



Conservation
ONTARIO
Natural Champions

Watershed Economic Incentives Through PHOSPHORUS TRADING and **WATER QUALITY**



Clean and plentiful water supplies are among the most important natural resources. As the population grows and development intensifies, the challenge to maintain high quality and quantities of water has grown in scope and complexity. The Ontario government is working with many partners including conservation authorities, stewardship councils, farmers, environmental groups, other stakeholders and interested citizens to address these challenges.

From this collaboration, a series of watershed-based demonstration projects were carried out using new and innovative approaches to environmental stewardship. The project reports are intended to assist both practitioners and non-practitioners in applying the results in other local watersheds.

The full reports and fact sheets are available on Conservation Ontario's website.

fact sheet

OVERVIEW

Water quality trading is an emerging trend in several jurisdictions around the world. In Ontario, this leading edge initiative is being used to create economic incentives for surface water management of pollutants on a watershed basis, specifically with regards to phosphorus.

Throughout the province, excess phosphorus loading is a problem in many of the watercourses. As a tool to control non-point source (NPS) pollution, the Ministry of the Environment (MOE) implemented an economic incentive program called "Total Phosphorus Management" (TPM). TPM involves water quality trading for phosphorus credits, and the only two examples of such an approach in the province to date are provided by the South Nation River and Lake Simcoe watersheds. In both cases, the MOE developed a framework for the implementation of the TPM program and allowed local stakeholder committees to develop an approach adapted to their watershed. Coordination of the committees in both watersheds has been provided by the local conservation authority.

This information is based on the experience of the TPM programs in the South Nation River and Lake Simcoe watersheds. It highlights the potential advantages of TPM as follows:

- Net water quality and environmental benefit
- Lower costs for wastewater or storm water discharge treatment
- Funding available for other point or non-point source water quality improvement projects

This information provides important information to consider before establishing new TPM programs in other Ontario watersheds, and it would also be applicable to other trading parameters.

WHAT IS TOTAL PHOSPHORUS MANAGEMENT ?

TPM is a surface water quality trading program for phosphorus and is new economic instrument to improve water quality in Ontario. The goal of TPM is to achieve a net environmental benefit as an actual reduction in the phosphorus load to the watershed.

Prior to implementing a TPM program, MOE must determine the offset ratio for the watershed offsetting program. The offset ratio is a multiplier that reflects how much more phosphorus must be taken out from point or non-point sources of pollution versus what is contributed to watercourses by point source discharges.

TPM allows municipal and industrial wastewater dischargers the option of investing in the control of non-point source (NPS) pollution instead of employing more costly point source phosphorus treatment to reduce nutrient loadings. Since the cost of controlling NPS phosphorus is 7 to 10 times cheaper than controlling point source pollution, there is a natural economic incentive for controlling phosphorus loadings to a watershed through investments in NPS controls. Examples of NPS controls include manure storage, restricting livestock access to watercourses, septic system repair, and erosion control structures.

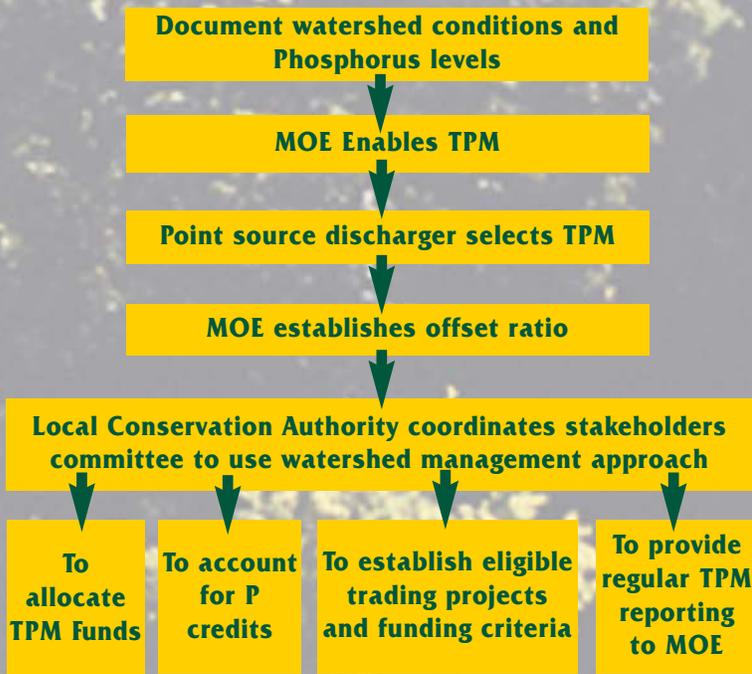
The TPM approach requires many stakeholders to work together on a watershed basis to coordinate a successful program.

THE LAKE SIMCOE WATERSHED TPM EXPERIENCE

As a result of the success of the South Nation pilot, the MOE, Lake Simcoe Region Conservation Authority and other stakeholders have been working together since 2000 to develop a framework for applying the TPM approach as part of the Lake Simcoe Environmental Management Strategy (LSEMS). Studies indicate that a reduction of 25% in current phosphorus loading is required to restore the health of the Lake.

To accomplish this, the TPM program is being adapted to address the projected urban expansion within the Lake Simcoe watershed. Urban stormwater run-off and the discharge from sewage treatment plants are the only two phosphorus loading sources expected to increase into the future.

PARTNERSHIP REQUIREMENTS FOR ESTABLISHING A TPM PROGRAM



HOW ARE PHOSPHORUS CREDITS CALCULATED ?

Possible scenario: Sewage Treatment Plant (STP) expansion trade

A new development in a municipality will add an estimated **Phosphorus** load of **20 kg/yr** to the STP's effluent.

Instead of upgrading the existing STP to maintain the phosphorus loading quality, the municipality has the option to trade to mitigate the problem through the Lake Simcoe TPM program.

To maintain the current loading will require additional treatment capacity at a total **capital cost** of approx. **\$500,000**.

Urban stormwater retrofit trade opportunities within the watershed exist, and the trading ratio of **8:1** is established (based on a unit cost phosphorus reduction of \$2,500/kg for stormwater retrofits).

This means that for **every kilogram** of phosphorus allowed to be discharged by the STP, **eight kilograms** must be reduced from urban runoff through stormwater control best practices.

The cost to the municipality for the trade is:

$8(\text{trading ratio}) \times 20 \text{ (kgs of phosphorus to trade)} \times \$2,500 \text{ (cost per kg)} = \mathbf{\$400,000}$

In this trading scenario the municipality saves approx \$100,000!

THE SOUTH NATION RIVER WATERSHED TPM EXPERIENCE

TPM has been successfully applied on a pilot basis within the South Nation Watershed for the past 4 years.

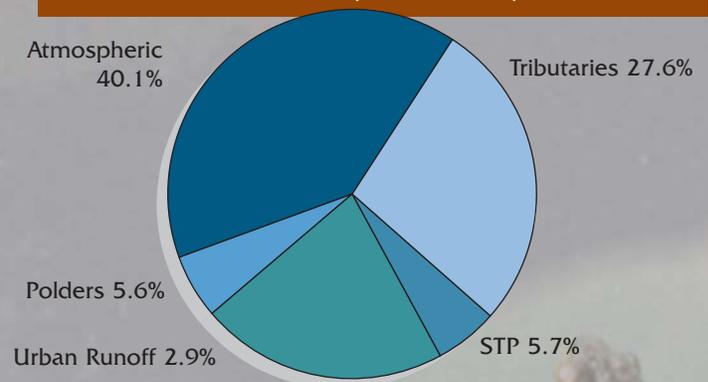
The South Nation River has one of the most extensive watersheds in eastern Ontario. The land use in the watershed is dominated by agriculture and the surface water quality is poor due to sedimentation and excessive loadings of nutrients such as phosphorus and nitrate. Total phosphorus levels within the watercourses have been found to be 2 to 4 times above the Provincial Water Quality Objectives (PWQO).

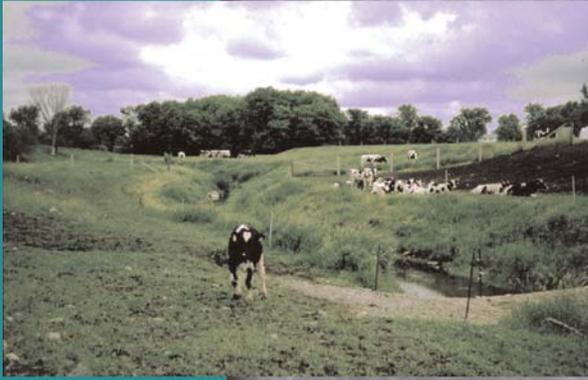
For the implementation of TPM, the MOE has established the offset ratio at 4:1. This means that for every 1 kilogram of phosphorus that enters the watercourse from a point source discharge, 4 kilograms of phosphorus must be stopped from entering from non-point sources of pollution.

Several groups have come together to set out the roles and responsibilities for implementation of the TPM component of the South Nation River Watershed Water Management Strategy. They include:

- ▶ South Nation Conservation's "Clean Water Committee";
- ▶ Farm organizations;
- ▶ Municipalities;
- ▶ Industry;
- ▶ Provincial Ministries of Environment and Agriculture, Food and Rural Affairs; and
- ▶ Watershed landowners

Estimated Phosphorus Loadings to Lake Simcoe for 1998 (Tonnes/Year)





POINT SOURCE - a source of pollutants from a municipal treatment plant or an industrial facility, often by way of a pipe.

NON-POINT SOURCE - a source of pollutants from a wide geographic area, such as manure run-off, stream bank erosion, and stormwater run-off which often threatens the quality of ground and surface water sources of drinking water.

PHOSPHORUS - is a non-toxic pollutant. It is an essential nutrient and in excessive amounts it leads to eutrophication (which in turn depletes oxygen) of a water system. Phosphorus accumulates along the entire length of a river from a variety of point and non-point sources.



SUCCESSFUL WATER QUALITY TRADING REQUIRES THE FOLLOWING PREREQUISITES:

- ▶ Clearly defined water quality enhancement goals and targets.
- ▶ A good understanding of both point and non-point sources of pollution and their contributions to phosphorus loading.
- ▶ Involvement of all potential stakeholders in program scoping and design.
- ▶ Acknowledgement of the fact that trading complements but does not replace the more traditional government regulatory process.
- ▶ A written management agreement between the point source discharger(s) who will be contributing funding and the body responsible for administering the trading program.

PROJECT PARTNERS



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