

NWT CIMP Community-Based Water Monitoring Guidance

1. INTRODUCTION

This provides guidance on community-based monitoring (CBM) for water projects to produce high quality, long-term data that addresses both local and regional water variability concerns. It refers to the establishment of long-term water monitoring projects. For more information on the Northwest Territories Cumulative Impact Monitoring Program (NWT CIMP), visit www.nwtcimp.ca.

What is the difference between monitoring and research?

Monitoring = conducting sampling with the aim of examining long-term, temporal or spatial trends. For example, what is the change in temperature in stream A over many years?

Research = conducting sampling in order to answer one or more specific question(s). For example, what is the impact of temperature changes on fish in Stream A?

Increasingly, communities are interested in understanding local water quality and quantity and are involved in community-based water monitoring. With good planning, CBM provides a unique opportunity for NWT communities to build long-term capacity and gather much needed monitoring information.

We are mandated to understand long-term water quality trends at both local and regional scales.

What is the difference between local and regional-scale monitoring?

Local = monitoring sites located close together, often they are nearby a community

Regional = monitoring sites are more spaced out and representative of a broader area

2. PARTNERSHIPS

Through experience, we know that monitoring partnerships with government, private or academic experts have a greater chance of successfully collecting useful information and building community-capacity. Each partner builds on the varied strengths of others and is able to contribute in multiple ways.

If you are applying for NWT CIMP funding for a science-based community water monitoring project, it is **highly recommended** that you partner with a government, private or academic group that has scientific expertise and knowledge. These partnerships strengthen monitoring programs to answer local, regional and long-term water questions.

NWT CIMP and the Aurora Research Institute have developed a step-by-step resource for communities to engage with partners and set up community-based monitoring programs called [Working Together Towards Relevant environmental Monitoring and Research in the NWT](#) (2013).

3. STUDY DESIGN

A well-planned study design is essential for a project's success. Keep in mind that though community questions may be local, we are also interested in the regional watershed perspective over the long-term. It is useful to identify the geographical monitoring limits, the present and planned water uses and the expected pollution sources. Your project needs to be designed so that factors contributing to water variability can be understood. These factors may be different depending on scale. Many descriptions and examples of effective study design exist and should be investigated and considered. Some examples include:

- [A Guide to Designing and Conducting Water Quality Monitoring in Northern Canada](#) by the Northern Ecological Monitoring and Assessment Network;
- [Water Quality Monitoring System](#) by the International Institute for Sustainable Development;
- [A Practical Guide to the Design and Implementation of Freshwater Quality Studies and Monitoring Programs](#) by the World Health Organization.

Remember...

expert water partners and other helpful resources are available
to help guide the study design.

3.1 General Considerations

Good monitoring projects are designed around well-defined, clear questions. These questions will determine what to measure, spatial extent of sampling, intensity and duration of the measurements and the usefulness of data.

When starting the design, look at the 'big picture' questions which often arise from community concerns. Consider what component is the best place to start addressing the larger question and build from there. Start small and focus the project in order to collect data within a particular scope and budget. It is better to have consistent data in a few key areas that can be analyzed for trends than to collect data inconsistently at a number of locations that is inadequate for spatial or temporal trend analysis.

3.2 Standardized data

Parameters to be monitored will depend on the project purpose and objectives. All water quality monitoring projects will include some or all of the following parameters:

- *chemical* (pH, dissolved oxygen, metals)
- *physical* (temperature, colour, conductivity, turbidity)
- *biological* (algae, benthic macro invertebrates, phytoplankton)

Data from a CBM project is most useful if it can be compared with data from other monitoring sites in the watershed, region and territory. Find out what monitoring information exists in your watershed and region. This will help to understand different approaches and programs, standardize sampling and analysis methods, and potentially connect projects. Potential monitoring contacts include government, such as the GNWT-ENR Water Management and Monitoring Division, industry, academic, and other community-based projects. Projects that show evidence of efforts to standardize data collection and analysis with existing projects stand a higher chance of being funded.

3.3 Recommended Protocols and Guidance

Several data collection protocols and guidance for water quality and fish sampling are available and should be used. See the NWT CIMP Science Project Funding Guide.

3.4 Data Management

NWT CIMP is committed to timely and open access to data. We require a data management plan (DMP) for all funded projects. See NWT CIMP Funding Guides for our Data Management Policy. Water quality data is made available to the public through an online data-sharing portal called the [Mackenzie DataStream](#).

3.5 Frequency and Timing of Sampling

How often a sample is taken and timing depends on many factors including the project objectives, the water body of interest (e.g. lake, river), type of samples (e.g. water, sediment) and what is being measured. For example, stations where water quality changes often should be sampled more often than at stations where quality remains similar over time.

To ensure comparability of data, it is important to sample each site at the same season (and same time period for biological parameters) of each year. Most CBM projects focus on summer sampling due to ease-of-access. Single season sampling is acceptable, but there are limitations of the data that must be acknowledged in the analysis. For community water monitoring, it is less likely that sampling will occur in winter due to on-ice safety concerns. If the study questions involve seasonal effects or questions on winter conditions, then significant safety planning and training are likely required before conducting winter field sampling.

When determining the frequency of sampling, consider several questions: How many samples are needed to be able to detect and understand trends? Will there be enough data to provide an understanding of natural variability? Ensure that there is consideration for statistical power to determine statistical significance of the data. By ensuring the study design is appropriate, you can determine statistical relationships between two or more things, and the data is stronger, useful and more defensible for decision-making.

3.6 Sampling Locations

Selecting the right sampling location is important to the success of the project and should not be done randomly. Think about the questions you are trying to answer and talk to an expert.

It is important to know where other monitoring sites are. The GNWT-ECC maintains a list called the [NWT Water Monitoring Inventory](#). Various resources on NWT water monitoring networks and surveys are also available. Where possible, locate sites near long-term monitoring sites so that you may assess temporal trends. Know where point source and non-point source impacts may be (e.g., effluent from a mining site).

Sites should be located so that variability in water quality can be more easily explained. For instance, it would be difficult to explain water monitoring results from one site in the middle of the Mackenzie River because it is influenced by such a large upstream area. But monitoring a number of smaller nearby tributaries and/or along the Mackenzie at various points would provide a better understanding of local or regional water quality and the factors that influence them.

Start by focusing on a smaller geographical area and if possible, gradually increase the number of sampling locations over time. This will increase your chances of success and your ability to explain your data. It is important to consider drivers of water quality and how they would be measured or modeled to explain changes in water quality data. It is important to think about how the data will be analyzed at the end of the project in order to determine what needs to be collected at the beginning.

3.7 Quality Assurance/Quality Control (QA/QC)

Sample collection and measurement should be rigorous, repeatable and use acceptable methods. By strictly following sampling protocols, such as described in Section 3.3, you will collect and maintain good quality and consistent data.

If data is to be used in a legal context, or compared with data collected by industry, a 'chain of custody' approach and rigorous QA/QC procedures (e.g. travel blanks, field blanks) are required. The chain of custody provides a record of everyone who had a hand in collecting and analyzing a sample, and gives an assurance that proper procedures were followed. Recommended resources include CCME's [Protocols Manual for Water Quality Sampling in Canada](#) and the Government of British Columbia's [Water Quality Procedure Guides and Sampling Manuals](#).

3.8 Safety Plan

When collecting samples, everyone's safety is top priority. Being well-prepared and documented in case of an emergency is a must. Regular scheduled 'check-ins' help ensure safety. Equipment, training, job hazard assessments, field safety plans and journey management plans are some tools that are available to increase worker's safety.

3.9 Long-term Plan

With CBM projects, it is useful to think of the long-term plan at the beginning. If the goal is to support a long-term monitoring program, then there are several questions to consider: How will this project be supported over the long term? Where will project funding come from? Can project partners provide funding? Higher costs are normally associated with purchasing equipment, providing training and addressing short-term questions. For example, the first three years of a project could focus on a comprehensive assessment of a watershed. In later years, monitoring could be scaled back to several key sites of interest, and would require a much lower maintenance-level of funding.

A. TRAINING

A key principle of NWT CIMP is to support community capacity-building. Participation in community monitoring is one way for community members to gather experience that can lead to future employment. We encourage community members to obtain standardized training certifications.

In addition to providing funding for community members to gather experience collecting water data, we can support community members to participate in certified training opportunities as part of a project. An example is EcoCanada's [Building Environmental Aboriginal Human Resources](#) (BEAHR) training.