

# STRATEGIES FOR WATER CONSERVATION – GOLF INDUSTRY

## e-NEWSLETTER 1

November 12, 2007

**Purpose:** This email-newsletter is the first in a series of newsletters that will address effective planning strategies for water-use efficiency and conservation for golf courses using Best Management Practices (BMPs) as the environmental management model. The goal is to provide the Georgia Allied Golf Council (GAGC) resource information relative to planning activities for water-use efficiency and conservation.

**Approach:** The approach we will use is:

- Provide information on what are the key *state level issues (state-BMPs)* and means to resolve these issues that the GAGC and its member associations should focus on as they formulate plans of action.
  - Provide information on *site-specific BMPs* – i.e., BMPs for water-use efficiency and conservation on an individual golf course. The Georgia Golf Course Superintendents Association (GGCSA) has taken leadership among water users in Georgia in fostering the BMPs approach so in this area we will point out available resources and concentrate more on the state-BMPs aspects.
  - Answer specific questions of concern from the GAGA relative to water issues.
  - Newsletters will be posted on the UGA Turf Team website ([www.GeorgiaTurf.com](http://www.GeorgiaTurf.com)) for reference and use by the turf industry.
  - A similar Newsletter will be developed for the remainder of the Green Industry through the Urban Agriculture Council with focus on their unique needs.
- 

### ARTICLE 1.

This article is based on a paper submitted to the Golf Course Management magazine of the Golf Course Superintendents Association of America for their December 2007 issue. The primary focus of this article is on understanding the difference between state-BMPs and site-specific BMPs.

### **Moving Beyond Site-Specific BMPs for Water Conservation**

R.N. Carrow, C. Waltz, and M. Esoda

#### **Two Levels of BMPs for Water Conservation**

Water availability for irrigation will impact the golf course industry more than any other environmental or business issue in the short and long term. It is essential that the whole golf industry be aware of the best water management options at the golf course and regulatory levels;

and be engaged in formulating acceptable plans at these levels. If the industry does not formulate, adopt, and promote sound water management plans at these levels, then others will do so and we must accept the results. In this article we provide an overview of the water management plan “options” that are used by various government entities.

A successful “**environmental management plan**” is essential for any environmental issue, including water-use efficiency and conservation. Two environmental management philosophies (plans) have evolved for addressing complex environmental problems, namely: a) a rigid regulation approach that is neither business friendly or environmentally sound; or b) a Best Management Practices (BMP) approach based on principles that evolved over 30 years from the US EPA’s Clean Waters Act BMPs program for protection water quality (Carrow and Duncan, 2007). The latter environmental management approach is business and environmentally friendly. *Golf Course Management* and the GCSAA Education Department have presented information packages related to **site-specific BMPs** (i.e., for an individual golf course) for water-use efficiency and conservation in printed, seminar, and on-line formats (Table 1). 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 (2007) in a recent Council for Agricultural and Technology special report on turf and landscape water issues.

As noted, the primary emphasis in each of the BMPs materials in Table 1 was on “site-specific BMPs plans”. Site-specific BMPs for water conservation includes practices and strategies that a golf course superintendent and club management would use on their golf course – i.e., specific site. 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 should be considered as an essential first step --- just as other water users (industrial, agricultural, businesses, etc.) should adopt specific BMPs for their facilities or sites. However, the BMPs principle for water-use efficiency and conservation can also be applied at the state, water district, or community level, with the community level plans normally being for a large metropolitan area, such as San Antonio, TX (Finch, 2007). 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 a “**State BMPs**” for water-use efficiency and conservation (Table 3). In the remainder of this article, we will focus on State BMPs.

**State BMPs have three important components.** *First*, State BMPs define the water management region and who is the regulatory authority for the “region”. It is not unusual for a state to invest overall water management authority in a Department of Natural Resources (DNR); but, the DNR may allow regulation at a water district or metropolitan wide level. The water district is normally a major water shed area and it is often best to allow latitude in management at this level, such as when one water shed receives rain, but not another. *Second*, State BMPs contain the regulations for water management at all area levels down to the specific site. Regulations would detail the various water conservation and water efficiency measures within the water district – i.e., the State BMPs plan (Table 3). *Third*, a State BMPs plan encourages or mandates all water users to operate on BMPs principles. For large irrigated sites, such as golf courses, athletic fields, sod production, and institutional grounds, each would be expected to have site-specific BMPs (Table 2).

For positive impact in shaping the nature of the state-wide (and districts within a state) water management plan either as it is developing or to change a current water plan into one more BMPs-based, three essential activities must happen: a) all aspects of the golf industry must *become involved*; b) they must *formulate a water management plan* based on BMPs concepts at both the site-specific and State BMPs levels, c) they must proactively *present this water management plan* to the state political and regulatory groups, and d) be willing to transcend golf and involve other green industries and non-plant related groups (e.g. mining, poultry processing, pulp and paper, etc.). Later in the article, key issues to consider in State BMPs will be addressed.

### **A Case Study – Georgia.**

Water-related concerns over the past several years in Georgia with appreciable increase in intensity in the latter part of 2007 due to extreme drought, have resulted in activity by the golf industry in each of these areas. In 2004, the Georgia Golf Course Superintendents Association brought forward to the DNR a comprehensive site-specific BMPs plan for golf courses, which was accepted by the DNR based on 75% of GGSSA member golf course adopting such plans (Waltz and Carrow, 2007). This was achieved earlier this year (i.e., > 90% adoption) and golf is the only water user to have BMPs, let alone to have most of their members practicing this approach even though golf courses use < 1 % of the state water resources with most from stormwater collected on-site.

However, in early 2008 it is expected that the state legislature will enact a Comprehensive State Wide Water Management Plan. As with other states, all water users will be included in the comprehensive plan and this would entail indoor residential or domestic, landscape water, industrial, commercial, institutional, and agricultural water users (Vickers, 2002). ***The nature of the final form of this plan at the state-wide level or a water district within a state 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. But, if a more rigid regulations approach is used, then the site-specific BMPs are essentially overridden and “one-size fits all” regulations dominate.***

In the current State Water Plan draft, the site-specific BMPs approach is being used in two areas. First, the State has added site-specific BMPs to the check list needed 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 (GAGC) was formed with leadership from the GGCSA and includes the allied state associations of club managers, club owners, golfers, and golf course pros. GAGC is actively working to foster a state-wide BMPs approach as the best water management plan for the state (Table 3). An approach similar to that used by the GGCSA in 2004 that resulted in acceptance of site-specific BMPs will be used; namely, to formulate and bring forth to the State political and regulatory entities a BMPs-based, water-use efficiency and conservation plan encompassing the components of the State plan that would impact the golf industry. ***While it is important to present to the political and regulatory groups information about the size, extent, and economic importance of the golf industry, the industry must not lose sight that the real issue is “what will be the final water management plan”. Thus, proactively developing and then presenting a***

*science-based BMPs plan aids in focusing the issue on certain key issues. Following are the most important key issues at the state-BMPs level and these are underlined in Table 3 for reference.*

### **Key Issues of State BMPs**

**Triggering Into 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 taken when moving from one water restriction level to another. In a BMPs approach, there are triggers that inform water users that a change from one level to the next is coming. Usually, there are 1 or 2 triggers for each level. For example, key lake, reservoirs, 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. The contrast is to read about going from one level to perhaps a restriction level a couple steps below in the morning newspaper. Community-based decisions are too often made without consideration to real triggers and this causes harsh impacts on water users.

**Nature of Water Use Restrictions at Each Restriction Level.** A key characteristic for BMPs is to allow water reductions to occur in a systematic and known manner as a crisis intensifies from one level to another. For golf courses, this would normally means reducing irrigation on areas, but maintaining greens even at the highest restriction level unless that level is so severe that it closes down on a long-term basis the major water users in a community. Thus, the golf industry, similar to any other business, should indicate to the political and regulatory entities what would be reasonable means of achieving water use efficiency at each restriction level. Once agreed upon, these practices should not be changed at the local level – see next section. Incremental reductions in water use should be predetermined and based on established triggers for each restriction level. The intent is to not penalize those operating under site-specific BMPs and have documented water-use efficiency. In contrast, arbitrary percent reductions in water use – outside of a State BMPs approach – can penalize the water managers that have exhibited water use stewardship.

**Where is the Real Decision-Making Level?** One aspect of a state plan is to determine at which level the comprehensive plan will actually operate in terms of defining the specific regulations or control procedures. Usually, this is at the watershed or water district level, since water conditions often vary from one watershed to another. Another version is to allow communities to develop water conservation plans. For large metro areas such as San Antonio, TX, the community level is reasonable. But water management districts (WMD), like found in Florida, are the most common BMPs type regulatory model.

A state-wide water plan based on the BMP approach (science based, holistic, considers affects on businesses, jobs, economic impact, potential adverse environmental impacts) normally develops overtime with a process including: input from all water users; incorporates the best science; maintains a fair approach to all water users; does not allow certain industries to be singled out simply because they are more visible or ones that environmental activists often target; protects the jobs and economy; considers potential adverse environmental effects; and is formulated with considerable input, time, and discussion. However, if the state plan allows a

district or community to easily impose different restrictions without consideration of the same points essential for a State BMPs plan, the effective plan becomes a series of arbitrary plans (community by community) often imposed by local politicians without the expertise or prolonged thought and input process that make a BMPs the best approach to water conservation as well as all environmental issues. Thus, a state plan can be negated if the water district or community based authorities are allowed to operate without proper constraints. As noted, water management for a large metro area may be reasonable, but only when the management approach is in conformity to the state-wide philosophy. Measures to prevent local entities from imposing regulations without the study and trigger mechanisms inherent in good State BMPs should be included in a State BMPs --- this is a problem for other environmental issues as well as well, such as protection of water quality.

**Cost and Benefit Considerations for All Stakeholders.** An important component of environmental management plans should be the influence of decisions on all stakeholders, including community impact of imposing regulations or restrictions on jobs, economy, and adverse environmental effects. Golf courses are businesses just as other community businesses that provide jobs, purchase goods and services, and provide goods and services. Not all people play golf or appreciate it, but not all people appreciate other businesses either – e.g. paper mills, assembly plants, soft drink bottlers, etc. The point is that key regulatory leaders, such as the US EPA, have as part of their guidelines for BMPs (for water quality and conservation; Carrow et al; 2005b; Carrow and Duncan, 2007) and Environmental Management Systems (EMS) (Carrow and Fletcher, 2007a, 2007b) stakeholder considerations that require attention to effects on jobs, economy, and other environmental impacts. To illustrate, stakeholder considerations would entail evaluation of how a regulation for one environmental issue may induce another environmental problem --- example, removal of stable turfgrass ground cover could result in soil erosion and sediment movement into surface waters. If a state BMPs plan does not limit the ability of districts or communities to ignore negative effects to all stakeholders, the whole economy eventually is adversely affected since these businesses cannot depend on a stable business ethic in the state or community. The logical outcome of the philosophy to target specific industries would be to identify industries with the highest water use and prevent their activity during a water crisis. Application of this means of water management in Atlanta would close some high profile businesses not related to the green industry.

**Site-Specific BMPs Plans.** Each industrial, agriculture, commercial, institutional, domestic indoor and outdoor, general landscape areas, and large irrigated landscapes (golf courses, sod farms, sports facilities, or any similar sites) would have site-specific BMPs to operate under during non-drought and drought periods under a State BMPs. The general 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 turf industry segment to develop their own site-specific BMPs templates such as has been done for golf. However, site-specific BMPs are really not meaningful if a true BMPs approach is not fostered at the state, water district, and community levels. Instead, they become another means of fostering regulations toward an industry. Or, to state this differently, there cannot be two water conservation approaches that are in direct opposition as to foundational principles – one based on scientific findings and intellect and the other driven by activists and emotion.

**Monitoring.** A State BMPs 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. It is not the individual aspects that is important but the overall success – i.e., the nature of site-specific BMPs is for each site to make decisions on how best to achieve the overall goal rather than 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 State BMPs-based approach at state, water district, and urban levels. Some states have moved in this direction, but as with any plan, positive input from specific water users can foster even more sustainable (water, soil, economic, job, and environmental sustainability) water conservation plans (CUWCC, 2007; GreenCO, 2004; TWBD, 2004). In our 2008 GCSAA Seminar (Developing BMPs for Golf Course Water Conservation: Approaches and Management) we will be addressing State BMPs and the key issues along with site-specific BMPs and irrigation practices. We will all be part of a State Water Management Plan, but more important is to proactively influence the state plan so that it is truly BMPs-based at all levels. Only in this manner will environmental and economic sustainability be fostered.

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

---

Golf Course Management Articles

- Characteristics and benefits of the BMPs environmental management approach versus a rigid regulation approach (Carrow et al., 2005a).
- Strategies (components) of a site-specific BMPs plan for water conservation on golf courses (Carrow et al., 2005b).
- Case studies of BMPs for water conservation from two states (Carrow et al., 2005c).

GCSAA Educational Department

- “Developing BMPs for Golf Course Water Conservation: Approaches and Management” half day seminar – offered at the 2008 GCSAA Show.
- 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 (GeorgiaTurf, 2007).
- W.A.T.E.R. online class by C. Waltz, R.N. Carrow and R. R. Duncan.

Table 2. Components or key strategies in a **site-specific BMPs** program (GeorgriaTurf, 2007).

---

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 Guidance 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 3. This table contains an outline of common **State BMPs** for an urban water conservation plan. Adapted from CUWCC (2007); Finch (2007); CreenCO (2004); TWBD (2004); Vickers (2002); US EPA (1998);

---

1. Identify water conservation goals.
2. Develop water-use profiles for water users and forecasting for future needs.
3. Identify and evaluate all water conservation measures across all users.
4. With consideration of items 1-3, develop a community or water district BMPs plan including well-defined, logical water restriction levels with stated triggers to move from one level to another. Usually 1-2 triggers are used and these are well publicized. Both water restriction levels and the requirements for triggers should be consistent with state and water district BMPs practices.
5. Information source – i.e., identify the decision-making individual or office that can address question relative to water management regulations in the water district.
6. 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. For golf courses and other water users, water audits, leak detection, and repairs would be part of their site-specific BMPs.
7. Indoor water conservation measures, including all public buildings and facilities.
8. Conservation pricing with water costs rising above the normal use level for a user that is operating under site-specific BMPs.
9. Stakeholder cost and benefits. Evaluation of voluntary and regulated water conservation measures on all stakeholders – i.e., community jobs, economy, environmental. This evaluation should be not only when selecting initial conservation practices but also in terms of how fairly and uniformly different businesses are treated, especially in times of water crisis.
10. Encourage alternative irrigation water sources especially by large landscape areas such as golf courses.
11. Consider potential for water conservation incentives such as rebates for conservation devices, systems, and measures.
12. Develop an on-going public information and education program based on a positive attitude that fosters voluntary actions by individuals to achieve water conservation. Avoid making every citizen a “water cop”. Conservation plans and programs are long term and their nature influences the community attitudes and actions.

13. School based educational programs that foster understanding of BMPs.
14. Foster development of site-specific BMPs for all industrial, commercial, institutional, agricultural, and irrigation landscape water users. See Table 2 and Carrow et al. (2005b; 2007) for components or strategies within a site-specific BMPs plan. All public owned sites that are irrigated should be models for development and use of site-specific BMPs.
15. Develop a monitoring and reporting program that entails all water users. Monitoring requirements should focus on the essential information and not become burdensome for water users by requiring unnecessary information. Overall water-use efficiency and conservation are the important aspects and not monitoring every component within a site-specific BMPs plan. Public facilities should not be exempt from monitoring and reporting.

## References.

CUWCC (California Urban Water Conservation Council). 2007. Memorandum of Understanding Regarding Urban Water Conservation in California. Amended 2004. <[www.cuwcc.org](http://www.cuwcc.org)>

GeorgiaTurf. 2007. BMP's and Water-Use Efficiency/Conservation Plan for Golf Courses: Template and Guidelines. By R.N. Carrow, R.R. Duncan, and C. Waltz. [http://www.commodities.caes.uga.edu/turfgrass/georgiaturf/Water/Articles/BMPs\\_Water\\_Cons\\_07.pdf](http://www.commodities.caes.uga.edu/turfgrass/georgiaturf/Water/Articles/BMPs_Water_Cons_07.pdf)

Carrow, R.N. and R.R. Duncan. 2007. Best management practices for turfgrass water resources: Holistic-systems approach. In M. Kenna and J. B. Beard (eds). *Water Quality and Quantity Issues for Turfgrasses in Urban Landscapes*. CAST Special Publication. CAST, Ames, IA. In press. [www.cast-science.org](http://www.cast-science.org)

Carrow, R. N., R. R. Duncan, and D. Wienecke. 2005a. BMPs: Critical for the golf industry. *Golf Course Mgt* 73(6):81–86.

Carrow, R. N., R. R. Duncan, and D. Wienecke. 2005b. BMPs approach to water conservation on golf courses. *Golf Course Mgt* 73(7):73–76.

Carrow, R.N., D. Wienecke, M. Esoda, F. Siple, C. Waltz, and R.R. Duncan. 2005c. Two case studies: State BMPs for water conservation on golf courses.

Carrow, R. N. and K. A. Fletcher. 2007a. Environmental management systems (EMS) for golf courses. *Green Section Record*. 45(4): 23-27.

Carrow, R. N. and K. A. Fletcher. 2007b. The devil is in the details—EMS for golf courses. *Green Section Record* 45(5): 26-31.

Finch, C. 2006. San Antonio water conservation program addresses lawn grass. In M. Kenna and J. B. Beard (eds). *Water Quality and Quantity Issues for Turfgrasses in Urban Landscapes*. CAST Special Publication. CAST, Ames, IA. In press. [www.cast-science.org](http://www.cast-science.org)

GreenCO. 2004. *Green Industry Best Management Practices (BMPs) for the Conservation and Protection of Water Resources in Colorado*. Second Release. Wright Water Engineers, Inc. and GreenCO, Denver, CO. <[www.greenco.org](http://www.greenco.org)>

TWDB (Texas Water Development Board). 2004. *Water Conservation Best Management Practices Guide*. Report 362. Texas Water Development Board, Austin, TX. <http://www.twdb.state.tx.us/publications/reports/GroundWaterReports/GWReports/Individual%20Report%20htm%20files/Report%20362.htm>

US EPA (U.S. Environmental Protection Agency). 1998. *Water Conservation Plan Guideline*. EPA 832-D-98-001. U.S. EPA, Office of Water, Washington, D.C.

Vickers, A. 2002. Water Use and Conservation. Waterplow, Amherst, MA

Waltz, F.C Jr. and R.N. Carrow. 2007. Applied Turfgrass Water-use Efficiency / Conservation: Agronomic Practices and Building Cooperation between Industry Trade Associations and Regulatory Authorities. Acta Hort. accepted and *in press*.

**Newsletter Contacts:**

- Dr. Clint Waltz, State Extension Specialist in Turfgrass Water Management, Department of Crop and Soil Sciences, The University of Georgia, Griffin Campus.  
<http://www.cropsoil.uga.edu/people/faculty.php?id=waltz>
- Dr. Robert N. Carrow, Research Scientist in Water Conservation and Quality, Department of Crop and Soil Sciences, The University of Georgia, Griffin Campus.  
<http://www.cropsoil.uga.edu/people/faculty.php?id=carrow>