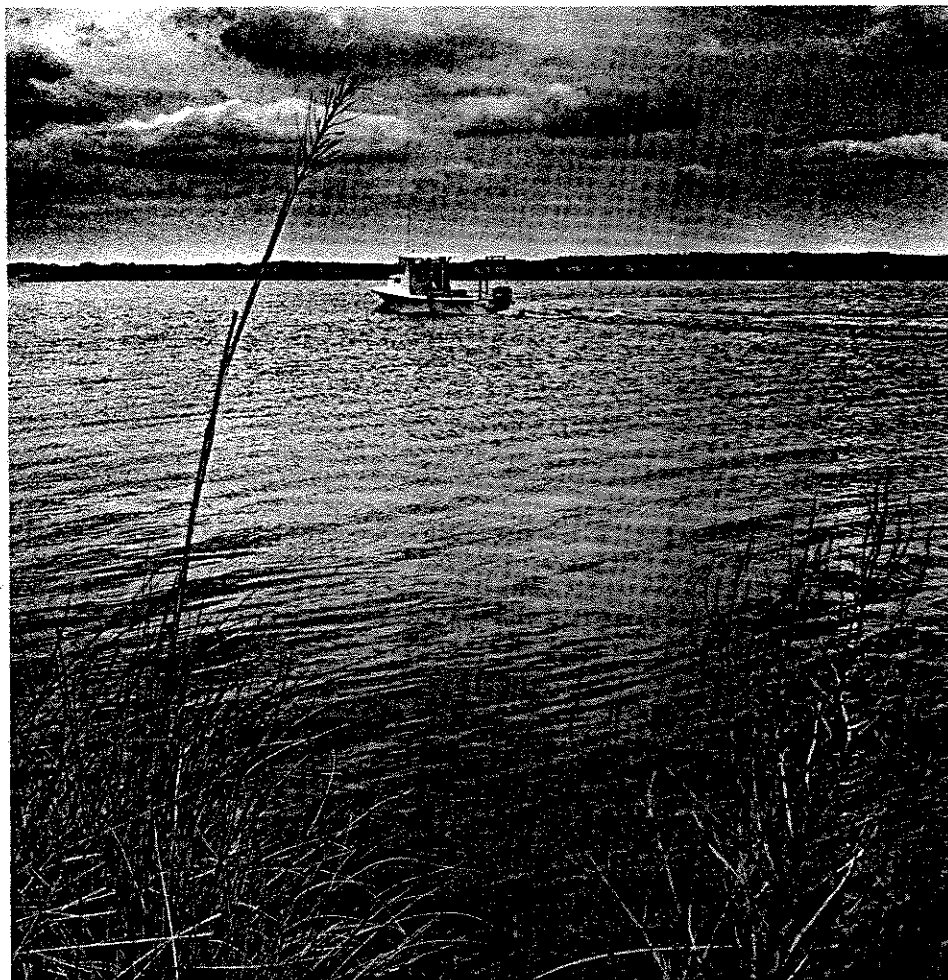


# Albemarle-Pamlico: Case Study in Pollutant Trading

by John Hall  
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## Most of the nutrients came from nonpoint sources



*Albemarle-Pamlico sound.  
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The Albemarle-Pamlico estuary of North Carolina is the second largest and one of the most productive estuarine systems in the country. Over the past two decades, excess nutrients entering the estuary from the Tar-Pamlico River have caused algal levels to increase. These increased levels can lead to fish kills, odors, and habitat loss and can generally diminish water quality. The system has also suffered significant losses in wetlands, submerged aquatic vegetation, and spawning areas due to real estate development.

To reverse the degradation of the estuary, in 1989 North Carolina's Department of Environmental Management decided to increase control of municipal and industrial point-source dischargers along the river. Under a proposed watershed plan, these dischargers would be forced to build advanced treatment facilities to reduce their nutrient loading to the river. Estimated capital cost for the facilities was approximately \$50 million.

The problem with the state's strategy was that almost 80 percent of the nutrient pollution entering the Tar-Pamlico River was discharged *not* from point-sources, but from agricultural and urban runoff and other nonpoint-sources of pollution. (See pie chart on page 29.) The state's strategy provided for only minimal increased attention to reducing nonpoint-source pollution and did not earmark additional funding or staffing for such efforts. Technical analyses indicated that little, if any, actual improvement in water quality would occur from the point-source control measures.

In 1989, a group of municipalities and industries located along the Tar and Pamlico Rivers joined together to form the Tar-Pamlico Basin Association, Inc. Their purpose was to

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develop an alternative strategy that addressed both point and nonpoint sources of pollution in the entire Tar-Pamlico watershed on a cost-effective basis.

The Association proposed to optimize reductions in point-source loadings through existing facilities and to promote nonpoint-source reductions through innovative financing arrangements. Both technical and regulatory assistance was offered to leverage state resources in reaching a better understanding of the nutrient dynamics of the estuary and in identifying the most cost-effective mix of point- and nonpoint-source controls. This concept of point sources contributing to nonpoint-source controls is known as point/nonpoint-source "trading."

In December 1989, the Association's alternative strategy was adopted, and an agreement was signed by the Tar Pamlico Basin Association, the State of North Carolina's Department of Environmental Management, the Environmental Defense Fund, and the Pamlico-Tar River Foundation. The strategy consisted of three primary components:

group point-source controls, nutrient discharge trading that funded nonpoint-source controls, and nutrient modeling of the watershed that improved targeting and tracking of pollution sources.

### Point-Source Controls

Under the Tar-Pamlico agreement, the Association is given group nutrient-reduction goals, rather than individual nutrient limitations being placed in each member's discharge permit. The goals are set at increasingly stringent levels each year for the first five years of the project.

The agreement requires members of the Association to evaluate their facilities to identify operational or minor capital improvements that could reduce nutrient discharge levels. Once they have optimized existing facilities, they are given the choice of achieving the group limitations by making major improvements to their facilities, "trading" discharge levels between themselves, or by funding implementation of nonpoint-source pollution controls.

As a result of the initial evaluation,

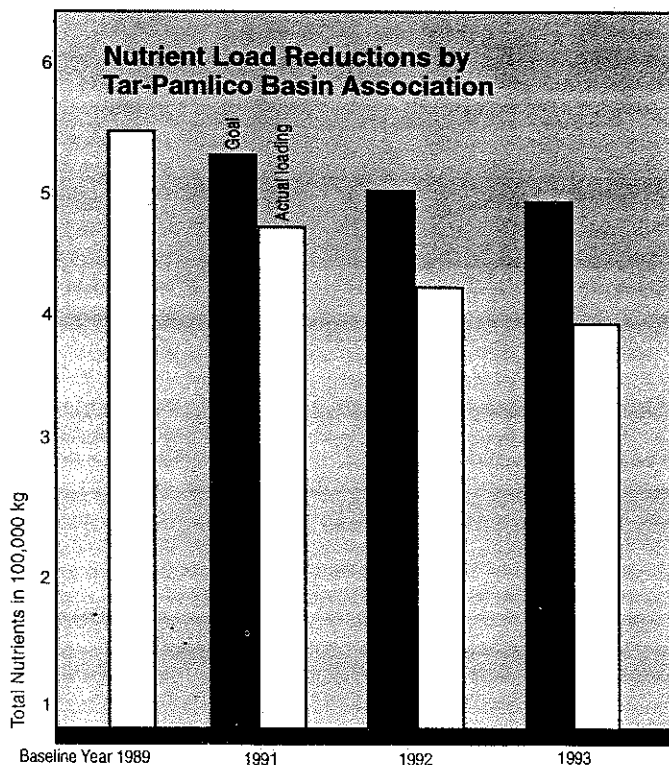
Association members were able to meet almost 80 percent of their group nutrient-reduction targets through operational changes alone. By working together as a group, they were able to finance a sophisticated engineering evaluation of their plants which as individuals--particularly the small towns that are members of the Association--they never could have afforded.

The bar chart shows the Association's success in reaching its nutrient-reduction goals during the first phase of the project. From 1989 to 1993, the new approach reduced overall nutrient loading to the watershed by 28 percent even though the average flow per month to the watershed increased by 18 percent. Effluent nitrogen concentrations, the primary pollutant of concern, decreased from 14.4 mg/l to 8.9 mg/l. This result far exceeded reductions that would have occurred under the original state proposal.

### Nonpoint-Source Controls and Nutrient Trading

If the Association members had not been able to reach their group nutrient reduction goals, the Tar-Pamlico strategy would have allowed them to pay into a fund to implement nonpoint-source controls. The arrangement was for them to pay \$56 for each kilogram of nutrients they discharged over the target level. A 10-year credit was to be given for each kilogram funded by this approach. The flexibility of this arrangement is important because, once plant performance is optimized, preventing nutrient pollution through nonpoint-source controls, such as agricultural best management practices (BMPs), is far less costly than it is through advanced wastewater treatment. Further, it also promotes habitat restoration, wetlands preservation, soil-quality control, and those other benefits that come with agricultural BMPs.

Even though point/nonpoint-source trading has not been necessary yet, the Association has provided almost \$1 million for demonstration projects in the watershed, primarily involving





Egrets are native to Tar-Pamlico river marshes.

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implementation of agricultural BMPs. With the help of federal funds, the Association developed model BMP projects to ensure that the infrastructure is present when trading becomes necessary. In addition, the Association has spent \$150,000 to finance additional personnel in the North Carolina Division of Soil and Water Conservation to assist in identifying nonpoint sources and implementing BMPs in the watershed.

### Nutrient Modeling

In addition to obtaining funding for BMP projects, the Association funded creation of a water quality model of the Pamlico estuary and obtained funding for development of a geographic information system (GIS) of the watershed. Through the use of these models, the state can target BMPs to those operations that are causing the greatest impact and can determine if additional point-source limitations would improve water quality. This capability allows the state's regulatory strategy to move beyond the scatter-shot approach of controlling all point or nonpoint sources to the maximum extent and brings to bear a more sophisticated cost/benefit analysis of pollution improvement impacts.

### Conclusion

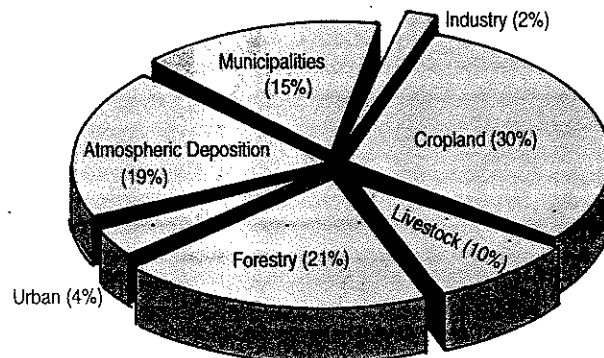
At the end of 1995, the Tar Pamlico project will move into Phase II. Development of the project, in which the infrastructure and foundation for trading and nonpoint controls were established, will give way to implementation, in which the basic concepts will be retained and trading can occur as necessary. Negotiations on the specific provisions of Phase II are just beginning, but there is no question that the project is considered a success by all the parties involved: the Association members, the regulators at the state and federal

levels, and the members of the environmental community.

The concepts of point/nonpoint-source trading and watershed-based management have also become increasingly popular since the Tar-Pamlico project first introduced these concepts. Despite some initial skepticism, EPA is now pointing to the project as a model for cost-effective and innovative water-quality control. Both the House and Senate versions of the Clean Water Act reauthorization contain provisions for a watershed approach to water-quality improvement; both versions would be improved if additional provisions are included to encourage cost-effective alternatives such as point/nonpoint-source trading.

As this concept grows in popularity and prominence, communities interested in implementing similar approaches should look to Tar-Pamlico as a case study experience. To aid communities in such an endeavor, Congress recently appropriated funds for creation of a guide to watershed planning and point/nonpoint-source trading as implemented in the Tar-Pamlico basin. This guide will be available in the fall of 1994 through the North Carolina Department of Environmental Management, 512 North Salisbury Street; Raleigh, North Carolina 27604. □

1988 Tar-Pamlico Nitrogen Sources



(Figures total greater than 100 percent due to rounding.)