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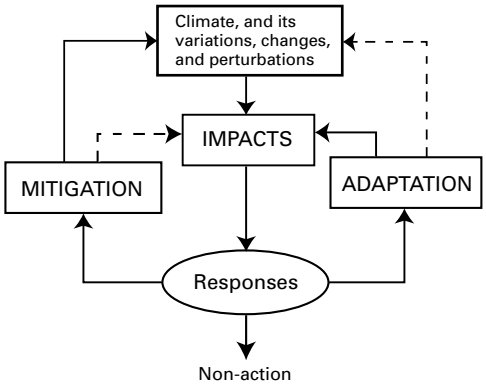
Adapting to climate change

Some degree of climate change is inevitable

Scientists agree that climate change is unavoidable and that the current warming trend cannot be stopped or reversed. Even if emissions of greenhouse gases stopped altogether, which is unlikely to happen because it will take time to reduce our dependence on fossil fuels, the planet will continue to warm. However, actions that are taken to reduce greenhouse gas emissions, called mitigation, can slow down this warming trend. Reducing greenhouse gas emissions is important to slow the rate and magnitude of climate change, and to provide ecosystems and human activities more time to adapt to the impacts of climate change. (Figure 1).

Reducing greenhouse gas emissions is important to provide ecosystems and human activities more time to adapt.

Figure 1. Putting Impacts and Adaptation into Context (Smit, 1993)



How do we adapt to climate change?

There are a range of actions that can be taken to adapt or reduce the adverse consequences of climate change. Adaptation measures have been classified into the following framework:

Bear the loss – This option occurs when there is no capacity to respond or when the costs of adaptation are considered to be high in relation to the risk or expected damages.

Share the loss – This option involves sharing the losses among a wider community, such as through insurance or disaster relief programs.

Modify the threat – It may be possible to reduce the threat of a natural event such as a flood, drought, or forest fire by constructing dams, dikes, or implementing Fire Smart programs.

Prevent the effects – This option includes steps that are taken to prevent the effects of climate change, such as pest and disease control in forest lands or irrigation of agriculture lands.

Change use – This option may be considered where the threat of climate change makes an operation particularly risky (for example, using different crops or planting different trees).

Change location – This more extreme option involves moving the location of economic activities or other activities, such as hunting and fishing or the location of a protected area.

Research – Research can improve our understanding of the possibilities, options, information needs for successful adaptation, and to improve our understanding of what and who is vulnerable to climate change.

Education and Outreach – This option involves providing educational opportunities to those affected by the impacts of climate change, including communities, industries and individuals, on options that are available to respond to climate change.

Sensitivity, adaptability, and vulnerability

Because some degree of climate change is inevitable, we will need to consider how ecosystems and human activities will be affected by climate change impacts, and what we can do to respond to these impacts. The potential impacts of climate change can be understood in terms of sensitivity, adaptability, and vulnerability:

- *Sensitivity*: Degree to which a system will respond to a change in climate conditions, e.g. extent of change in ecosystem composition, structure, and functioning.
- *Adaptability*: Degree to which adjustments are possible in practices, processes, or structures of systems to projected or actual changes of climate. Adaptation can be spontaneous or planned, and can be carried out in response to or in anticipation of changes
- *Vulnerability*: Extent to which climate change may damage or harm a system. It depends on a system's sensitivity and ability to adapt to new climatic conditions.

To predict the impacts of climate change and assess sensitivity, adaptability, and vulnerability, we need to understand the magnitude and the rate of climate change, future climate variability, key ecological processes, and options that are available to improve the ability of a system to cope with change.

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Is the North more vulnerable to climate change than southern Canada?

The magnitude of climate change in northern Canada will be greater than in many other parts of the world. However, because our current climate regularly undergoes large changes from week to week, season to season and year to year, we may be better prepared to deal with climate variability and climate change. Also, since cold temperatures are a limitation to many ecosystems and socio-economic activities, a warmer climate may bring many benefits. In addition, Canada is a relatively wealthy nation with a social infrastructure that can help Canadians to adapt more readily. These factors indicate that Canadians may be less vulnerable to the consequences of climate change than, for example, residents of many developing countries.

However, the ability to cope with climate change is not the same in every region of the country. In particular, the Intergovernmental Panel on Climate Change has concluded that Indigenous peoples of the North are more sensitive to climate change because their homelands and hunting habitats will be directly affected.

Adaptation has always been part of the way of life in the North. The rate at which changes are projected to occur, however, will make future adaptation much more challenging. Northern Indigenous peoples are highly resilient; however, the cumulative effects of climate change and globalization may pose challenges to maintaining traditional ways of life.

In addition, vulnerability to climate change differs from community to community. There are large regional differences in development, infrastructure, governance, and the adaptive capacity across the North. Furthermore, as communities grow and change, the nature of their vulnerability and responses can change.

Why adapt?

The rate and magnitude of present-day climate change is unprecedented. It will affect the future of northern Canada. Major ecological, sociological, and economic impacts are expected. In northern Canada, places where water is close to its melting point are highly sensitive to climate change, so biophysical and socioeconomic systems in these areas are particularly vulnerable.

The Whitehorse Declaration on Northern Climate Change *released at the Circumpolar Climate Change Summit in March 2001, is symbolic of northerners' strong desire to work towards northern-relevant solutions on the climate change issue.*

Adapting to climate change in northern Canada: next steps

Discussions and development of responses on adaptation in Canada's North are currently in their very early stages. There are information gaps that need to be filled through a process of communication and community engagement. The NCE completed a *Gap Analysis* in March 2002 which showed that current information concerning northern systems, predicted climate changes, and the impacts of those changes on northern systems is poor. At present, there is an insufficient understanding of the implications of climate change, especially within the context of other forces of change affecting the North, including oil and gas development, population expansion, diamond mining, and wilderness tourism.

In the long-term, there is a need for direct participation of northern residents and institutions in climate change impacts and adaptation research and dialogue. New approaches to integrating traditional knowledge and scientific knowledge are needed, as is an understanding of the capacity of northern residents to adapt in the context of future development choices.

Although some important groundwork has been laid, much more needs to be done to ensure sustainability of northern communities, ecosystems, and ways of life in northern Canada. The northern offices of the Canadian Climate Impacts and Adaptation Research Network are now a growing network of researchers and stakeholders spanning the North. This important initiative will continue to build capacity by drawing together researchers and stakeholders, identifying knowledge gaps and research questions, improving access to information, and providing a stronger voice and visibility to the issue.

Additional reading

Feenstra et. al. 1998. *Handbook on Methods for Climate Change Impact Assessment and Adaptation Strategies*. United Nations Environment Programme. Available at http://130.37.129.100/IVM/research/climatechange/Handbook.htm

Cohen, S.J. (ed). 1997a. *Mackenzie Basin Impact Study*. Environment Canada. Available at: http://yukon.taiga.net/knowledge/resources.html

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Whitehorse Declaration on Northern Climate Change. Available at http://www.taiga.net/nce/declaration/index.html),