WECO: WATERSHED EDUCATION FOR COMMUNITIES AND OFFICIALS

Nancy White[1] and Leon Danielson[2]

ABSTRACT: Local communities and governments can play an important role in watershed management. The guiding objective of the Watershed Education for Communities and Officials (WECO) project is to empower local citizenry with the tools and mechanisms to protect water quality. The White Oak River watershed is the pilot study area for the WECO project which was initiated by NC Cooperative Extension Service in 1996. Led by a multi-agency and multi-disciplinary project team, a 25 citizen, stakeholder-based White Oak River Advisory Board reviews technical water quality and policy information to develop consensus-based management strategies and policy options targeted at water quality problems in the river. In the first year the Board was able to work with County Commissioners for all three counties in the watershed, US Army Corps of Engineers, and NC Department of Transportation to devise alternative strategies for stormwater management in the river's estuarine zone.
KEY TERMS: water quality, policy development, stakeholders

INTRODUCTION

In North Carolina coastal estuarine systems, land use change has been implicated as a significant cause of water quality impairment (NC Department of Environment and Natural Resources, 1997; White, et al., 1998). Such development processes change surface hydrology, pollutant delivery, and as a consequence, adjacent water quality. Decisions regarding placement, density, and type of development are controlled by policy implementation at the local level. Furthermore, while the degree of impact may vary with each location, it is the cumulative effects throughout a watershed that can be most damaging to water quality. Hence, there is a need to effectuate policy locally, but on a multi-jurisdictional, watershed basis.

Increasingly, local communities and governments are showing interest in playing a role in developing and implementing solutions to water quality problems (NC Department of Environment and Natural Resources, 1997). However, in reality, logistical complications arise upon implementation of this concept. First, a mechanism for effectively involving local citizen stakeholders in the policymaking process may not exist and/or is difficult to establish. Second, technical data needed to address local issues and concerns are often not available, or are in a form not easily understood. Third, the means for addressing water quality problems on a watershed-basis may not exist, suggesting a need to develop, coordinate, and deliver multi-jurisdictional education on water quality issues and policy

---

[1] Extension Programs Leader, School of Design, NC State University, Box 7701, Raleigh, NC 27695, (919) 515-4678, nancy_white@ncsu.edu
[2] Professor, Department of Agricultural and Resource Economics, NC State University, Raleigh, NC, 27695, (919) 515-4534, leon_danielson@ncsu.edu

alternatives. This paper discusses our experiences as members of the North Carolina Cooperative Extension Service working to help citizens develop solutions to water quality problems in our State.

METHODS

Project Study Area

The White Oak River watershed is one of four rivers in the White Oak River Basin (Figure 1). It is 48 miles long, and it encompasses 320 mi^2. The watershed begins in freshwater creeks and swamps of Jones County, NC, and contains portions of three other counties--Craven, Onslow, and Carteret. Along its route to Bogue Sound and the Atlantic Ocean, the river traverses between 30 ft. banks, which are relics of ancient dune ridges. This river is home to five threatened or endangered organisms--alligators; loggerhead, green and leatherback turtles; and the Croatan crayfish. The river and its estuarine waters have extensive primary nursery waters and provide habitat for several anadromous species--herring, shad, striped bass, and sturgeon. The majority of the river is classified as SA, or saltwater suitable for commercial shellfish harvesting.

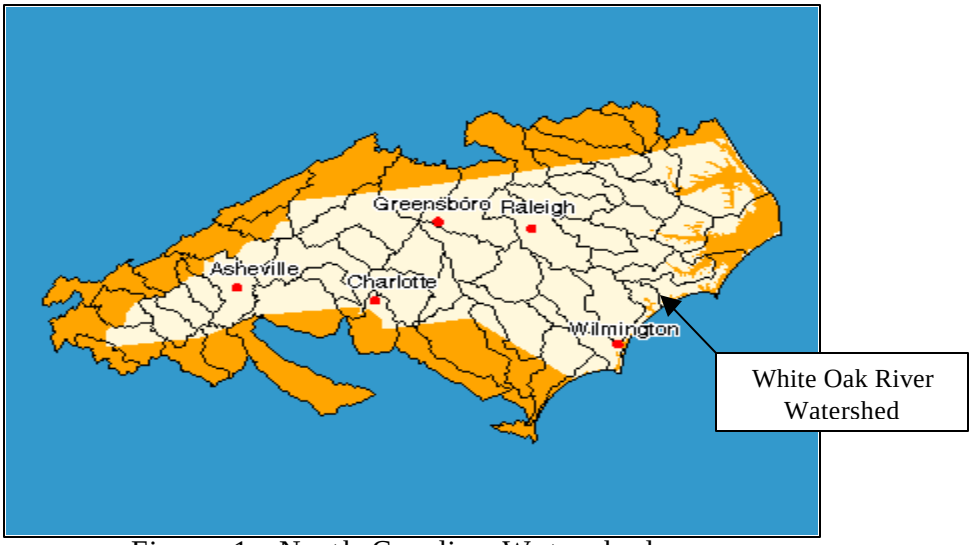

Figure 1. North Carolina Watersheds

The White Oak has six major land cover/ land use classes with wetlands being the largest single type at 52% of the total. Forests are the second largest land cover type constituting the majority of the headwaters in the Croatan National and Hoffman State Forests (22%). A very small portion of the watershed is urban (2%) and agricultural (11%) (NC Department of Environment and Natural Resources, 1997).

Project Objectives

Despite a low level of urbanization, population growth is proceeding rapidly, causing water quality concerns. The North Carolina Division of Water Quality's basinwide management plan notes an increase in shellfish closures in the river (NCDENR, 1997). At

state-sponsored public meetings, over 100 citizens expressed concern and called for more public education on water quality.

The goal of this project, Watershed Education for Communities and Officials (WECO), conducted by NC Cooperative Extension Service, is to improve water quality in the White Oak River through education of citizens and government officials who live and work in the watershed. The project's main thrusts are : 1) the delivery of technical information and educational material on water quality, management strategies, and policy options that support watershed-based planning; 2) the empowerment of local citizens by facilitating collaborative partnerships between communities, local officials and state agencies within the watershed; and 3) the facilitation of the development of local stakeholder - driven policy recommendations for the entire watershed.

Project Process

Local NC Cooperative Extension Service leaders, recognizing the interest of their constituencies in water quality education, assembled a team involving members from the North Carolina Division of Water Quality, North Carolina Division of Coastal Management, North Carolina Division of Environmental Health - Shellfish Sanitation Branch, North Carolina Cooperative Extension, and 25 citizens who comprise the stakeholder-based Advisory Board for the White Oak River watershed.

The citizen Advisory Board is the decision-making entity. This group includes crop farmers, livestock farmers, fisherpersons, developers, foresters, tourism directors, teachers, scientists, and local government officials from the watershed. The government agency representatives as well as Cooperative Extension personnel function as support staff to the Board. They provide resources, perform research and reviews, make reports, serve as technical advisors and provide formal facilitation and consensus-building services.

The Board began meeting in August of 1996. Their first task was to prioritize water quality issues upon which to focus their efforts. To accomplish this task, the Board reviewed baseline water quality data provided by the NC Divisions of Water Quality and Coastal Management. Data on White Oak River watershed conditions such as shellfish closure areas, impaired streams, water classifications, sensitive habitats, land use/ land cover, and census data were communicated to the group using GIS images. The group also reviewed historical maps, listened to the observations of long-time residents, and learned from each other.

Very early in the educational process Board members expressed concern that past bridge and road construction across the mouth of the river had contributed to water quality problems. Furthermore, this road, Highway 24, was slated for expansion. The Board acknowledged the need for the road, but recognized a unique opportunity to address its impact if they moved quickly. Because of this urgency, the Board resolved to meet twice monthly and work on three primary issues of concern:

1) To determine if hydraulic obstructions, attributable to placement of fill upon which the causeway and Highway 24 were constructed, impacted water quality in the mouth of the river;

2) To review if construction of the American Intracoastal Waterway (ICWW) across the mouth of the river in 1932 and 1933 altered tidal flows, and

3) To assess if increased stormwater inputs from enlarged imperviousness associated with the widening of the highway would impact adjacent shellfish resources.

The project staff reviewed scientific literature of research performed in the river, and over the next 11 months, arranged for the Board to hear individual as well as panel presentations involving experts in coastal processes from the following agencies:

1-United States Army Corps of Engineers;
2-NC State University Departments of Engineering, Marine Earth and Atmospheric Sciences, and Forestry;
3-NC Department of Transportation (NC-DOT);
4-UNC Chapel Hill Departments of Marine Sciences, Geology, History, Soil Science, Biology and Botany;
5-Duke University Marine Laboratory; and
6-NC Divisions of Water Quality, Water Resources, and Environmental Health.

Also, historic maps, located in the ACOE archives, showed that, prior to the 1930's, the mouth of the White Oak River was open and unrestricted allowing free tidal flow. In 1932 and 1933, Department of Transportation built Highway 24 and US Army Corps of Engineers (ACOE) constructed the ICWW. These projects closed approximately 80% of the mouth of the river. Based on this information, a review of scientific research indicating that the sedimentary and nutrient regimes had changed in recent history, recommendations by the above-noted experts, and their own expertise, the Board concluded that hydraulic alterations attributable to Highway 24 and the Intracoastal Waterway had altered the river's physical processes -- circulation patterns, sediment movement, and salinity regimes -- resulting in a negative impact on fish populations, shellfish habitat, and water quality in the estuary and river. In addition, they felt that the roadway expansion plans for Highway 24, while needed, would exacerbate the situation.

Various mitigation strategies were considered including bridge spans, dredging, and removal of the fill areas, but after considerable review and discussion, and in consideration of local economic needs, the Board developed the following recommendations for their local elected officials:

1. To reduce freshwater inputs to the estuary and possible negative impacts of highway runoff on water quality, the Advisory Board recommended that storm water runoff not be discharged into the river and that Department of Transportation (DOT) explore options to eliminate discharge into the waterways. At a minimum, the Board recommended that discharge from Highway 24 should be directed south of the causeway. In addition, it was recommended that velocity, volume, and quality of that runoff be ameliorated, if feasible;

2. To restore salinity regimes, increase tidal circulation, and reduce sedimentation, the Advisory Board recommended that DOT and US Army Corps of Engineers work together and take actions to reopen the mouth of the river to the maximum extent possible. Additionally, the Board recommended that DOT and ACOE access ACOE ecological restoration funds and collaborate to mitigate the impacts of this expansion and past actions.

3. To ensure that the channel remains open, the Advisory Board recommended that the State of North Carolina develop and implement a long-term maintenance program supporting improved circulation, reduced sedimentation and restored salinity regimes.

RESULTS

The management recommendations were presented to all three Counties' Commission Boards in the watershed. With the endorsement of Board members from each county, a cooperative, multi-county policy resolution supporting the recommendations was obtained from all three. This local support provided the appropriate justification for relevant state and federal agencies to take action to address the Board's concerns, and consequently, a meeting was coordinated involving DOT, ACOE, several representative Board members, and project staff. Upon review of the material, DOT agreed to revise the road expansion design in support of the recommendations. The ACOE also agreed to work to develop legislative authorization to obtain funding to address Board concerns.

Over the next year, DOT staff worked closely with the Board, and re-designed the stormwater management systems in the vicinity of the causeway. Because the road right-of-way is very narrow, there is inadequate space for grassed swales or retention facilities. Piped discharges with velocity dissipaters are planned, against grade and away from shellfish beds, to discharge into the boat channels of the Intracoastal Waterway. Also, on the bridge spans, the design includes the use of innovative "water quality islands" that will retain, filter and consequently provide "first flush" treatment to the runoff from the causeways and bridges. These treatments are expected to reduce stormwater inputs from the road, sediment loads attributable to the highway, and incidences of shellfish closures in the causeway/estuary area. They will be installed over the nest two-three years, and monitoring will be conducted to quantify effectiveness of the treatments.

Also, over the last year, ACOE has actively supported the call for further research recommended in items two and three. In conjunction with the office of NC Representative Walter Jones, Jr., it is anticipated that authorization language to obtain funding will be included in that Water Resources Development Act for either 1999 or 2000. Furthermore, based on these results and their highly positive experience with the stakeholder-driven WECO Project and White Oak River Advisory Board, the ACOE has recently requested the project team assist them with the establishment of a stakeholder group to address the water quality problems in another watershed.

CONCLUSIONS

In the beginning, the Project Team envisioned an effort similar to Project NEMO delivered by Cooperative Extension Service faculty at the University of Connecticut. NEMO has two main thrusts. First, in the short term, project workers, using the current land use plan, develop a build-out scenario of the target watershed and identify pollution "hot-spots" using literature-based delivery coefficients for the proposed land uses. This component of the project is delivered in a very concise, compact program in recognition of time-limitations of most local elected officials. The second thrust of the program is an overarching educational effort focused on planning techniques to mitigate stormwater impacts as indicated by density of impervious surface areas.

However, the citizens and officials who comprised the original WECO Advisory Board clearly communicated two problems with this approach. First, they wanted to work on developing solutions to a specific problem that could not be addressed by a generic educational effort. Second, they wanted to take action immediately. The Board clearly expressed that long - term studies or project activities would not meet their needs. Their concerns centered around local issues requiring a focused, directed effort. As a result, the Project Team found their work priorities shifted from a long-term, broad-based water quality educational effort to the immediate task of finding and interpreting data specifically relevant

to White Oak River estuarine hydraulics. Because the project was locally-empowered and stakeholder-driven, these concerns were communicated and adjustments were made.

Future Directions and Adjustments

Following their recommendations on the Highway 24 expansion, the Advisory Board turned to attentions to increasing shellfish closure management issues. Over the last year, they have heard many researchers and agency representatives discuss a variety of topics relevant to understanding these issues. Despite the initial commitment and concern regarding the causeway and shellfish closure problems, the Project Team has found it difficult to maintain a high level of attendance by the Board members during this phase of the project. Additionally, the Team noted a "lack of awareness" of the continuing work of the Board by County Commissioners.

These problems have been addressed in several ways. First, to improve attendance and commitment, the Board needed to feel that their work was relevant and directed, and that their elected officials were vested in the effort. To support this, the Project Team worked with local Cooperative Extension Service faculty to obtain official advisory status from the County Commissioners for the Board. This task took more than a year, but was granted by all three Counties in the watershed. To raise awareness of the Board's work with their elected officials, the Board and Project Team now make regular, quarterly reports to each County Commission and have redesigned the minutes into a more friendly, fact sheet format for distribution.

The Team also found that to foster local ownership, the project needed to be more locally driven and controlled. To address this issue, project staff encouraged the Board to elect a citizen chair to run their meetings, set the agenda, and direct decision-making. The Team, which had been more involved in these aspects of the project, now serve as staff at the direction of the Chair, providing facilitation as needed.

This project delivers highly technical research information in a form that is meaningful to citizens. In doing so, they can make well-informed policy recommendations to their elected officials. The time commitment by these persons is significant, but the actions of the White Oak River Advisory Board demonstrates that citizens will make significant donations of personal time to locally relevant, results-oriented, even watershed-based efforts. WECO has demonstrated a new and broadened educational role for the NC Cooperative Extension Service, a role that is predicated upon a willingness to become involved in the sometimes risky and controversial policymaking process, and to put into practice and teach the leadership skills of facilitation and consensus-building.

REFERENCES

Danielson, L. E., 1998. Are We Really Prepared to be Honest Brokers and Conflict Resolvers in Controversial Situations? Organized Symposia in Dealing with Controversy in Natural Resource Issues, at AAEA Annual Conference, Aug 4, 1998. Salt Lake City, Utah.

North Carolina Division of Environment and Natural Resources, 1997. White Oak River Basinwide Water Quality Management Plan. North Carolina Division of Water Quality, Raleigh, North Carolina, 227 pps.

White, N. M., D. E. Line, J.D. Potts, William Kirby-Smith, Barbara Doll and W.F. Hunt, in review, 1999. Jump Run Creek Shellfish Restoration Project. Journal of Shellfish Restoration.