



Using numerical models to predict the effects of land use change on a stream
Presented by Todd Rayne
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One of the important issues facing land planning and regulatory agencies is the hydrologic impacts of converting rural agricultural land to residential and commercial uses. One of the conventional ideas is that an increase in impermeable surface area from pavement and roofs will decrease the amount of recharge to aquifers underlying the area. Accordingly, base flow and water quality in streams will be negatively affected by the change. However, most previous watershed-scale groundwater studies simulated recharge in a simplistic zoning manner that did not incorporate small-scale variability in topography or land use. Furthermore, field studies in which recharge and stream flow changes were measured before, during, and after development are also rare because the long-term nature of the project presents logistical difficulties.

We used three models to simulate recharge, groundwater flow, and stream temperature in a small drainage basin in southern Wisconsin. The recharge model calculates spatially variable recharge rates that incorporate topography, soil, meteorological, and land use data. The results were used as input into a MODFLOW model of the basin to simulate base flow into a stream. This output was used as input into a model that uses stream flow, vegetation patterns, channel width, and meteorological data to predict stream temperature. In this talk, I will present some of the model results and discuss the strengths and weaknesses of using linked models as tools to predict hydrologic effects of land use changes.

Presenting January's program is Dr. Todd Rayne, Associate Professor in the Geology Department at Hamilton College. His research interests are focused on using numerical modeling to study ground water flow through geological materials and to use models to predict human impact on hydrologic systems.

Meeting logistics: The meeting will take place on Thursday, January 15, 2004 at the Genesee Inn, 1060 East Genesee Street, Syracuse, NY. A social hour will be held at the Inn from 5:30 p.m. to 6:30 p.m., followed by a buffet dinner. The dinner will start at 6:30 p.m. and our featured speaker, Dr. Todd Rayne of Hamilton College, will begin his program at 7:30 p.m. The cost of dinner is \$20 for members, \$22 for non-members, and \$15 for student members. Please RSVP by Monday, January 12, 2004 to Bonnie at Parratt-Wolff via e-mail at bolney@pwinc.com or 437-1429.

DIRECTIONS: To get to the Genesee Inn, take the Route 690E exit from Route 81S. Take the first exit off of 690 (Teal Avenue) and turn right at the bottom of the off-ramp. Go approximately 1 mile (crossing Erie Boulevard) and turn west (right) onto Genesee Street. The inn is on the south side of the street, between Crouse and University Avenues.