



Title: A Watershed Nutrient Management Decision Support System for the Eucha Basin

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State: Multi-State **Region:** Heartland

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Theme: Watershed Management

Situation: Lake Eucha water quality is being degraded from excess algal growth, resulting in odor and taste problems in this critical drinking water supply. This excess growth is the result of an overabundance of nutrients in the lake, assumed to be primarily phosphorous from either point sources, such as the City of Decatur municipal wastewater treatment plant, or from non-point sources from pastures.

Objectives: Our goal is to develop, implement, and evaluate a decision support system (DSS) for developing comprehensive watershed nutrient management strategies and TMDLs. The DSS will integrate a GIS ecosystem model with a stakeholder-driven risk-based nutrient management decision process, using bio-indicators and water quality data for validation. We will accomplish this goal by completing the following objectives: 1. Develop a GIS ecosystem model decision support system (DSS) to provide risk-based information on sources and fate of nutrients within watersheds (terrestrial and aquatic). 2. Develop a stakeholder input and advisory structure to guide the development and implementation of the risk-based DSS. 3. Develop seasonal external phosphorus load thresholds for Lake Eucha using in situ algal bioassays and a reservoir model. 4. Evaluate the effectiveness of the nutrient management DSS in the Eucha Basin and develop management alternatives for implementation.

Methods: In order to capture the spatial and temporal complexity of ecosystem processes within a policy framework, we developed a watershed nutrient management decision support system (DSS) for both agricultural and urban landscapes. Our approach for developing the DSS integrates stakeholder participation in each step of the project using Analysis and Deliberation (A/D). Analysis is used to inform policy deliberation so that the best information is brought to bear upon the problem to be solved ("getting the science right"). Deliberation is used not only to make a decision, but also to frame the analysis and to empower participants in understanding analytic findings ("getting the right science"). Thus, risk management in resource decision-making is not solely within the discretion of the analysts. All interested and affected parties (stakeholders) decide what information should be considered in the analysis, what approaches should be used to predict impacts, and how to evaluate alternative impact management schemes.

Partnerships: University of Arkansas, Oklahoma State University, and USDA-ARS are collaborating to address this very contentious problem.

Research: The stakeholder component requires researchers to work through the extension program to engage the community in collaborative learning.

Resources: This project was partially responsible for stimulating collaboration between the three institutions to develop a joint Phosphorus Index, a major regional initiative.

Results: Results in Year One are limited to field data collection, stakeholder identification, and preliminary decision matrix development.



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