



Beyond site-specific best management practices for water conservation

A statewide best management practices plan benefits all water users.



Over the short and long term, the availability of water for irrigation will have a greater impact on the golf course industry than any other environmental or business issue. The entire golf industry must be aware of the best water management options at the golf course and regulatory levels, and it must be engaged in formulating acceptable plans at these levels. If the golf industry does not formulate, adopt and promote sound water management plans, then others will formulate plans and the industry will be forced to accept the results. In this article, we provide an overview of the water management plan options that are used by government entities.

State and site-specific BMPs

A successful plan is essential for any environmental issue, including water-use efficiency and conservation. Two types of management philosophies (or plans) have evolved for addressing complex problems:

- A rigid regulation approach that is neither business-friendly nor environmentally sound
- A best management practices (BMPs) approach based on principles that have evolved over 30 years from the U.S. EPA's Clean Water Act BMPs program for water-quality protection (2,12)

A good starting point for understanding the characteristics and implications of these two divergent environmental management plan options is the article by Carrow and Duncan (2) in a recent special report on turf and landscape water issues published by the Council for Agricultural Science and Technology.

The BMPs approach is friendly to both business and the environment. *Golf Course Management* and GCSAA's education department have presented information packages related to site-specific (that is, for an individual golf course) BMPs for water-use efficiency and conservation in printed, seminar and online formats (Table 1). As noted in each of the BMPs materials in Table 1, the primary emphasis is on "site-specific BMPs." A site-specific BMPs plan for water conservation includes practices and strategies that a superintendent and club management would use on the specific site, the golf course.

The broad strategies of site-specific BMPs are summarized in Table 2. Obviously, adoption and implementation of the water-use efficiency and conservation strategies listed in this table are essential first steps. Similarly, other water users (industrial, agricultural, business, etc.) should adopt specific BMPs for their facilities or sites.

The BMPs principle for water-use efficiency and conservation also can be applied at the state, water district or community level. Community-level plans usually apply to a large metropolitan area, such as San Antonio (9). In fact, site-specific BMPs are most effective when they are within a wider BMPs-based water management plan. (For the purposes of this article, we will call the state, water district or community BMPs "state BMPs" for water-use efficiency and conservation. In the remainder of this article, we focus on state BMPs.)

State BMPs

State BMPs have three important components. First, state BMPs define the water manage-

R.N. Carrow, Ph.D.
C. Waltz, Ph.D.
M. Esoda, CGCS



ment region and the regulatory authority for that region. It is not unusual for a state to invest over-all water management authority in a department of natural resources, but the department of natural resources may allow regulation at the level of a water district or a community/metropolitan area. The water district is normally a major watershed area, and it is often best to allow latitude in management at this level because one watershed may receive rain, while another may not.

Second, a state BMPs plan contains the regulations for water management at all area levels down to the specific site. Regulations (that is, the state BMPs) would detail the various water-conservation and water-efficiency measures within the water district (Table 3).

Third, state BMPs encourage or mandate all water users to operate on BMPs principles. All types of large irrigated sites, such as golf courses, athletic fields, sod production fields and institutional grounds, would each be expected to have site-specific BMPs (Table 2).

If the golf industry is going to affect the nature of state- and district-level water management plans, or if it is going to change a current water plan to one based on BMPs, three essential activities must occur:

- All segments of the golf industry must become involved.
- They must formulate a water-management plan based on BMPs concepts at both the site-specific and state levels.
- They must proactively present this water-management plan to state political and regulatory groups.

We will address key issues to consider in formulating state BMPs plans.

A case study: Georgia

Over the past several years, water-related concerns have led Georgia's golf industry to engage in the three essential activities outlined above. Extreme drought in the latter half of 2007 has increased the intensity of the industry's efforts.

In 2004, the Georgia Golf Course Superintendents Association brought comprehensive site-specific BMPs for golf courses to the department of natural resources. The department's acceptance of the plan was contingent on adoption of BMPs plans by 75% of GGCSA member golf courses. By mid-2007, more than 90% of GGCSA member courses had adopted the BMPs. Even though golf courses use less than 1% of the state water resources and most water applied to golf courses comes from on-site stormwater collection, the

golf industry is the only water user in the state to have BMPs, let alone to have most of its members practicing this approach.

In early 2008, the Georgia state legislature is expected to enact a comprehensive statewide water-management plan. As with other states, the comprehensive plan will include all water users, including users of landscape water, indoor residential or domestic, industrial, commercial, institutional and agricultural water (13). The nature of the final form of this plan at the state or water district level is critical. If the water conservation plans at the state, water district and community levels are based on a BMPs model, then site-specific BMPs become an integral and important component. However, if a more-rigid regulations approach is used, then the site-specific BMPs plan is essentially overridden and one-size-fits-all regulations dominate.

GCSAA information on BMPs

Golf Course Management articles
• Characteristics and benefits of the BMPs environmental management approach versus a rigid regulation approach (4).
• Strategies (components) of a site-specific BMPs plan for water conservation on golf courses (5).
• Case studies of BMPs for water conservation from two states (8).
GCSAA Education Resources
• "Developing BMPs for golf course water conservation: Approaches and resources," half-day seminar offered at the 2008 GCSAA Education Conference
• Template and guidelines for developing a BMPs-based water-use efficient and conservation plan on a golf course. This step-wise template is used in the GCSAA seminar noted above (3)
• W.A.T.E.R. for efficient water management, online course by C. Waltz, R.N. Carrow and R.R. Duncan

Numbers in parentheses refer to references in the literature cited section of the article.

Table 1. GCSAA information sources related to site-specific BMPs for water-use efficiency and conservation.

Key strategies

1 Initial planning and site assessment for a water-conservation program
2 Alternative irrigation water sources
3 Irrigation system: design, installation and maintenance
4 Irrigation scheduling for water conservation: tools and approaches
5 Selection of turfgrass
6 Golf course design for water conservation
7 Additional management practices for water conservation
8 Clubhouse, maintenance facility and general grounds water-conservation strategies
9 Benefits and costs of regulations for all stakeholders
10 Education: internal and outreach
11 Monitoring and modifying the BMPs plan

Table 2. Components or key strategies in a site-specific BMPs program (3).



In the current draft of the state water plan for Georgia, the site-specific BMPs approach is being used in two areas. First, the state has added the site-specific BMPs plan to the checklist of conditions to be fulfilled when applying for a new golf course water permit. Second, site-specific BMPs will continue to be used to develop the water conservation program for all golf courses.

To build on this foundation, the Georgia Allied Golf Council was formed with leadership from the GGCSA. The GAGC, which includes the allied state associations of club managers, club owners, golfers and golf course pros, is actively working to foster a statewide BMPs approach as the best water management plan for the state (Table 3). The GAGC's approach will be similar to that used by the GGCSA in 2004, which resulted in acceptance of site-specific BMPs. Namely, the GAGC will formulate and bring to the state political and regulatory entities a BMPs-based water-use efficiency and conservation plan encompassing the



On Sept. 28, 2007, the director of the Georgia Environmental Protection Division declared a level-four drought response across the northern third of Georgia, prohibiting most types of outdoor residential water use. An irrigation pond at Atlanta CC is pictured. Photos by M. Esoda

components of the state plan that would affect the golf industry.

Although it is important to present information about the size, extent and economic importance of the golf industry to the political and regulatory groups, the industry must not lose sight of the real issue: What will be the final water management plan? Thus, proactively developing and then presenting a science-based BMPs plan aids in focusing on certain key issues.

Key issues of state BMPs

Triggering a water-restriction level

One area of confusion when discussing a BMPs approach versus a rigid regulation approach is that regulations or rules are necessary within BMPs, especially during a water shortage. One difference is the manner of moving from one water-restriction level to another. In a BMPs approach, triggers inform water users that a change from one level to the next is coming. Usually, there are one or two triggers for each level. For example, key lake, reservoir, stream or water-table levels are used within a water district. Each trigger is published in the media, and all water users have an opportunity to adjust. By contrast, with rigid regulations, users may learn from the morning newspaper that they are moving from a lower level to a much more restrictive level, perhaps two or more levels beyond the current one. Community-based decisions too often are made without consideration of real triggers, resulting in unduly harsh impacts on water users.

Water-use restrictions at each level

A key characteristic of BMPs is allowing water reductions to occur in a systematic and known manner as a crisis intensifies from one level to

Common state BMPs

1 Identify water conservation goals.
2 Develop water-use profiles for water users and for forecasting for future needs.
3 Identify and evaluate all water conservation measures.
4 Considering items 1-3, develop a community or water-district BMPs plan that includes well-defined, logical water-restriction levels with stated triggers to move from one level to another. Usually, 1-2 well-publicized triggers are used. Both water-restriction levels and the requirements for triggers should be consistent with state and water-district BMPs.
5 Infrastructure improvements. Public system water audits, leak detection and repair. Public water-delivery systems are often the source of major water loss in many urban areas. Water audits, leak detection and repairs should be part of the site-specific BMPs for golf courses and other water users.
6 Indoor water-conservation measures should include all public buildings and facilities.
7 Conservation pricing with water costs rising above the normal use level for a user that is operating under site-specific BMPs.
8 Stakeholder cost and benefits. Evaluation of the effects of voluntary and regulated water conservation measures on community jobs, the economy and the environment. This evaluation should occur when selecting initial conservation practices and when considering how fairly and uniformly different businesses are treated, especially in times of water crisis.
9 Encourage alternative irrigation water sources, especially for large landscape areas such as golf courses.
10 Consider potential for water-conservation incentives such as rebates for conservation devices, systems and measures.
11 Develop an ongoing public information and education program based on a positive attitude that fosters voluntary actions by individuals to achieve water conservation. Conservation plans and programs are long-term, and their nature influences community attitudes and actions.
12 Develop school-based educational programs that foster understanding of BMPs.
13 Foster development of site-specific BMPs for all industrial, commercial, institutional, agricultural and irrigation landscape water users (Table 2) (3,5). All public-owned sites that are irrigated should be models for development and use of site-specific BMPs.
14 Develop a monitoring and reporting program that entails all water users. Monitoring requirements should focus on only essential information to avoid becoming a burden for water users. Overall water-use efficiency and conservation are most important, not monitoring every component within a site-specific BMPs plan. Public facilities should not be exempt from monitoring and reporting.

Table 3. An outline of common state BMPs for an urban water conservation plan (adapted from 1,9,10,11,12,13).



Workers repair a groundwater well at Atlanta CC.

another. For golf courses, this ordinarily means reducing irrigation on most areas, but maintaining greens even when the highest restriction level is in effect unless that level closes down the major water users on a long-term basis.

Thus, the golf industry, like any other business, should provide the political and regulatory entities with reasonable means of reducing water use at each restriction level. Once agreed upon, these practices should not be changed at the local level (see next section). Without such plans, all users are often required to reduce water consumption by a certain percentage, which penalizes users that follow site-specific BMPs and already are highly efficient in their water use compared to facilities that do not follow BMPs.

Where is the real decision-making level?

State plans determine which level of government will define specific regulations or control procedures. Usually, the watershed or water district defines the regulations because water conditions often vary from one watershed to another. Another approach allows communities to develop water-conservation plans. For large metro areas such as San Antonio, it is reasonable to define regulations at the community level, but only when the management approach conforms to the state-wide philosophy. Measures to prevent local entities from imposing regulations without the study and the trigger mechanisms inherent in good state BMPs should be included in a state BMPs plan.

A statewide water plan based on the BMPs approach (science-based; holistic; considers impact on businesses, jobs, the economy and the environment) ordinarily develops over time with a process that includes input from all water users; incorporates the best science; maintains a fair approach to all water users; does not single out industries that are more visible or frequent targets; protects jobs and the economy; considers potential

adverse environmental effects; and is formulated with considerable input, time and discussion.

By contrast, if a state plan allows a district or community to impose different restrictions without following the BMPs process and without considering the points essential for a state BMPs plan, then the effective plan becomes merely a series of arbitrary plans (community by community). Thus, a state plan can be negated if the local water authorities are allowed to operate without proper constraints.

Costs and benefits for all stakeholders

An important consideration in developing a water management plan is its effect on all stakeholders, including its impact on the economy of the community and on the environment. Key regulatory leaders, such as the U.S. EPA, include in their guidelines for BMPs (for water quality and conservation) (2,5) and Environmental Management Systems (6,7) stakeholder considerations, such as effects on jobs, the economy and the envi-

Drought map



The level-four drought response in Georgia includes all of metropolitan Atlanta, Rome, Athens and Columbus.



To reduce water usage but keep the greens alive, a probe is used to locate small dry spots, which are then watered using a watering can.

ronment. To illustrate, stakeholder considerations would entail evaluation of how a regulation for one environmental issue may induce another environmental problem. For example, removing stable turfgrass ground cover could result in soil erosion and sediment movement into surface waters.

If state BMPs do not limit the ability of districts or communities to ignore negative effects on all stakeholders, the whole economy may be adversely affected because the affected businesses cannot depend on a stable business ethic in the state or community. The logical outcome of the philosophy of targeting specific industries would be to identify industries with the highest water use and prevent their activity during a water crisis. Applying this form of water management in Atlanta would close some high-profile businesses not related to the green industry.

Site-specific BMPs

Under a state BMPs plan, each industrial, agricultural, commercial, institutional, domestic indoor and outdoor general landscape area and each large irrigated landscape (golf courses, sod farms, sports facilities, or any similar sites) would have site-specific BMPs for operating during non-drought and drought periods. The site-specific BMPs strategies would be similar for all irrigated landscape areas, but the specifics would vary to fit each situation. Therefore, it is important for each segment of the turf industry to develop its own site-specific BMPs template as the golf industry has done.

Site-specific BMPs are not meaningful if a true BMPs approach is not fostered at the state, water district and community levels. Instead,

BMPs become another means of fostering regulations targeted at an industry. To state this differently, there cannot be two water conservation approaches that are in direct opposition as to foundational principles — one science-based and logical, and the other driven by political activists.

Monitoring

A state BMPs plan normally would include monitoring at the site-specific level to track success. This is reasonable when the focus is on overall water use and water-use efficiency. However, when the monitoring and reporting escalates to reporting on all or many of the individual strategies, then monitoring becomes cost-prohibitive. The individual aspects of the plan are not important, but the overall success is. By its nature, a site-specific BMPs plan allows each site to make decisions on how best to achieve its overall goals rather than forcing it to follow a cookie-cutter approach. Unnecessary reporting is sometimes a means to impose more-rigid regulations under the guise of a BMPs program.

Conclusions

The examples presented illustrate how and why golf course groups should move beyond implementing site-specific BMPs and take a leadership role within each state to foster a BMPs-based approach at the level of the state, water district and municipality. Some states have moved in this direction, but, as with any plan, positive input from specific water users can foster water conservation plans that also support water, soil, economic, job and environmental sustainability (1,10,11). In our 2008 GCSAA seminar (Developing BMPs for golf course water conservation: Approaches and management), we will address state BMPs along with site-specific BMPs and irrigation practices. Because we will all be part of a state water management plan, it is important to proactively influence the state plan so that it is truly based on BMPs at all levels. Only in this manner will environmental and economic sustainability be fostered.

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The No. 10 hole at Atlanta CC reflects the drought conditions that have plagued Georgia in 2007.



The research says

- Besides adopting site-specific water conservation plans based on BMPs, members of the golf industry should unite to present a BMPs-based plan to regulatory bodies at the state level.
- State BMPs define the water management region and the regulatory authority for that region; contain regulations for water management at all levels down to the specific site; and encourage or mandate all water users to operate on BMPs principles.
- To avoid rigid regulations, a series of triggers and water-restriction levels must be developed so that water users know the restriction levels and the triggers that will cause restrictions to increase from one level to the next.
- With a state BMPs-based plan, water districts and metropolitan areas must exercise their authority over water conservation issues within the boundaries set by the state BMPs.
- A BMPs-based plan considers the impact of water restrictions on all stakeholders.
- In Georgia, the golf industry has worked successfully with the state department of natural resources to achieve site-specific BMPs plans for water conservation on golf courses, and both groups are working toward state BMPs.

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R.N. Carrow (rcarrow@uga.edu) is a professor and C. Waltz is an associate professor in the department of crop and soil sciences at the University of Georgia, Griffin Campus; M. Esoda is CGCS at Atlanta (Ga.) Country Club.