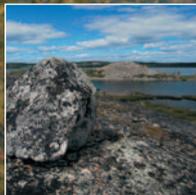
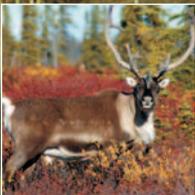




Indian and Northern
Affairs Canada

Affaires indiennes
et du Nord Canada

A Citizen's Guide to Cumulative Effects



Canada



Introduction

There has been growing industrial development in the Northwest Territories over the past 10 to 15 years, particularly in the areas of mining, oil and gas. All of these activities affect the natural environment in one way or another. Some projects have more of an impact than others, but small effects add up. These “cumulative effects” are a growing concern for the many organizations who share the responsibility of caring for the NWT’s land and water. Understanding and minimizing cumulative effects is essential to making informed decisions about land and water management and resource development in the NWT.

Organizations with environmental stewardship responsibilities in the NWT include Aboriginal governments and resource management boards, regulatory boards, the territorial and federal governments, environmental non-government organizations and industry. Indian and Northern Affairs Canada is one of these partners, and this booklet describes some of our activities related to understanding and managing cumulative effects. Because this booklet is intended to provide an overview of environmental management in the NWT, it also touches on areas outside our activities.

What are cumulative effects?

Cumulative effects are changes to the biophysical, social, economic, and cultural environments caused by the combination of past, present and “reasonably foreseeable” future actions. Impacts (changes) can be caused by natural events such as forest fires, or by human activities such as a mining. However, the term is usually used to describe the effects of industrial development that “add up” or “accumulate,” to produce observable impacts on the land and people. Cumulative effects on the land might be seen as changes to the number of wildlife or birds, increases in non-native plants, or the melting of permafrost. The cumulative effects of development on people might be seen in areas such as the employment rate, availability of housing or traditional activities like hunting or trapping.

Why should we care about cumulative effects?



Activities such as logging, oil and natural gas development, commercial fishing, mining, hunting, recreation and human settlement all contribute to cumulative effects. Since the early 1990s, there has been considerable growth in some of these activities in the Northwest Territories. Understanding the cumulative effects of such activities is important for making informed decisions in managing land, water and other natural resources in the NWT.

Are cumulative effects always harmful?

+ Past Activity A Impact
+ Past Activity B Impact
+ Present Activity A Impact
+ Present Activity B Impact
+ Future Activity A Impact
+ Future Activity B Impact
= *Cumulative Effect*

No – cumulative effects can be positive or negative. It's often easy to think of how industrial development harms the environment, but human activities can also produce benefits. For instance, since the establishment of the diamond mines in the NWT, more residents are finishing high school and earning higher salaries. There are many people, individuals, groups, business and industry

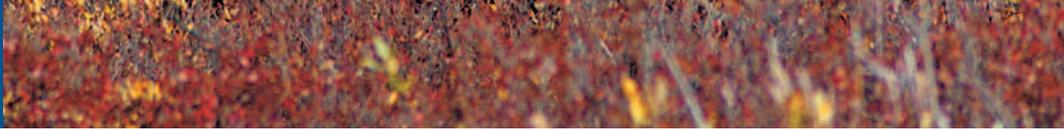
working to find ways to allow development to happen in a way that doesn't permanently harm the environment.

How do cumulative effects work?

No one activity causes cumulative effects. Cumulative effects are caused by the addition or accumulation of impacts from different activities over time. One impact by itself may not be a cause for concern; it might even seem insignificant. However, the addition of many small impacts over time adds to the end result – cumulative effects and an increase for concern.

Let's look at an example of how cumulative effects occur.

Imagine a mid-sized river running through undisturbed boreal forest. The water is cold and clear, and moves quickly. A good number of fish live and spawn in this river, and the water is good to drink.



At one point, the river passes by an outfitter's camp. It isn't a big camp, but even so, it has an effect on the river. The grey water from the kitchen is emptied into a hole in the ground (sump). Gasoline and oil for boat motors and generators are stored on site and sometimes small amounts are spilled when refueling. There is an outhouse at one end of the camp. Over many years, when rain water and snow melt flow through the soil, they carry contaminants from the sump, fuel storage and the outhouse down to the river.

Later, the river flows through an area that has been logged. When trees are clear-cut, the soil loses a lot of its natural protection, and more soil washes into the river when it rains and when snow melts. The river now becomes murky because of the particles of soil that are suspended in the water. Since it is difficult for fish to feed or reproduce in this kind of water, there are now fewer fish in the river.

Further downstream, water is being pumped from the river to supply a mining operation which needs a lot of water to crush and wash the ore that is being mined. The water that is left over is then treated to remove harmful chemicals, and pumped back into the river, but it now contains a few more chemicals than before it was taken from the river. As a result, the water level in the river is a little bit lower, and the water might now be unsafe to drink without treating it first.

The river soon reaches an area where there are a number of farms. Water is needed for use in farm homes, as well as for livestock and irrigating crops. When run off from rain or snow passes through this area, it sweeps contamination from livestock waste into the river, as well as pesticides and insecticides from adjoining fields.

By the time the river passes through this area, the water level is much lower. The quality of the water has also dropped because of increased chemicals, bacteria, and suspended solids. Fewer fish live in this portion of the river than do upstream. It is a very different river than the one we saw flowing through the boreal forest.

As you can see, no one activity can be blamed for the changes in the river – but the combined result was significant.



Is human activity responsible for all changes in the environment?

No – Many changes in the environment occur naturally. Some summers see more rainfall than others, for instance, while some winters are colder than others. When we look at the cumulative effects of human activity, we have to keep these natural variations in mind because they can work together to create a more serious impact than any of them on their own.

Can all cumulative effects be predicted?

Understanding and predicting cumulative effects is a challenging science. By collecting information over long periods of time, we can learn how certain types of activities contribute to cumulative effects. In addition, there are natural changes that occur all the time that must be taken into account when considering what further impact a human activity will have.



For example, the water level in a lake might be fairly constant and predictable over many years. A small exploration company draws water from the lake for its camp, lowering the water level by 20 centimetres. This does not have a harmful effect on the waterfowl that nest along its edge. After one very dry winter with little snow, though, the lake level drops another 50 centimetres, and the shoreline moves 10 metres

from its normal place. The grasses along the old shoreline die. As a result, the ducks have less nesting area. They also have to go farther to find food, exposing their nests to foxes. While the mining camp can probably continue to draw water, regulators may decide to not allow a second, larger camp to be built, because it would cause the water level to drop even further.



The dry winter and resulting drop in the level of the lake can not be predicted. In fact, many natural changes can rarely be predicted accurately. However, by observing and monitoring the effects of the drop in water level on the waterfowl, scientists are able to conclude that the dry winter, combined with the activities of the first camp, have a harmful effect. Knowing that a second camp would cause the lake level to drop another 30 centimetres, regulators decide to be cautious and not allow the second camp – the cumulative effect of the two camps combined with natural change could be too great.

How is Indian and Northern Affairs Canada involved with cumulative effects management in the NWT?

Cumulative effects management involves looking at impacts from the past and present, predicting what impacts may occur from planned future activities, and deciding how to best deal with the negative effects. In the Northwest Territories, scientists, governments, Aboriginal people and industry are cooperating to monitor the cumulative effects of development on the environment. While scientists and Aboriginal people are carrying out field studies to assess current trends in the environment, Aboriginal Elders are using their traditional knowledge to provide valuable information about weather patterns, the land, plants and animals, and how these have changed over time.

Understanding and minimizing cumulative effects is an important part of the overall environmental management and stewardship of lands and resources. Good environmental management requires putting together all the pieces of an environmental stewardship framework. Each piece provides information that helps regulators and land managers make good decisions about sustainable development. In the NWT, this framework is called the Cumulative Effects Assessment and Management Strategy and Framework. Indian and Northern Affairs Canada has had a lead role in both its development and ongoing implementation.



The NWT Cumulative Effects Assessment and Management Strategy and Framework

The need for a framework to help developers, regulatory agencies and others understand and manage the potential cumulative effects of development projects on the environment and communities of the NWT has been recognized for many years. Aboriginal organizations, industry, resource management boards, federal and territorial governments, and environmental non-governmental organizations have cooperated to develop the NWT Cumulative Effects Assessment and Management (CEAM) Strategy and Framework.

The NWT CEAM Strategy and Framework is intended to help facilitate the protection of ecological integrity, the building of sustainable communities (including social and cultural dimensions), and responsible economic development within a sound environmental management framework.

The environmental stewardship framework consists of:

- A **vision** describing where the NWT and its communities want to be in 10, 20 or 50 years and coordination in achieving this vision by a group of interested stakeholders;
- **Land use and conservation planning**, where legislated land use plans and conservation initiatives such as the Protected Areas Strategy set aside undeveloped areas and set limits to development in certain other important ecological or cultural areas;
- **Baseline studies and monitoring** carried out for development activities or on a regional basis, which help establish baseline conditions and trends in environmental quality. Monitoring conducted by agencies established for the diamond mines, or by the NWT Cumulative Impact Monitoring Program are included here;
- **Research** conducted by governments, industry and the public that help us understand different components of the environment and how they change and interact;



- **Assessment**, regulation and enforcement, which provide a process for assessing the environmental effects of development and under what conditions development should proceed;
- **Information management**, which allows for ready access to information needed to understand and manage environmental effects;
- **Capacity-building**, which allows communities, regional Aboriginal organizations, governments, industry and other affected parties to effectively participate in, and fulfill their responsibilities as environmental stewards in the NWT; and
- **An environmental audit**, which is an independent check on the health of the environment, the effectiveness of environmental management processes and the effectiveness of the organizations responsible for protecting the environment in the NWT.



The Northwest Territories Cumulative Impact Monitoring Program

The Northwest Territories Cumulative Impact Monitoring Program (CIMP) will look at how all uses of land and water, and deposits of waste, affect the environment of the NWT now and in the future. The program is based on land claims and legislation, including the Gwich'in, Sahtu, and Tlicho agreements, and the *Mackenzie Valley Resource Management Act*.

CIMP follows a community-based approach, which means that communities will be involved throughout the program: in the design, monitoring, analysis/interpretation and reporting of traditional knowledge or science-based information.

The program has been developed by a working group, which is a partnership among NWT Aboriginal governments, the Government of Canada, and the Government of the Northwest Territories.

NWT Environmental Audit

The *Mackenzie Valley Resource Management Act* states that an audit of the environment must take place in the Mackenzie Valley at least once every five years to evaluate and review:



- The state (health) of the environment: trends in environmental quality, contributing factors, and the significance of trends;
- The effectiveness of the NWT Cumulative Impact Monitoring Program;
- The effectiveness of the NWT's integrated environmental and resource management systems; and
- The response to any recommendations of previous environmental audits.

Similar requirements for environmental audits are described in the Sahtu, Gwich'in and Tlicho agreements.

The first NWT Environmental Audit was completed in December, 2005, and contains 50 recommendations. The responsibility for addressing these is shared among as many as 25 directly affected parties, including government, agencies and resource management boards. These recommendations are intended to be used by decision-makers to improve the effectiveness of the regulation of environmental and resource management in the NWT.

Environmental Agreements



Each of the NWT's three diamond mines has an environmental agreement, a legal contract among the mining company, governments and Aboriginal organizations. The agreements set out requirements for the company's environmental management plans, monitoring programs, and closure and reclamation plans. Each of the environmental agreements for the diamond mines establishes a monitoring agency, funded primarily by industry. Aboriginal governments

are playing a fundamental role in these agencies, which advise the company, communities, and the Minister of Indian Affairs and Northern Development on environmental issues related to the project.



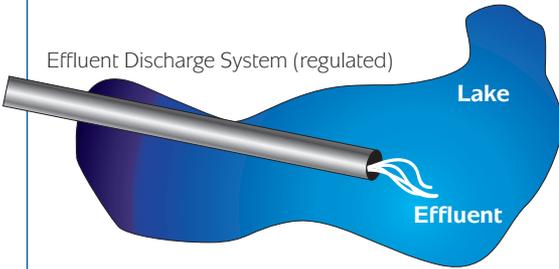
What happens to the information gathered through these programs and other studies?

This information is used to “adaptively manage” projects. When a development project first starts up, the company, Aboriginal communities, environmental organizations, government, and land and water boards try to predict its effects on the environment, based on existing information and previous experience. These predictions are used to develop ways of mitigating – or reducing – the impact of the development on the environment. As the project proceeds, the monitoring programs show whether the impacts on the environment are occurring as predicted, and the steps used to mitigate them are working as expected. Sometimes, the information gathered through the monitoring programs show that the mitigation measures being used to protect the environment need to be adjusted in order to minimize impacts as much as possible. This may require revising the terms and conditions of a developer’s water licence, land use permit or environmental agreement.

Can you give me some examples of these “mitigation measures”?

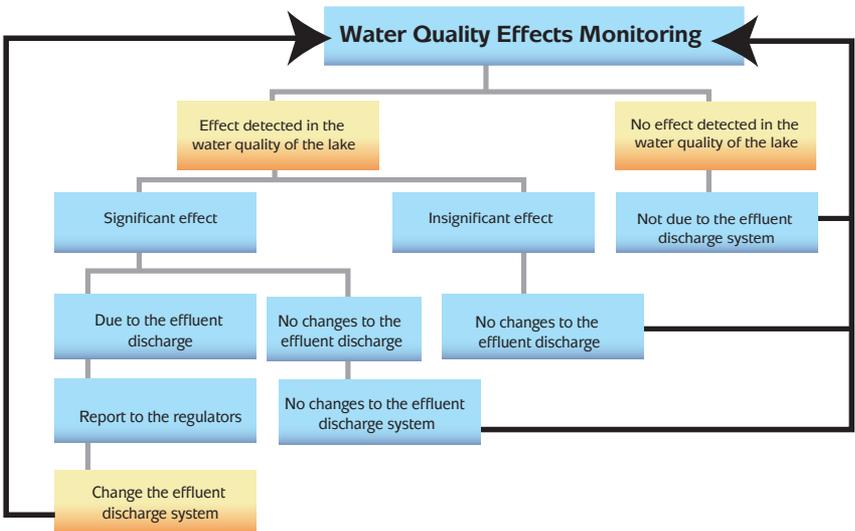
A mining company might be allowed, according to its permits, to discharge a certain amount of mine waste water into a lake, as long as the water does not have more than the allowed amounts of certain chemicals. These restrictions are intended to prevent harmful impacts to the fish that inhabit the lake, or the caribou and people that drink water from the lake. If a second and third company need to discharge waste water into the lake as well, the environmental assessment and regulatory process would review how much, and what kind of waste water these companies could discharge, to make sure that there continues to be no harmful impacts to environment, including the fish, wildlife and humans. In the end, this could require that all three companies be required to discharge less, and cleaner, waste water.

Mitigation measures can be seen in the following Water Quality Effects Monitoring example.



The water quality monitoring would determine whether the effluents that are being discharged into the lake will have an effect (change) on the water quality in the lake. From

there, scientists have to determine whether the effect is significant or insignificant. If the effect is insignificant, nothing would likely change in the operation of the effluent discharge system, but monitoring will continue. If the effect is significant, the scientists' next job is to determine whether the effect was caused by the effluent discharge system. If the system caused the change, it is reported to the regulators and the effluent discharge system would be changed to lower the amount of effluent that is discharged into the lake. These steps can be seen in the diagram below.





What can people do about cumulative effects?

If there is industrial development in your area, there is probably a community-based monitoring program already in existence. Check with your local band office, regional Aboriginal government, or Indian and Northern Affairs Canada to see what is happening in your area, and how you can participate.

The NWT's land and water boards, and environmental impact review boards, consider cumulative effects and make recommendations on how to mitigate them when approving development projects. You can make a difference by learning about the regulatory system in the NWT and participating in public hearings.

We all have an impact on our surroundings, and there are many things we, as individuals, can do to reduce those impacts. Often it is as simple as recycling pop or juice containers, or walking to work instead of driving. If you think about all of your actions and the cumulative effects that they might have, you can probably come up with your own list of “mitigation measures”!



Key definitions



Conservation

The planning, management and implementation of an activity to protect the essential physical, chemical and biological characteristics of the environment against harm.

Contaminant

Any physical, chemical, biological or radiological substance in the air, soil or water that has an adverse effect. Any chemical substance with a concentration that exceeds natural levels or which is not naturally occurring in the environment.

Cumulative Effects

Changes to the biophysical, social, economic, and cultural environments caused by the combination of past, present and “reasonably foreseeable” future actions.

Ecological Integrity

Quality of a natural, unmanaged or managed ecosystem, in which the natural ecological processes are sustained, with genetic, species and ecosystem diversity assured for the future.

Ecosystem

A community of plants, animals and non-living things that exist in the same place.

Environmental Hazards

Any biological, chemical, or physical agents found in or transmitted through the air, water, food, soil, or manufactured items that may adversely affect the health or well-being of the public.

Environmental Quality

A measure of the condition of an environment (soil, water, air) relative to the requirements of one or more species and/or to any human need or purpose.



Habitat

The specific area in which a particular type of plant or animal lives.

Land Use Planning

The development of plans for the uses of land that, over long periods, will best serve the general good.

Mitigation

Reducing the negative impacts of a particular land use or activity on the environment.

Monitoring

Observing changes in the environment over time.

Pollutant

A contaminant that negatively affects the physical, chemical or biological properties of the environment.

Sustainable Development

Industrial development that does not detract from the potential of the natural environment to ensure benefits for future generations.

Sustainability

Development that conserves the ecological balance by minimizing, and where possible, avoiding depletion of natural resources.

Threshold

The point at which the accumulated stress on the ecosystem exceeds the system's ability to accommodate change. This results in a fundamental shift in the system.

Toxin

A substance, dose or concentration that is harmful to living organisms.



For more information

General

NWT Cumulative Effects Assessment and Management Strategy and Framework

www.ceamf.ca

Northwest Territories Cumulative Impact Monitoring Program

www.nwtcimp.ca

NWT Environmental Audit

<http://nwt-tno.inac-ainc.gc.ca>

Monitoring agencies

Independent Monitoring Agency (Ekati Mine, BHP Billiton)

www.monitoringagency.net

Environmental Monitoring Advisory Board

(Diavik Diamond Mine)

www.emab.ca

NWT Regulatory Boards



Mackenzie Valley

Gwich'in Land Use Planning Board

www.gwichinplanning.nt.ca

Gwich'in Land and Water Board

www.glwb.com

Gwich'in Renewable Resource Board

www.grrb.nt.ca



Mackenzie Valley Environmental Impact Review Board
www.mveirb.nt.ca

Mackenzie Valley Land and Water Board
www.mvlwb.com

Sahtu Land and Water Board
www.slwb.com

Sahtu Land Use Planning Board
<http://209.146.197.178/index.html>

Sahtu Renewable Resources Board
www.srrb.nt.ca

Inuvialuit Settlement Region

Joint Secretariat – Inuvialuit Renewable Resource Committees
www.jointsecretariat.ca/JS/history.htm

Fisheries Joint Management Committee
www.fjmc.ca

Inuvialuit Game Council
www.jointsecretariat.ca/IGC/aboutus.htm

Wildlife Management Advisory Council (NWT)

Wildlife Management Advisory Council (North Slope)
www.taiga.net/wmac

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