# ATHENS COMMUNITY WATERSHED PROJECT

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**Abstract.** Representatives from several groups within the Athens community have come together to form the Community Watershed Project (CWP). The Athens CWP is designed to address the particular problems of the North Oconee River drainage in Clarke County, Georgia, while serving as a pilot for community watershed projects throughout the state. The CWP recognizes the need for holistic water quality approaches, and builds upon state and federal activity associated with the Georgia Total Maximum Daily Load (Clean Water Act Section 303) process. Major focus is directed to previously uncontrolled non-point sources. The CWP was initiated with the River Rendezvous: an opportunity for community members to participate in visual surveys assessing the general health and identifying threats to the North Oconee watershed. Future direction of the group will be determined by the goals and values established by participants and the Athens community at large.

## INTRODUCTION

The Athens Community Watershed Project (CWP) is a collaborative effort dependent on the involvement of citizens, including individuals, grassroots organizations, and local governments. The Georgia Center for Law in the Public Interest, which litigated the Total Maximum Daily Load (TMDL) lawsuit (Sierra Club v. Hankinson, 939 F. Supp. 865 (N.D.Ga. 1996)), initiated the CWP as a community-oriented means of addressing community watershed problems. Representatives from several existing community groups and organizations, the University of Georgia, and the Athens community at large have come together in shared recognition of the need for a local initiative to address watershed protection issues. The project establishes a community dynamic which helps communities address a broad array of local problems and issues. The CWP brings together diverse sections of the community, including representatives of neighborhood groups, conservation and good government groups, federal and state agencies, businesses, and local governments. The CWP is intended to help communities help themselves while working within, alongside, or in conjunction with government agencies.

"Watershed programs are aimed at management of human activities in order to protect water quality" (Cowie and Cooley 1989). Therefore, it is critical to involve the local public in the development process since "fixes" will require behavior and activity modification. The CWP operates on the premise that public participation is necessary for effective watershed protection because individuals must understand the need or purpose for change if modification of behavior and activities is to be accomplished. Much the CWP's focus is placed on educating communities about how they can organize to address community water concerns, particularly non-point source concerns. However, non-point source controls can not be addressed independently of TMDLs. The Georgia TMDL process assures that communities have the potential to address non-point problems effectively. Community members can participate in the TMDL process, because they will know what, when, where, and how agencies will be active. The CWP is designed to advise community members how they can add to and enhance the work of the government agencies. Participation will be accomplished with activities ranging from stewardship to finding opportunities to participate in decision-making processes (local government, state agency). The CWP aims to provide tools for the assessment and prioritization of water resource issues, development of solutions, and opportunities for targeted, cooperative actions to reduce pollution and enhance aquatic habitat.

## GOALS AND OBJECTIVES

As with any watershed protection approach, the ultimate goal is the improvement of water quality. The difference lies in the development of community spirit within the watershed to foster these improvements. Central to the goals of the CWP is the development of an understanding of the connection between human activities in the watershed and the impacts of these activities on water quality. This requires a community educated on the mechanisms of water quality impairment and methods of addressing challenges to water quality. Effective control of impacts on water quality will require the management of human activities directly affecting water resources. Through community meetings and activities, the CWP will provide a forum for the discussion of the value of water resources, challenges to water quality, and identification

of solutions. CWP projects will focus on opportunities for community participation in identifying threats, prioritizing these threats in community meetings, and contributing to a public well educated on solutions. A key to effective community action is involvement in the process of problem solving by drawing on their experiences and resources. Solutions may range from low-tech fixes to institutional change, but should be determined by those dependent upon the resource. The Athens CWP also hopes to serve as a positive model for other communities in Georgia faced with challenges to water quality.

## RIVER RENDEZVOUS

The North Oconee Watershed in Athens, Georgia was selected as a the target watershed for the pilot community project of the CWP: The River Rendezvous. The River Rendezvous was held at the Boys and Girls Club of Athens on Saturday, October 3rd, 1998. Approximately 160 individuals participated in the project. The pilot project is the first toward establishing a tool kit of community programs which can be replicated and used in other communities. "A first step in protecting our streams is understanding how urbanization impacts them" (EPD 1993).

As evidenced by calls for watershed management approaches, pollution prevention requires an understanding of the impacts on water quality at a watershed level. Aquatic ecosystems in urban landscapes represent some of the most impacted components of a disturbed system in Georgia (Mikalsen 1993). Development of the River Rendezvous allowed Athens community members an opportunity to assess such impacts through a visual determination of the North Oconee River's general health. Visual monitoring provided an opportunity for large numbers of people to participate and learn more about the conditions of their local waters.

### Planning

A steering committee was formed to direct the project, which included: a chairperson and volunteer, location, and site selection coordinators. Initial members of the steering committee represented the community and not local government or state agencies. This ensured that the community would feel empowered to take what is often considered an agency job, water quality management, into local control. After all, Athens is a progressive city with an active and motivated community.

Several groups were identified as primary resources for this project: the Athens Land Trust, Oconee River Land Trust, Greenway Commission, Federation of Neighborhood Associations, and Georgia Center for Law in the Public Interest. Each group was asked to contribute a member to the steering committee. Other members of the steering committee included recognized community leaders in the environment, members of several university departments, and professionals who could offer assistance regarding watershed management and monitoring. The group then identified local partners who would participate through specific activities or local adopt-a-stream programs.

### Survey Locations

The survey area was limited to the North Oconee watershed within Clarke County. A number of criteria were considered in the initial selection of approximately 50 sites including: land-use, 303 (d) listed waters, tributaries and their confluences with the North Oconee, areas under high development pressure, and conservation areas, with an attempt to balance rural and urban areas. However, accessibility was the ultimate determinate in site selection. The visual survey was adapted from Adopt-A-Stream data sheets. Participants were asked to describe weather conditions, water appearance, odor, presence of algae, and to categorize the land use within one quarter mile of the stream. Then participants ranked the stream from 1 to 7 (poor to excellent) in the following categories: vegetated banks, bank erosion, stream bed siltation, stream bed substrate, presence of trash, land use within sight, human modification within the stream, and water odor. Space was provided for additional observations on presence of wildlife, evidence of pollution, and the predominant form of trash. Participants were also provided a legend to draw a map of the site. Finally, a water sample was collected and returned for the measurement of turbidity and specific conductance. The mainstem North Oconee was also divided into segments and surveyed by canoe.

### Results/Data Analysis

Sampling sites were divided into five categories based upon land use: natural, recreational, residential, commercial/industrial, and agricultural. Samples were also grouped to determine the effects of location relative to GA highway 10 bypass loop that encircles Athens (north of, south of, and within). A general linear model procedure (LSD) in SAS was first used to test for differences between mean values of turbidity, conductance, and visual ranking totals in the different land use and location categories.

No significant differences were found between the mean values of any of the three responses at different locations relative to loop 10 (data not shown). Marginally significant differences ($\propto$=0.1) were found between land use categories in both conductivity and turbidity (Table 1). However, no significant differences were determined in total visual score. Conductivity was the highest in the commercial/industrial category ($p$=0.0945). Turbidity was slightly higher in the agricultural category than any other category ($p$=0.0824). The agricultural category is represented by only two sites, therefore additional sampling of sites in this category would be necessary to draw conclusions.

**Table 1. Mean Values (±standard errors) Collected at the River Rendezvous for Conductivity, Turbidity, and Total Visual Scores for Five Different Land Use Categories.**

| Land Use Class | Conductivity (S) | Turbidity (NTU) | Total Visual |
|---|---|---|---|
| Natural | 79.5±12.0 | 10.9±1.8 | 38±2 |
| Recreational | 136.0±47.4 | 11.3±2.9 | 31±4 |
| Residential | 139.2±79.6 | 17.1±8.8 | 35±4 |
| Commercial/ Industrial | 330.0±118.5 | 13.0±3.7 | 32±4 |
| Agricultural | 46.0±1.0 | 50.9±41.8 | 28±3 |

**Survey Discussion**

The statistical evaluation summarized the results and attempt to determine if negative qualities or trends (low summed visual values, high turbidity or conductance) were associated with a particular land use or longitudinal flow through an urban area (10 loop designations). No significant differences were determined among land use groupings based upon the sum of the visual survey, their ultimate purpose was realized in the involvement of community members in the visual identification of problems associated with streams. This knowledge and experience will be used to prioritize objectives and direction in future projects.

Runoff from urban areas carries many pollutants including: heavy metals, oil, grease, other petroleum products, nutrients, pesticides, organics, bacteria, high temperature. Some of these pollutants would likely contribute to an elevation in specific conductance (dissolved ionic materials), whereas sedimentation in urban areas is more isolated and associated with poor construction, development, or agricultural practices. Runoff from rural areas is likely dominated by sediment, nitrogen, phosphorus, and animal waste. Land disturbing practices combined with poor erosion control can particularly elevate sedimentation rates into rivers and streams, thereby elevating turbidity.

Wang and Yin (1997) identified several trends in spatial relationship between land use and conductivity. Conductivity measures are closely related to percentage of urban land use, but not related to agricultural land use. There is a cumulative downstream increase in conductivity with urban land use. These conclusions are supported by elevated specific conductance measures in commercial and industrial developed areas of the North Oconee watershed, particularly Carr's Branch tributary (Conductivity=583 and 605 S). Additionally, specific conductance increases, although not significantly, as it flows through longitudinally through Clarke county (71-106 NTU).

## RECOMMENDATIONS FOR FUTURE MONITORING PROJECTS

The use of probability-based sampling designs (Rathbun 1998) would add strength to the data by eliminating bias and increasing reproducibility of results; however, this project employed judgment sampling like that used for the current project has been widely used by state and federal agencies. Two possible probability-based designs are outlined below. Other variations of these designs might prove to be more appropriate as the objectives of the Athens Community Watershed Project evolve.

Regardless of sampling design, a digitized map of the watershed area would be required. The first option begins with the first-order streams and progresses with increasing stream-order through the entire area of interest. Each individual stream would be placed in an end-to-end fashion, noting each stream as a segment on the line. After completion, all rivers and streams of interest would consist of a single 'line'. At this time, the total number of sites desired to be sampled would be selected at random along the line. In cases where accessibility is a problem, the closest accessible point to the sample site would be appropriate. Many statistical tools could then be employed to monitor such things as total and mean levels of contaminants along the length of the river and proportions of the river length exhibiting certain conditions (i.e. erosion or various land uses). All of these calculations along with corresponding estimates of variability are easy to perform and interpret.

The second option, a stratified random sample, could be manipulated to address the primary objectives of the watershed project. The rivers and streams would first be divided according to their similarities, such as land use categories or stream order. For example, different segments of the stream known to be of a certain land use category could be elongated and placed end-to-end as described above. For the previous study, five different strata and, therefore, five different 'lines' would then be sampled as described for the simple random sampling design. The number of sites sampled from each of the 'lines' could be determined as a proportion of the total length of each stratum. However, if certain strata are deemed to be of more importance than others are, investigators could place more emphasis on those strata by distributing sampling sites unequally. All of the same statistical tools cited for simple random sampling design are available for the stratified random sampling design. In addition, each of the calculations can be applied to a single stratum rather than the river as a whole.

## FOLLOW-UP SURVEYS

Participant surveys were mailed out after the River Rendezvous to assess the best methods for advertising future activities, areas of interest for community education, what the

community liked best about the River Rendezvous; participation in future events, and the ease and confidence of data acquisition which, ultimately reflects on data quality. Of 80 surveys mailed out, 28 were returned in time for analysis and inclusion in this report. This information will be used to improve the communication, effectiveness, direction, and clarity of future programs developed by the CWP.

Survey results revealed that participants learned of the River Rendezvous primarily through word of mouth, the University of Georgia, and fliers. Advertising in newspapers and through nonprofit organizations also had a substantial affect on drawing participants and should continue to be used in Rendezvous activities.

Activities that brought participants the most enjoyment included making a personal contribution toward resolving local environmental problems and actively participating in stream data collection. Watershed issues that participants would particularly like to learn more about include land use planning, habitat conservation, environmental regulations, pollution, and water quality/sewage effluents. Participants agreed that morning training sessions were sufficient to provide enough information for conducting stream surveys. Participants also agreed that locating sites and collecting data were easy to do.

Finally, 96% of the survey participants indicated that they would be interested in participating in future monitoring projects. Ninety-three percent of the participants indicated that they would be interested in being trained to conduct chemical and biological analysis for future monitoring projects. These results illustrate that the community is enthusiastic and committed to protecting water quality in the Oconee watershed.

## CONCLUSION

The CWP is a local initiative developed to encourage involvement by allowing the community at large to determine the value of its water resources. The pilot project of the Athens CWP, the River Rendezvous, illustrated a community interest in water quality issues. A community meeting will be organized to present results of the Rendezvous and allow community members to participate in setting goals. Collaboration is a process involving the cooperation of individuals and organizations with a common interest that leads to action and results. In this spirit, members of the CWP encourage the participation and involvement of all stakeholders in maintaining our water resources. The benefits of a community approach to watershed protection are best summarized in comments received from River Rendezvous participants:

> ". . . more than anything, the event gave me a reason to be personally concerned about the pollution of the river, thanks." and "I think this is an absolutely wonderful project and one that I believe strongly in, getting as many people as possible from the community is the key to success in any venture. "


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