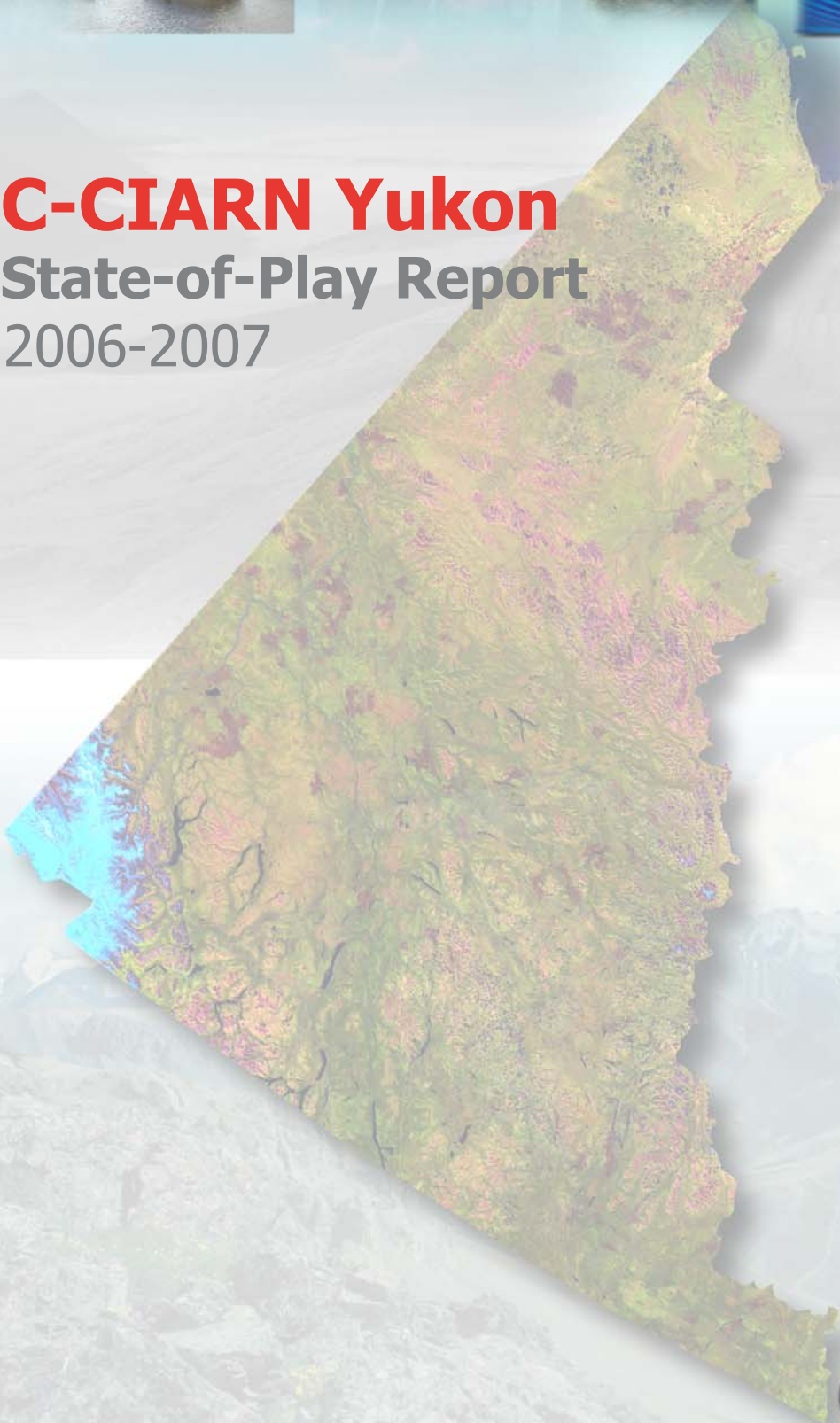




C-CIARN Yukon

State-of-Play Report

2006-2007



C-CIARN North/Yukon – State-of-Play Report

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

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Preface

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

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

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

1. Introduction

Hosted by the Northern Research Institute at Yukon College the Yukon office of C-CIARN North serves as a networking and coordination hub for research and information sharing related to climate impacts and adaptation in the Yukon and also serves as the coordination centre for the C-CIARN North network.

The primary goals of C-CIARN North are:

- To contribute to the co-ordination and interaction of the impacts and adaptation research community to provide greater visibility and understanding of the issues and needs.
- To provide a mechanism for stakeholder involvement in impacts and adaptation research and in developing research priorities.
- To provide a source of information on impacts and adaptation research to communities, governments, business and industry.
- To involve a broader range of researchers in this area in order to increase the climate change impacts and adaptation research capacity in Canada.
- To assist in co-ordination of climate change vulnerability assessments.

C-CIARN Yukon has over 300 members in its network and communicates with over 2000 adaptation researchers and stakeholders on an annual basis. Some of the major accomplishments of C-CIARN Yukon during our first five years in operation include:

- Publication of a “Compendium of Yukon-based Research related to Climate and Climate Change from 1978-2003”
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- Publication of “Research Needs Survey, Literature Review: Previously Identified Research Needs, by Claire Eamer – Mar/Apr. 2004”
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- Publication of “Research Needs Survey, Online Survey Results, by Claire Eamer – Mar/Apr. 2004”
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- Publication of “Research Needs Survey, Yukon Survey Results, by Claire Eamer – July 2004”
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- Construction and continued maintenance of the C-CIARN North’s impacts and adaptation website which receives over 500 hits/day www.taiga.net/c-ciarn-north/
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- Web Resources include our Database for Climate Change Information Sources for Northern Canada <http://yukon.taiga.net/infosources/> (over 2300 entries) as well as the Directory of Climate Change Contacts for the Canadian North <http://yukon.taiga.net/contacts/>
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- The northern node of the Canadian Climate Impacts and Adaptation Research Network played a valuable supporting role in the formation of the Northern Chapter of the Canadian Climate Change Impacts and Adaptation Assessment in fiscal year 2005-06. C-CIARN North was instrumental in the organization and coordination of three stakeholder consultation meetings, one in each of the Territories.
- Organized over 30 workshops for stakeholder engagement throughout the Yukon.

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- Administered and coordinated over the past three years the “Forest Management in a Changing Climate Project”. Intended as the first step in a longer-term process of evaluating climate impacts, assessing risks to ecosystem and community values, and developing scenarios for adaptation, the project aims to support informed forest management decision-making in light of climate change.

2. Key Climate Change Impacts on the Yukon Region

Drawing on outcomes from C-CIARN North Workshops and stakeholder meetings in the past, we were able to synthesize gathered information into three distinct key impacts:

2.1 Hydrological Shifts

a) Degradation of surface level

permafrost: The Yukon has regions of continuous, discontinuous (or sporadic) and no permafrost. As temperatures increase, some of the permafrost will melt and their zones will shift northward.

b) Glacial melt: The St. Elias mountain range contains the 3rd largest terrestrial ice field in the world after Antarctica and Greenland. It contains approximately 1% of the world’s frozen fresh water. All of the glaciers in the region are melting and the rate of recession is increasing. The amount of melt in the last five years already exceeds the melt of the ten years previous.

c) Increased variability in precipitation and storms:

Precipitation patterns are changing and are variable from one sub-region to the next. Some areas are drying out. In June 2005 the Yukon set a record for highest precipitation in a single storm and we also saw the first funnel cloud on record. Storm events are more frequent, including thunderstorms.

d) Hydrological shifts in lakes and rivers:

Shoulder seasons are lengthening. Freeze-up is arriving later and break-up comes sooner. As flow changes so too does the quantity and transport of sediment.

2.2 Species Distribution

a) Tree Line:

Most of the Yukon is treed. However, in the mountains throughout the Yukon, there is a forest / alpine tree line. Studies show that especially on south facing slopes, this tree line is advancing up slope. Elders are saying that regions which were once covered with bush are now becoming forested. Where the tree-line meets the tundra is also expected to move northward.

b) Species Distribution: Some species are moving north. Some, like moose are moving north into new regions. Other shifts are occurring in time rather than place, such as migratory birds arriving earlier, putting them out of sync with other species. Whether this is an advantage or a disadvantage, depends on the inter-relationships between the various species.

c) Caribou: While warmer weather will favour caribou, other impacts create hardships. Winter and spring-feeding has become more difficult due to deeper snows and increased layers of ice on and in the snow. Spring and summer have seen greater levels of insect harassment. It is uncertain what the cumulative affect will be

on the caribou herds, but there is concern as caribou are extremely important to the culture and economy of Yukon First Nations.

d) Fish: As the rivers change in flow volumes, temperatures and sediment load, thus fish habitat, will change. Again, there are no current predictions what the net outcome will be. We do know that there are other downstream influences (which are sometimes climate related) especially for long migration species such as salmon.

e) Spruce Bark Beetle: Severe and persistent outbreaks of insect pests, such as the spruce bark beetle, have been linked to hotter and drier conditions. The spruce bark beetle is becoming a greater problem in the Yukon, as milder winters and springs enhance breeding conditions for the pest. Currently, the beetle has killed 80% of the spruce forest in the Southwest Yukon.

2.3 Impacts on People

a) Infrastructure: Existing infrastructure was built under a different climate. Even small increases in snow load, storm severity & frequency and melting permafrost can directly affect the structural integrity of infrastructure. As new infrastructure is introduced, upgraded designs and plans must take climate change projections into account. However, existing infrastructure remains vulnerable. This potential list includes buildings, roads, pipelines, airports, industrial facilities (such as mines which rely on permafrost) and water supply & disposal systems. Soft infrastructure, such as Emergency Response Plans will also need to be rethought.

b) Opportunities: In a few instances, the impacts will create new opportunity. For

example tourism might see an extended season as a result of milder temperatures during the shoulder seasons. Another potential win is with agriculture. Currently this is a small sector in the Yukon, but an extended growing season along with rising fuel costs for produce transported into the territory may create a favourable environment. In general climate change has brought with it renewed interest in the North. Indirectly then it has created a great deal of opportunity.

c) Traditional Activities and Culture: Fishers and hunters will need to adapt to shifts in the distribution and abundance of fish and wildlife. New species may become viable options, while others will decline in health and abundance. Safety of hunters is a growing concern, as snow, ice and weather conditions are becoming less predictable. These changes to climate might create an interruption or strain in the cycle of passing on Traditional Knowledge. On the whole, changes to the land will likely result in a disruption to First Nation culture.

d) Health: As climate change impacts food security, affecting the availability and access to country foods, it can ultimately affect health. Other health risks include increased ultraviolet radiation exposure and insect born disease. Pests and disease are likely to encounter environments which have not previously been exposed and which are therefore ill-adapted to resist attack.

e) Cumulative Impacts: Climate change is difficult to isolate out. It crosses regions, sectors, ecosystems and human systems. The impacts will tend to accumulate to present an overall strain. For example, climate variability, ecosystem shifts, economic pressure, language and governance issues can and will all combine to impact the well-being of a community. In

order to address the situation, it will be necessary to look at the system holistically on a case-by-case basis. And solutions will likely only be successful if they come from within.

3. Key Stakeholders

The C-CIARN North – Yukon Node maintains one-on-one contact with over 2000 stakeholders and researchers. Many of these contacts stand out as key individuals that must be engaged in order for appropriate decisions be made to reduce risks to the Yukon. In particular, for the above listed key impacts to be addressed, certain contacts should play a crucial role:

Federal Government

Indian and Northern Affairs Canada plays a critical role in managing and supporting climate change adaptation work in the Yukon Territory, and across the North. This includes funding of initiatives and coordination of the Northern Climate Change Coordinating Committee (NC4).

Environment Canada: Representatives from Environment Canada sit on our management committee and play an active role. We collaborate with researchers, the Canadian Wildlife Service and with Environmental Protection Branch on various workshops and projects. Because Environment Canada in the Yukon manages wildlife issues, continued work with these stakeholders is imperative in order for adaptation decisions to be made to reduce the risks of climate change in the region.

Natural Resources Canada: As NRCAN houses the C-CIARN node, we work with them on many levels. This includes their role

as the climate change research directorate, as well as the Office of Energy Efficiency. As we continue to tackle the adaptation issue, NRCAN projects also provide essential work on the mitigation side, which must go hand in hand.

National Round Table on the Environment and the Economy: We have been working with them on developing policy on the role of governments in climate change adaptation and will continue to do so into the future.

Parks Canada: partnerships with individuals on various projects. As they manage parks and protected areas in the territory, they play a key role in observing front-line ground-level impacts.

Territorial Government

Executive Council Office: Executive Council Office (ECO) facilitates the Cabinet decision-making process by providing advice, analysis and other services to Cabinet and its committees and by coordinating policy development and other projects of an interdepartmental nature. Representing the office of the Premier, and the corporate message of the territory, ECO has a key role to play in ensuring cooperation and cohesion between departments. As climate change is a multidisciplinary issue, we must work closely with ECO to ensure that adaptation decisions are incorporated at every level in all departments. Ian Church, senior science advisor, is a critical link between ECO and C-CIARN North – Yukon, in ensuring that this takes place.

Environment: This department takes the lead on climate change work for the Yukon Government. They are deeply concerned with the work of C-CIARN North –Yukon and work actively on most of our projects. Having recently

released the Yukon Climate Change Strategy, they are currently undergoing work on the Yukon Climate Change Action Plan, a document which will be key in reducing risks related to climate change impacts in the territory.

Energy Mines and Resources: Setting the framework for managing the mining, forestry, and oil and gas development in the territory, EMR is an important stakeholder in adaptation work. In the Yukon, we are on the cusp of a potentially huge mining and oil and gas development boom, whereupon it will be essential that climate change impacts and adaptation issues are integrated in their regulatory framework. Currently we work closely with various key individuals towards this objective.

Energy Solutions Centre: As a faction of EMR, the Energy Solutions Centre plays a key role in educating, monitoring, researching, and advising policy to ensure sustainable and renewable energy solutions are incorporated at every level of government, industry, and society. They are critical partners on a variety of projects now and into the future.

First Nations

Council of Yukon First Nations: The Council of Yukon First Nations is the central political organization for the First Nation people of the Yukon. They are currently made up of 11 First Nations (not all Yukon First Nations). We have a strong partnership and successful history of cooperation with CYFN. CYFN is heading up the Yukon Node of the International Polar Year, and as well, they have a full-time climate change coordinator position.

Individual First Nation Governments: Because they are on the front-line and are most affected by climate change, it is crucial that we develop individual working relationships with each First Nation government (whether land claims are settled or not). Their rights and guarantees under the land claim agreements are becoming jeopardized by the impacts of climate change.

Educational Institutions

Yukon College, University of the Arctic, and researchers from a variety of post-secondary institutions play a major role in providing critical information on the monitoring and assessment of risks associated with a changing climate. The engagement of these individuals within decision-making processes is essential.

These institutions are key in developing the next generation of climate change professional, and have the capacity to incorporate climate change issues into almost every level and discipline.

Industry/Private Sector

The engagement of key industry sector stakeholders ensures that climate change decisions are incorporated into management and business plans, contributing to a sustainable future for the territory.

Industry/private sector has an impact both as a contributor of greenhouse gases and as it often causes land-use change.

Work with the Yukon Innovation Cluster and representatives from various resource-based industries are pivotal to this relationship. The proposed Innovation Cluster would concentrate on the development, commercialization, and export of technologies and related solutions for cold-weather regions around the world.

Yukon Chamber of Commerce is also an important stakeholder in developing future industries that take climate change into consideration.

Resource extraction: Engaging the forestry, mineral, and oil and gas sectors is critical at this point, as the industries are set to boom and the impacts of climate change are increasingly interfering, socially, economically, and environmentally.

Utilities: The continued engagement of Yukon Electric (distributor) and Yukon Energy (producer) towards a sustainable energy future is a critical step towards the mitigation of the impacts of, and adaptation to, climate change. For example, as the territory is largely dependent on hydroelectricity, any hydrological shifts due to climate change will greatly impact the economics and security of our energy supply.

Municipalities

Association of Yukon Communities: The purpose of the Association is to further the establishment of responsible government at the community level and to provide a united approach to community ambitions. AYC assists communities in their endeavour to achieve and sustain strong and effective local government, thereby improving the quality of life for all of the people of the Territory. Seeing that adaptation is most effective when developed at the local level, the engagement of AYC is very important. This includes working closely with the City of Whitehorse, the largest municipality in the territory.

Non-Governmental Organizations

We work with a number of environmental non-government organizations such as Yukon Conservation Society, the World Wildlife Fund, the Canadian Parks and Wilderness Society, Raven Recycling, Yukon Fish and Wildlife Management Board, Arctic Youth Network, Pembina Institute, David Suzuki Foundation, Inuit Circumpolar Conference, Inuit Tapiriit Kanatami and the Arctic Energy Alliance. The above organizations all have climate change programs that operate or influence the Yukon. These groups are essential to engage as they provide information that is independent from government.

Yukon Environmental and Socio-Economic Assessment Board

YESAB administers the process to assess the environmental and socio-economic effects of projects and other activities in the Yukon or that might affect the Yukon. The incorporation of climate change impacts and adaptation protocols within this process is essential.

General Public

The people of the Yukon, ultimately, are the ones that must be engaged the most on the issue of climate change impacts and adaptation. Not only for their own successful adaptation to climate change, but also to elect a government that takes these priorities seriously. Through newspaper articles, media interviews, weekly email updates, and other outreach activities, we are able to bring the climate change issue to the Yukon public.

Elected Officials

Elected officials, such as our MP, MLAs and city council members, must also be engaged on these issues. We do work with them, wherever

possible, through workshops and conferences, but also because many of them are subscribers to our e-newsletter and weekly emails updates.

4. Strategies for Stakeholder Involvement

There is not only one strategy that has been successful. We have had to constantly adjust our approach to accommodate different groups.

Overall, we have found great success with small face-to-face meetings and consultations. These have been the most successful as they are focused discussions with clearly outlined objectives and achievable outcomes. Examples of these are steering committee meetings, National Assessment consultations, Forest Management working group meetings, Yukon Energy Partners, etc.

Workshops have been another good way to engage with stakeholders. The workshops have exposed many key stakeholders who were previously underexposed on the subject matter to a full range of new information, partners, and ideas. They have also laid the groundwork for long-term relationships around the issue of climate change impacts and adaptation. Workshops also often introduce new people to the issue and forge new working partnerships.

Websites play an important role in capturing as broad an audience of existing and potential stakeholders:

- C-CIARN North www.taiga.net/c-ciarn-north/
- ACIA www.taiga.net/acia
- Southwest Yukon Project

www.yukon.taiga.net/swyukon/about.cfm

Also:

- Climate Change course at Yukon College.
- Web Resources include our Database for Climate Change Information Sources for Northern Canada <http://yukon.taiga.net/infosources/> as well as the Directory of Climate Change Contacts for the Canadian North <http://yukon.taiga.net/contacts/>
- Electronic Newsletters and weekly Email Updates reach almost all of our key stakeholders.
- Media exposure (print, radio, television) has been an excellent way to reach a wide variety of our stakeholders. We have been interviewed and featured in over a dozen media stories this year already.

5. Engaged Stakeholders

- Key stakeholders that are already engaged are most often involved with the issue because they are already impacted by climate change, both on economic, social and environmental fronts. We need to engage those people that aren't yet impacted but are at a risk of facing serious consequences due to their inaction. We need to start the planning process now.
- Mining companies are taking action to adapt to climate change only because they are being forced to. Their ice roads simply are not staying frozen long enough to suit their needs and so they must seek alternative actions. Mining depends on water, so shifts to the hydrology around mine sites affects their economic performance and safety.
- First Nations feel the direct impact of a changing climate. They have been compelled to take action because it is affecting their lives today. First Nations are particularly equipped to deal with climate change as they have a history of continual adaptation to environmental and cultural change, but they are also vulnerable due to multiple and cumulative socio-economic stresses.
- Lessons can be drawn from the experiences of aboriginal communities that are successfully adapting to climate change and applied to other scenarios and organizations.
- Information sharing from researchers and experts has allowed them to develop sophisticated risk assessment and management plans.

- Research and monitoring is a critical tool to help stakeholders make adaptation plans. There needs to be a baseline from which to base decisions.
- Over the past five years of the existence of the C-CIARN network, stakeholders have become involved through many of the mechanisms discussed in the "Strategies for Stakeholder Engagement" described above.
- Many of the tools used to guide adaptation decisions are still in development. There is a need to advance their progress.

5.1 Outstanding Needs of Engaged Stakeholders

To improve and expand stakeholder engagement, from the perspective of C-CIARN Yukon:

- We need long term commitment from the federal government as to its direction on climate change. Provincial and territorial governments, industry/private sector etc., are all hesitant to make long-term financial commitments to climate change in absence of a clear long-term federal climate change plan.
- We need to put adaptation into practice. The establishment of a Yukon Adaptation Center of Excellence is a key stage in this. This center, and a network of others, will be an arena for increased stakeholder collaboration around the issue of climate change, and will allow adaptation technologies to go mainstream, and begin to be incorporated at every level of society. This would engage people we haven't even

begun to work with, such as engineers, geologists, and educators.

- We need to place climate change into the mandatory curriculum of our public education system. The issue needs to be a mainstream topic, as familiar to our students as photosynthesis.
- We need the mainstreaming of climate change so that it is incorporated into decision making processes including environmental assessments.
- More education and outreach is needed. Adaptation is still a relatively new subject that many people don't fully understand. There is a great need for examples and demonstrations of successful adaptation projects.
- From our discussions with key stakeholders, the largest factor that impedes decision-making related to climate change is the information gap between the climate change experts and the individuals who are making policy decisions.
- Climate Change models are not perceived to be sources of information upon which decisions can be made. One problem is that policy-makers and decision-makers are unable to interpret the information presented to them. There is a need to increase confidence in the modelling activities and to make them accessible to the people that can most use them. Another problem is that the scale of modelling and research is regional (and larger) while the scale of the decision makers is often local.

- We need to encourage and promote long-term vision and strategizing by our political and community leaders. People, who may already seem to be engaged, may not be thinking about it in the right timeframe or perspective.
- There is a need to increase capacity in stakeholder groups across the board, whether that means making information more accessible or employing climate change experts and consultants to assist in bridging the info gaps.
- We need to have complex, scientific concepts conveyed in a manner which is easily understood and deployed in plain language.

6. Unengaged Stakeholders

- All of the "Needs of Engaged Stakeholders" as outlined above, apply equally to the "Unengaged Stakeholders".
- The clear picture of the economic impacts needs to be illustrated to all unengaged stakeholders. Both the economic incentives and disincentives need to be made urgently clear.
- We need to demonstrate how climate change is poised to impact their industry, their interests, their lifestyle and community.
- Lack of understanding results from short-term thinking. We need to emphasize the point that this is not a long-term problem, that it is indeed a short-term problem. The timeframe that we have to mitigate greenhouse gases and prepare to adapt to the risks and impacts is a much shorter timeframe than most people believe.

- If people are able to visually see an impact, they are more likely to take action and become involved. The problem is that the impacts are often very subtle, although no less grave. People need to be shown how to see the issues and problems, because without assistance, they may see nothing. The further use of interactive visual aids on websites, educational materials or in presentations needs to be developed.
- Many unengaged stakeholders want to see long-term commitment from the federal government before they are to invest in the problem.
- Extreme weather events are already happening here in the Yukon. Even the rapid recession of familiar glaciers is a shocking reality to most adult Yukoners. Despite this, the connection between the loss of glaciers and the potentially catastrophic changes to our lakes and rivers needs to be illustrated with more certainty. Connectivity needs to be made between isolated events and climate change as a whole.
- People that don't fully understand climate change don't like public scrutiny and may push it aside because they don't have the expertise to deal with it. Bringing key decision makers into a safe, inclusive, and welcoming environment where there can be open discussion and shared-learning is needed.

7. Unanswered Research Questions

There is an overall need for more in-depth analysis of impacts. With this being said, there has been little research being done on adaptation responses within all sectors and regions. There is an urgent need to advance this.

The increase in climate impacts and adaptation research activity in the Yukon as anticipated for International Polar Year will offer unprecedented opportunities to expand researcher engagement, obtain valuable new information for decision makers, and generally raise the profile of key adaptation issues.

Some of the research questions that need addressing are:

- Socio-economic effects of climate change impacts on subsistence lifestyles.
- The impacts of climate change on the health of Northern communities (e.g. UVB exposure, drinking water quality and availability)
- Collection of detailed community-specific data on demographic composition (e.g. stability, turnover), and aspects of local economies and social structures that will determine how, and to what extent, Yukon communities are likely to be affected by, and respond to, changing environmental conditions (Duerden 2004). Communities within the same region will experience different levels of disruption from identical climate changes due to differences in local socio-economic conditions and sensitivities.

- Case studies of community response to extreme weather event hazards to assess disaster and emergency response readiness capabilities and identify necessary improvements.
- Evaluation of the potential for “failure” of existing roads, buildings, buildings, water-sewer lines due to the combined affects of changing environmental hazards and other factors (e.g. aging infrastructure).
- Sampling and analysis to develop maps of community permafrost conditions and techniques to model terrain thaw sensitivity/stability in support of land use planning and development.
- Studies to define the current status, trends, health conditions, of key mammal populations (e.g. caribou) in order to establish benchmarks against which climate change impacts can be measured and assessed.
- Ongoing monitoring of wildlife populations believed to be impacted by changing environmental conditions.

8. Advancing the Impacts and Adaptation Issue

A long term commitment from the federal government as to its direction on climate change is essential if this issue is to advance. Provincial and territorial governments, industry/private sector etc., are all hesitant to make long-term financial commitments to climate change in absence of a clear long-term federal climate change plan.

There isn't enough capacity around the climate change adaptation issue. We need to start implementing projects to evaluate our successes and failures and move forward. A lack of capacity and expertise on the adaptation issue is hindering the important work that must advance.