

Session 1: The Impaired Waters Program and TMDLs

This training session is intended for local leaders and other water resources professionals who may not yet be familiar with the concept of impaired waters or a Total Maximum Daily Load (TMDL). In addition to describing the Impaired Waters Program, this training module also attempts to outline the benefits and challenges of developing a TMDL and to answer some frequently asked questions.

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Acronyms

BMP – Best Management Practices
CWA – Clean Water Act
EPA – Environmental Protection Agency
MPCA – Minnesota Pollution Control Agency
NPDES – National Pollutant Discharge Elimination System
TMDL – Total Maximum Daily Load
WWTF – Wastewater Treatment Facility

The Legal Framework for the Impaired Waters Program

The Federal Clean Water Act (CWA) of 1972 provides states with the overarching framework for protecting and restoring water quality. An important part of the CWA is Section 303, which is the focus of this training session. Section 303 established the Water Quality Standards Program and the Impaired Waters Program.

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The Water Quality Standards Program

The Water Quality Standards Program provides the backbone of all regulatory programs that protect surface waters. Water quality standards consist of *beneficial use classifications* for all waterbodies within the state, the *numeric and narrative criteria* that will protect those uses, and *nondegradation* protections for high quality waters. Minnesota Rules Chapters 7050 and 7052 govern implementation of the state's water quality standards program.

Beneficial use Classifications

The Clean Water Act requires MPCA to designate beneficial uses for Minnesota rivers, drainage ditches, streams, wetlands, and lakes. MPCA has developed the following use classifications for Minnesota waters.

Table 1-1: Beneficial Use Classifications

Use Class	Beneficial Use
Class 1	Drinking Water
Class 2	Aquatic life and recreation
Class 2A	Cold water fisheries, trout waters
Class 2Bd	Cool and warm water fisheries, drinking water
Class 2B	Cool and warm water fisheries
Class 2C	Indigenous fish and associated aquatic community
Class 2D	Wetlands
Class 3	Industrial Uses and Cooling
Class 4A	Agricultural and wildlife uses
Class 4B	Agricultural Use, livestock and wildlife watering
Class 5	Aesthetics and navigation
Class 6	Other uses
Class 7	Limited resource value waters (not fully protected for aquatic life due to lack of water, lack of habitat, or extensive physical alterations)

Water Quality Criteria

Water quality criteria (both narrative and numeric) are developed based on scientific data and professional judgments regarding pollution concentrations and their effects on the environment and human health. Water quality criteria set acceptable levels for various pollutants in water, including chemical, physical and biological conditions, based upon the kind of beneficial use assigned to a waterbody.

These criteria are benchmarks used to determine whether a waterbody is supporting its designated uses, by comparing the quality of the waterbody to the criteria established for a particular use.

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Example:

Numeric criteria for Class 2B waters– (aquatic life and recreation)

Standard	Units	Notes
Dissolved Oxygen	5 mg/l	As a daily minimum
E. coli	No more than 200 orgs/ 100 mls	As 30-day geometric mean of 5+ samples per month (April-October)
Turbidity	25 NTUs	

How Do We Know If Beneficial uses are Being Protected?

Minnesota has over 14,000 lakes and 92,000 river and stream miles. To determine whether beneficial uses are being protected, MPCA regularly assesses the state's rivers, streams lakes and wetlands. The MPCA began assessing its waters for use support in the mid-1970's. To date (2006), MPCA has conducted adequate assessments of water quality for only 10% of state rivers and streams and 16% of its lakes. With only limited funding available for these assessments, MPCA has been unable to determine the health of the majority of our state water resources.

Where data has been collected, it is used to determine if a beneficial use is being supported or not in a particular waterbody. MPCA then categorizes each assessed water into one of the following use support categories:

- **Fully supporting** - waters are not impaired
- **Partially supporting** - one parameter shows impairment
- **Not supporting** - waters are impaired
- **Not attainable** - assigned to limited resource waters not expected to meet fishable/swimmable goals

The concept of use support is important in that it identifies which waterbodies are in good condition, which need restoration, and which are not expected to ever reach fishable or swimmable goals. Each assessed waterbody that does not meet water quality standards is considered impaired and must be placed on MPCA's Impaired Waters (303(d)) List.

MPCA's Impaired Waters Program

Assessment of all Minnesota's waters will require more monitoring capabilities than MPCA currently has. Significantly more resources will need to be dedicated to water quality monitoring in order to assess all waters. For example, developing an in-depth study for just one waterbody typically requires several years of data collection and analysis.

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While current resources do not allow for an adequate assessment of all of Minnesota's waters, MPCA officials predict that Minnesota's list of impaired waters will grow to many times its present size as the state expands its existing monitoring program. Once all Minnesota waters have been assessed, more than 10,000 impairments are expected to be included on the state's Impaired Waters List, with impaired waters located in nearly every watershed statewide.

The Impaired Waters Program (Section 303(d)) requires MPCA to prepare a list of impaired waters every two years, which is transmitted to EPA for review and approval. In addition, MPCA must prioritize these waters and develop an in-depth study of each, called a Total Maximum Daily Load (TMDL) study.

TMDL studies are intended to be a first step toward improving water quality and restoring beneficial uses for each impaired water.

EPA requires that TMDLs be developed and completed within 15 years of a waterbody being placed on the 303(d) list. MPCA's Impaired Waters Program exists with the goal of ensuring that impaired waterbodies are listed, TMDLs are developed for each and that waters are eventually restored to meet water quality standards.

Why is the Impaired Waters List Important?

The 303(d) list is valuable for several reasons. First, it is a mechanism for drawing together a significant amount of information about the condition of state waters for the public and decision makers. Second, once a waterbody has been placed on The Impaired Waters List, the MPCA is then obligated to gather additional information about its condition and the causes of the impairment(s), known as the Total Maximum Daily Load (TMDL) study. Third, the Impaired Waters List encourages state and local governments to work toward the restoration of each waterbody in a timely manner. Ultimately, this is the most important goal of the listing process.

Types of Impairment

River and stream assessments are conducted by river "reaches," which extend from one tributary to another and are typically less than 20 miles long. Lake assessments are generally completed for an entire lake. Every two years, with new assessment information available, MPCA adds more impaired waters to the state's 303(d) list. EPA must review and approve each new list.

The 2006 TMDL list includes 2,250 impairments on 1,297 waterbodies. Of the 2,250 impairments listed, 1,440 are caused by mercury or other bioaccumulative toxics.

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Examples of impairments commonly seen in waterbodies across Minnesota include:

- Low dissolved oxygen
- E. coli
- Turbidity
- Bioaccumulative toxics
- Mercury
- Ammonia
- Excess nutrients
- Biotic integrity

Some waterbodies have multiple impairments, which must be reported individually.

Overall, about 40% of all Minnesota waters that have been fully tested were found to be impaired.

Causes of Impairment

According to Minnesota's 305(b) Report developed in 2004, MPCA estimates that approximately 85% of these waters are impaired primarily by nonpoint sources of pollution. Other impairments are caused by point sources of pollution that come from discrete sources, such as factories and sewage treatment plants, permitted stormwater systems, etc. and are usually discharged through pipes.

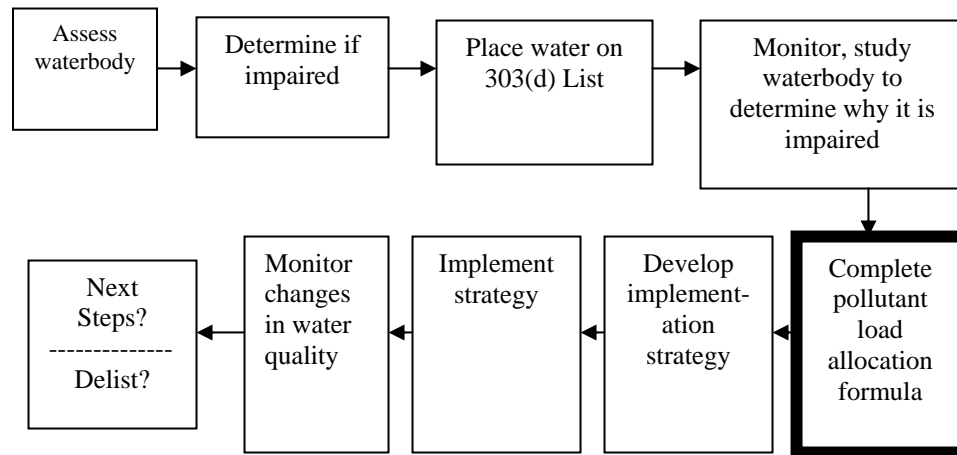
What Exactly is a TMDL?

According to the EPA, a TMDL is both a *process* and a *formula*.

The TMDL as a process

A TMDL provides an organized framework for pinpointing the water quality problems associated with an impairment. The TMDL also serves as a springboard for action, by not only diagnosing the problem, but also outlining pollutant reduction goals as well as action steps that can lead to the restoration of beneficial uses of the waterbody.

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MPCA assessment tools are works in progress. They are regularly updated and improved as better information becomes available.

LA(s) + WLA(s) + MOS + RC = TMDL for pollutant

Where: **LA** = Load allocation for nonpoint sources of pollution
WLA = Waste load allocation for point sources of pollution
MOS = Margin of Safety to account for scientific uncertainty
RC = Reserved loading capacity for future development
TMDL = Total Maximum Daily Load

TMDL as formula

Completing a pollutant load allocation formula is at the heart of the TMDL process. Using quantitative assessment tools (e.g. models); TMDL studies describe the existing condition of a waterbody and determine the maximum amount of a specific pollutant (fecal coliform, mercury, etc.) that can be discharged to a waterbody while still meeting water quality standards.

This formula must be completed for each pollutant causing an impairment.

TMDL studies outline pollution reduction targets as well as recommendations for controlling the causes of impairment. The maximum amount of a pollutant that can be discharged to a waterbody must then be divided among all pollutant sources within the watershed. Consequently, reductions must often be achieved by both point and nonpoint sources in order to restore beneficial uses to a waterbody.

While scientific and quantitative in nature, a TMDL is also a collaborative process, bringing together the expertise of citizens and local, federal and state agencies.

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The long-term success of any restoration effort will depend on the commitment and participation of the community's citizenry to implement land use changes and to support tighter restrictions on point source discharges within the watershed.

What Does a TMDL Document Include?

Some of the major components of a TMDL document include:

1. A description of your **public participation plan**. MPCA supports and encourages public and stakeholder involvement in all TMDL studies. EPA also encourages project sponsors to recognize the importance of including stakeholders and citizens in the development of a TMDL, from the very earliest stages to the end of the process. In fact, EPA will only approve a TMDL if it documents that a reasonable attempt has been made to encourage public participation in the process. Usually, this means that the project sponsor has conducted public meetings or open houses, convened an advisory committee or used other creative techniques to bring people together and gather input on the project.
2. An **assessment** of waterbody health may include a study of the biological, chemical, flow and habitat conditions in the stream or river segment, wetland or lake.

Assessments typically involve collecting data from existing sources (largely held within MPCA databases and reports) and determining whether or not water quality standards are being met. The TMDL study typically evaluates whether existing data is adequate to fully assess water quality. If not, the TMDL must describe additional monitoring needs and the methods that will be used to collect and analyze new data.

3. A **technical analysis** of water quality data to determine the causes and sources of impairments. The analysis will identify major pollution sources (e.g. feedlots, industrial facilities or urban runoff) and in some cases pinpoint some probable "hot spots" or discharge locations in the watershed. Identifying major sources allows technical staff to estimate the amount of pollution currently being discharged to the impaired water from both point and nonpoint sources.
4. An **allocation of acceptable pollutant loads** to the waterbody from both point and nonpoint sources.

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Using a variety of watershed or pollutant models, technical staff can determine how much pollutant loadings have to be reduced to bring the waterbody back into compliance with water quality standards. Acceptable pollutant loadings are divided between point and nonpoint sources in the watershed.

5. A **general implementation strategy** that includes potential restoration strategies and which outlines a set of tools (best management practices [BMPs], cost-share programs, educational programs, etc.) that will allow it to improve water quality over time. The project sponsor must develop a more detailed implementation plan within one year of the TMDL study being approved by EPA.

The implementation plan should include **reasonable assurances** that nonpoint source BMPs will be implemented and will achieve expected pollution loading reductions. EPA guidance requires that states provide reasonable assurances when TMDLs are developed for 1) waters impaired by both point and nonpoint sources or for 2) waters impaired solely by nonpoint sources.

Where waters are impaired by point and nonpoint sources and where point sources are given less stringent wasteload allocations based on the assumption that nonpoint source load reductions will occur, the state must provide EPA with reasonable assurances that nonpoint source BMPs will be implemented and will achieve the expected pollutant load reductions.

6. An **effectiveness monitoring plan** to assess progress in improving water quality overtime. This plan should include strategies to monitor water chemistry or habitat condition during and after implementation of regulatory and voluntary programs, and other activities designed to restore beneficial uses to the waterbody.

Why Develop a TMDL Study?

- Public support for clean water is strong.
- To restore beneficial uses of surface waters.
- To satisfy the Clean Water Act requirements.
- To protect community assets (tourism, development potential, sense of place).
- Benefits tourism industry in your community.
- Provides an opportunity for local leadership.
- Provides mechanism for integrating resource planning activities at the local level.

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The Clean Water Act of 1972 requires that impaired waters be listed every two years and that TMDL studies are completed for each.

While this requirement has been in existence for several decades, until recently, we did not have the tools and funding to begin to implement the TMDL program in a meaningful way.

In recent years, EPA and MPCA have been actively developing the framework and technical tools that will help local governments manage successful projects. At present, MPCA's TMDL program can provide limited funding to local sponsors who wish to manage their own TMDL process.

Good water quality is important to a healthy agricultural and business economy. For example, the presence of clean water can be a major attraction to certain industries which may be looking to locate in your community. On the contrary, an impaired water could result in the postponement of growth and development until a TMDL study is completed.

Statewide, tourism is a \$9 billion industry. Much of that is based on Minnesota's water resources. To protect and enhance Minnesota's tourist economy, it makes sense to invest in addressing pollution problems now, rather than paying more in the future.

TMDL studies allow local units of government to formally acknowledge the many tangible and intangible benefits that come from having clean water in their community. Taking the steps to begin a TMDL study in your community puts you in a proactive mode, allowing you to make better, more reasoned decisions, rather than reactive ones.

A TMDL can be used to synthesize or integrate multiple natural resource planning activities such as shoreland, ordinance development, local water planning and preservation of green space within the community. A TMDL can provide the foundation for local efforts to preserve natural assets and create a sense of place and a quality of life for its residents over the long term.

Now is a good time to act. Public opinion supports protection and restoration of our surface waters. In fact, Minnesotans consistently rank protection of surface water as their top environmental priority.

What Might Happen if You do not Develop a TMDL Study?

- Human health and safety could be compromised
- Litigation puts MPCA and communities on the defensive
- Growth and development may be limited or postponed until TMDL study is approved
- A community's greatest assets remain impaired for present and future generations

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Failure to act to improve an impaired water could mean that the health and safety of the public is compromised.

Beach closings and fish advisories are examples of unaddressed pollution problems that pose risks to the public.

Inadequate and slow progress in meeting the Clean Water Act's Section 303 mandate has led to TMDL lawsuits across the country. Developing a TMDL study in a timely manner will help to avoid costly litigation and reduce the likelihood that communities will face restrictions when considering economic growth opportunities.

Most importantly, if we do not act now, our waters will remain impaired for current and future generations, significantly limiting opportunities to enjoy recreational opportunities and their aesthetic beauty.

If You Develop Your Own TMDL Study, What Can You Expect?

- A challenging process to manage
- More and better knowledge about your waterbody
- An integrated planning process to restore your waters
- Better partnerships and collaboration among interested parties

Developing a TMDL can be a challenging and sometimes frustrating process. There are many technical questions to answer and a large variety of stakeholders to involve in the process. Determining whether a waterbody is impaired and defining necessary pollution source controls is often a complex and time-consuming process, especially if nonpoint source pollution is involved. There will be a steep learning curve as watershed science and principles are developed and implemented. Typically, the Project Manager and various stakeholders must invest a significant amount of time early in the process to learn about water quality assessment techniques and the wide variety of tools available for addressing the causes and sources of water quality impairment.

Developing the written TMDL study takes time – at least 2 years to complete, sometimes more. However, at the end of that process, local sponsors and the MPCA will have a greater understanding of the causes and sources of pollution in the watershed and what can be done about them. As a result of the TMDL study, partnerships at the state and local level are often strengthened and a shared vision can result from collaboration on the process.

A TMDL study is a negotiated agreement about the use of a waterbody. The study provides a mechanism for integrating multiple planning functions (drainage management, local water planning, zoning, etc.) to accomplish a goal.

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The TMDL Implementation Plan can take time to accomplish since there are usually no quick fixes to complex water quality problems. Pollution is often caused by many individual activities on the land which can be difficult to pinpoint and difficult to successfully address.

The nature of water quality restoration efforts requires an iterative approach to finding the most effective solutions. This takes time and patience and a long-term vision for the improvement of your waterbody.

The following assistance is available for those organizations that choose to develop a TMDL study.

Help is Available to Local Units of Government

- Funding for TMDL studies
- MPCA staff assistance (administrative and technical)
- Consultant pool (Master Contract Lists)

Limited funding for TMDL diagnostic studies is now available from the MPCA. MPCA can also offer technical, planning and administrative assistance to those local units of government who wish to manage their own TMDL process. In addition, MPCA has a pool of pre-approved consultants which can be tapped to assist communities with technical or planning needs.

Approved Consultants

These consultants are included on MPCA's master contract list:

- Barr Engineering Company
- Brown and Caldwell
- Emmons and Oliver Resources
- Linmo-Tech, Inc.
- STS Consultants, Ltd.
- Tetra-Tech EM, Inc.
- University of Minnesota
- Wenck Associates, Inc.
- EarthTech, Inc.

Frequently asked Questions and Answers

Q: Can previous studies fulfill the requirements of a TMDL?

A. No. However, some or all of the data from previous projects may be useful in completing a TMDL study. Unlike other watershed studies such as Clean Water Partnerships, TMDL studies require completion of a load allocation formula.

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This formula requires a different level of technical expertise than was needed in previously completed watershed projects. If you have previously conducting monitoring on your waterbody, contact MPCA staff to determine if it can be used to complete a TMDL study.

Q: Who is ultimately responsible for the content of a TMDL?

A: The MPCA and EPA. MPCA is responsible for reviewing all TMDLs for quality and completeness and submitting it to the EPA; EPA is responsible for approval. Both MPCA and EPA are responsible for legally defending the technical accuracy of the TMDL study. Local units of government are not legally liable for the accuracy or completeness of the document.

Q: Who will pay for TMDL implementation activities?

A: A host of funds, including federal, state, local, nonprofit and private monies will likely be needed for implementation of water quality restoration activities.

Q: Do TMDLs mean more regulation?

A: Potentially. A TMDL creates a pollution budget that can have both regulatory and voluntary implications. While the *TMDL is not in and of itself a legally enforceable document*, the permits that are issued to support restoration of the beneficial uses of that impaired water are.

Federal regulations require that NPDES permits issued within an impaired watershed be “consistent with approved TMDL study.” This means that MPCA will use TMDL studies to guide issuance of NPDES point source permits within the impaired watershed.

For example, a TMDL study may determine that point source loadings must be reduced in order to restore beneficial uses of a waterbody. In that case, MPCA would need to tighten effluent limitations in the NPDES permits for facilities discharging to that impaired water. *The new permit requirements would be legally enforceable.*

There are a number of NPDES permits that may be impacted by a TMDL:

- 1) Wastewater/industrial NPDES / SDS permits
- 2) Feedlot permits (if over 1000 animal units, or over 500 animal units in sensitive areas)
- 3) ISTS (over 10,000 gallons per day) permits
- 4) Permitted municipal separate storm sewer systems (MS4s)
- 5) Construction stormwater permits

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For nonpoint sources of pollution, state agencies will continue to rely on financial incentives and education to address certain nonpoint sources, such as agriculture and forestry. Section 303 gives MPCA no new authorities to address nonpoint sources of pollution. However, local units of government always have the authority, if they choose to use it, to develop pollution control regulations that are more stringent than those developed by the MPCA or other state agencies.

Q: How will We Implement TMDLs?

- Through the collaborative efforts of local, state and federal agencies
- With significant involvement from the public
- Using government and private financial resources
- Consistently, over a long period of time

When government agencies and non-governmental organizations work together, funds and expertise can often be leveraged in effective and creative ways.

While government plays a significant role in restoring water quality, there will be little success unless the public takes an active role in implementing land use changes and in supporting needed point source improvements over time.

Water quality improvements often become apparent only after many years of implementing point source pollution control strategies, making necessary land use changes, etc. Project sponsors and the public will need to take a consistent and patient approach to water quality restoration activities in order to ensure success over the long term.

Summary

- Impaired waters are waters not meeting state water quality standards
- The Clean Water Act requires that impaired waters be restored to meet beneficial uses
- A TMDL is the tool to accomplish water quality improvements
- A TMDL is a quantitative study which:
 - determines the sources and causes of impairment
 - determines an acceptable pollutant loading for the waterbody, which is divided between point and nonpoint sources
 - outlines a general plan for restoring beneficial uses
- There are benefits – and challenges – to your community for developing a TMDL
- Funds and assistance are available to local units of government that develop TMDLs

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