



## WATER RESOURCES RESEARCH GRANT PROPOSAL

**Project ID:** 2003IN110B

**Title:** Minimizing Runoff and Nonpoint Source Pollution Due to Urbanization

**Project Type:** Research

**Focus Categories:** Hydrology, Models, Management and Planning

**Keywords:** runoff, water quality, urbanization, optimization

**Start Date:** 03/01/2003

**End Date:** 02/28/2004

**Federal Funds Requested:** \$20000.00

**Matching Funds:** \$40038.00

**Congressional District:** 4

**Principal Investigators:** Engel, Bernard; Harbor, Jon

**Abstract:** Urbanization of land uses can have significant negative consequences on runoff and water quality. Proper land use planning can potentially reduce the effects of urbanization on runoff and water quality. The magnitude of the potential benefits of land use planning that considers impacts on water and water quality is largely unknown. This project builds on significant past and ongoing work to create models to assess the impact of land use changes on long-term runoff and nonpoint source (NPS) pollution (<http://www.ecn.purdue.edu/runoff>). These models will be used to quantify the potential for reducing runoff and nonpoint source pollutants from urbanization through optimal placement of proposed land use changes within watersheds. Historical and projected land use changes within representative watersheds will serve as inputs to these models in conducting the assessments. Optimization techniques will be used to identify areas within the watersheds that minimize runoff and NPS pollution for the observed or proposed urbanization. The magnitude of reductions in runoff and NPS pollution will be quantified for these situations, thereby providing estimates of the benefits such planning approaches might have. Optimization techniques that force contiguous and compact development to simulate minimization of infrastructure development costs and reduction of "sprawl" will be utilized to identify development patterns that minimize changes in runoff and NPS pollution for such constraints. Again, the magnitude of reductions in changes in runoff and NPS pollutants will be quantified for representative

watersheds. The results will provide guidance for land use planners and stakeholders interested in minimizing the impacts of development on water quality and runoff. The runoff and NPS pollution model and optimization system will be made widely available as a web-based decision support tool. By integrating the results into the current WWW-based model, the target audience for this work will be reached.

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