# WATER QUALITY TRADING IN GEORGIA: ADDRESSING TWO POTENTIAL IMPEDIMENTS TO SUCCESS

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## INTRODUCTION

In 2003, the EPA issued a national water quality trading policy to support the development and implementation of market-based approaches to water quality management. The EPA advocates water quality trading as a cost-effective means to preserve and improve water quality (EPA, 2003). The agency hopes to build on the success of air quality trading programs, which have been effective in efficiently controlling the emissions of compounds responsible for the formation of acid rain. A survey in 2003 found over forty water quality trading initiatives across the U.S. and six state policies and programs (Breetz, et al., 2003). These projects vary in their stage of implementation, scale, and targeted pollutants.

Despite the overall success of emissions trading as an environmental policy tool, watershed-based nutrient trading has failed to generate significant cost savings in a number of policy experiments around the U.S. A multidisciplinary team at University of Georgia working in the Etowah River Basin is addressing two hypothesized reasons for this lack of success: an inability to successfully address environmental uncertainty that results from trading, and an over-reliance on traditional trading structures and fixed trading ratios.

## STUDY AREA

The Upper Etowah River Basin drains an area of 1,050 square miles supplying water for Lake Allatoona. A comprehensive study of the lake's water quality classified Lake Allatoona as being in transition between mesotrophic and eutrophic, with phosphorus (P) being the primary limiting nutrient for algal growth (Rose, 1999). The authors concluded that unless measures were taken to control P inputs to the lake, it would be unfit for drinking or recreational purposes. As a result, the Georgia Environmental Protection Division has imposed a P load restriction on the lake (GAEPD, 2002). Additionally, a total maximum daily load for P has been developed for the Little River embayment.

In the rural northern part of the watershed there are significant areas of agricultural land use. The main agricultural activity is broiler production and a typical farm combines this with beef cattle production and pastures. Downstream in the more urbanized section of the watershed there are eight point sources permitted to discharge P. Comparing the lake load restriction to permitted point sources and non-point source loads reveals the Etowah River Basin as a potentially ideal system for trading between point and non-point sources.

## METHODS

### Uncertainty and Trading Ratios

Trading activity that involves credits produced from reductions in non-point source emissions can result in inexact levels of pollutant loading. Unlike point sources where emissions can be monitored with accuracy, emissions from a diffuse source, like a farmer's field, are not easily measured. This uncertainty is compounded due to the spatial and temporal distribution of non-point source reductions.

Uncertainty is being addressed by incorporating a stochastic component into the effectiveness of any given control measure that is based on actual field measurements of nutrient emissions from poultry growing operations. These measurements will include a variety of best management practices (BMPs) implemented on farms draining first-order streams within the Georgia Piedmont. The variation in effectiveness of similar BMPs in similar settings, relative to appropriate controls, will serve as the basis for modeling randomness in actual contributions to nutrient loadings.

A watershed-scale model will be used to estimate phosphorus loads from poultry operations in the watershed. These loading estimates along with load estimates from other land use categories will be used to scale and route loads through the stream system[1]. Appropriate trading ratios will then be calculated from these results based on

[1] Load estimates for other land use types will be taken from previous studies in the region and the literature.

the randomness of improvements produced by the controls, the subsequent use of the credits, and the required levels of certainty that environmental criteria are being met. We also examine the option of adjusting trading ratios *ex post* if monitoring is able to remove uncertainty about the effectiveness of management practices.

**Trading Structures**

The second focus of the study is to look at institutional options to manage trading. Trading structures must provide adequate oversight to disallow trades that do not serve a program's environmental goals while encouraging beneficial trades and keeping transaction costs as low as possible. They must also provide long-term oversight and adequate compliance procedures to ensure that all agreed-on management practices under the program actually take place. We analyze three structures with respect to their flexibility and their likelihood of success in the Etowah Basin.

Common among the early trading programs is the market model or bilateral negotiations (Breetz, et al., 2003). Under this model, buyers of credits seek out sellers and negotiate a trading agreement, with a regulatory agency approving the trade and establishing a trading ratio (Woodward and Kaiser, 2002). The buyers through monitoring and enforcement establish the authenticity of the reductions provided by the sellers. So far this trading model has resulted in only a handful of trades because of high information and transaction costs.

A second possible trading framework is the market-maker model, which consists of an association of stakeholders, regulators and other interested parties who seek out and broker deals between buyers and sellers. Sellers can register their credits with the association making it much easier for buyers to find them, exchange information and negotiate a trade. However, it is still the buyer's responsibility to prove the reductions are real and quantifiable.

A less traditional structure is the clearinghouse or fund model. Point sources pay into a fund and in return receive credits towards higher emissions. The managers of the fund finance projects to achieve the needed reductions. Clearinghouses eliminate all contractual or regulatory links between sellers and buyers (Woodward and Kaiser, 2002). The advantages of this model are flexibility to prioritize environmental needs, low transaction costs, and the ability to aggregate resources to complete innovative, large-scale projects to reduce emissions. The disadvantage of this model is the difficulty in setting the price for credits. If insufficient funds are collected to produce the desired environmental benefit, the integrity of the riverine system may be compromised.

The second and third models, if adopted, would require significant public investment; therefore, careful attention must be paid to the likelihood of success before these approaches are recommended. Our approach to determine feasibility will be to gather and analyze data on the following:

- The number of potential buyers and sellers;
- The relative magnitude of transaction costs among the alternatives;
- Estimates of the costs that a point source would incur compared to the cost of buying credits from a non-point source;
- The presence or absence of the expertise to manage a fund or watershed association, and the degree of trust the stakeholders in the watershed have with such managers to make good decisions that affect costs and environmental integrity; and
- The presence or absence of large-scale projects that could be facilitated through a fund structure better than through the other options.

We are in the process of surveying both point source dischargers and poultry producers in the watershed to identify potential buyers and sellers and to estimate costs. An advisory council consisting of stakeholders from the watershed will assist us in identifying potential trading opportunities, evaluating trading frameworks, and determining the best method for communicating to a larger, more diverse audience.

## CONCLUSION

Making trading part of a successful overall strategy for reducing nutrient pollution requires a detailed understanding of the effectiveness and variability of the nutrient reduction practices available to all parties. It also requires setting up institutions that can provide reasonable certainty of meeting environmental goals while also providing economic incentives and keeping administrative and transactions costs within manageable levels. Our approach in the Etowah Basin is based on directly incorporating these factors. We expect to have results to report at the next Georgia Water Resources Conference.

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