



WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: NY1561

Title: An interactive, Internet-based, nonpoint source pollution modeling system for improving landscape management

Focus Categories: Management and Planning, None

Keywords: Water quality models, Internet, Streams, Water quality management, Nonpoint pollution

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Congressional District: 26

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Abstract

Problem: In deciding how to improve water quality in a watershed, managers may ask: what are the most effective BMPs for improving water quality in a given region? How would current water quality conditions change with an adjustment in landuse? How much change would implementation of a BMP create in pollutant runoff such as total nitrogen, total phosphorus, suspended solids, lead or zinc? This proposal addresses the creation of a tool for use on the Internet by both planners and community members to answer these questions. This tool will enable watershed management agencies to visualize the use of BMPs in landscape management and will help community members gain a better understanding of their watershed.

Objectives: The research objective is to provide easy and widespread access to a landscape planning model and information that will facilitate stakeholder involvement and consensus building in watershed management. This project would improve a previously created watershed simulation model. Data will be available from on-going work in the Cattaraugus and Irondequoit watersheds in NY. The resulting design can potentially be applied, through additional efforts and data collection, to other watersheds in the State. The proposed interactive, Internet-based tool allows users to apply landscape changes and view model results from the basin level down to an individual stream segment.

Methods: This project involves literature review, data collection, water quality model enhancement and testing, and web site development. Recent work has compiled digital data layers for land use, soils, rainfall, elevation, stream segments and drainage basins for the New York tributaries to the Great Lakes. These data layers will be the basis for the surface water nonpoint source, GIS-based, pollution screening model developed by Adamus and Bergman (1995). This model calculates the volume of runoff using runoff coefficients for landuse and soil categories and predicts sediment and pollutant loading using known concentrations given each landuse type. We will use a slightly improved model to predict loading of total nitrogen, total phosphorus, lead, zinc and suspended solids to each stream segment. Predictions of the model will be tested using STORET water chemistry data available in both watersheds.

The project will provide online means for users to interactively create water quality simulations over the Internet. Users will define an area for modeling by choosing one of the two watersheds (see Figure 2). They will then have the opportunity to zoom in/zoom out or create a box around their region of interest. Larger selected regions will be modeled with coarser data to enable the model to run at acceptable speeds. The user will then choose a scenario to model:

- Produce predictions of pollutants given the current state;
- Apply a BMP to the selected area and model the future state;
- Compare the results of one BMP with another BMP to determine effectiveness of different BMPs on different regions;

BMPs to be modeled include such pollution prevention measures as streamside buffers, changes in land use, creation of wetlands, and improved soil management practices.

The results of each model simulation will be displayed to the user on the screen in an easy to interpret format, using GIS maps and graphs.