Margaret McCahon is a graduate student in the Ecological Sciences and Engineering Interdisciplinary Graduate Program (ESE-IGP), and her home department is Agricultural and Biological Engineering (ABE). She has been at Purdue since August, 2008, pursuing both her MS and PhD degrees. Margaret obtained her BS from F. W. Olin College of Engineering in 2008. At Olin College her studies focused on bioengineering. She is enjoying a change of focus towards the environment, as well as the interdisciplinary opportunities provided by Purdue's ESE program.

Agricultural & Biological ENGINEERING

Thesis Defense

Speaker: MARGARET McCAHON

Title: Strategically Siting Constructed Wetlands to Target Nitrate Removal in Tile-Drained Agricultural Watersheds

Major Professor: Indrajeet Chaubey

Date: May 24, 2010

Time: 2:00 pm

Place: ABE 301

Abstract:

Constructed wetlands can be used in agricultural watersheds to protect surface waters from pollution by agricultural activities. A particular concern for the agricultural Midwest is the high nitrate export from agricultural fields that affects water quality at local and regional scales, including hypoxia in the Gulf of Mexico. Nitrate losses are greater in the tile-drained agricultural lands characteristic of northwest Indiana. In this thesis a methodology is presented for strategically placing constructed wetlands in the landscape, and this methodology is applied to an 8-digit hydrologic unit in northwest Indiana. Results showed 19 sites that are suitable for wetland placement, requiring conversion of 0.1% of the entire 8-digit watershed. These wetlands would intercept approximately 3% of nitrate-rich waters from tile-drained lands, removing approximately 1% of all nitrate exported. To better estimate nitrate removal in these headwater wetlands, the Soil and Water Assessment Tool (SWAT) was applied to a small portion of the watershed where three potential wetland sites were found. Wetlands were found to remove nitrate in every month having flow. These three wetlands were capable of removing 18-40% of incoming nitrate. If placed strategically, wetlands can efficiently remove nitrate from tile-drained flow, but the extent of their impact in the landscape is dependent on the suitability of local conditions for wetland placement, as well as the specific criteria used for siting wetlands.