Bluffton, SC – Continuous Monitoring & Stormwater Sampling by a Municipality: A Case Study in Data Management

Kim Jones, Town of Bluffton
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The purpose of this paper is to present the history of water quality monitoring within the May River watershed and how it has led to multitudes of data, but the lack of useful information regarding statistically significant changes within the watershed as a case study for other municipalities in data management.
Introduction

• Increasing coastal population growth
• Increasing need for water quality monitoring to protect the environment, associated economics and quality of life
• Increasing number of communities approach the MS4 designation
• Data Management is paramount to all monitoring programs succeeding
Background

- Located in SE corner of the state
- Since incorporation in 1825, Bluffton was one (1) square mile until 1998 when annexation began; today Bluffton is 53-56 mile $^2$
- Population growth has increased from 500 people in 1998 to estimates of over 12,000 today
- Enough homes have been platted for a population of 60,000
May River:

- The river nearly bisects the town
- It has been designated as an Outstanding Resource Waters (ORW) by DHEC
- It is home to the longest continually operating oyster shucking business in South Carolina and has never experienced a closure of shellfish beds
- Public outcry for protection of the river in the face of looming development
Background

• Water Quality Studies on the May River initiated by the Town of Bluffton:
  – A Baseline Assessment of Environmental and Biological Conditions in the May River, Beaufort County, South Carolina (Van Dolah, Sanger, Filipowicz, eds., 2004)
  – Town of Bluffton May River Monitoring Program: Stormwater Sampling Study (BP Barber, 2007)
  – Town of Bluffton May River Watershed Monitoring Program (BP Barber, 2008)
Background

• **Additional data sources for the May River include:**
  – DHEC ambient and shellfish stations
  – Beaufort County ambient monitoring as recommended in the Stormwater Master Plan (Thomas & Hutton, 2006)
  – Private sector monitoring – Palmetto Bluff
  – Comparative data exist in SCECAP (Van Dolah, et.al., 2006) and other studies

• **Currently, the Town is in a data rich, but information poor situation**
Experimental Design for Decision Making

- Two goals the Town needs to achieve are:
  1) To determine if there are statistically significant trends in water quality data for the May River
  2) To determine where and how the most effective monitoring can be conducted in future studies
Experimental Design for Decision Making

• After considering its options the Town chose to form a Technical Advisory Committee comprised of:
  – Experts within the fields of water quality monitoring, statistical analysis, and ecological modeling from NOAA, SC DNR, USGS and the University of South Carolina
  – Representatives from state agencies, the private sector and concerned citizens
Experimental Design for Decision Making

- The TAC has been charged with:
  1) Providing an objective scientific review of the Town’s monitoring program
  2) Statistically analyzing the data from the Town’s current project and additional data sources (DHEC, Beaufort County and Palmetto Bluff data) including how they relate to previously collected data from the Baseline Report and Stormwater Study
  3) Directing future needs for monitoring within the May River watershed
Experimental Design for Decision Making

• **Methodology developed by the TAC includes:**
  1) Compiling existing data sources (properly QA/QC prior)
  2) Statistically analyzing the data using a repeated measures ANOVA
  3) Developing a predictive spatial analysis model relating upland land use (development) change to water quality

• **Questions to be answered utilizing the methodology:**
  1) If significant changes in the condition of the May River have occurred since the Baseline study of 2002
  2) If there is evidence that stormwater runoff is affecting the May River and how it compares to other drainage basins
  3) What monitoring efforts are most valuable and feasible to continue in the future
Experimental Design for Decision Making

• This approach will meet the Town’s goals by providing:
  1) The necessary information on current water quality relative to the Baseline study, which will direct future monitoring
  2) “Action levels” will be determined when statistically significant changes are detected for parameters that have no Federal/State standards, i.e. stormwater runoff
  3) When an actionable level has been obtained, the TAC can provide guidance on developing an “action plan”
Methods

• Partnerships established:
  – Data contribution: DHEC-EQC, Beaufort County & Palmetto Bluff
  – Funding: DHEC-OCRM has provided a $15,000 matching grant to the Town to which Palmetto Bluff is contributing to conduct data compilation into an excel format and perform statistical analyses using a repeated measures ANOVA
Conclusions

• In Spring 2009, the Town expects to know:
  1) If significant water quality changes have occurred within the May River watershed
  2) If stormwater runoff carries pollutants at actionable levels
  3) How to direct future monitoring to clarify any issues and develop plans to attend to these issues

• The Town expects the TAC to recommend:
  1) Changes in the monitoring program
  2) Microbial source tracking of fecal “hot spots”

• The Town anticipates having a cohesive metadata framework into which current data from disparate sources can be entered for future analyses
Discussion & Recommendations

• Data Management steps to include prior to beginning a monitoring project:
  – Identifying data sources available including other jurisdictions, state and federal agencies and the private sector
  – Evaluating data available to determine if they may be useful in the proposed project
  – Establish partnerships aimed at data sharing and possibly cost-sharing for data collection and/or analysis

• Benefits:
  – Avoiding duplication of efforts
  – Economical benefit of cost-sharing of data collection and analysis

• A municipality should establish connections with experts in the field of water quality. This relationship is invaluable as most municipalities do not have the expertise on staff to adequately manage and analyze data of this magnitude. If the Town had not been able to forge these partnerships, it is worrisome to contemplate the alternatives.

• If these partnerships cannot be created then a municipality must incorporate the cost of data management into its project proposal.
Discussion & Recommendations

• While certainly each project has its own design constraints, it would be helpful for municipalities if a more formalized process/framework for data management was created and disseminated.

• Municipalities are trying to make sound policy decisions based upon the best science at hand, but yet there is a disconnect between science and policy-making that must be breached as we move forward in the field of water quality monitoring by municipalities.
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