



Colleen Moloney

Colleen grew up in Naperville, Illinois. In May 2014, she earned her Bachelor's degree from the University of Illinois Urbana-Champaign in Agricultural and Biological Engineering with a specialization in Soil and Water Resources. She then started graduate school at Purdue's Ecological Science and Engineering Interdisciplinary Graduate Program in August 2014 to pursue her MSABE. During her time at Purdue, she has worked as a Teaching Assistant and Research Assistant as well as served as an organizing committee member for the International SWAT conference hosted at Purdue in 2015, planning committee for the ESE program's 2015 Keystone Series, marketing chair for the 2015 ABE Graduate Student Symposium, 3MT competition organizer for the 2015 ESE Symposium, and Treasurer for the 2015-2016 ABE Graduate Student Association. Colleen also enjoys volunteering at the Humane Society, practicing yoga, reading, crochet, and going to the gym, as well as rooting for the Chicago Blackhawks.



Simulation of Flow and Water Quality from Tile Drains at the Watershed and Field Scale

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ABE 301

Tile drainage is a standard practice in the Midwest, US used to remove excess water and reduce risk. As models, such as the Soil and Water Assessment Tool (SWAT), become more widely used in determining water quality impacts of tile drains, ensuring the correct processes are simulated has become an important goal.

Four modifications were made to the SWAT model regarding subsurface flow to increase the physical basis of these algorithms:

1. Percolation through the soil profile was altered to be based on Darcy's and the Buckingham-Darcy Law.
2. The restrictive layer of the soil profile was redefined to be the bottom of the soil profile and an additional variable was added to control the seepage through the restrictive layer.
3. Water table depth was defined to be based on the water content between field capacity and saturation by layer.
4. The percentage based lag through the tile drains was removed so flow is delayed only by the drainage coefficient.

The modified algorithms were tested and evaluated twice. First, at the Southeast Purdue Agricultural Center's (SEPAC's) experimental tile drained field. Second, on a small watershed located in Central Ohio monitored by the USDA-ARS. For both models, the modifications improved the performance of SWAT for tile flow predictions, but tile and stream nitrate was more severely under-predicted. Phosphorus was also looked at in Ohio, and an extreme under-prediction issue was observed.

These modifications improved the physical basis or simplified the process representation in the SWAT model, and showed improvement to the tile flow model predictions. The model should be further tested and further developments, specifically for nitrogen and phosphorus, should continue.