It's been a pleasure to call Purdue my home for the past 6 years. I earned my Bachelor's degree in May 2010 from the ABE program and continued on for graduate school. I've lived in Indiana most of my life and grew up just north of Indianapolis in the town of Westfield. In my spare time I enjoy running and competing in long distance races. I'm moving to Indianapolis in a few short weeks to work for an engineering firm as a water resources engineer

Agricultural & Biological ENGINEERING

Thesis Defense

Speaker: Sarah Rutkowski

Title: Assessing Climate Change Variability Impacts on Subsurface Drainage and Streamflow Patterns in an Agricultural Watershed

Major Professor(s): Drs. Keith Cherkauer and Laura Bowling

Date: Friday, May 11, 2012
Time: 10:00 am
Location: ABE 212

Abstract:

We tested a new drainage algorithm within the Variable Infiltration Capacity (VIC) model to determine its ability to adequately simulate subsurface tile drainage. Output was compared to the record of observed tile drainage and water table data from the Southeast Purdue Agricultural Center (SEPAC). Subsequently, we applied the calibrated model for watershed scale simulations. The results indicated that tile drainage systems increase streamflow flashiness, increase peak flows, and decrease annual low flows where the average change between the metrics were 50 %, 95%, and 67% respectively. The model was also modified to handle Drainage Water Management (DWM) where drain depth is effectively changed through the year to reduce the release of water and nutrients when the field is not being worked. Future climate data was used to force the model for simulations using conventional tile drainage practices and DWM. We found that DWM mitigates the effects of conventional drainage by increasing field-scale seasonal water conservation and reducing streamflow flashiness. There was a noticeable decline in growing season water conservation from DWM which decreased from approximately 7.1 million cubic meters annually between the years of 2010 and 2039 to about 6.6 million cubic meters by the late 21st century (2070-2099).

Application:

Subsurface (tile) drainage is an important water management practice for agricultural watersheds in the Midwest because it lowers seasonally high water table levels and enables the land to be utilized for row crops. At the same time this practice poses problems for the environment because it increases the concentration of nitrates entering local bodies of water and alters streamflow patterns. Most large scale hydrology models (such as the VIC model) designed for use at watershed or river basin scales ignore the role of subsurface drainage in hydrology, meaning that the role of drainage and drainage management methods on river flow are less understood.