

Deriving effluent limits using a watershed-level model

E. Jane Simmons^a, Wanhong Yang^a, Yongbo Liu^a

^aDepartment of Geography, University of Guelph, Guelph, Ontario, Canada, N1G 2W1

What do you need to know?

Where water quality is being impacted by urbanization and agricultural intensification, the results of this project could lead to improvements in the approval process for innovative watershed-wide wastewater management programs.

With informed regulation, these watershed-wide management programs may lower wastewater related costs incurred by municipalities and improve the overall water quality in Ontario lakes and streams.

Study Area

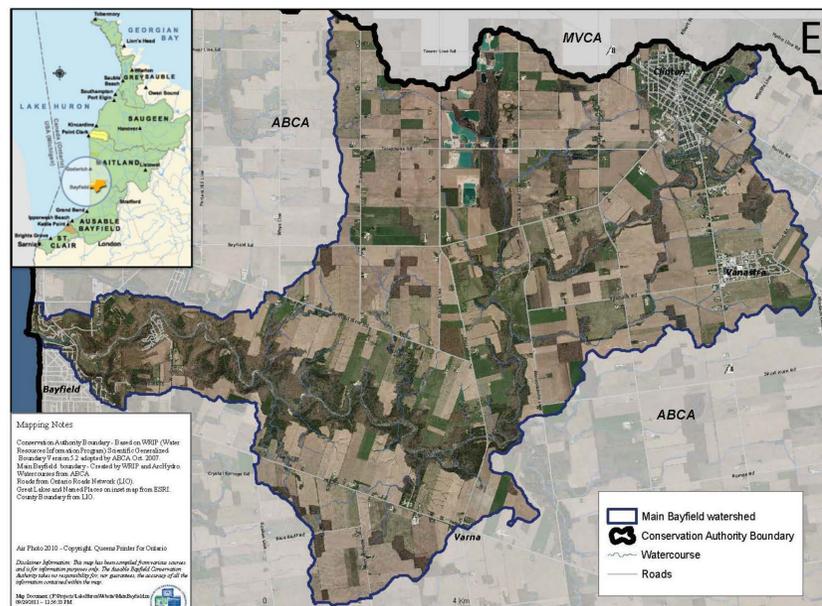


Figure 1 Main Bayfield Sub-Watershed

The 92 km² watershed is located in south-western Ontario and drains to Lake Huron. The area is characterized by low-relief topography, one of the warmest climates in Canada, and predominantly cropped land cover. There are three municipal wastewater treatment plants with outlets to the Main Bayfield River or one of its tributaries.

Introduction

In Ontario, there has been interest in programs which allow wastewater treatment plants to compensate agricultural land owners for implementing conservation programs that lead to stream quality improvements equivalent to treatment at the plant.

However, determining informed effluent requirements for wastewater treatment plants participating in watershed-wide wastewater management programs is emerging as a regulatory challenge.

Aim

A case study is being conducted to extend the capabilities of a watershed-level model which will provide insight into the strengths and limitations of various approaches for determining effluent requirements for wastewater treatment plants.

Methods

1. Employing a watershed-based model to examine the effect of agricultural conservation practice scenarios in a pilot watershed (Figure 1);
2. Determining wastewater treatment plant pollutant limits based on statistical analysis, and model results; and
3. Evaluating the various approaches for setting pollutant limits with project stakeholders.

Results

- Municipalities have begun to look beyond the wastewater treatment plant for approaches of improving stream water quality.
- There is agreement among scholars on the economic, social and political conditions required for successful conservation programs. Further research is required to address technical and regulatory considerations.
- The applicability of watershed-level models for determining pollutant limits has not been extensively considered and case study investigations are strongly needed.
- Generalized federal and provincial datasets are easy to access online. However, detailed data at the watershed and municipal level can be more difficult to obtain.
- Preliminary survey results suggest that technical risk and acceptance of a proposed approach is highly important to stakeholders (Figure 2).

Figure 2 Preliminary evaluation criteria weighting

Category	Criterion	Wt.
Technical Feasibility	Technical Risk	3
	Data availability	2
	Expertise required	1
Environmental Protection	System Integrity	1
	Precaution and adaption	2
Regulatory Constraints	Current	1
	Anticipated	1

Note: Preliminary results are based on three surveys received as of October 25, 2012. The weighting and criteria are subject to revision.