

STRATEGIES FOR WATER CONSERVATION – GREEN INDUSTRY

e-NEWSLETTER 1

November 16, 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 all components of the turfgrass and landscape industry in Georgia with the exception of golf courses using Best Management Practices (BMPs) as the environmental management model. The goal is to provide the Urban Agriculture Council resource information relative to planning activities for water-use efficiency and conservation.

Approach: The approach we will use is:

- Provide information on the key *state level issues (state-BMPs)* and means to resolve these issues that the UAC and its member associations should focus on as they formulate plans of action in the short and long term. .
- Provide information on *site-specific BMPs* – i.e., BMPs for water-use efficiency and conservation for individual and large landscapes such as sod farms, sports fields, and general grounds.
- Provide information on landscape regulations for water crisis periods that will maintain businesses and vital landscape functions.
- Answer specific questions of concern from the UAC relative to water issues.
- Newsletters will be posted on the UGA Turf Team website (www.GeorgiaTurf.com) for reference and use by the turf industry.
- A similar Newsletter will be developed for the golf course industry through the Georgia Allied Golf Council (GAGC) with focus on their unique needs.

Article 1. In the initial e-Newsletter, provides an overview of key issues for a State water-use efficiency and conservation plan that incorporates environmental and economic sustainability within the Green Industry. In e-Newsletters to follow various aspects will be expanded upon.

FORMUALATING A PLAN FOR WATER CONSERVATION BY THE GREEN INDUSTRY

Drs. Clint Waltz and R.N. Carrow

Henry Ford was right!!

- *“Coming together is a beginning. Keeping together is progress. Working together is success.”*
- *“If everyone is moving forward together, then success takes care of itself.”*

The First Step – Identify an Effective Water Conservation Plan.

Environmental stewardship requires that an effective environmental management plan (i.e., approach or model) exists, is recognized, and is implemented for each environmental issue of concern. If each component of the turfgrass industry (sod farms, athletic facilities, landscape areas, etc.) cannot define, articulate, and support an effective environmental management approach, then we cannot complain if

others do the task for us – even in a manner that we may not like. Or, to put it in other terms, *the critical first step in addressing any problem is to develop a plan that will truly address the issue of concern – i.e., the problem of water conservation and stewardship.*

When turfgrass industry leaders interact with state government officials, they may express various messages – i.e., their “talking points”. Talking points are often presented verbally as well as with written materials and should include at least three points:

- **Information on the nature of the industry** --- jobs; services; economic impact and importance; functional, recreational, and aesthetic roles of turfgrass and landscape plants in the environment. Surveys or documented materials related to these aspects are useful.
- **Commitment statement of the particular industry component to “environmental stewardship” and “sustainability”**. The environmental stewardship commitment may be in the form of an official mission statement. Sustainability should be presented as commitment to: a) sustainability of our natural resources including the particular issue of concern; and b) economic sustainability of the industry and state economy.
- **A proposed environmental management plan** (in this case for water conservation) that uses terminology accepted by regulatory and political groups; has proven to be highly effective; can be presented in a systematic manner; and contains the key issues important for the Green Industry.

The last talking point is often omitted in turfgrass industry contacts with regulatory and political groups i.e., an effective environmental plan is not proactively presented. When an effective plan is presented, this requires regulatory and political groups to reply or respond. Communication has much more impact when the turf industry can proactively bring forth an environmental management plan that is based on BMPs and their inherent characteristics – i.e., the premier approach for complex environmental issues. The Georgia Golf Course Superintendents Association did present a BMPs based plan to the Department of Natural Resources in 2005 (Waltz and Carrow, 2007) and their actions should be a model for the UAC.

When confronted with numerous and complex issues, can the turfgrass industry present a unified environmental management approach on this issue? We believe that the answer is yes. In this article, the **first purpose** is to propose an environmental management approach that is highly effective; understood and accepted by regulatory groups; and can function at three key levels. This environmental management plan that can be used for water-use efficiency and conservation is the **Best Management Practices (BMPs) approach**. The three key levels that BMPs function are:

- State-BMPs. This level represents the regulations that define water-use efficiency/conservation plans at the state, district, water shed, or large urban area levels (Table 1).
- BMPs for homeowners and general grounds (Table 1).
- Site-specific BMPs – for large irrigated landscape sites such as sod farms, sports fields, and general grounds which are managed by a professional turf manager (Table 2).

Before discussing each level of BMPs, it is useful to understand how BMPs evolved and why this approach is considered the “gold standard” for dealing with an individual environmental issues such as water conservation. By proactively adopting this strategy the turfgrass industry can provide leadership for all water users in the state of Georgia – since the BMPs approach is also the best approach for other water users. Thus, Green Industry leaders should be familiar with the history, characteristics, and terminology of the BMPs model.

BMPs History and Characteristics

BMPs History. Best management practices (BMPs) is an environmental management approach that focuses on a single environmental issue. The first federal initiative using the terms “best management practices” came 30 years ago in the 1977 amendment to the EPA Clean Water Act (CWA) (Rawson 1995; Gold 1999; US EPA 2005; Carrow and Duncan, 2007). The BMPs concept has been refined over 30 years to successfully protect surface and subsurface water quality from pesticides, nutrients, and sediments and has culminated in comprehensive regulations supporting BMPs within agriculture (US EPA 2003) and urban landscapes (US EPA 2005). The terminology of BMPs remained almost exclusively related to water quality up until recent years when the BMPs term and concept started to be applied to other environmental issues (Carrow and Duncan, 2007). Many other approaches or models can be found in the literature such as Integrated Pest or Plant Management (IPM; pesticides), Sustainable Agriculture (soil quality, water issues, air quality, etc.), and Precision Agriculture (efficient use of inputs). But, these are more limited in scope, while BMPs encompass all possible strategies to address an environmental issue.

Characteristics. BMPs have certain inherent, characteristics that account for their success in achieving environmental stewardship regardless of the specific environmental issue (ELC, 2005; Carrow and Duncan, 2007). These characteristics have made the BMPs approach highly successful for protection of water quality from pesticides, nutrients, and sediments with a long track record – i.e., the gold standard or premier means of dealing with this complex environmental problem. These same characteristics make it the best model for other individual environmental concerns. Understanding these characteristics is crucial to understanding how this tested and science-based approach can be adopted as a model for water conservation. The characteristics are as follows:

- *Science-based.* BMPs are science-based and continue to evolve as science advances. The very definition of BMPs illustrates why this approach is effective: a) “best” is used to imply the best combination of strategies that can be adopted on a site or for a particular situation with current technology and resources, b) “management” denotes that environmental problems must be managed, and that management decisions by trained personnel can maximize success, and c) “practices” implies that multiple strategies are necessary to make a positive difference. BMPs can be documented, and accountability can be monitored.
- *Holistic or whole-systems based.* BMPs recognize that no “silver-bullet,” or single practice, can achieve successful stewardship with regard to a specific environmental problem because we work within complex, dynamic ecosystems. In contrast, rigid regulations (or command and control approach) are based on limited strategies and a “one-size fits all” concept, ignoring the principal that successful environmental stewardship must consider interactions among ecosystem components (ELC, 2005). For a particular environmental issue, there will be a number of potential strategies or options that can be used to address the issue --- for example with water conservation, strategies may include using water efficient grasses, irrigation design for uniformity, irrigation scheduling to maximize water-use efficiency, use of alternative irrigation sources, and other practices. A basic principal of BMPs is to keep all strategies available and then to select the best combination for a specific site.
- *Holistic in considering all stakeholders and implications relative to potential environmental, jobs, and economic effects.* The holistic and multiple-stakeholder dimensions as components of the CWA are noted by: “Evolution of CWA programs over the last decade has also included something of a shift from a program-by-program, source-by-source, pollutant-by-pollutant approach to more holistic watershed-based strategies...Involvement of stakeholder groups in the development and implementation of strategies for achieving and maintaining state water quality and other environmental goals is another hallmark of this approach” (US EPA 2006). When the BMPs concept is applied to other environmental issues beyond water quality, the same

stakeholder principles are inherent in the BMPs – i.e., more reliance on stakeholder voluntary actions than on rigid regulations.

- *Educated site-specific choices and management.* Because no single factor will achieve maximum environmental benefits on a site, adjustments within the whole ecosystem are the basis of the BMPs model; thereby, educated decision-making is important. BMPs encourage professionalism and education of the turfgrass manager, including continuing education. Each site is different, and adjustments, therefore, must be site-specific and account for system changes over time. Also, regional differences in climate and soil will modify site-specific BMPs.
- *Fosters entrepreneurial development and implementation of new technology and concepts that will improve environmental stewardship.* BMPs encourage on-going integration of new technology, plants, concepts, and products to achieve the “best” practices.
- *BMPs allow on-going monitoring of progress.* BMPs require a number of adjustments in individual practices to achieve a high degree of environmental stewardship for a specific issue and these individual strategies within an overall BMP can often be monitored.
- *BMPs terminology is readily recognized within environmental and regulatory groups at all government levels.* One reason is because BMPs for protection of water quality are at multiple governmental levels, starting at the federal level with the CWA, but also at state, regional, watershed, urban, and site-specific levels (DEP, 2002; EIFG, 2006; US EPA, 2005). When the BMPs terms and concept are presented to these groups as applied to other environmental issues beyond water quality a common ground is established that consists of the various inherent characteristics of BMPs even though the actual BMPs strategies differ for each environmental issue.

Site-Specific BMPs and BMPs for Homelawns and General Grounds

The primary focus of this article is on State-BMPs, but the University of Georgia has considerable information on site-specific BMPs. Carrow et al. (2007) have published an extensive template for development of site-specific BMPs on golf courses that could easily be adapted to other large irrigated landscapes such as sod farms, athletic fields, and irrigated grounds (Table 2). Waltz et al. (2007) have developed BMPs documents for turfgrass, landscape, and general grounds. This publication can be accessed by visiting the UGA Turf Team website at www.GeorgiaTurf.com.

State-BMPs.

The BMPs principle for water-use efficiency and conservation can be applied at the state, water district, or community level, with the community level plans normally being for a large metropolitan area. An example of how BMPs have been implemented at metropolitan areas such as San Antonio, TX (Table 1) (Finch, 2007). In this article we will use the term “**State-BMPs**” to imply any of these water regulatory levels since the state legislature determines the ultimate control for decision making. **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 on all areas down to the specific site and homelawn/general grounds levels. Regulations would detail the various water conservation and water efficiency measures within the water district – i.e., the State BMPs plan (Table 1). *Third*, a State BMPs plan encourages or mandates all water users to operate on BMPs principles. For large irrigated sites, such as athletic fields, sod production, and institutional grounds, each would be expected to have site-specific BMPs (Table 2).

The State-BMPs regulations are the most important of all BMPs levels because they determine the true nature of the state water plan – i.e., is it truly a BMPs based approach or a rigid regulatory plan with a BMPs name; therefore, the Green Industry should focus most of their efforts in this arena. For positive impact in shaping the nature of the state-wide (and districts within a state) water management plan, three essential activities must happen: a) all aspects of the green industry must *become involved*; b) they must *formulate a water management plan* based on BMPs concepts at homeowner/general landscape, site-specific, and State BMPs levels, c) they must proactively *present this water management plan* to the state political and regulatory groups. It is this unity of purpose of the UAC and the GAGC that is more important than unity under one organization. There are certain **key issues** in State BMPs that are of most importance.

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 all 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 or water management area. 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 large irrigated sites, this would normally mean reducing irrigation on selected areas, but maintaining key areas 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, Green Industry businesses, similar to 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 BMPs 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 with 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, 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. Green Industry enterprises are businesses just as other community businesses that provide jobs, purchase goods and services, and provide goods and services (Berle et al., 2007). Not all people participate in sports or appreciate landscape businesses, 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; 2005; 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 this philosophy of targeting specific industries would be to identify industries in a community with the highest water use and prevent their activity during a water crisis – and these are normally not Green Industries. Application of this means of water management in Atlanta would close some high profile businesses not related to the green industry. The next two topics will illustrate how common sense BMPs can maintain economic sustainability and function of key turf areas.

Home Lawns and General Grounds Water Restrictions. During water crisis as restriction levels are triggered into operation, the current model has been to restrict all outside irrigation or limit irrigation on new plantings planted by a licensed landscaper – with many not clear as to whether the landscaper had to do the irrigation or the homeowner. The net effect has been to put many landscaper businesses and their employees out of jobs. How can this be avoided in the future? Some suggestions are:

- Grasses in homelawns and general grounds can be allowed to go into dormancy for prolonged periods. The dormant cover still provides erosion control and most often a high percent of the grass recovers after rainfall. Irrigation of whole landscapes is what accounts for the majority of water use on these sites.
- Trees and shrubs do not go into dormancy during prolonged drought but will die if the drought is too long at considerable cost to the homeowner for removal and replacement. During even the most severe water restriction level, it makes sense to allow homeowners to water trees and shrubs on a once a week basis with hand-held hose and/or bucket with hand-held hose the best means to avoid back injuries (AdelaidNow, 2007). A similar policy, but with irrigation allowed every other day, could be applied to new plantings of trees and shrubs. This would allow landscape businesses to operate at a basic level with little additional water use. Some may not agree with these

proposals, but if other non-Green Industry water users are not placed under water restrictions that would impact their businesses and jobs to the same degree as the landscape industry, why should one industry be singled out by a policy that saves little water but destroys many businesses? A small savings in water has a very long-term effect on the business climate since new landscapers are not very apt to arise if there is no protection of the same events occurring again. It is for these reasons that BMPs consider “all stakeholders” impacts. Sustainability is not just in terms of water, but the long term economy and jobs.

Community Sports Fields. Community sports fields should be exempt from full water restrictions unless the water crisis is at the extreme level such as has occurred in Queensland Australia after a prolonged 4 year drought as illustrated by a recent newspaper articles stating “Sports Medicine Australia has reported an increase in grazes, knee and shoulder injuries, concussion and heel pain during southeast Queensland's water crisis. Dust has also caused a rise in asthma attacks (Couriermail, 2007)”. For player safety, irrigation should be allowed within 24 hours of field use to maintain a reasonably resilient field. Water use on community based sports fields is a very small percent of total water use but has a major influence on youth sports programs.

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. The extensive BMPs template developed by Carrow et al. (2007) can provide an outline for templates in these other areas. 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 within an overall site-specific BMPs then monitoring becomes cost prohibitive and without real purpose. It is not the individual aspects that are 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 on individual water conservation strategies is sometimes a means to impose more rigid regulations under the guise of a BMPs program. It is also important for the State BMPs to define the key office that will answer questions related to regulation during water crisis – this becomes very difficult if every community has their own regulations.

Conclusions

The key issues presented illustrate how and why UAC groups should move toward implementing site-specific BMPs, fostering reasonable BMPs for homelawns/general grounds, and take a leadership role within each state to foster a State BMPs-based approach at state, water district, and urban levels. The issues outlined above are the key ones that should be of primary focus by the Green Industry. 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).

Table 1. 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. (2005; 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.

Table 2. Components or key strategies in a **site-specific BMPs** program (Carrow et al., 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. Landscape Design for Water Conservation.
7. Additional Management Practices for Water Conservation.
8. 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.

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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>