

C-CIARN NORTH

Canadian Climate Change Impacts and Adaptation Assessment Northern Regions Chapter

Northern Consultation Meeting #1 Whitehorse, Yukon

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Participants

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Jody Butler Walker, Yukon Public Health Association
Michael Westlake, Coordinator, C-CIARN North

Notes

Claire Eamer
Stephanie Ryan

Morning – Plenary Session

Introduction

- Opening prayer by Stanley James
- Welcome to participants – Michael Westlake, C-CIARN North

Overview: Canadian Climate Change Impacts and Adaptation Assessment

Presented by Tanuja Kulkarni, National Assessment Coordinator, Natural Resources Canada

The Climate Change Impacts and Adaptation Assessment is a scientifically objective assessment of existing knowledge of the risks and opportunities that climate change presents to Canadians. The assessment will cover what we already know as well as identifying knowledge gaps. Important goals are to understand Canada's ability to adapt and the limits to adaptation, and to understand the significance of the rate of change. This national assessment will complement and contribute to the global perspective of the 4th Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), which is currently under development.

The Impacts and Adaptation Assessment differs from previous national studies in that climate science is not the subject of the assessment but one of the contributing sources of information, along with such things as information about biophysical and socioeconomic impacts. The goal of the assessment is to provide and integrate information that will assist Canadians in developing policy related to adaptation.

The assessment will draw on a variety of knowledge sources, including peer-reviewed scientific publications, grey literature such as government reports, traditional knowledge, local knowledge, and the expertise of people working in affected fields and locations. Among the cross-cutting themes that will be addressed are public safety and security, economic sustainability and development, human health, cultural impacts, security and sovereignty, and ecosystem and species sustainability.

The primary focus is on the regions of Canada, although international and transboundary issues will also be addressed. Taking a regional approach will raise the profile of the issue within political jurisdictions, highlight relationships among sectors, and emphasize collaboration within and between jurisdictions. Case studies will provide examples of local approaches. Ultimately, the assessment should tell us what climate change means for Canada.

A number of different products will be developed, aimed at several different audiences. These include a synthesis report, a full scientific report, regional impacts and adaptation posters, and highlights documents. Other potential products have not yet been determined. Target date for release of the assessment is the spring of 2007.

The Northern Regions chapter should make a strong contribution to the assessment. It has the advantage of building on the information gathered for the Arctic Climate Impact Assessment and our knowledge of existing climate change impacts. Now we want to concentrate on the human dimension of climate change – an important contribution the North can make to the national picture.

Discussion

In response to questions, Chris Furgal outlined linkages between the Canadian assessment process and similar international efforts:

- Linkage with IPCC's 4th Assessment Report: The Canadian and IPCC assessments will be completed at approximately the same time. The Canadian authors are currently discussing how to link the two and avoid duplicating efforts. Many of the Canadian authors are also working on the IPCC report, and findings from the Canadian assessment will feed into the IPCC assessment.
- Linkage with other international reports: Several recent studies on the impacts of climate change on the North will help advance the Northern Regions chapter. These include the Arctic Climate Impacts Assessment and the Arctic Human Development Report, both initiated by the Arctic Council, and the Millennium Ecosystem Assessment, initiated by the United Nations.
- Because of the work already done in these reports, we have a good basis for understanding climate change in the North and a good sense of where we need to go next. The next step is to concentrate on the human dimension, and that focus will inform all of the Northern Regions chapter.

Overview: Northern Regions Chapter

Presented by Chris Furgal, co-lead author

Lead authors for the Northern Regions Chapter are Christopher Furgal, Université Laval, and Terry Prowse, Environment Canada, University of Victoria. Contributing authors are B. Bonsal, C. Dickson, H. Melling, D. Milburn, R. Chouinard, F. Jackson, S. Nickels, M. Nuttall, A. Ogden, J. Reist, W. Savigny, N. Snow, and T. Edwards. The contributing authors will be calling on others to assist in developing their chapters. All contributions are welcome and all will be acknowledged.

The chapter is divided into six principal sections: introduction; current and future conditions; implications of climate change for the Arctic environment; implications and adaptation for key areas and issues; regional centres and small communities; and conclusions. The various contributing authors are working on specific sections, with the lead authors pulling the sections together into a coherent whole. For purposes of the report, the northern region is considered to be the area encompassed by the Yukon, the Northwest Territories, and Nunavut.

The introduction will provide a brief overview of the region, its population, and current climatic, demographic, and socioeconomic conditions. The second section will survey past climate in the region through the instrumental records and reconstructions of climate before such records, current climate conditions, and projections for the region's future climate. It will also summarize current and future socioeconomic and demographic conditions and trends.

The third section of the chapter will examine the implications of climate change for the arctic environment: how key components of the natural environment have changed in the recent past and are forecast to change, and the importance of those changes for other parts of the physical system, people, and ecosystems. Section three provides important background information for understanding the changes in various sectors discussed in the next section.

The fourth section, the largest part of the chapter, discusses vulnerabilities, projected changes, and adaptation within key areas of northern experience. Currently, ten subject areas are proposed: hydroelectric development, oil and gas, mining, linear infrastructure, shipping and transport, forestry, fisheries, wildlife, aesthetic and recreation aspects of northern environments, and human health. In each of these sectors, discussion will address: current status and key vulnerabilities; projected changes and changes in relation to climate; and sensitivity, adaptive capacity, and options for adaptation.

The fifth section of the chapter will look at the different perspectives, vulnerabilities, and potentials for adaptation in several groupings of northern communities: regional centres, small communities, and indigenous peoples. Finally, the chapter conclusion will offer a brief summary for the region of key vulnerabilities, implications for northern adaptive capacity, and the key gaps and needs for further research and action.

The first draft of the northern chapter is due at the end of March 2006. It will be reviewed over the summer and the authors will respond to the comments in the fall. The final version is due in December, with release of the full report scheduled for spring 2007.

Further Comments by Authors

Chris Furgal, co-lead author:

- Northern consultation: Hope to hear from participants what they would expect to find in each section and whether the section will provide the information northerners need to deal with change.
- General comment: The assessment report itself will not contain policy recommendations, although they may appear in a separate product. Nevertheless, the authors want the assessment to be as relevant to policy development as possible.
- Introduction: Want to describe what the Canadian North really is. In the past, most discussion has focussed on small aboriginal communities, leaving out the large regional centres. By including the full range of northern communities, the Northern Regions chapter will provide something new.
- Current and future conditions:
 - The focus will be on the near future. The level of uncertainty involved in projecting climate conditions decades ahead is so great that the projections are not useful for policy development. The most useful range is 10-15 years into the future.
 - Very little work has been done on projecting demographic conditions and trends, so the authors are looking for any information that might be used to indicate trends.
 - There are many drivers of change in the North, climate being only one of them. We need to put climate change in the context of other forces.
- Implications and adaptation for key sectors: Lead authors for the sectors have asked that participants in the northern consultation sessions comment on the outline or identify key issues within the sectors.

Aynslie Ogden, lead author for Forestry:

- The goal of the section is to create a profile of the northern forestry sector, both industry and non-industry aspects.
- The literature falls short in providing a regional perspective – much of the information in the ACIA comes from Alaska – so local knowledge will be required fill the gap. Ogden is currently conducting a survey of forest sector practitioners, including industry, government, and individuals closely involved in forest resources. The results will show as a range of opinions rather than a consensus.
- Climate change must be put in the context of the range of factors that influence vulnerability and sustainability of the forest sector.
- Should the goals of other regions be ours? What are our adaptation options and what makes sense for our region?

➤ We need robust decisions and practices that make sense under a variety of conditions, including a changing climate.

Chris Furgal:

- Fisheries: Regionality is an important concept in northern fisheries. There are unique components that vary by geography.
 - Not all adaptations are beneficial and not all impacts will be negative.
 - The northern fishery is likely to attract interest from outside the region. Previous studies like the ACIA have talked about the circumpolar North, but maybe we should talk about relationships between the North and the rest of the world in areas like fisheries.
- Health: Very little specific work has been done on health and climate change impacts. Will use information on vulnerability to broader environmental change, for which there is some data.
 - Problem – there is no single source of standardized health information for all of the northern population. Sources vary in content and accessibility.
 - One of the things we hope to get from these consultations is information on the status of the health system in the regions.
 - Will be looking at the idea of “no regrets” policies – things that we should be doing anyway but that will also help us deal with climate change.
- Regional centres and small communities: Will look at how components like transportation, economic development, health, and policy come together in regional centres and in small communities. Their adaptive capacity is quite different.
- Data sources: Please pass on information about any sources of data that would be useful for the chapter, especially demographic and socioeconomic data, and please assist the authors in getting access to the information. Even data collected at the community level would be helpful.
- Case studies: There will be approximately five for the Northern Chapter. The case studies will include two examples of a geographic location where there are a number of different things that are changing, two thematic case studies looking at changes that are taking place in a number of locations (e.g., changes to permafrost), and one example of adaptation already taking place.

Discussion

The following comments, arising from the morning discussion, are grouped by subject. Unless attributed to one of the morning session’s presenters, the comments and suggestions came from participants in the workshop.

Community and Social Issues

- It’s important to look at the relationship between the regional centres and the small communities. There is a strong perception, whether it is reality or not, that resources come to the centres but are not distributed to the communities.
- Projections are that the northern regions are going to be more preferable habitats for humans to live in. What does this mean in terms of urbanization? Do we have the power to project any of what is coming?
- There are many questions associated with an influx of people into the North, whether because of climate change or development. What are the consequences of 5000 people moving into a small

community? What resources will be used from the area? How will issues like sewage and pollution be handled? We need to allocate money to look at potential impacts of expanded population.

Roles and Issues Related to Aboriginal Communities

- Aboriginal communities are still often treated as stakeholders rather than the legislative authorities most of them are in the Canadian North. Once the legislative authority and responsibility of aboriginal governments are recognized, resources can be moved to the communities so that they can handle their own adaptation.
- Aboriginal northerners need to be at the planning table where the future of their communities is being decided. The North will face other pressures as the rest of the world changes, including migration of increasing numbers of people into the North, possibly more than the region can sustain, and pollution from increased human use, which is already happening and should be cleaned up.
- Aboriginal governments have jurisdiction over huge traditional territories in northern Canada, and aboriginal organizations have communication networks that cross political boundaries. These governments and organizations should be major contributors to all parts of the northern chapter.
- Other issues related to aboriginal communities include: resource use conflicts and issues relating to self-governance and autonomy; UV exposure – children are experiencing 30% more UV than parents did at their age; emergency measures to deal with climate change impacts.
- Resources should be made available for First Nations to address both mitigation and adaptation. Mitigation and adaptation should not be separate issues.

Communications and Products

- It is important to remember that aboriginal governments should be a major target audience for the assessment, so those producing communication materials should recognize and address their needs.
- (Furgal) Many terms used in discussing climate change don't translate into other languages and cultures. Communications products should be reviewed by someone outside the science and climate change field. There is a need for plain-language communications products.
- (Furgal) A one-year communications plan for the assessment has been approved.
- (Kulkarni) Communications products other than those mentioned earlier have been discussed, but nothing has been decided yet.
- The cost of communications products is also an issue. Some of the ACIA materials are too expensive for small governments and communities.
- We need a more holistic approach to providing information and resources.

Sources of Information

- People in communities have their own ideas, so two-way communication will be important. Communities must have buy-in if the assessment is to be used.
- (Furgal) The need for two-way communication is recognized. The Council of Yukon First Nations (CYFN) and other northern aboriginal organizations will have individual sections, but their perspectives will inform the entire chapter.
- CYFN has been consulting with communities and elders about climate change. A good resource for this document might be the Elders Council on Climate Change. Also, local people living on the land see changes on the land and in hunting and food security.

Human Health

➤ There is an issue of unintentional injuries related to the effects of climate change, such as people falling through the ice. This information should be tracked and compiled.

Case Studies

➤ It might be useful to include a case study of how indigenous people have adapted in the past.

➤ We have to be careful in the case studies not to imply that people have adapted in the past and can do it again. Change is coming faster this time.

➤ The Alaska Highway gas pipeline coming through the Yukon might be a good case study from an adaptation point of view. This may be an opportunity to illustrate the need for adaptation and what the issues will be with the pipeline.

➤ (Furgal) We can increase the number of case studies if people come up with good ideas. Case studies speak to people very directly about practicalities.

Future Research

➤ The funding of research needs to be more community-based. The questions are in the North but the funding and research is based in southern universities.

➤ Acquisition of knowledge is not just the responsibility of government. Where money comes from dictates what is being studied. It may soon be aboriginal governments funding research for the acquisition of information.

Afternoon – Breakout Groups

Group A

Resource people: Michael Westlake, Tanuja Kulkarni

Comments are grouped according to the sections in the draft outline of the Northern Regions chapter. Unless attributed to one of the resource people, the comments and suggestions came from participants in the breakout group.

General Remarks and Suggestions

- There is interplay between one region and another, and these have political boundaries that are difficult to think across. We need to think about ourselves globally and beyond our borders of the Yukon.
- It needs to be clear that this is a document from one point in time and that there is a long-term plan for follow-up. There needs to be an opportunity to continue to do this kind of assessment.
- There is a need for this document to have a clear purpose and for it to be useful to a variety of sectors. It also needs to be recommended for policy foundation and development.
- The document needs to be useful to working groups. Most of these groups want to know what the solutions are in terms of adaptations, and they want these suggestions to be as specific as possible.
- The document needs not to be just scientific.
- Integrated Sustainable Community Plans – it is critical to go to the communities with options and find out how they want to take steps to adapt to climate change. We need options for adaptation in different areas.
- Resource use conflicts are applicable to all sections in the document.
- Linkages with other parts of the country and the world should be a theme through all sections.

1.0 Introduction

- The introduction should include a discussion of governance in Canada's North. What are the implications of governance across all three territories?
- The introduction should be reflective and inclusive of different knowledge systems and not compare them.
- A lot of global processes are climate-related and the arctic regions are the major drivers globally, especially with respect to oceanic systems.
- There is an elders' panel and working group that represents the polar regions and there is a strong need to have more and ongoing communications with what's happening around the polar North. Elders look at the polar North globally and much information could come out of this.

➤ The introduction is an opportunity to break out of insular thinking. More than anywhere in Canada, the North thinks beyond the boundaries of jurisdiction and of Canada. This is important in dealing with the issue of climate change. The North, western science, and traditional knowledge are all insisting that we look at this globally, in an effort to come up with the best approaches to adaptation.

2.0 Current and Future Conditions

➤ (Westlake) There is a desire to move forward and talk in terms of current and future conditions, as past climate has already been well studied.

➤ There is still a need to gather stories about what has happened here before. Where does this fit in the document?

➤ The sharing of information is very important but we don't have the dollars for the travel and meetings to exchange of information. For example, in Bangladesh there was a three-meter increase in the high water mark for the ocean, and there has been talk of water levels rising here in the North. It would be beneficial to share information on how we have both responded or adapted to these changes.

➤ The problems we are having with water and fish are happening in other regions too. There is a need for money so people can go to communities and other places to share information.

➤ We need to identify what questions need to be asked, whether our research answers these questions, and whether these are the answers that communities want.

➤ Communities need a level of adaptive capacity that is sustainable. Taking action is only beneficial if it can be sustained. It is often more difficult when a community fails on a larger scale. New Orleans is an example of a community that had technology in place but didn't have the ability to adapt and step over the obstacle. How are we going to adapt and move on if something goes wrong?

➤ There are different capacities for Whitehorse and Old Crow. There is a need for tangible, realistic options.

➤ The resolution of the detail is very important. There is a need to focus on each region, right down to the community level, to help people understand what changes in climate might occur 10, 20, and 30 years from now. What does it mean for heating costs and our ability to grow things?

➤ It would be beneficial to include snapshots of the range of what might occur. Even if they are not totally accurate, they get people thinking. We need to show the relevance of climate change for the individual.

➤ People want some sense of what to prepare for. This document should instigate change within a person's life and provide an approach to how they can live.

➤ People find it hard to think on a 10-year time scale. They may believe that they can make a difference when the time scale for adaptation is longer (30-40years).

4.0 Implications and Adaptation for Key Areas / Issues

➤ Agricultural Industries should be a separate heading like Fisheries, Forestry, and Wildlife. Agriculture in the Yukon has a historical context and will likely expand with changes in climate.

4.1 Hydroelectric Development

➤ Hydroelectric Development should be re-titled Energy Development. This section should cover projections, demands, renewable energy, water storage, thermal energy, and wind-generated

power. Yukon Energy can provide expertise and give projections as the icefield in British Columbia supplies their system.

- Change the section title to reflect renewable energy development.
- In the future there will be a dependence on an energy mix of hydro, geothermal, wind, solar, and diesel. The energy mix is going to change and climate change will affect this. There are already wind experts in the Yukon.
- (Westlake) Do we need hydroelectric development?
- People on a grid system demand it and we need to provide some kind of energy for all these people. There is a need for more information on options and what we can afford to maintain. There may be future energy demands that come from oil and gas development and mining. Individuals are going to be impacted. It may be only for a short time, but there will be lasting effects.
- Looking to the future, there is not enough power to run compressor stations that would be built with a pipeline.
- Let developments create their own power source.
- (Westlake) The answer might be smaller systems distributed where needed.

4.2 Oil and Gas

- Perhaps oil and gas should be rolled into the power section.
- The Territorial Strategy on Climate Change is going to be released soon but it is more focused on energy efficiency. It will have a dramatic impact as people will need to pay attention to this.
- The effects of climate change are already costing money. Whitehorse is an ultra-conservative community that talks about changing but needs to actually move on it and figure out how to adapt to the change that we know is coming. Right now we are very low producers of greenhouse gases. However, the power doesn't exist for the next mine that opens in the territory. The diesel generators will have to be turned on for back-up power when the mines open, and our greenhouse gas production will skyrocket. There is a need to look for other options now. Do we let the companies that need the power decide what they need?
- A pipeline has huge energy requirements, and impact assessment does not look at climatic effects. Developments often assume that there will be an automatic grid connection.

4.3 Mining

- The Yukon government knows that there will be 10 mines opening in the next 10 years but they can't show where. There are impacts on the community from these developments and they increase the cost of living as rents go up. There is a need for up-front negotiation with the Government of Canada. If these developments go ahead, roads will need to be repaired and more housing built. It is not happening yet but there is a lot of staking and exploration going on during a time of high gold prices.
- There is a communication gap between First Nations and the government. The Mount Skookum mine used Sheep Lake for its tailings pond and the sheep have now been displaced.
- Large businesses expect to do business as they have in the past, arriving to make some money and leaving a mess behind. This process has to be reassessed. Large-scale businesses need to consider how they contribute to changes in the environment, community, and climate in the North. The mining community and large-scale developments have to look at ways of providing their own energy in a

way that will not compromise the intact ecosystems of the North. Governments of the North have to look at these large-scale companies to make sure that they are operating in ways that use energy efficiently and are respectful of the land.

➤ If large developments occur, there is also the chance to leave a positive legacy behind that the community can benefit from. This could be a key adaptation and mitigation tool.

4.5 Shipping and Transport

➤ With regards to the Shipping and Transport section, the Canadian North and circumpolar North have very expensive infrastructure. There is an opportunity for slower river transport. In the NWT, the Mackenzie River was a main transport route until the Dempster Highway opened. Rivers provide sustainable travel infrastructure until water levels become an issue with changes in climate.

➤ There is concern regarding the use of a shipping lane in the Arctic. First-year ice has nearly a foot of algae growing on its underside and provides a platform for harvesting food. An oil spill under the ice would have devastating effects on ocean life and its productivity. There would also be changes to the albedo effect of the ice.

➤ There is a need for transportation options that aren't as sensitive to changes in climate. Heavy-lift, lighter-than-air vehicles for transport in the Arctic are being developed out of Winnipeg. These "Airships to the Arctic" can do heavy-haul work and help address the winter road issue. Old Crow had to employ a Hercules to transport fuel to the community when the ice road wasn't passable. Transport by air is more expensive but could be somewhat comparable to the cost of building an ice road that is only used for a short time.

➤ Winter roads that carry supplies and fuel to the BHP diamond mines were only open for a very short window this year. The diamond mines are now contracting researchers to develop wind power alternatives.

➤ With more mines functioning in the Yukon there will be an increase in traffic on the Skagway Road. What are the effects of more gas and freight coming over the White Pass?

➤ One properly loaded transport truck causes the same wear on a section of highway as 9,000 cars. If the truck is overloaded then the damage increases exponentially. The projected number of trucks that will be traveling the highways to build the pipeline will require the rebuilding of this highway. The highway between Haines and Fairbanks is built for heavy loads but the section between Haines Junction and Whitehorse is not. Roads in the Yukon are largely chip seal and do not have high weight limits, and as such stand to be damaged more severely. The road between Carcross and Jake's Corner does not have the strength to support heavy loads. Rail transport has more ability to handle heavy loads than do roadways.

➤ With regards to fuel and cargo spills, there are more issues with cold temperature clean-ups. If there is a spill along the ice platform in the Arctic, it is assumed that emergency measures can be mobilized from these platforms. However, if the climate changes to the extent that these platforms don't exist, we will need to adapt our emergency measures.

➤ In British Columbia, most food transport relies on the mountain passes being open from Alberta. If highways are shut down for more than four hours, BC begins to notice problems with supply. Recently in the Yukon the plumbing in a number of houses froze up during a four-hour power blackout. If four hours caused a shock to the system, we may need to reassess how northern communities are being built. Are we also vulnerable to a disruption in transportation?

4.6 Implications and Adaptation for the Northern Forestry Sector

➤ The Forestry Stewardship Council has a document that may be useful.

- There was also a roundtable document that was written for the Prime Minister in preparation for COP11. There were comments that the boreal forest could be disappearing in as soon as 50 years. This would be a useful document for the section.
- Beringia contains the story of a great variation in species that once existed here, including oak and walnut forests in the Dawson area. There is a long record available as a result of Beringia.
- Are we introducing genetically modified trees to the landscape as it changes?
- Will Jack Pine trees still grow here in 100 years? Species that dominate after fire are changing. The Takhini Burn study found that even 50 years afterwards, the reestablishment of trees has been difficult. There has been so much evaporation that seeds aren't germinating in the Fox Lake and Takhini burn areas. What will the forest look like in the future and what seeds will come in and establish?
- The lack of precipitation combined with a fire that burned right through the duff layer is making re-vegetation afterwards very slow if at all. The mushers on the Yukon Quest Trail commented on the Eagle section, where a fire had burnt so badly that there was only rock left and the snow was grey with dust. Are forest fires changing and is this an environmental condition that we need to address?

4.7 Fisheries

- The remobilization of methyl mercury needs to be addressed.

4.9 Aesthetic and Recreational Aspects of Northern Environments

- There is increasing potential for ecotourism here in the Yukon and this is affected by a warmer climate. Tourism is currently the largest industry in the Yukon and it is largely being driven by the First Nations culture and the wilderness environment.
- Cultural and palaeontological resources are impacted by both climate change and increases in tourism and recreation. There is an opportunity to salvage artifacts as glaciers recede.
- (Westlake) The ice patch story is going to be included in document.
- Important to include research by Chris Burn with respect to permafrost and the protection and preservation of Beringia fossils.
- Intellectual property rights come into play here as the artifacts don't belong to the people who found them. We need to sort this out soon so that it doesn't become more of an issue later. Under the Biodiversity Convention Act, there are benefits accruing to aboriginal people in an area but does this extend into prehistoric findings?
- Genetic resources could potentially be at risk with changes in climate. There is an opportunity for access and benefit sharing.
- (Westlake) The loss of genetic information is the overarching issue.

4.10 Human Health

- The Centre for Indigenous People's Nutrition and Environment (CINE) at McGill holds 12 years of documentation regarding First Nations diet in the North. It includes information on trees, plants, fish, game, migratory and local birds and dietary information related to foods of First Nations people.
- Cindy Dickson has a document with detailed information on First Nations diet in the Yukon.

- It is important not to emphasize the disparities between aboriginal and non-aboriginal people when discussing health. We need to state in the document that the section is going to address human health without making reference to differences between aboriginal and non-aboriginal perspectives.
- Talking about alcohol and drug abuse doesn't provide any useful information. This document needs to break new ground when talking about human health.
- There are respectful ways of presenting information. For aboriginal people in the past, "research" meant identifying problems. Ethnic characterizations are negative and perpetuate myths. Jody Butler Walker (Yukon Public Health Association) agrees to work on this section with Lori Duncan (CYFN).
- There is a need to look at contaminants with regards to a shift in climate. The caribou in Ross River weren't edible at one time because the lichen they had been eating was building up cadmium in their livers.
- Young people are mostly dying of car crashes but older people are dying of cancer in the First Nations communities. Cancer of the throat, lungs, stomach and leukemia. Is there a dietary cause of this?
- If there is a change in climate, there will be impacts on wildlife, fish, and plants. There has been a marked increase in diabetes throughout First Nations communities in North America.
- There is a need to look at levels, cycling, and the long-range transport of contaminants. The document needs to address the cycling and re-circulating of both imported and locally generated contaminants.
- There is a link between changes in temperature and the cycling of contaminants.

5.0 Regional Centres and Small Communities

- Major urban centres often adapt better because of the financial resources that are available to them. However, shock often hits major centres harder, as smaller communities are more apt to be prepared and have learned to be more resilient. Large centres often have massive infrastructure that does not always work to their advantage. (Reference to the flooding in New Orleans)
- Small centres are more capable of adapting as they are often less complex, but they may have less capacity and fewer resources to effect these adaptations.
 - The landscape is very changed in urban centres.
 - Climate change will affect transportation and air transport.
 - People may require alternative heating sources, which may increase the demand for other resources like firewood.
- There is the question of whether people have enough food (dry goods) to get them through a break in food transport into the territory.
 - In the Eastern Arctic, if the sealift doesn't come in, there is a huge impact on the community.
 - There is an increased likelihood of shipping through Lancaster Sound.
 - Whitehorse and smaller communities need to establish what kind of emergency preparedness is needed with respect to food, fuel, water, and communications (radio).
 - There is concern for elders who can't get their own wood. There is a risk of their houses freezing up during power outages.

- There needs to be preparedness for a disruption of service in all levels of community. Assumptions about what will be available during a time of crisis are no longer valid. There is a need to reevaluate the availability of water, heat, and food.
- There are tsunami predictions for the Canada's West Coast. In this scenario, the YVR airport in Vancouver does not survive, but the Abbotsford airport does. If we need air relief, we need to know what we can count on for ways of resources getting to us.
- Northern communities are far removed from information. There are only two First Nation communities represented here today out of 14. There also may be information that we are missing from Ottawa that we know nothing about but need to include. Small northern communities are the most affected by climate change and need to be included in the consultation process. Only three major centres are being visited in the North for this chapter.
- It is important not to take the cheapest option but the most resilient one when building and adapting. An example is changing repeater stations over from propane back-up to solar power. When putting technology to use in the North, both redundancy and resiliency need to be considered. Also, the community needs to have the capacity to service the technology.
- Communities that are close together need to consider how they can work as a unit and perhaps trade essentials.

Communications Products and Approaches

- In the communities it is beneficial to utilize existing groups to get information out.
- It is important to include kids and youth in the communication of information.
- Target various groups when advertising and educating.
- There is a lesson from the last ACIA publication. The smaller publication was more popular due to all the pictures and graphics.
- With new information coming out all the time, there needs to be a current story and information line that can go out with each presentation. An update in the form of a newsletter would be very useful. There is also the issue of covering enough issues so that people want to read it because it has relevance to them.
- Use Northern Native Broadcasting to communicate the findings of the national assessment and to engage aboriginal communities in climate change discussions.
- A video or DVD would be useful as an educational resource.
- Renewable Resource Councils would be a good place to send this document.
- The International Polar Year would provide a good venue to highlight the release of this document.

Group B

Resource people: Chris Furgal, John Streicker

Comments are grouped according to the sections in the draft outline of the Northern Regions chapter. Unless attributed to one of the resource people, the comments and suggestions came from participants in the breakout group.

General Remarks and Suggestions

➤ (Furgal) There is a social justice issue related to the vulnerability of northern communities. We will be opening a can of worms if we do not address the obligation to follow up on what we find in an assessment. There is a social responsibility associated with conducting an assessment and identifying vulnerabilities and challenges.

➤ Individual points and examples should be linked to broader issues and impacts: e.g., if communities have to build or move houses, climate change can affect the location.

➤ Identifying various individual issues helps move the issue up the political agenda by emphasizing the wide-ranging nature of the impacts.

➤ (Furgal) We've been talking about how to move the issue out of the narrow compartment of climate. The Millennium Ecosystem Assessment looks at the impact of multiple stressors.

➤ Climate change is relatively slow, so it ends up low on the priority list. We need to make clear that the issue is integrated into many areas and can't be fixed with one simple measure. At the same time, that means that there are many opportunities for solutions or ways to attack the issue.

➤ Important to be aware that there are many different priorities, and First Nation governments are still setting up their systems. However, climate change has immediate impacts, like many people in Old Crow not getting their meat last fall.

➤ It's often hard to put a finger on a local impact and say it is the result of climate change, but if you look at the broader picture, you can see the climate-related impacts.

➤ We need to let people know this is a long-term problem that won't be solved quickly or easily. Take and recognize small victories, but a long-term strategy is required.

➤ We have to expect some missteps.

1.0 Introduction

➤ Looking at the North as a region is a problem from the beginning because there is so much diversity. This diversity has to be captured in the introduction.

➤ (Furgal) It will be important to capture the diversity of the region – economic systems; demographics; political systems, especially as regards self-government.

➤ This section should introduce the concept of links between the North and other systems and regions, within Canada and globally.

➤ The North is a barometer of change for other regions.

- Somewhere we need to look at how communities work in the North. The introduction should describe the political systems and recognize that communities and territories are very different and at very different stages of development.
- The focus in discussions of climate change is usually on the High Arctic. However, the area from the Yukon west to Russia is warming fastest.
- (Furgal) We should also identify where we have the most data – that is, the western Arctic, especially the western NWT and the Yukon.
- Indicate in the introduction that human health and the impacts on human well-being are a major theme throughout the assessment.
- Indicate that the impacts of climate change are already being felt in the North.
- Identify sources of information – both traditional knowledge and science – and the difficulties involved in integrating or linking the two.
- State up front that anyone who lives close to the land will experience the strongest impacts.

2.0 Current and Future Conditions

- The content for the sections on past and future climate is fairly standard, and has appeared in scientific papers and other assessments. Local information is not so easily available.
- Some local material is available; e.g., Carol Geddes film, *A Tale of Two Winters*. Other local material will have to be pulled out of reports and documents focusing on issues other than climate change, or sources like linguistic evidence of past migrations.
- (Furgal) Climate scientists tend not to be aware of local and traditional knowledge.
- The east-west division for discussion of future climates is not necessarily the best approach. Ecosystem divisions like boreal/tundra/marine or alpine/non-alpine might make more sense.
- (Furgal) Authors have asked for that kind of breakdown, but the data is not available. The climate change scenarios still work on a very broad scale.
- More data on precipitation is needed. Looking at precipitation on too broad a scale tells us nothing. When and where precipitation falls is as important as the amount, particularly in mountainous regions like the Yukon. Detailed precipitation information is also important for things like building standards related to snow load. This lack of detail could be identified as a knowledge gap.
- When looking at the human response, it's most useful to look at responses in general – that is, vulnerability and the ability to respond.
- (Furgal) The assessment will not be closely tied to model projections. They work on a gross scale, but adaptation takes place on the local scale.
- (Furgal) Variability is more important than simple change, particularly for resources and industries. Variability and extremes are important for adaptation in general. The impacts and adaptation community should let the modeling community know what kind of information it needs. That can be done through this assessment.
- Regional and local data collection is happening, but it is not integrated into modeling. Community monitoring exercises like the Arctic Borderlands Ecological Knowledge Co-op and the CircumArctic Rangifer Monitoring and Assessment Network (CARMA) are sources of information.

- Demographic changes: Migration is not just simple movement into or out of the North. We should also look at the impact of bursts of activity and people like the International Polar Year.
- It is often misleading to talk about socioeconomic impacts. Social impacts and economic impacts are not the same and not necessarily closely linked. There is often value in splitting the social and economic impacts apart and looking at them separately.
 - Social and environmental impacts should also be considered separately.
 - Look at the links between the Canadian North and national and global trends.
 - This is the place to talk about the new governments that exist in the North and that don't exist in other parts of Canada.
 - Capacity in the North should also be discussed: related to power, human training and expertise, financial resources, access to information and knowledge. Maybe this section should mention factors that limit the capacity to adapt within communities.
 - There is a shift going on in aboriginal communities from a land-based economy toward an employment economy. People still talk about traditional knowledge and living on the land, but the way people live is changing. This affects their ability to adapt. They can't go back, but it is hard to go forward if you are limited in education and access. Climate change acts as an amplifier for these existing stresses.

4.0 Implications and Adaptation for Key Areas/Issues

4.1 Hydroelectric Development

- We must recognize that any solution to energy provision will be a mix.
- One of our vulnerabilities is water supply for hydro generation.

4.2 Oil and Gas

- If we adopt adaptive strategies that lead to increased use of fossil fuels, this is maladaptive in the long run. Mitigation and adaptation should be considered together.
- The demand for energy will increase, and northern oil and gas will be developed primarily to meet someone else's demand. The argument will likely be made that the economic impacts of climate change can be met in the North by developing oil and gas. It's an odd linkage and represents a disconnect in community desires.
 - There is some discussion that if we are going to develop oil and gas then we should follow best practices to limit the impact.
 - (Furgal) This is an example of the trade-offs involved in adaptation and mitigation.
 - The Yukon is currently close to the limit of its hydro capacity. A major mine would quickly use it up, and the only viable quick alternative is diesel generation.
 - It's important to examine the linkages between sectors. Is there capacity in the energy sector to respond to trends in other sectors?
 - Renewable energy and new technologies should be considered in the assessment. Research goes on where the demographics justify it, but the work doesn't go into adapting technologies to northern conditions. Adaptation is required not just to climate change but to climate, equipment, and human capacity.

➤ Communities want to get off diesel and move to alternative energy modes. The question is whether it will work. Small northern communities are at the vanguard of experimenting with alternative energy but, because of limited capacity, they need it to work the first time. They don't have the resources to try and fail. This is a limitation of adaptive capacity.

➤ Some of the energy modes being tested: micro hydro, geothermal, wood burner combined with district heating (Kluane First Nation), micro hydro and geothermal (Taku River Tlingit), warm water wells (Haines Junction and Mayo), co-generation and waste heat (Watson Lake), wind (Whitehorse), biomass and beetle-killed wood (Haines Junction area).

➤ The North needs alternative energy sources, so it would be good to document these experiments and the lessons learned from these community-based projects.

4.3 Mining

➤ Major issues are permafrost and stream flow.

4.4 Linear Infrastructure

➤ Principal issues are permafrost, ice cover, and snow loads.

➤ More forest fires lead to denuding slopes and making them more vulnerable to instability. The Yukon Geological Survey has been working on some of these issues along the Alaska Highway pipeline corridor (contact Panya Lipovsky) and Jill Johnstone (Yukon College and Carleton University) has been working on forest fires, regeneration, and climate change.

➤ Climate change should be part of the considerations in environmental and development assessments.

4.5 Shipping and Transport

➤ The Northwest Passage should be dealt with in this section.

➤ Oil and gas development could lead to pressure for industrial and port development on the Yukon North Slope.

➤ A rail line from Alaska through the Yukon has been proposed. The Yukon government has released a preliminary study.

➤ Resource development in the Yukon could lead to increased stress on the Skagway corridor.

➤ More freeze-thaw cycles are already creating problems related to road safety and transportation.

➤ Winter roads are affected. Old Crow had to wait a year to get construction supplies for a new school because the winter was not cold and snowy enough to build a winter road.

➤ Access to traditional hunting, trapping, and fishing territories is becoming unreliable.

➤ (Furgal) Some communities are finding they have more use for four-wheelers than snow machines because of the longer fall and spring seasons.

4.6 Implications and Adaptation for the Northern Forestry Sector

➤ This is an area to consider for a case study. It provides competing interests, clear impacts, and potential adaptation. Elements involved include forest management practices, traditional use of forests, beetle kill and fires, standing dead trees and potential use, fire management.

4.7 Fisheries

- Jody Mackenzie-Grieve did research on lake trout sensitivity to temperature in Dezadeash Lake, which is very vulnerable to climate change impacts.
- Issues include fish health, contaminants, and country foods. Kluane First Nation people report catching and consuming more predator fish than in the past, which leads to concern about contaminant concentrations.
- A case study in this field could show how linkages work in northern communities and give a sense of how interwoven the issues are. It is important to show these connections, both within the North and with the rest of the world.

4.8 Wildlife

- Issues are human use and management of wildlife populations.
- Same concerns as for fisheries.

4.9 Aesthetic and Recreational Aspects of Northern Environments

- The North holds a cultural value for the South. The idea of North is important in southern minds, especially in Canada.
- The quality of life that northerners value is related to the environment and the landscape.
- We may be at the threshold of what the landscape can withstand. Along with immigration and development, climate change is another pressure.
- Some tourists are actually coming to the Yukon in order to see climate change happening.
- Ice patch recession, which has revealed new information about the past, can be seen as a positive impact.

4.10 Human Health

- The discussion should relate to health and well-being in the broadest sense, not just the biophysical impacts of climate change.
- We don't want to talk just about sensitivities and vulnerabilities but also about resilience. The northern population has had to be resilient to withstand many changes in the past. The section should focus not only on problems but also on strengths.
- (Furgal) That's the concept of social capital, how the social fabric of many small communities enables adaptation.
- Maybe the best way to help people prepare for climate change is to address the other stressors that reduce their adaptive capacity.
- Some decisions and resources should be directed by the choices of the communities. Wherever you can empower communities, this will lead to better decisions.

Sovereignty

- This is not in the outline, but it should be. It might have to be dealt with in the international chapter, but it should be recognized in the northern chapter.

- The North should have the strongest role in the international chapter because of the North's relationship with the circumpolar world and the Arctic Council
- Note that some of the participants in the northern consultation would like to review the international chapter.

5.0 Regional Centres and Small Communities

- The dynamic between large and small communities is an important influence. It's difficult to work out an equitable distribution of resources between the two kinds of communities.
- The assessment might not need to explain the dynamic, just acknowledge its existence and the related issues.
 - Respect the validity of local and traditional knowledge.
 - Recognize the capacity issues of northern communities and governments.
 - Adaptation, mitigation, and public education should all be dealt with together.
 - If the regional centres and smaller communities are dealt with separately, explicitly recognize the dynamic between them.
 - If communities are to start doing or directing their own research, several issues must be dealt with: How do you develop the expertise? How do you keep the information in the community? How do you build research capacity?
 - *Together Today for our Children Tomorrow* has a section on research that parallels what is happening today.
 - We should look at what research needs to be done, how it should be done, and by whom.
 - We should work toward the time when First Nation governments will have the capacity to fund their own research.