Water Resources Engineering Seminar Series

Pollution Transport in Watersheds: Modeling, Calibration, and Uncertainty

Dr. Christine Shoemaker
Joseph P. Ripley Professor of Engineering
School of Civil & Environmental Engineering
Cornell University

Friday, March 21st
12:15* -1:15 pm, 202 Hammond Building

This talk will discuss methodology for data analysis, modeling, and optimization in complex watersheds, and describe the application of this methodology to the Cannonsville Reservoir, which is one of the City of New York's drinking water reservoirs. The Cannonsville drains an 1178 km2 watershed consisting of primarily agricultural (dairy farming) and forested land. The occurrence of eutrophic conditions in the Cannonsville reservoir, due to excessive phosphorus (P) loading, has resulted in restrictions on future economic growth in the watershed when the growth directly or indirectly increases P loadings. In addition to the local economic impacts of this problem, New York City is faced with building a filtration plant costing an estimated 8 billion dollars for its water supply system if water quality in its reservoir system is degraded further.

My group has used the model SWAT2000 to model hydrology, sediment, and Phosphorous movement over the watershed and into the reservoir. Excellent calibration and independent validation results were obtained. The model was used to look at future scenarios. The current results indicate Phosphorous loadings will increase even if economic activities and phosphorous management program do not change. Since this result has very serious policy implications (and because it differed from earlier modeling studies), we also performed an independent mass balance of phosphorous in the watershed. The results of the mass balance also supported the prediction that phosphorous loading to the reservoir will increase over time. I will also discuss a new method for sensitivity analysis that allows the consideration of hundreds of parameters simultaneously in a computationally efficient manner. In addition, we will describe the beginnings of a new research project on the use of surface approximation methods to solve calibration, combined sensitivity analysis, and uncertainty analysis in a computationally efficient manner.

* Note that this is a 'brown bag' seminar series. 202 Hammond will be open at 12:00pm and you are encouraged to bring a lunch, show up early, and socialize with your colleagues.

Water Resources Engineering Seminar Series