

# Reducing Agricultural Nitrate Losses in the Embarras River Watershed through Bioreactors, Constructed Wetlands, and Outreach

Proposed by the University of Illinois at Urbana-Champaign

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Tile-drained corn and soybean fields in the upper Midwest are the major source of nitrate delivered by the Mississippi River to the Gulf of Mexico each winter and spring. This is a major factor in causing the hypoxic zone that forms each summer in the Gulf. The flat, productive soils of the upper Midwest produce high yields of crops, but the tile-drainage needed to make agricultural production practices feasible and timely on these fields often leak large amounts of nitrate. Therefore, the long-term goal of our project is to develop techniques that could lead to large watershed scale reductions in nitrate export. Our project will focus on the effectiveness of constructed wetlands and woodchip bioreactors, both of which are placed at the end of tile lines before they enter a ditch or stream. This work will be conducted in the Embarras watershed in east-central Illinois, where we have been sampling water quality since 1993. This project will work cooperatively with a range of interested stakeholders on this watershed. New wetlands and bioreactors will be installed with monitoring equipment on cooperators fields, and we will use some wetlands built in 1994 to assess long-term performance. We will determine how well these end-of-pipe techniques work in reducing nitrate export, as well as determining whether they contribute greenhouse gases during nitrate removal. We will implement a full range of extension activities including fact sheets that highlight research results and document the water quality benefits of the project and field days to demonstrate results to producers, landowners, and the general public. Interviews and surveys will assess stakeholder interests and motivations before and after extension programming. At the end of our study we will have a thorough understanding of how well wetlands and bioreactors work to reduce nitrate loss from fields and their greenhouse gas impact, as well as knowledge of stakeholder acceptance and barriers, effective extension programs, and evaluations of our work. We will educate undergraduate and graduate students in our departments about water quality and how wetlands and bioreactors work, as well as develop a course for students from Northeastern Illinois University (an Hispanic Serving Institution). Finally, we will work with Illinois 4-H, educating kids about wetlands.