



PATHWAY TO BETTER MONITORING IN CANADA'S NORTH

A step-by-step guide to designing northern
monitoring programs



Monitoring: Checking the Land's Pulse

You are walking up a riverside trail that your grandfather used to take you on and are surprised to see that half of it has caved into the water. You are catching lots of fish that have open sores and wonder if upstream pollution might be the cause. You have noticed low river levels the past few spring-times and are worried that neighbouring wetlands might dry up. You are finding lots of slushy overflow on the land, making winter bush travel tougher. What's going on?

Our land is changing in many ways, some natural, some not. Monitoring is a powerful tool to learn about changes in the land's health, what might cause them, and how we should respond to those changes.

Just as changes in your pulse, blood pressure, and body temperature are important indicators of your own health, trends in wildlife, fish, plants, water, permafrost, and other key parts of the environment can tell us how the land is doing. Keeping track of these, understanding how they interact, and adjusting how we take care of the land and our communities is what monitoring is all about.



"The elders work on the land and see the land all the time. They notice these differences."

Robert Mackenzie, Behchoko

Monitoring Partners

Monitoring programs in northern Canada usually involve some combination of four key partners, each with different priorities, skills and knowledge.

Communities

Communities can help design and carry out home-grown monitoring studies to address local issues while contributing to broader, regional programs.

Regulators

When co-management Boards or other regulators approve things like mines, pipelines and roads, they commonly ask developers to conduct a monitoring program to make sure they are meeting the conditions of approval. The regulator must approve such programs before they are carried out.

Academic researchers

Universities may take the lead on monitoring programs designed to increase our understanding of northern lands.

Government

Several federal and territorial departments have ongoing responsibilities to collect general baseline information to monitor the condition of northern waters, air, fisheries, and wildlife.

CIMP Mission Statement

“To watch and understand the land and to use it respectfully forever.”

Watch the land = Use Science and Traditional knowledge for monitoring.

Understand the land = Collect and analyze information to track the land’s health and learn about the causes of change.

Use it respectfully = Use monitoring results to improve decision-making.

Purpose of this Guide

Deciding exactly *what* to monitor and *how* depends on many things. What issues made you notice the need for your monitoring program? What are your goals? What information do you need? How should that information be collected and shared? How should your results be used?

This guide describes a step-by-step Pathway to help communities and their monitoring partners discuss such questions and design a program that best suits their needs.

Your input on how best to accomplish each step and how you want to be involved in the Pathway will be used to create more detailed “how-to” Guidance Documents to promote better monitoring programs across northern Canada.



“We notice that science splits things up by topic. Traditional Knowledge can help bring things together.”

Douglas Esagok, Inuvik

Why CIMP Created the Pathway

The NWT Cumulative Impact Monitoring Program, or CIMP, supports and conducts monitoring programs that address land and water issues of vital importance to northerners. Guided by a northern-based Working Group, CIMP is promoting a partnership approach to monitoring through its step-by-step Pathway.

Challenges can arise when you try to independently run a monitoring program that lacks a shared purpose and a clear plan from start to finish. Other challenges include agreeing on what to monitor, deciding “who does what, when”, and how best to use traditional knowledge. CIMP created the Pathway to address such challenges.

Every one of the Pathway steps is important. Follow them all, one after the other, and your monitoring program will likely benefit from:

- Strengthened partnerships
- Clarified roles and responsibilities
- More effective study design
- Improved information sharing
- More involvement of northerners
- Better balance of scientific and traditional knowledge
- Increased understanding of impacts and connections
- Enhanced relevance for northerners
- Wider awareness and usefulness of results

CIMP Working Group

Purpose

- Guide the development of a long-term, partner-based monitoring program
- Advise on the use of cumulative impact monitoring information in decision-making

Principles

- Be community-driven & relevant
- Balance scientific & traditional knowledge
- Plan for the long-term
- Adhere to land claims & legislation
- Communicate, educate, train
- Build on existing and related programs

Membership (including observers)

- Gwich'in Tribal Council
- Sahtu Secretariat Incorporated
- Dehcho First Nations
- Tlicho Government
- Akaitcho Territory Government
- Northwest Territory Metis Nation
- North Slave Metis Alliance
- Government of the Northwest Territories
- Government of Canada
- Mackenzie Valley Environmental Impact Review Board
- Inuvialuit Joint-Secretariat

Pathway Approach

**Step 1. Define a purpose**

Why are we monitoring?

Step 2. Identify key connections:

How do things interact and/or connect, and what should we track?

Step 3. Review current information:

What is already known?

Step 4. Ask the right questions:

What needs to be answered?

Step 5. Make a plan:

How will we find answers?

Step 6. Collect information:

How do we gather the observations and data?

Step 7. Analyze information:

How can we turn observations into useful knowledge?

Step 8. Report findings:

How should we tell our story?

Step 9. Adapt to changes:

What has changed? Should we adjust our monitoring program?

Step 1. Define A Purpose

Why are we monitoring?

What and why

The first and most important step in the Pathway is to clearly define your purpose for monitoring. This may be broad – *Is water quality changing?* – or specific – *Is seismic activity threatening woodland caribou habitat?* A shared understanding of the purpose will help shape all other steps along the Pathway, from identifying what indicators you should monitor to how the information will be used.

Who

Regardless of who initiates your monitoring program, close collaboration among the right mix of partners is critical at this early stage so that everyone can contribute to and agree on the purpose.

How

Northern-based meetings or workshops are one good way to identify which partners should be at the table, identify critical issues, discuss the role of traditional and scientific knowledge, and refine the purpose of your monitoring program.



"The ideas for research projects should come from communities, based on local land users' observations and concerns."

Douglas Esagok, Inuvik

Step 2. Identify Key Connections



How do things connect and what should we track?

What and why

A clear purpose to your monitoring program will help you identify exactly what you should track. In turn, by bringing partners together to discuss key connections between different parts of the environment, you can identify additional indicators and stressors to include in your study.

Who

Community members who know the land best and other monitoring partners can provide valuable insights into what environmental factors should be monitored. Once these are known, you can identify who has expertise in these areas and confirm which partners can contribute to your study.

How

Again, community-based workshops are a good way for partners to discuss important environmental connections and to develop a conceptual model of how the environment “works”.

“There are a lot of things to monitor out there. Don’t try to monitor everything. Focus on priorities that are useful to decision-making.”

Marc Lange, CIMP

Step 3. Review Current Information

What is already known?

What and why

This step involves reviewing traditional and scientific knowledge about the issue you want to monitor. It will help you identify similar studies, existing information sources, and appropriate methods to collect and analyze your data. It may also help refine your ideas about how things connect – “conceptual model” – and sharpen your study’s purpose.

Who

Close collaboration of all partners involved in your monitoring program is especially important in this step since everyone will likely have something to contribute.

How

The group leading your monitoring program can pull together input from partners through meetings, conference calls, emails and other forms of targeted communication. Information shared in Steps 1 and 2 should be included in Step 3.



“We need to create the right situations to share knowledge.”

Douglas Esagok, Inuvik

Step 4. Ask The Right Questions



"What and how long we monitor is determined by the questions we are asking. You can't make a plan unless you know what questions you want to answer."

Steve Kokelj, CIMP

What needs to be answered?

What and why

At this point you should have a clear purpose, know what you want to monitor, and have a good sense of available information. Building on this foundation, you can now define specific research questions that will guide the collection and analysis of information.

Who

Technical partners may take the lead on drafting research questions that will test the conceptual model developed in Step 2. Getting input on these questions from both decision-makers and communities will increase the usefulness of your results.

How

Research questions should be based on the conceptual model of how different environmental factors connect and interact (Step 2).

Step 5. Make A Plan

How will we find answers?

What and why

This step is all about finding ways to answer the questions you posed in step 4. It results in a detailed plan, or study design, that spells out how, where, when, and by whom information will be collected, stored, analyzed and reported. Logistics for transportation, equipment, safety, and environmental protection are an important part of the planning process.

Who

Your planning team should include scientific and community field staff who understand the local landscape's sensitivities, challenges and logistical realities. Before launching your monitoring plan, it's good to have it reviewed by outside experts — biologist, hydrologist, statistician; experienced land user — to help make the best use of resources.

How

Partners should work together to plan monitoring activities to promote efficiency of data gathering. Choose the data collection and analysis tools that will best answer your questions. These could include field sampling, interviews, and/or remote sensing. Get clear agreement among your partners on "who's doing what and when". This will help the whole project go smoothly. And be realistic. The most successful monitoring plans balance the need to use best available practices with the actual capacity of people and money to do the job.



Step 6. Collect Information

How do we gather the observations or data?

What and why

Data collection is typically the most costly step in northern monitoring. This makes it critical that the methods to gather observations — whether through field work or interviews — be clearly defined, well understood, and carried out by a well-trained team.

Who

Your team should have a clearly identified leader to coordinate data collection and ensure safety. For this step, collaborators may include researchers, technicians, traditional knowledge holders and community members who work closely to share knowledge and collect data.

How

Share logistics wherever possible to reduce your costs. Use “industry standard” procedures — or protocols — to boost the usefulness of your results, both for your study and for comparison with others like it.



Step 7. Analyze Information

How can we turn observations into useful knowledge?

What and why

Analysis is the key that unlocks the knowledge contained within the observations (or data) that you have collected. Statistical tests, graphs, and other analytical methods help researchers reveal changes and trends in what you are tracking which might otherwise remain hidden. Such insights can go a long way in answering your key monitoring questions. Traditional stories and observations from communities also provide valuable insights into what's happening on the land.

Who

The researchers on your team will likely be the ones leading data storage, sharing, and analysis tasks.

How

Choose data analysis techniques that will best answer the research questions you asked in Step 4. Organize and store your data in ways that are accessible to decision-makers and other monitoring programs. Where possible, add your data to an existing information bank. This will promote more open information sharing and help detect stories of environmental change and interactions that your study alone may have missed. Such data management strategies will give your information a life beyond your particular project and contribute to a wider understanding of cumulative impacts.



Step 8. Report Findings



How should we tell our story?

What and why

The “story” revealed by your monitoring efforts needs to be told in the right way to the right people. Know your target audience. Decide on what key messages you want to tell them. Most importantly, report on how your results shed light on better ways to manage the land.

Who

The lead group for your monitoring program typically will be responsible for packaging and presenting your results. All project partners will want a chance to review and add their input to this material.

How

You may choose one or more reporting formats, each involving different styles, schedules and purposes. These include technical journals, plain language summaries, peer-reviewed research reports, regulatory documents, workshops, conferences, public meetings, and websites. It’s important to match your format with the needs of your particular audience.

Step 9. Adapt To Changes

What has changed? Should we adjust our monitoring program?

What and why

Keeping an eye on change is at the heart of monitoring. But it's not only the environment that may be changing. As time goes on, your original monitoring partners, team leaders, funding levels, community values, or government priorities might change too. You need to track these changes and, where necessary, adjust your monitoring program to stay relevant and effective.

Who

All partners on your team can provide regular input on outside factors that might call for revisions to any step of your original monitoring program.

How

Once you complete all eight steps above, or after some predefined monitoring period, say two years, you should conduct a review of progress to date and your current operating situation. This review will result in three possible outcomes:

- **Continue your monitoring program.** Your original research questions are still relevant. Contributing to a long-term data record remains a priority. Your program detected a noticeable change or trend in the environment.
- **Adjust your monitoring program.** You detect environmental changes that call for adjustments in, for instance, how often or how closely you take field samples. Other possible adjustments: updating equipment, using new techniques, or linking with other monitoring programs. Document all adjustments and be sure they don't affect your ability to answer your initial research questions.
- **Stop your monitoring program.** A cost-benefit analysis reveals your program is not cost-effective. Other reasons for stopping: change in priorities; you detect no environmental change; you discover other data sources that duplicate your efforts or results; new questions arise that call for an entirely different approach to monitoring.





We Want Your Input

This work is part of a larger project to help improve monitoring across Canada's north. Your input on how best to accomplish each step and how you want to be involved in the Pathway will help CIMP prepare more detailed "How-to" Guidance Documents. These will help clarify the roles and responsibilities of key partners and help them design and deliver better monitoring programs.

To provide your ideas or ask questions about how communities and the North should be involved in the various steps of this Pathway, please send an email to cimp@aandc.gc.ca.

Gathering your input on this Pathway is part of CIMP's ongoing commitment to work with partners and make sure northerners have a strong voice in shaping how monitoring is done in the land they know best.

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