
University of Pennsylvania



Institute for Environmental Studies

presents

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The Academy of Natural Sciences

Optimization of Agricultural Best Management Practices at a Watershed Scale Using a Genetic Algorithm-GIS-AnnAGNPS Integrated System

Non-Point Source (NPS) models and monitoring data are often used to evaluate management practices and develop NPS pollution control plans. Application of a dynamic NPS model requires efficient input data acquisition, storage, organization, reduction, and analysis accompanied by manipulation, interpretation, reporting, and display of model outputs. Further, analyzing management options using a NPS model requires tremendous resources (in terms of labor, time, and dollars) because of the need to consider a number of sub watershed areas and management options. Recent advances in NPS pollution modeling, farm economics, optimization algorithms, and computers allow us to develop integrated systems that are at the cutting edge of science to address NPS pollution modeling issues. This presentation describes a methodology that integrated a GIS (Geographic Information System), a Genetic Algorithm (GA) [an optimization algorithm] and a continuous simulation, pollutant-loading model, AnnAGNPS (Annualized Agricultural Non-Point Source Pollution). A GIS helps extract, store, and organize input data as well as manipulate and display model outputs, whereas, an optimization algorithm helps optimize NPS pollution control strategies on a sub watershed-by-sub watershed basis in a watershed by maximizing NPS pollution reduction and net monetary return. To test the methodology, optimization analysis was performed for a USDA (United States Department of Agriculture) experimental watershed in Pennsylvania to identify BMPs that minimized long-term (over a 4-yr period) water quality degradation and maximized net farm return on an annual basis. Results indicate that the GA was able to identify BMP schemes that reduced pollutant load by as much as 56% and increased net annual return by 109%.

Date: Thursday, March 6, 2003

Time: NOON - 1:30 pm

Place: Auditorium at Wistar Institute

On Penn's campus: Spruce Street & Penn's 36th Street Walkway

No Food or Drink Permitted in the Auditorium

NO REGISTRATION REQUIRED

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