



NWQMC

NATIONAL WATER QUALITY
MONITORING COUNCIL

Working Together for Clean Water

Methods and Data Comparability Board

The Value of Data Comparability

What is Data Comparability?

Data comparability exists when data are of known quality and can thus be validly applied by external users, even when project objectives differ. Ideally, in order to maximize the potential for data comparability, water-quality monitoring entities should collaborate to determine the minimum data elements, including background information, to be included in the data-collection effort. In the long run, collaboration and comparability will help water-quality managers make the best use of the resources available for water-quality assessment.

The problem

Each year various governmental and private organizations dedicate significant resources to monitor our aquatic resources and watersheds. We use this information to protect human health, preserve and restore healthy ecosystems, and to sustain a viable economy. When the various monitoring entities produce comparable data and information, we will be better able to answer fundamental water resources questions such as:

- What is the condition of the Nation's surface, ground, estuarine, and coastal waters?
- Are water-quality conditions getting better or worse?
- Are water-quality goals and standards being met?

Compiling comprehensive and consistent assessment information on a national, state, tribal, or watershed level can be problematic for several reasons:

- **Incompatible methods:** The use of different data-collection and analysis methods often prevents others from using the data.
- **Lack of information about the data (metadata):** The metadata is either non-existent or poorly communicated.

- **Questionable data quality:** Quality-assurance and quality-control activities are not integrated into monitoring programs or the information is not well documented.
- **Unavailable data and information:** Information and data are not communicated or are inaccessible.

Without attention to each of these areas, potential users cannot optimize the use of the data, resulting in duplication of efforts and an underutilization of available water-quality information.

What is the Methods and Data Comparability Board?

The Methods and Data Comparability Board (Methods Board) is a partnership of water-quality experts from federal agencies, states, tribes, municipalities, industry, and private organizations who all share a commitment to developing water-quality monitoring approaches that facilitate collaboration and comparability amongst all data-gathering organizations.

Both the Methods Board and its parent organization, the National Water Quality Monitoring Council (National Council) are co-chaired by USGS and USEPA and are Workgroups under the Advisory Committee on Water Information (ACWI), chartered under the Federal Advisory Committee Act (FACA). The Methods Board and the National Council are multi-agency committees charged with developing a voluntary, integrated, and nationwide water quality monitoring strategy.

Through inclusion, sound science, and consensus, the Methods Board identifies, examines, recommends, and fosters monitoring approaches that facilitate collaboration amongst all data-gathering organizations. The Board develops products that enhance our ability to achieve real environmental gains while making the best use of the limited resources available for water quality monitoring.

A Strategy for Achieving Comparability

The Methods Board has devised an operational framework for comparability that includes four key elements to ensure that data are well documented, consistent, and of known quality. It is critical in the planning and implementation stage of any monitoring program to address each of these elements and associated considerations to optimize the benefit of the resources spent on monitoring.

Element	Key Considerations
1 Identify objectives and design monitoring program	<ul style="list-style-type: none">✓ Study objectives✓ Monitoring questions✓ Data-quality objectives and requirements✓ Measurement quality objectives✓ Sampling design
2 Collect data in the field	<ul style="list-style-type: none">✓ Field accreditation/certification and training✓ Field-activity protocols✓ Field-method quality control and assessment✓ Sample handling and preservation
3 Collect data in the laboratory	<ul style="list-style-type: none">✓ Method comparability✓ Laboratory accreditation✓ Reference materials availability✓ Laboratory method verification
4 Manage data	<ul style="list-style-type: none">✓ Required metadata✓ Data-quality documentation✓ Data verification and analysis

Identify Objectives and Design Monitoring Program

Appropriate data collection methods and other monitoring activities cannot be properly identified without first defining the overall data-quality objectives (DQOs). The DQOs address:

- the type of data needed
- the spatial and temporal scales over which data should be collected
- the quality of data needed
- resources and personnel requirements to complete the project as planned

A quality-assurance project plan (QAPP) and/or Sampling Analysis Project Plan (SAPP) is useful for ensuring that the desired information is available to meet the project objectives. Collaboration with all appropriate stakeholders throughout the DQO process is essential for ensuring data comparability upon completion of the program.

Collect Data in the Field and Laboratory

Measurement quality objectives (MQOs) should be based on the method performance required to meet the DQOs. The National Environmental Methods Index (NEMI) at <http://www.nemi.gov> allows users to easily compare potential differences among methods for the same parameter. By providing a user-friendly format for evaluating the characteristics of available methods, NEMI assists the user in project design and helps determine potential comparability of data produced by different methods. This information also helps to address field and laboratory safety and quality-assurance/quality-control (QA/QC) concerns and requirements. Method decisions should consider availability of new and better technologies, if appropriate, and the need for laboratory and field accreditation. A sample management plan should be developed as a means of assuring quality throughout the process.

Manage Data

A data management plan should be developed that documents:

- data handling in the field and laboratory
- electronic data storage and archival
- approach for data quality-assurance review to ensure the integrity of databases
- metadata requirements that allow another data user to determine data comparability.

The Board and NWQMC developed a list of common Water Quality Data Elements (WQDEs) (<http://wi.water.usgs.gov/methods/>) that define core metadata needs for chemical and microbiological data. Core data elements are being developed for biological and physical field and laboratory data as well.

Setting Data Quality Objectives (DQOs), developing a Quality Assurance Project Plan (QAPP) and a data management plan at the outset of a monitoring project or program is an essential component of the Methods Board comparability framework.

The DQO process is a planning framework that defines what, how, when, and where data are collected and analyzed to ensure that the type, quantity, and quality of environmental data used in decision making will be appropriate for the intended application. The DQOs that result define the measurement quality objectives (MQOs) that must be met, such as precision, bias, and selectivity, to achieve the data quality desired.

Quality Assurance Project Plans (QAPP) and Sampling and Analysis Project Plans (SAPP) both rely on defined DQOs and MQOs, and are essential for sound project planning, and to the collection and reporting of data of known quality.



What if...

What if monitoring programs could, at the same time, pursue their own goals and activities and also integrate information from other sources to support their needs?

What if data and information from a variety of sources could be aggregated to improve coverage across jurisdictions?

What if we could design programs and use monitoring information collaboratively to better understand how to protect and manage our waters and watersheds?

What if this integration, aggregation, and collaboration enabled us to achieve a better return on public and private investments?

These "what ifs" can only be realized if we all strive for comparability!

Examples of comparability efforts

In Maryland, the Department of Natural Resources and Montgomery County are taking steps to integrate their stream monitoring programs. A study is underway that will determine the comparability between the two agencies' sampling protocols. For example, if the County adopts the DNR's benthic invertebrate protocols, the DNR will, in turn, be able to use the County's data for their stream- condition assessments.



The USGS Water Resources program and Wisconsin DNR coordinated several studies to determine the comparability of water-chemistry and aquatic-invertebrate data collected using different methods, as well as the similarity of water-quality predictions using their respective databases. The results provided confidence that their methods were comparable for certain conditions.



The National Water Quality Monitoring Council

The National Water Quality Monitoring Council (Council) provides a national forum to coordinate consistent and scientifically defensible methods and strategies for improving water quality monitoring, assessment, and reporting. The Council promotes partnerships that foster collaboration, advance the science, and improve management within all elements of the water quality monitoring community. A vital aspect of this role is fostering increased understanding and stewardship of our water resources.

The Council was created in 1997 as a vehicle for bringing together the diverse expertise, skills, and talents needed to develop collaborative, comparable, and cost-effective approaches to water quality monitoring. The Council's 35 members meet several times a year in locations throughout the country and represent federal, state, interstate, tribal, local, and municipal governments; watershed and environmental groups; the volunteer monitoring community; universities; and the private sector, including the regulated community. These members are organized into work groups whose activities and products advance the Council's goals. The current Council work groups are *Collaboration and Outreach*, *Water Information Strategies*, *Watershed Components Interactions*, and the *Methods and Data Comparability Board*.

The Council is co-chaired by the U.S. Geological Survey and U.S. Environmental Protection Agency and is chartered as a subgroup of the Advisory Committee on Water Information (ACWI) under the Federal Advisory Committee Act.

In the past, Virginia water resource management agencies were reluctant to use water-quality data collected by Virginia Save-Our-Streams (SOS) volunteers due to concerns over the reliability and comparability of the data. Following a comparison/validation study and a subsequent change in SOS's sampling protocol, new results showed a strong correlation between the volunteer and professional multimetric indexes, and there was 96 percent agreement between ecological condition conclusions reached by both parties. Virginia's state agencies are now committed to using SOS data for future 305(b) assessments.



The Texas Groundwater Protection Committee's Agricultural Chemicals Subcommittee has screened ambient ground-water samples for atrazine and metolachlor since 2000. Several Groundwater Conservation Districts have collaborated in collecting samples during their regularly scheduled monitoring events, while the Texas Commission on Environmental Quality performs analyses and prepares the reports. Comparison between immunoassay and lab methods led to an efficient and defensible approach for determining which samples require confirmation analysis by traditional methods. This approach allows for quick trend identification, enabling the state to focus program resources quickly and more efficiently. Within a 4-year period ending in 2003, the screening of all Texas aquifers will be completed, saving the state considerable time and money over traditional methods.

Additional information, including documents referenced in this fact sheet, can be obtained through the Methods and Data Comparability Board web site: <http://wi.water.usgs.gov/methods/>

Information can also be obtained from the Methods Board co-chairs:

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