

## **Measuring Nutrient Reduction Benefits for Policy Analysis Using Non-market Valuation and Environmental Assessment Models.**

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Setting efficient ambient nutrient criteria requires knowledge of the benefits and costs associated with different standards, but state regulators often face difficulties when monetizing benefits. This project will develop and demonstrate a generalizable framework for valuing the non-market benefits of fresh water nutrient reductions. This framework will specifically address states' needs for evaluating nutrient reduction plans. This project consists of the following three main components:

- 1) Development of a eutrophication production function mapping quantitative measures of ambient nutrient levels to qualitative indicators of water body quality and suitability for designated uses.
- 2) Development of a combined revealed and stated preference model for valuation of the non-market benefits of nutrient reductions that is directly linked to the eutrophication production function. The model will provide a generalizable framework of data sources and analytical techniques designed to facilitate benefit transfer and scalability. In particular, the model will be adaptable, in that benefit functions that can be calibrated based on local conditions and local policy questions of interest.
- 3) Transfer of knowledge on the general framework and its use for regulatory analysis via (a) a training workshop for state-level water quality regulators and analysts and (b) distribution of the software, data sources, and educational materials necessary for implementing the framework.

The analysis integrates three modeling approaches and exploits existing secondary data as well as primary data gathered as part of this project using eco-region IX of EPA's regional classification system in the southeastern U.S. as our demonstration area. Innovative, ongoing research by project team members will be extended. The ongoing research is on production function modeling that aims to quantify the relationship between measurable nutrient levels and descriptive criteria for individual water bodies. This modeling effort will be linked with stated preference (SP) and revealed preference (RP) valuation models. An SP conjoint model is proposed to elicit preferences for the attributes of water bodies, where the attribute levels link directly to the output from the eutrophication production function. Key components of the choice experiment models will be combined with RP data on water recreation choices drawn from the most recent versions of the EPA-sponsored National Survey of Recreation and the Environment. The RP data will provide more detailed local information to enhance policy analysis in smaller geographic areas. A recently developed RP/SP strategy is exploited that controls for idiosyncratic, unobserved water body attributes in a location-specific benefit function that includes relevant policy variables.

The project contributes a scientifically rigorous yet accessible valuation protocol that is applicable across a large region but customizable for local applications. Its outputs will

include an integrated water quality/economic model to predict non-market values for changes in nutrient concentrations. The training workshop and materials will assure the tool is made available to state, regional, and national water quality analysts and policy makers.

## Measuring the Benefits of Nutrient Management Strategies at North Carolina Reservoirs

This project will utilize a linked environmental assessment model with non-market valuation techniques to provide benefits estimates associated with recent nutrient management strategies for Jordan and Falls Lake that have been suggested by the NC Environmental Management Commission's Division of Water Quality. Understanding the benefits of improved water quality in these two lakes is an important component of the fiscal analysis the Division of Water Quality must undertake of its proposed regulations.

This research is receiving support from the Water Resources Research Institute and the US Environmental Protection Agency. For more information, [click here](#) or contact Professor Roger von Haefen, Principle Investigator.

## Assessing the Impacts of Water Conservation Regulations in North Carolina

This project is a collaborative effort among CEnREP faculty and researchers at the University of North Carolina and will investigate the effects of pricing and other demand-management strategies for limiting household water usage in North Carolina. A demand model for household water use across NC communities is being developed that will help NC water managers understand the relative importance of water pricing and management tools such as watering restrictions play in reducing household water use.

This research is receiving support from the Water Resources Research Institute. For more information, [click here](#) or contact Professor Roger von Haefen, Principle Investigator.

## Estimating the Value of Irrigation Availability for Farmers in the Southeast

This project provided a critical review of the research to-date that has estimated the value of irrigation availability to farmers in the southeast. The focus of the project was irrigation availability in southwest Georgia, where approximately half the cropland is irrigated. Georgia, like North Carolina, has been suffering from drought in recent years and water allocation among agricultural and municipal water users has become a critical public policy debate. One important input into this debate requires understanding the value of the water to these various end-users. This project will provide a best-estimate of the value for farmers based upon the current available research.

This research is receiving support from the U.S. Department of Agriculture. For more information, [click here](#) or contact Professor Laura Taylor, Principle Investigator.