief, Sambaa K'e First Nation
Kearsay, Tara, Dennis Bevington's office
Kertland, Pam, Natural Resources Canada
Knotsch, Cathleen, Inuit Tapirisat Katami
Kochon, Richard, Chief, Behdzi Ahda First Nation
Kochtubajda, Bob, Environment Canada
Koe, Bonnie, Aklavik Indian Band
Kolkelj, Steve, Indian and Northern Affairs Canada
Kuptana, Fred, The Joint Secretariat-Inuvialuit Renewable Resources Committee
Lafferty , Leon, Chief, Tlicho Community Government of Behchoko
Lafferty , Richard C., Flash Point Facilitators Ltd.
Lakusta, Tom, Environment and Natural Resources, GNWT
Landry, Bernadette, Chief, Deh Gah Got'ie Dene Council
Landry, Ed, Aurora College
LaRochelle, Bernard, NWT Federal Council/Rural Secretariat
Lavoie, Chantal, Vice-President NWT Projects,DeBeers Canada Inc.
Lee , Sandy, Member of the Legislative Assembly of the NWT
Lee, John, Ecology North
Lennie , Terrance, Sachs Harbour Hunters and Trappers Association
Lennie, Freddy Youth, Pehdzeh Ki Dene Band
Lennie , Tim, Chief, Pehdzeh Ki Dene Band
Lenoir, Sonnie, Dene Nation
Lie, Tom, Local Government Administrators of NWT
Lindsay, Derek, Mayor, Town of Inuvik
Little, Lois, Lutra Associates
MacDonald, Gord , Diavik Diamond Mines
Mackenzie, George, Grand Chief, Tlicho Government
Malcolm, David, Arctic Energy Alliance

Malgokak, Peter, Mayor, Hamlet of Ulukhaktok
Martin, Johanna, Environment, Government of Yukon
McLeod, Michael, Minister, Environment and Natural Resources, GNWT
McLeod, Robert, Member of the Legislative Assembly of the NWT
Menicoche, Kevin, Minister, Transportation, GNWT
Mercredi, Travis
Meredith, Tayna, Aurora College
Michel, Brenda, Lutsel Ke First Nation
Moghal, Zainab, Gartner Lee
Moosenose, Michael, Community Government of Whati
Naden-Holder, Denise, Native Women's Association
Nerysoo, Richard, Chief, Inuvik Band Council
Neyelle , Charlie, Chief, Deline First Nation
Nitsiza , Albert, Tlicho Community Government of Whati
Nitsiza , Alfon-sez, Tlicho Community Government of Whati
Nitsiza , Charlie J. , Chief, Tlicho Community Government of Whati
Nogasak-Thrasher, Jackie , Hamlet of Tuktoyaktuk
Norwegian, Keyna, Chief, Liidlii Kue First Nation
Norwegian, Yvonne, TthedzehK'edeli First Nation
O'Rae, Brent, Indian and Northern Affairs Canada
Ordell, Michael
Papier, Michel, Yellowknives Dene First Nation elder
Paquin, Emery, Environment and Natural Resources, GNWT
Paulette, Francois, Smith's Landing First Nation
Prior, Jake, Pembina Institute
Proctor, Tammy, K'asho Got'ine Charter Community Council
Rabesca, Jimmy B., Community Government of Whati
Ritchie, Doug, Ecology North
Robinson, Andrew, Arctic Energy Alliance
Ross, Peter, Chief, Gwichya Gwich'in Council
Sandiford, Katharine, C-CIARN Yukon
Scott, Craig, Environment and Natural Resources, GNWT
Singer, Claire, Ecology North
Sluiman, Bill, Indigenous Cooperative on the Environment
Smith, Duane, President, Inuit Circumpolar Council Canada
Sparling, Jim, Environment and Natural Resources, GNWT
Stevens, Jim, Hamlet of Tuktoyaktuk
Stoesz, Rosella, Ecology North
Stone, John, Carleton University

Sutendra, Siva, Municipal and Community Affairs, GNWT
Thom, Lee Maria, Deh Cho First Nation
Thomas, Sharon, NWT Status of Women Council
Tobac, Henry, Kashogotine Charter Community Council
Tsetta, George
Tsetta, Isadore, Yellowknives Dene First Nation elder
Van Tighem, Gordon, Mayor, City of Yellowknife
Weis, Tim, Pembina Institute
Westlake, Michael, C-CIARN Yukon
Willett, Mindy, World Wildlife Fund
Wilson, Leslie, Environment Canada
Yakelaya, Norman, Member of the Legislative Assembly of the NWT
Zaloum, Charles, Natural Resources Canada
Zoe, Sonny, Tli Cho Community of Whati
Zoe-Chocolate, **Camilia**, Dene Nation

NWT Climate Change Leadership Summit: A Call to Action

January 15 -17 2007 – Katimavik A, B, C, Explorer Hotel, Yellowknife, NWT

AGENDA

Purpose

To provide a forum where leaders in the NWT can receive information about climate change impacts in the NWT and discuss what they can do about it.

Objectives

Leaders in the NWT will:

- learn important information about the impacts of climate change in the NWT.
- find out what is being done to reduce the impacts of climate change.
- hear northern success stories about managing and adapting to the impacts of climate change.
- discuss next steps and actions to support communities, regions and others in the NWT to plan for, manage and adapt to climate change.

Outcomes

As a result of participating in the Climate Change Leadership Summit, leaders in the NWT will:

- √ be more knowledgeable about climate change impacts and how they can reflect this understanding in community and regional plans and initiatives.
- √ have clearer direction on the next steps to take to develop plans and initiatives to manage and adapt to climate change.
- √ take action and champion actions to plan for, manage and adapt to climate change.

Day One – Registration and Introduction - Monday, January 15h, 2007

2:00-5:00pm & 7:00-9:00pm *Registration at the Explorer Hotel*

3:00-5:00pm *Bus Tour*

This tour will start at the Explorer Hotel. Participants will visit buildings in Yellowknife that have installed up-to-date energy saving devices. This tour will be available again on Wednesday night, January 17.

7:00-9:00pm Film Night: An Inconvenient Truth: A Global Warning Katimavik C

The United States like Canada uses a huge amount of energy, which is one of the major causes of climate change in the NWT and the rest of the Arctic. What North America does or does not do will have a major impact on the Arctic. In this film, former U.S. Vice-President Al Gore talks about climate change and the impact it is having on our planet and what it will do in the future. This evening session will be open to the public and all Summit participants. Michael

Miltenberger, MLA will introduce the film. Doug Ritchie, Ecology North, will moderate the discussion.

Day Two – Climate Change Impacts in the NWT -Tuesday, January 16th, 2007

8:15 am *Registration at the Explorer Hotel*

******COFF EE AND MUFFINS******

Katimavik B

8:45 - 9:00 *Call to Order* - Lois Little, Summit Facilitator

Welcome and Opening Prayer – Rachel Crapeau, Yellowknives Dene First Nation, Lands and Environment Committee

Opening Remarks by Summit Chair - Bernard LaRochelle, Canadian Rural Secretariat/ NWT Federal Council

9:00- 9:10 Introductory Comments - The Honourable Michael McLeod, GNWT Minister of Environment and Natural Resources

9:10- 9:20 Review of Summit Agenda – Lois Little

9:20- 9:30 An Introduction to the Summit - Bob Bromley, Ecology North

Bob Bromley will speak on the realities of climate change and responses to it. He will distinguish between mitigation and adaptation measures.

9:30 - 10:30 The Science of Climate Change - Bob Kochtubajda, Environment Canada

Bob Kochtubajda will speak on the impacts of global climate change particularly in the Arctic. Q&A will follow the presentation.

10:30 -10:45 ******BREAK*******

10:45 -12:00 NWT Perspectives on Climate Change

Duane Smith, President of the Inuit Circumpolar Council Canada and Bill Erasmus, Dene National Chief will offer northern perspectives on climate change impacts and thoughts on adaptation and management. A brief Q&A will follow each presentation.

12 Noon to 1:15 pm ******LUNCH IN KATIMAVIK A******

12:30 pm ******VIDEOS IN KATIMAVIK C******

Doug Ritchie will introduce two videos on climate change - the Arctic Climate Impacts Assessment video (22 min.) and the Dene Nation video on climate change (12 min.).

1:15-3:00 pm *Climate Change Threats and Opportunities (Small Groups)*

Leaders will participate in one of four small group sessions: 1) Wildlife and Renewable Resources, 2)Traditional Economy and Well being, 3) Industrial Development and Infrastructure, or 4) Community Infrastructure. The small group sessions will follow a 'talk show' format, with a facilitator or host to introduce the topic, moderate a short panel presentation and facilitate discussion among participants. Small groups will:1) identify the threats and opportunities associated with climate change happening now and anticipated in the future, and 2) identify areas where more research is needed.

3:00-3:30 ******NETWORKING BREAK IN KATIMAVIK C******

3:30-3:45 *Reports from Small Groups*

Each group will have 4 minutes to present main threats, opportunities and research needs.

3:45-4:45 *Addressing Climate Change in the North - Success Stories*

Short presentations by Chief Gary Harrison, Chair of the Arctic Athabaskan Council and Michael Westlake of the Canadian Climate Impacts and Adaptation Research Network in Yukon will inspire leaders in the NWT to share stories and concrete examples of successes managing and adapting to the impacts of climate change.

4:45-5:00 *Wrap-Up and Introduction to Day Three and the Tuesday Evening Session*

7:00-9:00 pm *Wind Energy: Making it Happen in the NWT* ***Katimavik C***

Wind energy can reduce our use of imported diesel. To date, there have been problems using it in the NWT. What are the challenges? What are the opportunities? How do we make it happen? Tim Weis of the Pembina Institute will give a presentation on wind energy, followed by a discussion with panelists, Myra Berrub of the NWT Power Corp, Ric Bolivar of Ryfan Wind Inc., and Dwayne Wohlgemuth of GNWT Industry, Tourism and Investment. This evening session will be open to the public and all Summit participants. Wade Carpenter will moderate.

Day Three – Moving Forward - Wednesday, January 17th, 2007

8:15 - 8:45 am ******COFFEE AND MUFFINS******

8:45 - 9:00 *Welcome Back and Preview of the Day Ahead* – Lois Little

9:00 - 10:00 *Adaptation Planning in the North*

Presentation by Jackie Bourgeois, Government of Nunavut Coordinator of Climate Change Adaptation Programs, and brief comments by Johanna Martin, Government of Yukon and Jim Sparling, Government of the Northwest Territories, followed by a brief Q & A.

10:00 - 10:15 ******BREAK******

10:15 - 12:00 *Tools to Help Us Manage and Adapt to Climate Change Impacts (Small Groups)*

Following the same 'talk show' format as yesterday and working on the same theme, leaders will work with the same facilitators and resource people to identify tools to manage and adapt to climate change. The four themes are:1) Wildlife and Renewable Resources, 2) Traditional Economy and Well being.3) Industrial Development and Infrastructure and 4) Community Infrastructure

12 Noon - 1:00 pm ******LUNCH SERVED IN KATIMAVIK A******

1:00 pm *Reports from Small Groups* **Katimavik B**

Each small group presenter will be allocated 4 minutes to present the main tools and ways they are used to manage and adapt to climate.

1:15-2:45 *Moving Forward (Small Groups)*

In geographically similar groups, leaders will draw from the information shared in the Summit thus far to identify main concerns and priorities in their geographic area with respect to climate change, actions being taken, further action needed and possible next steps champions and leaders can take.

2:45 - 3:00 ******BREAK******

3:00 - 3:15 *Reports from Small Groups*

Each small group presenter will have 4 minutes to present the main concerns, actions and next steps.

3:15 - 4:30 *Closing Sharing Circle*

In keeping with northern traditions of sharing, leaders and resource people will share thoughts or commitments for taking action to plan for, manage and adapt to climate change in the NWT.

4:30 *Summit Closing and Wrap-up*

Final comments from the co-sponsors of the NWT Climate Change Leadership Summit – the Dene Nation and Ecology North.

4:40 *Written Evaluations and Consent Forms*

4:50 *Closing Prayer*

7:00-9:00pm *Bus Tour*

This tour will start at Explorer Hotel. Participants will visit buildings in Yellowknife with installed up-to-date energy saving devices.

7:00-9:00 pm *Well-Being in a Time of Climate Change* **Katimavik A**

Bill Sluiman of the Indigenous Cooperative on the Environment will lead an interactive workshop to explore techniques and approaches for maintaining wellness while adapting to climate change.

Presentations

NWT Climate Change Leadership Summit: A Call to Action

The following presentations and the Summit discussion paper can be accessed through the C-CIARN North website at:

http://www.taiga.net/c-ciarn-north/summit2007/index.html

Welcome and Opening Prayer – Rachel Crapeau, Yellowknives Dene First Nation -- Lands and Environment Committee

Opening Remarks by Summit Chair – Bernard LaRochelle, Canadian Rural Secretariat/ NWT Federal Council

Introductory Comments – The Honourable Michael McLeod, GNWT Minister of Environment and Natural Resources

An Introduction to the Summit – Bob Bromley, Ecology North

The Science of Climate Change –Bob Kochtubajda's presentation; John Stone's presentation

NWT Perspectives on Climate Change – Duane Smith, President of the Inuit Circumpolar Council Canada, Bill Erasmus, Dene National Chief

Addressing Climate Change in the North– Michael Westlake's presentation

Wind Energy: Making it Happen in the NWT

Myra Berrub's, Northwest Territories Power Corporation Presentation

Dwayne Wolhgemuth, GNWT, Industry, Trade, Investment

Tim Weis, Pembina Institute

Adaptation Planning in the North

Jackie Bourgeois's presentation