

COMMUNITY-BASED WATERSHED PLANNING IN THE KINGSTON LAKE WATERSHED OF NORTHEASTERN SOUTH CAROLINA: ACTIVITIES DURING 2008-2010

Susan Libes¹ and Dave Fuss²

AUTHORS: ¹Director, Waccamaw Watershed Academy, Burroughs & Chapin Center for Marine and Wetland Studies, Coastal Carolina University, P.O. Box 261954, Conway, South Carolina 29528-6054

²Watershed Planner and Stormwater Manager, Horry County Stormwater Management, P.O. Box 1236, Conway, SC 29528

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Abstract. A community-based effort at watershed management is being conducted in the Kingston Lake Watershed (HUC 0304020608) to address water quality impairments arising from nonpoint source pollution. These include low dissolved oxygen, high fecal coliform concentrations and elevated turbidity. This drainage basin is located in the Waccamaw River Subbasin in northeastern South Carolina and lies within the NPDES Phase II stormwater permit coverage areas of Horry County and the City of Conway. Coastal Carolina University's Waccamaw Watershed Academy has taken the lead in directing watershed planning and implementation efforts.

In the past two years, the following activities have been undertaken or completed: (1) production of a final draft of the watershed management plan based on feedback from stakeholders, (2) implementation of several stormwater retrofits, including restoration of floodplains within Crabtree Swamp, (3) a post project mail-in survey from 2400 stakeholders and a control group located in a reference watershed, (4) a storm drain marking program, (4) a River Friendly business certification program, (5) outreach to other community groups to foster watershed-planning within other regions of the Waccamaw River Subbasin, (6) development of a county-wide conservation subdivision ordinance, and (7) the hire of a watershed planner by one of the major partners, Horry County. The latter suggests that the watershed-based approach to natural resource management will be used on an enduring basis within Horry County.

INTRODUCTION AND BACKGROUND

The Waccamaw Subbasin has been targeted for watershed planning due to the rapid pace of development in this biologically unique and relatively pristine blackwater river system. The Subbasin lies within the Pee Dee Basin and falls within the jurisdiction of four coastal

counties, Horry and Georgetown in South Carolina and Columbus and Brunswick Counties in North Carolina. This Subbasin contains the Waccamaw River, which flows entirely within the coastal plain and empties into the Atlantic Ocean at Winyah Bay. It is comprised of twelve HUC 10 watersheds.

According to the U.S. Fish and Wildlife Service, 44% of Horry County is covered by wetlands with another 2% in open water (Tiner et al., 2002). Most of these wetlands are lowland swamps that border the Waccamaw and Pee Dee Rivers. This county has experienced a 36.5% increase in population between 1990 and 2000 with another 71% increase projected for 2000-2025 (Horry County, 2007).

The only city on the river, Conway, is located in the Kingston Lake Watershed (KLW), which lies within Horry County (Figure 1). KLW is comprised of 83,448 acres with 184 stream miles and has a population of about 23,000 (US Census, 2000). It has been delineated by the USGS into three HUC12 subwatersheds that drain into Kingston Lake. The latter discharges into the river.

Watershed planning in the Waccamaw Subbasin has been initiated in KLW (HUC 03040206-08) as it contains the only urban center on the River (Conway), has high projected population growth rates, and has well documented chronic water quality impairments. For example, several sites in KLW are on the state's 303(d) list due to contraventions of fecal coliform and dissolved oxygen water quality standards (SC DHEC, 2008). Downstream, the adjacent river is listed for mercury impairments in fish. Based on work conducted by the lead author from 1999 to 2002 as part of a USEPA 319 project, problems with turbidity and nutrients have also been documented (Libes and Bennett, 2004). Water quality problems were observed during both dry and wet weather flows. Another major concern is litter in the waterways.

At the conclusion of the US EPA 319 project, Coastal Carolina University's Waccamaw Watershed Academy (WWA) hosted a community workshop to gauge interest

in addressing these and similar problems throughout the Waccamaw Subbasin using the USEPA's watershed approach (USEPA, 2008). This workshop, entitled "Coastal Development and Watershed Planning: Collaborative Problem Solving to Protect Water Resources", was held in November 2003 and attended by approximately 100 stakeholders (<http://www.coastal.edu/wwa/watersheds/index.html>).

The stakeholders at the workshop identified watershed planning as a top priority. The WWA took the lead in directing watershed planning efforts, which were initiated with funding from the USEPA under a four-year Wetland Program Development grant (WPDG) awarded in 2005. Major partners in this grant-funded effort included: the City of Conway, Horry County, the Waccamaw Riverkeeper (Winyah Rivers Foundation), SC Department of Health and Environmental Control's Bureau of Water and Office of Ocean & Coastal Resource Management, the Waccamaw Regional Council of Governments, US Fish and Wildlife Service's Coastal Program, Earthworks Group (a locally based environmental engineering company), the Natural Resources Conservation Service, the Winyah Bay Focus Area Task Force, the SC Sea Grant Consortium, the North Inlet-Winyah Bay National Estuarine Research Reserve's Coastal Training Program, the Center for Watershed Protection (CWP), and the South Carolina Water Resources Institute.



Figure 1. The Kingston Lake Watershed

GOALS AND OBJECTIVES

The goal of the Wetland Program Development project was to generate a holistic, partnership-based watershed plan for K LW with special emphasis on its urban subwatershed (HUC12 0304020608-03). This plan was to be crafted as a model that could be adapted for use in the other watersheds of the Waccamaw Subbasin.

This plan was developed following USEPA (2008) guidance that promotes an iterative, collaborative, stakeholder-based approach. The goals and objectives of the K LW plan, which is currently in draft form, are summarized in Table 1.

Table 1. Kingston Lake Watershed Plan

Mission: Ensure that healthy waterways and abundant natural resources enhance community character, growth and vitality

Goals and Objectives

- A. Protect the scenic and recreational value of streams and wetlands and their riparian areas
- B. Conduct education and outreach to increase public awareness of water quality issues
- C. Improve the regulatory, policy, and educational tools available to revitalize the watershed
 - a. Explicitly acknowledge the link between land use and water quality
 - b. Effectively control stormwater pollution
 - c. Implement low impact development techniques
 - d. Conserve the essential functions of flood reduction, groundwater recharge, and pollution filtering of wetlands
 - e. Ensure that flood-prone areas and floodways are maintained in a state where their essential natural functions can be performed
 - f. Reduce vulnerability to pollution such as trash, bacteria and sediment
- D. Protect wildlife and aquatic habitat, particularly along the land-water interface
- E. Coordinate among stakeholders within the watershed to achieve common goals
- F. Assess watershed status and condition as it relates to the implementation of watershed management recommendations

A key management strategy is local government adoption of the K LW management plan as a supplement or appendix to existing plans, such as Horry County's Parks and Open Space Plan, or as a guide to assist in updates of existing ordinances, regulations, and other plans. Along these lines, the Horry County Parks and Open Space

Board has endorsed the draft K LW plan. Horry County's Stormwater Advisory Board and the City of Conway's Water Quality and Drainage Commission have both formally committed to a full endorsement of the final watershed plan when it is presented in 2010.

METHODS

Stakeholder engagement

The watershed planning effort for K LW has emphasized partnerships because stakeholder engagement was recognized as critical to the successful development and implementation of a watershed plan. The two most common modes of engaging stakeholders are to either attract stakeholders to a new process or use stakeholders' existing processes as the platform for engagement. The former option boasts the advantage of focusing exclusively on watershed issues, but is burdened by the difficulty of drawing stakeholders to an additional commitment in their busy routines. The latter option capitalizes upon stakeholders' relevant interests within their existing routines; the major drawback being the challenge of focusing stakeholders on issues of importance to an entire watershed. Regardless of which option is chosen, the overarching goal is to elicit dialogue with stakeholders about their underlying values and key issues within the watershed.

To stimulate maximum stakeholder participation, partnerships in K LW were built using a combination of both options. This was partly accomplished by plugging into existing processes, such as updates to comprehensive plans, providing technical advice during board and committee meetings, delivering presentations at civic club meetings, and assisting with revisions to local ordinances.

In an effort to assess the general public's level of understanding, awareness, and concern about water-related issues, a survey was administered at the outset of the project to 1200 people living in K LW and 1200 in another watershed selected as a control group. Conducted by Dr. C. Podeschi at Coastal Carolina University in 2005, the survey contained questions about water quality and watershed health to gauge concerns, perceptions of problems and causes, values placed on environmental health, personal practices, and willingness to change public policy and personal actions. A follow-up survey was administered in 2009 to assess changes in the public's understanding and awareness about water-related issues following completion of the watershed planning project and other educational outreach efforts.

Elements of the K LW Management Plan

The K LW management plan has been drafted as a comprehensive document that includes, in addition to the mission statement, the goals and objectives as listed in

Table 1, (1) a watershed characterization, (2) a list and discussion of key management strategies, (3) an implementation timeline, and (4) proposed funding sources. The planning document concludes with a summary of implementation activities performed to date, as many had been undertaken while plan development was still underway.

Watershed Characterization. The watershed characterization is a summary of a lengthy baseline assessment report that was assembled from all extant natural resource and land-use information. Additional data collection was performed by a group of stakeholders under the guidance of the CWP using their Unified Subwatershed and Site Reconnaissance (USSR) and Unified Stream Assessment (USA) protocols that rely on stream walks and other visually based approaches (Wright et al., 2004; Kitchell and Schuler, 2004). A major finding was that in the urban subwatershed, the pervasive system of drainage ditches has increased the natural linear stream miles by a factor of 7. An example is Crabtree Canal, which was created in the mid 1960s by the US Army Corps of Engineers by cutting a channel longitudinally through Crabtree Swamp. In response, restoration of the channelized floodplain has been initiated with funding from the US Fish and Wildlife Service.

Key Management Strategies. In addition to formal adoption of the K LW plan by the local governments, the stakeholders identified the following key management strategies: (1) Continue to have the WWA provide technical assistance to local governments (e.g., environmental planning, monitoring, research and technical information), (2) Continue education and outreach efforts (this was the most commonly requested strategy), (3) Continue building partnerships, with emphasis on improved intergovernmental and volunteer group coordination, (4) Facilitate stormwater retrofits, (5) Continue and expand water monitoring efforts to track changes (degradation or improvement), so as to assess results of implementation activities and better inform future planning efforts, (6) Communicate with individual stakeholders to determine their concerns and interests – this also requires developing and advertising new communication mechanisms, (7) Review, revise, and strengthen ordinances, policies, and plans, (8) Restore floodplain function in Crabtree Swamp by addressing man-made hydrologic changes, (9) Ensure that water quality improvement measures are integrated into NPDES Phase II stormwater management plan activities, (10) Increase traditional recreational opportunities along waterways, (11) Encourage green certifications and pollution reduction programs, and (12) Coordinate recreation/greenway planning with stormwater retrofits and stream restoration.

MAJOR IMPLEMENTATION ACTIVITIES

The demand for implementation of watershed management was immediate. Opportunities were capitalized upon to upgrade city and county stormwater ordinances, and open space and comprehensive plans. Two water quality monitoring programs were established, one conducted by volunteers under the aegis of the Waccamaw Riverkeeper™ and the WWA (<http://www.coastal.edu/wwa/vm>) and the other (http://bcmw.coastal.edu/river_gauge/) by the WWA's Environmental Quality Lab to augment data collected at seven USGS gaging stations. Funding is being provided by Horry and Georgetown Counties and Conway.

Over the past two years, the following implementation activities have been undertaken or completed: (1) development of a list of proposed stormwater retrofit projects with preliminary design and cost estimates, (2) initiation of several of these retrofits including a stream restoration effort on Crabtree Canal, (3) a stormdrain marking program, (4) a River Friendly business certification program in Conway, (6) outreach to foster watershed-planning in other regions of the Waccamaw Subbasin, (7) development of a county-wide conservation subdivision ordinance, (8) input to updates of other ordinances and plans, and (9) hire of a watershed planner by Horry County. The latter suggests that the watershed-based approach to natural resource management will be used on an enduring basis within Horry County.

LESSONS LEARNED

One of the goals of the USEPA WPDG project was to build local capacity for improved watershed management. Some of the lessons we learned as we accomplished this goal are: (1) As advised by the Center for Watershed Protection, target your watershed management efforts at the HUC 12 scale or smaller. (2) Plan to stray from the somewhat linear developmental process laid out in the USEPA's *Handbook for Watershed Planning* (USEPA, 2008). For example, you might not need to develop a watershed advisory board. Rather, consider embedding in existing groups. (3) Engage with the community by giving lots of outreach talks at meetings of existing organizations. Web pages are also critical, but brochures and newsletters less so. GIS mapping is also an effective communication tool, especially when used in a hands-on workshop setting. (4) It is very important to find a way to communicate clearly and succinctly with your audience about what is important in your watershed, i.e., to articulate what the stakeholders value and want to protect. CWP calls this process "finding the story of your watershed." This is best done by carefully listening to what the stakeholders have to say. (5) Don't wait for the

watershed plan to be formally completed to begin implementation – in particular get involved in any and all related governmental planning efforts. (6) You don't need a TMDL or 303(d) listings to engage in watershed planning, but it is important to know what regulatory drivers are applicable. (7) Hands-on activities are game changers. Get folks out into the field so they can experience their watershed. (8) Network with every state and federal natural resource agency that operates in your watershed. (9) Get a Riverkeeper. (10) Don't reinvent the wheel – use existing resources such as those from USEPA and the CWP. But in the end, guidance doesn't tell you how and what to do, as watershed planning is an adaptive and iterative process, so anticipate for uncertainty. (11) You don't need a large staff, but you do need at least two people with laser focus to keep the ball rolling. Sometimes it rolls slowly, so be prepared for some slow or even backsliding times. (12) It takes a long time to build community capacity – so budget a couple of years for the entire process. It took us about 5 years.

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LITERATURE CITED

- Tiner, R.W., H. C. Bergquist, G. P. DeAlessio, and M. J. Starr. 2002. Geographically Isolated Wetlands: A Preliminary Assessment of their Characteristics and Status in Selected Areas of the United States. US FWS, Horry County, 2007. Envision 2025: Comprehensive Plan.
- Kitchell, A. and T. Schueler, 2004. Unified Stream Assessment: A User's Manual, Center for Watershed Protection, 102 pp.
- Libes, S. M. and J. Bennett. 2004. Section 319 Nonpoint Source Pollution Control Program Project Final Report FY 99-03: Identification and Mitigation of Non-Point Sources of Fecal Coliform Bacteria and Low Dissolved Oxygen in Kingston Lake and Crabtree Canal. 119 pp.
- Wright, T., C. Swann, K. Capiella, and T. Schueler, 2004. Unified Subwatershed and Site Reconnaissance: A User's Manual, Center for Watershed Protection, 74 pp.
- USEPA, 2008. Handbook for Developing Watershed Plans to Restore and Protect our Waters, EPA 841-B-08-002.