

A 6,000 Stormwater Pond Task: Meeting the Needs of Diverse Audiences for Stormwater Pond Management Outreach in the Berkeley, Charleston and Dorchester Communities

C. Guinn Garrett¹, Kimberly A. Counts², Blaik P. Keppler³, April Turner⁴

AUTHORS: ^{1,2}Water Resources Extension Agent, Clemson University Cooperative Extension Service, 259 Meeting Street, Charleston, SC 29470, USA. ³Coastal Training Program Coordinator, ACE Basin National Estuarine Research Reserve, South Carolina Department of Natural Resources, 217 Fort Johnson Road, Charleston, SC 29422, USA.

⁴Coastal Communities Specialist, South Carolina Sea Grant Consortium, 287 Meeting Street, Charleston, SC 29401, USA.

REFERENCE: *Proceedings of the 2014 South Carolina Water Resources Conference*, held October 15-16, 2014 at the Columbia Metropolitan Convention Center.

ABSTRACT. Stormwater ponds are one of the most highly used flood management and water quality control practices in South Carolina, with an estimated 6,000 ponds in Berkeley, Charleston and Dorchester (BCD) counties alone. Poorly managed ponds can play a role in water resource degradation that threatens ecological and human health. State, county and local governments require regular maintenance of these ponds systems to ensure proper function and performance. In addition, input from BCD-area municipal and county level stormwater managers indicates a need for outreach that encourages proper pond maintenance for improved pond function and downstream waterway protection.

To assist meeting both regulatory and community needs, Carolina Clear and the Ashley Cooper Stormwater Education Consortium (ACSEC) partnered with the South Carolina ACE Basin National Estuarine Research Reserve Coastal Training Program and the South Carolina Sea Grant Consortium to host the biannual Charleston Area Stormwater Pond Management Conference in March 2012 and May 2014. The objectives of the conference were: 1) to increase awareness of the purpose of stormwater ponds and need for regular maintenance for function; 2) to provide participants the information needed to overcome common challenges in pond management; and 3) to integrate communities with service providers to assist in inspection and management actions. Management content was provided by local and regional researchers and experts in the field of pond management. Target audiences included community associations, property and pond management companies, and county and municipal employees. To accommodate these diverse audiences, the conference format included concurrent sessions as well as plenary lectures and vendor exhibition areas.

A comparison between the 2012 and 2014 conferences offered a tool to evaluate the effectiveness of this

outreach method in encouraging stakeholder awareness and implementation of stormwater pond best management practices. Feedback from the 2012 conference indicated that a majority of residents benefited from knowledge learned and would implement many of the recommended management practices into their pond maintenance protocol. Lessons learned and evaluation feedback from 2012 were used in formatting the 2014 conference offering, resulting in adjustments in conference promotion, plenary and session content, format and pricing. The Charleston Area Stormwater Pond Management Conferences offers a national model of outreach for communities tasked with providing impactful stormwater pond content-area knowledge to residential, commercial and government target groups. Lessons learned and priorities in content identified from the 2012 and 2014 conferences will be used to help shape the future direction of stormwater outreach for water resource protection in the South Carolina.

INTRODUCTION

Stormwater ponds are one of the most highly used engineering practices to provide for water quantity and quality control in coastal South Carolina. Almost 6,000 stormwater ponds exist in the Berkeley, Charleston and Dorchester counties alone, with estimates over 20,000 across the eight South Carolina coastal counties (Rollins, 2013; Sanger et al., 2010). These ponds provide for flood management, pollution mitigation and other amenities to communities.

Stormwater pond systems can play a significant role in watershed function and, if poorly managed, may impact the health of the pond and services provided, adjacent land values and profitability, and potentially, downstream water quality. There is a recognized link between poorly

managed stormwater pond systems and degraded water quality in downstream waterbodies. In the Charleston region, Lewitus et al. recorded 200 harmful algal blooms in brackish stormwater ponds along the South Carolina coastline that may have impacted receiving ecosystems; many of these blooms were attributed to excess nutrients in stormwater runoff (2008). These results raise questions as to what ecologic and human health impacts may result if downstream waterways are impaired by mismanaged pond systems.

In addition to the need to encourage better management of pond systems for human and ecologic health and integrity, there is a regulatory impetus to manage as well. South Carolina stormwater regulation mandates that local communities establish and enforce an inspection and maintenance program for best management practices, like stormwater ponds (SCDHEC, 2012).

To help address this need for pond management information for both residents and local governments, the Clemson University Cooperative Extension Service (CUCES) has used multiple modes of outreach to communicate and disseminate information to pond owners, managers and commercial audiences. Methods utilized have included workshops, site visits and consultations, fact sheets, mass-media and electronic and online services, including a stormwater pond management website; the website has experienced over 40,000 unique page views since its inception in October 2011.

In the Berkeley, Charleston and Dorchester communities, a community and education provider partnership was formulated with the CUCES's Carolina Clear program to address local water quality and stormwater management concerns. This partnership, the Ashley Cooper Stormwater Education Consortium (ACSEC), implements a region-wide stormwater outreach strategy to protect water quality through implementation of diverse education and involvement opportunities for residents. In its 2012 Strategic Plan, the ACSEC identified barriers to proper pond management in the Charleston Tri-County, highlighting a lack of pond owner(s) awareness and knowledge of pond maintenance responsibilities (Joyner and Counts, 2012).

The implementation of creative, high impact methods of outreach were considered essential in meeting needs for stormwater pond management education to: increase owner responsibility and awareness; provide tools for assisting communities and management companies in meeting the needs of regulatory agencies; protect homes and investment from flooding; and, for downstream waterway protection. In 2012, a one-day conference was piloted as a new initiative and model to address the identified need for pond management information. Evaluation of multiple aspects of conference delivery

will assist in guiding future local and statewide outreach efforts.

CONFERENCE AND EVALUATION FORMAT

Through a partnership between CUCES and the Carolina Clear Program, the South Carolina Department of Natural Resources (SCDNR)'s ACE Basin National Estuarine Research Reserve's Coastal Training Program (ACE Basin NERR CTP), the South Carolina Sea Grant Consortium and the ACSEC, the Charleston Area Stormwater Pond Management Conference was hosted on March 22, 2012 and May 22, 2014. The objectives of the conference were:

- 1) To increase awareness of the purpose of stormwater ponds and need for regular maintenance for function;
- 2) To provide participants the information needed to overcome common challenges in pond management; and
- 3) To integrate communities with service providers to assist in inspection and management actions.

Target audiences included community associations and other pond owners, property and pond management companies (commercial business) and county and municipal (local government) employees.

Both conferences were a one-day event that included plenary discussions and concurrent technical sessions lead by experts in the pond and water quality research and management fields. The selected format was intended to provide opportunities to target a range of informational needs for the diverse target audiences. Conference topics discussed included stormwater pond inspection and maintenance, nutrient dynamics in pond systems, water quality trends in Charleston SC tidal creek ecosystems, case studies, nuisance wildlife management, aeration, shoreline stabilization, dredging, applicable regulation, aquatic weed management and more. Speaker discussion varied between the two conferences, with feedback from the 2012 conference incorporated into topic discussion during the 2014 conference. The 2012 conference included a panel forum providing for open dialogue between participants and experts; the 2014 conference included a field tour to discuss stormwater pond inspection and maintenance.

Marketing and promotion of the conferences included social media, website, newspaper, direct mailings to pond owners, radio, email and word of mouth. Price of registration differed between the two conference offerings; the 2014 conference registration priced higher than 2012 to be consistent with costs associated with other multiple subject CUCES programs. Participants from the 2012 and 2014 conference were asked to participate in a written evaluation of the program that

allowed review of conference format, content, location, length, application and obstacles to adopting suggested best management practices. Evaluations format included closed and open-ended questions. Evaluations were similar in questions with some exceptions; the 2014 conference evaluation did not include a 2012 question that gauged obstacles to recommended practice adoption. The 2014 conference evaluation also included an additional question that evaluated effective course marketing and promotion. All responses received from conferences were evaluated in summation and individually to show differences between the 2012 and 2014 offerings and provide guidance toward future efforts.

RESULTS

There were 202 and 147 registered participants for the 2012 and 2014 conference, respectively. As shown in Table 1, the approximate percentage of attendees considered pond owners and commercial business representatives remained relatively similar between the 2012 and 2014 conference. Approximate percentage of attendees considered local government, or classified as municipal and county employees, increased from 21% to 27% between 2012 and 2014.

Table 1. Approximate percentages of registered participant affiliation at 2012 and 2014 conferences. Other types of affiliations were considered non-target and not shown here.

	2012	2014
Pond Owner	22%	19%
Commercial Business	17%	18%
Local Government	21%	27%

Of the approximately 40%, or 136, of 2012 and 2014 participants who took part some or all of the conference evaluations, approximately 98% of all conference participants indicated that they considered the conference as a good use of time, with high overall participant satisfaction in conference format, content, length and level of detail. Additionally, 79% of total conference participants agreed that their knowledge of ponds and pond management increased, and 95% of total participants indicated they anticipated applying information learned to future management work. The 2012 conference evaluation also helped partners recognize obstacles to implementation of recommended strategies (Figure 1). Anticipated cost, time constraints and barriers in communication with governing residential boards were most commonly listed barriers.

When evaluating conference topics and/or experiences that were considered most useful, responses noted in both 2012 and 2014 included shoreline management (erosion control), sediment contamination and dredging and aeration topics, as well as the opportunity to network with pond management vendors. During the 2014 conference, more session discussion was devoted to inspection and maintenance as compared to 2012, including a plenary discussion and field tour, and participant feedback indicated that this was highly useful.

The 2014 participant feedback revealed future pond management outreach programming needs. Notably, the most commonly listed need was a request for more in-depth information on stormwater inspection and maintenance, a primary concern of local government employees tasked with post-construction pond inspection and maintenance (Figure 2). Other topics in shoreline management, design and construction of stormwater ponds and residential upland best management practices were also more commonly identified.

To evaluate tools used in marketing and promotion of the conference and its registration, 2014 conference evaluation gauged how participants had learned or been made aware of the conference offering. Participant feedback indicated that most were aware of the conference and registration through email and direct contact communications (Figure 3). Other methods of marketing included radio, direct mail, website and newspaper, though responses indicated awareness from these marketing methods was substantially lower. Only 7% of respondents were made aware of the conference through a direct mailer sent to all Tri-County pond owners. This has implications on future communications for these and other pond management and stormwater programming initiatives.

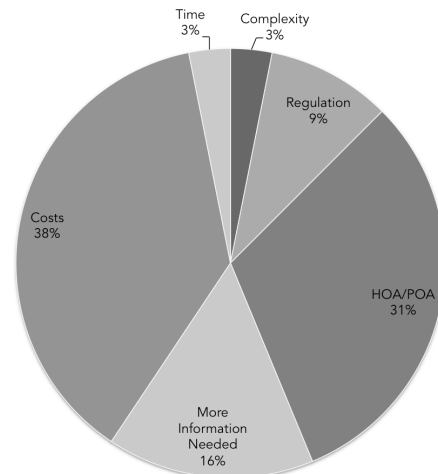


Figure 1. As part of the 2012 conference evaluation, participant indicated obstacles to suggested pond management practice adoption. Responses collected from

open-ended question represents 32 participants.

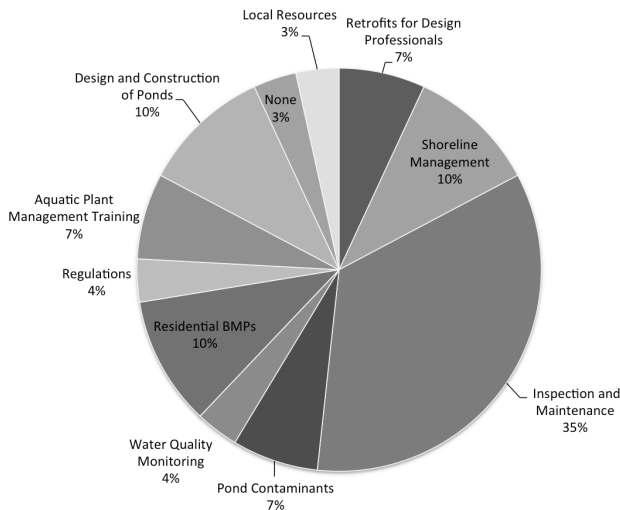


Figure 2. Feedback from the 2014 conference revealed that participants sought future program offerings in a variety of topics, most commonly inspection and maintenance, design and construction of ponds, and shoreline management. There were 29 responses to the open-ended evaluation question.

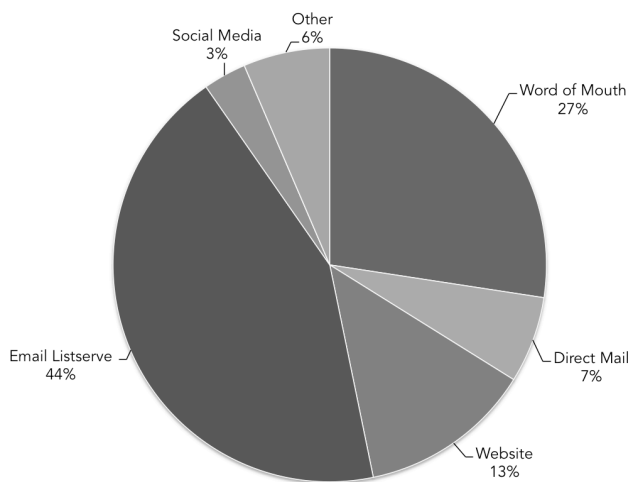


Figure 3. The 2014 conference evaluation included a question to gauge program marketing and promotion and participants were asked to indicate how they were made aware of the conference. There were 62 responses collected from this closed-ended question.

DISCUSSION AND CONCLUSIONS

The model used in the 2012 and 2014 Charleston Area Stormwater Pond Management Conferences provided for pond management instruction and lecture outside of the

small workshop and classroom setting. Impact numbers, measured as participant attendance, were higher than received for traditional one-on-one dialogue outreach. Additionally, the conference was hosted in a format to meet diverse needs of pond owner, commercial business and local government audiences; lecture topics, networking opportunities and the method of delivery were an engaging platform to effectively communicate with participants and encourage behavior change.

Evaluation results also suggested that future outreach for high-impact stormwater pond management content should consider an electronic-based format for ease of use and pond owner attendance. Pond owner attendance at each conference was lower when each were compared individually with a weekend sister conference hosted in 2012 in Myrtle Beach SC; there, approximately 75% of almost 250 participants were identified as residential pond owners (Powell et al., 2012). The participant differences noted between the Charleston and Myrtle Beach conferences may have been a result of conference scheduling and coordination, as professional obligations could have conflicted with the Charleston conference weekday offering. Future offerings should consider alternative methods of delivery to appeal to this pond owner community.

The analysis of promotion and marketing modes also revealed that a majority of participants received information on the conference through electronic communication. Electronic means of communication may be a highly impactful tool for future outreach, whether for promotion of programs or for allowing target audiences the ability to engage in materials in a self-paced and self-scheduled setting.

Evaluations and participant numbers for both conferences, paired with feedback from other CUCES program and ACSEC partner initiatives, show a community demand for future similar trainings, as well as additional tools that provide in-depth information on multiple aspects of stormwater pond management. Data received from evaluations reflect outreach needs and content gaps to target. Future efforts in outreach should include a focus on reducing perceived barriers to implementation by providing for cost planning, time management strategies in maintenance, resources for communicating with neighborhood governing bodies and more.

As stormwater ponds and associated management tool needs become increasingly prevalent in coastal communities, the Charleston Area Stormwater Pond Management Conference offers a model of outreach for communities tasked with providing impactful stormwater pond content to pond owner, commercial business and local government target groups. Lessons learned and priorities in content identified from the 2012 and 2014 conferences will be used to help shape the direction of

stormwater outreach for water resource protection in South Carolina. Future education and research-targeted initiatives through CUCES, SCDNR, the ACE Basin NERR CTP and South Carolina Sea Grant Consortium will each strive to meet these needs and community demand.

REFERENCES

- Sanger, D.M., J.E. Weinstein, K.D. Crawford. 2010. Sediment Contamination in Stormwater Detention Ponds. *Stormwater Magazine* July/August 2010: p 14-23.
- Lewitus, A.J., L.M. Brock, M.K. Burke, K.E. DeMattio, S.B. Wilde. 2008. Lagoonal stormwater detention ponds as promoters of harmful algal blooms and eutrophication along the South Carolina coast. *Harmful Algae* 8:60-65.
- Joyner, D. and K. Counts, 2012. Ashley Cooper Stormwater Education Consortium, Stormwater Outreach Strategic Plan 2012-2017. Charleston, SC.
- Powell, B., K. Counts, K. Giacalone, B. Keppler, L. Wood. 2012. "Impacts of the 2012 Stormwater Pond Conferences and the South Carolina Stormwater Pond Management Website." *Proceedings of the 2012 South Carolina Water Resources Conference, October 10-11. Columbia, SC.*
- Rollins, S. 2013. Stormwater Pond Maintenance Outreach in the South Carolina Tri-County. College of Charleston's Masters of Environmental Studies Program Internship Report. Charleston, SC.
- South Carolina Department of Health and Environmental Control. 2012. State of South Carolina NPDES General Permit for Storm Water Discharges from Regulated Small Municipal Separate Storm Water Systems.