Tile Drainage Modifications to Reduce Nitrate Losses in an Agricultural Watershed: Integration of Biophysical and Social Sciences with Extension and Education

Proposed by the University of Illinois at Urbana-Champaign

Mark David, Courtney Flint, Gregory McIsaac: *Natural Resources & Environmental Sciences*
Richard Cooke, Prasanta Kalita: *Agricultural and Biological Engineering*
George Czapar: *University of Illinois Extension*

Project Summary/Abstract

Our project will focus on the effectiveness and social barriers to implementation of two drainage-related management practices; drainage water management (controlled drainage) and saturated riparian buffers in the heavily tile-drained and high nitrate Spoon River subwatershed of the Upper Salt Fork watershed in east-central Illinois. We will work closely with an active watershed group in all phases of our work. This group includes a wide range of stakeholders. At the end of our study we will have a thorough understanding of the biophysical aspects of modified drainage systems, as well as knowledge of stakeholder acceptance and barriers (and what incentives might overcome the barriers), effective extension programs, and evaluations of our work. The next generation of professionals will receive education from both biophysical and social science viewpoints.

Specific objectives include for a tile-drained agricultural watershed in east-central Illinois are to:

1. Determine the fate of water and nitrate with both saturated riparian buffers and managed drainage at the field scale, including the effectiveness in removing nitrate **(research objective)**.
2. Model modified drainage systems using a long-term climate record to assess performance beyond the weather conditions that occur during the monitoring phase of this project **(research objective)**.
3. Demonstrate how modified drainage systems can improve local water quality with a variety of outreach tools **(extension objective)**.
4. Understand stakeholder motivations with respect to water quality and acceptance of modified drainage systems, leading to better targeted extension programming **(research objective)**.
5. Evaluate the acceptance by stakeholders of modified tile drainage systems that improve water quality, including possible incentives needed to implement these practices to obtain watershed scale improvements **(research and extension objective)**.
6. Develop both seminar/discussion and field based courses for undergraduate and graduate students, leading to students equipped with both biophysical and social science skills who can deal with watershed scale water quality issues **(education objective)**.
7. Involve grade 6-8 students in local water quality issues through a service-learning course **(education objective)**.

This project is directly relevant to the goals of the NIWQP by integrating a biophysical modification (drainage modification) with social science assessment leading to effective extension programming to improve watershed water quality.