



## WATER RESOURCES RESEARCH GRANT PROPOSAL

**Title:** Watershed Based Optimization Approach for Non-Point-Source Pollution Management

**Principle Investigator's Name, Mailing Address:**

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**Focus Categories:**WQL, M & P, LIP

**Key Words:** hydrologic models, nonpoint source, watershed management, water quality

**Technical Abstract:**

Nonpoint source (NPS) pollution has been identified as a major threat to our nations water quality. Many efforts have been initiated to reduce the agricultural nonpoint source pollution; however, EPA still reports NPS as a primary source of impaired streams and lakes. The number of impaired river segments (303d reach designations) has increased in nearly every state by an order of magnitude or more in the last one or two years. Thus, there is a tremendous need for more science performance-based watershed management planning tools. Performance based watershed management approaches have been estimated to be much more effective than those presently used. The goal is to provide scientific, informed decision-making for NPS pollution management through a watershed based optimization approach. The objectives are (1) to investigate the best environmentally sound and economically feasible solutions to the NPS pollution problem; (2) to provide scientific knowledge for informed decision making on the sources, location, and most cost effective options for pollution reduction; (3) to evaluate the performance approach from a watershed perspective and (4) to develop and coordinate coalitions of stakeholders into appropriate focus groups needed to evaluate their willingness to accept, adopt, and maintain recommendations and procedures stemming from this study.

A tiered approach will utilize BASINS Version 2 for broad identification of sub-watersheds by assessing their relative contributions to phosphorus loading. The next tiered model, AGNPS, will be used to assess specific areas within the high risk sub-watersheds that have the maximum potential for contributing to pollution of the reaches. For verification of the combined modeling approach, water quality sampling in cooperation with the US Geologic Survey and the Fisheries Division of the Michigan Department of Natural Resources will provide continued sampling of selected reaches and integrated measure through biological sampling of the reaches. We have developed several components for the watershed management tool. Our final research result will be an integrated NPS performance-based watershed management tool for the Stony Creek

watershed. This NPS performance-based watershed management system can provide guidance and strategies for the watershed community to better meet both environmental and economic goals. Outcomes involve: 1) the evaluation and demonstration of a science based approach for aiding nonpoint source pollution management; 2) the investigation of the cost-effectiveness of alternative BMP's to be used in specific high risk areas; and 3) help in optimizing performance based NPS pollution solutions. This watershed system will be easy to generalize and widely applicable to other watersheds that have NPS pollution problems. These results will be effectively disseminated through the Michigan Department of Environmental Quality (MDEQ), the Extension Service, and to other watershed management groups in the state and region through educational programs in the Extension Service. The results will also be transferable to sister environmental agencies in other states for their effective utilization.