BMPs: Critical for the golf industry

Best management practices are at the heart of successful environmental stewardship.

Robert N. Carrow, Ph.D.; Ron R. Duncan Ph.D.; and David Wienecke, M.S., CPAg

EDITOR'S note:

This is the first in a series of three articles highlighting the importance of best management practices in relation to the golf industry and environmental issues concerning water.

Environmental stewardship of the world's natural resources is a concern for everyone. Natural resources that require careful protection include air, soil, water quality and quantity, climate, natural ecosystems, energy sources and endangered species. What is the best way for an individual or a golf course to act as an environmental steward within the confines of the regulations affecting the golf industry?

Dealing with environmental issues

Three broad approaches for dealing with environmental issues that may confront the golf industry are prevalent. The first, indifference or inattention, is no longer a choice. Stimulated by the publication of Rachel Carson's book "Silent Spring" in 1962, societal pressures have increasingly moved toward national regulatory action to protect various aspects of the environment. Two broad options remain for adoption and implementation either at regulatory levels or at the site-specific, golf course level: rigid regulations or holistic, science-based methods; that is, best management practices (BMPs) (see sidebar).

Every individual in the turfgrass industry should have a clear understanding of these two philosophies now because environmental regulations protecting water quality have already been — or soon will be — adopted and implemented in many areas. In addition, water conservation is fast becoming the dominant environmental issue for the golf course industry.

Photos courtesy of R. Carrow

Figure 1. Golf courses, such as this one in the United Arab Emirates, can enhance the environment and economy in harsh environments by using BMPs to address environmental concerns.

Water conservation encompasses both water quantity and irrigation water quality, and it is still an open question as to which approach — rigid regulations or BMPs — will be enacted into the laws that govern it. With other environmental issues, the regulatory process and the turfgrass industry have had many years to adjust to appropriate BMPs. This is not likely to be the case with water conservation.

In this article, water conservation will be the "example environmental issue" for discussing the BMPs concept as the best means of dealing with environmental problems. We will focus on:

- Stating why a BMPs approach is the only reasonable and science-based means of dealing with all environmental issues, including long-term global water conservation
- Encouraging state and local golf course groups to provide leadership to promote this approach at the regulatory level in all environmental problem areas, but especially in areas related to water conservation
- Encouraging golf courses to adopt and implement BMPs approaches, not just in response to mandated regulations, but as a proactive environmental stewardship business policy; that is, the best operations strategy for sustainability of the environment and the golf business

WHAT ARE BMPs?

Although BMPs can be appropriately defined in relationship to a specific environmental issue, for a broad definition, we suggest:

Best management practices are a combination of practices determined to be the most practical means of protecting the ecosystem. Practicability is demonstrated by a sensible application of scientific, economic, environmental (direct and indirect impacts), aesthetic and ethical considerations. BMPs can be fostered by voluntary or mandated regulatory policy and applied on a site-specific basis.

Characteristics of rigid regulations

The golf course industry faced its first major environmental issue in the 1960s as attention was drawn to pesticide use by agriculture, horticulture and turfgrass enterprises. The sequence of responses that occurred with this environmental problem has often been repeated with other environmental issues, including water conservation. As regulatory pressures increase, politicians and regulatory agencies initially tend to enact rigid regulations.

When crisis management regulations are carried forward as the long-term approach to an environmental problem, serious issues are often overlooked by the politicians and other policy makers. What is necessary in a crisis is not always the best, reasonable approach for long-term sustainability. Some of the common problems with using this approach as an initial and long-term solution for environmental issues are:

- Rigid regulations are based primarily on politics rather than science. The latest concepts and technology can be effectively applied to environmental problems, but political or personal beliefs that are not based on good science cannot.
- Imposing rigid regulations as the primary approach to an environmental concern often triggers adverse economic impacts, loss of industry viability and undesirable environmental consequences.
- Rigid regulations replace site-specific management with a "one size fits all" strategy.
- The education and expertise of superintendents is not valued.
- Rigid regulations are not based on whole systems, but attempt to achieve conservation by changing only one or two aspects, such as reducing irrigated turf or landscape acreage; mandating irrigation duration and frequency; or outlawing pesticide applications. In contrast, a systems approach makes adjustments to the whole system: plant, soil, climatic/atmosphere, water, landscape and surrounds, management level and management resources.
- Rigid regulations do not encourage development or implementation of improved science-based technology or concepts.

Figure 2. Old Collier GC in Naples, Fla., has received several environmental stewardship awards by using BMPs.

Figure 3. Turfgrass on the stream banks can reduce sediment and movement of pollutants into water features.

Consequences of rigid regulations

Examples of mandatory regulations

When a serious water shortage occurs in response to lack of precipitation, increased population and/or lack of long-term planning, mandatory regulations are often the initial response from government, such as:

- Irrigation is allowed only on certain days of the week, within narrow time frames, and only on selected turf areas (reducing irrigated turf acreage)
- The quantity of water available for irrigation is at or below the current average for golf courses in the region
- All golf courses must reduce water use by a set percentage
- Combinations of the above

Some of these regulations certainly have a role to play under certain conditions, for example, as part of a local, state or regional crisis water management policy, and where the crisis water management plan includes all water users with appropriate water-use restrictions.

Mandatory regulations often are imposed as a long-term water conservation policy without considering the consequences to the environment, economy and human health. For example, the current Proposition 50 Water Use Efficiency program in California proposes using cash payments to encourage removal of at least 400 square feet of turf from individual residential and commercial sites. What have been the impacts of turfgrass removal under the auspices of water conservation? This approach has been used before without consideration for the potential adverse effects on the specific site or on the local/state economy and environment.

Taking regulations to extremes

Three examples illustrate what can happen when turf removal is carried too far.

- Grasses are a central plant for controlling wind erosion, which causes soil loss. When China removed all turf and many trees from Beijing's public spaces during the

Cultural Revolution in the 1960s, the result was serious air pollution from dust storms, related health problems and higher air temperatures within the city (3). Revegetation with trees alone did not resolve the problem, and turfgrass had to be restored.

- Mowed turfgrass can be an effective fire buffer; removal near homes can result in increased fire hazards and higher homeowner insurance premiums. Firewise landscaping for the wildland-urban interface suggests that zone 1 (30-foot ring around the home) and zone 2 be well-irrigated, low-growing, low-flammability plant species; zone 3 should be low-growing plants and well-spaced trees with minimal volume of vegetation biomass for fuel (7). Home sites without turfgrass are most susceptible to fire damage in dry years.
- Grasses are very effective in preventing and remediating soil degradation or quality by wind and water erosion, reducing soil loss and transport that adversely affects surface waters, preventing nutrient and pesticide transport into surface and subsurface waters, and reducing urban water runoff. Grass improves soil quality by contributing to organic matter in soils (5,11). Green spaces also modify temperatures in urban areas. If grass is removed, what will carry out these essential environmental roles in our urban areas?

Characteristics of the BMPs approach

According to the Environmental Literacy Council, in today's world, "Environmental literacy requires a fundamental understanding of the systems of the natural world, the relationships and interactions between the living and the non-living environment and the ability to deal sensibly with problems that involve scientific evidence, uncertainty, and economic, aesthetic, and ethical considerations" (6). Achieving this whole-system, science-based approach to managing environmental problems has been an evolving process within science, agriculture and government policy.

Background for BMPs development

A holistic concept of dealing with environmental issues has its roots in the Integrated Pest Management (IPM) approach that arose in the late 1960s and early 1970s in response to how best to develop science-based pest control strategies that could include judicious use of pesticides within a system of other types of pest control (cultural, pest-resistant plants, pest predators, etc.) In 1972, the USDA funded the first major IPM research effort; in 1977, the California Department of Food and Agriculture initiated an IPM program; and in 1979 the University of California started an IPM program.

Figure 4. Golf courses can provide habitat for wildlife, such as the eagle that has built a nest near a bunker.

Another milestone in the whole-systems approach to addressing environmental problems was the "sustainable agriculture" movement, formalized in 1985 with the Food Security Act, which provided for sustainable agriculture research (12). This was enhanced in 1988 by funding of the Low-Input Sustainable Agriculture (LISA) program, which was expanded in 1990 to become the Sustainable Agriculture Research and Education Program (SARE).

Since the mid-1990s, the "precision agriculture" concept has developed from within the sustainable agriculture philosophy. Although precision agriculture is not a whole-systems approach, it highlights a critical component: inputs should be applied only where they are needed, at the rate required, only when needed. Precision agriculture recognizes the great spatial variability that farmers and superintendents must deal with when managing a site and illustrates why management must be based on educated, site-specific decisions.

Establishment of BMPs

The first federal initiative using the term "best management practices" came from the 1977 amendment to the Clean Water Act, which established BMPs as soil conservation practices to protect water quality (12). The BMPs focused on a holistic approach similar to IPM, but included concern for pesticides, nutrients and sediments as related to water-quality protection.

In recent years, the terminology and concept of BMPs has expanded into the area of water conservation (4,9,10) and are now used in ordinances, regulations and management manuals to deal with a wide variety of water-quality issues, such as pesticide use and fate, nutrient use and fate, sediment control from wind and water erosion and wetlands protection (9). The terminology and concept of BMPs likely will be used for an array of environmental issues other than water quality within the turfgrass industry and the regulatory arena.

Successful environmental stewardship

Although IPM (pesticides) and sustainable agriculture (soil-quality) efforts tend to have a somewhat different focus than the BMPs

(water quality and quantity), they all have certain characteristics essential to successful environmental stewardship (6).

- *Based on science.* All BMPs are based on science and require that inputs be applied only where they are needed, when necessary and only at the quantity required. These approaches can be documented, and accountability can be monitored.
- *Holistic or based on whole systems.* Because we work within whole ecosystems, no single answer or narrow strategy solves a specific environmental problem and also achieves successful stewardship.
- *Holistic — considers all stakeholders and the effects of potential environmental actions.* For example, water conservation programs should consider their effects on the economy, the environment, jobs and site use. The customer or user/manager/owner of a turf site is not the only one potentially affected by water conservation measures (1,2,8).
- *Educated site-specific adjustments.* No single factor will achieve maximum environmental benefits on a site, and because each site is different, adjustments must be site-specific. Adjustments within the whole ecosystem are the basis of BMPs, and educated decision-making is important. BMPs encourage professionalism and education, including continuing education, of the superintendent.
- *Development and implementation of new technology and concepts.* BMPs encourage ongoing improvement in technology, plants, concepts and products to achieve the best practices; guideline templates can be developed and updated over time.

Figure 5. A well-designed irrigation system combined with good scheduling practices can conserve water while maintaining acceptable turf.

Conclusion

Regulatory agencies and environmentalists support the BMPs philosophy for protection of water quality, so it seems they would also support BMPs for turfgrass water conservation and other environmental issues. Therefore, we encourage the golf course industry to vigorously adopt and foster the BMPs approach to all environmental challenges, including water conservation, and to use the BMPs terminology, which is already understood and used for many environmental issues.

Literature cited

1. Beard, J.B., and R.L. Green. 1994. The role of turfgrasses in environmental protection and their benefits to humans. *Journal of Environmental Quality* 23:452-460.
2. Carrow, R.N. 2004. Can we maintain turf to customers' satisfaction with less water? Proceedings 4th International Crop Science Congress, Sept. 26-Oct. 1, 2004. Brisbane, Queensland, Australia.
3. Cathey, H.M. 2003. Water right — Conserving our water, preserving our environment. International Turf Producers Foundation. www.turfgrasssod.org (verified April 2, 2005).
4. CUWCC. 2005. Memorandum of understanding regarding urban water conservation in California. Amended 2004. www.cuwcc.org (verified April 2, 2005).
5. Deletic, A. 2004. Modeling of water and sediment transport over grassed areas. *Journal of Hydrology* 248:168-192.
6. Environmental Literacy Council. 2005. About us. What is environmental literacy? www.enviroliteracy.org (verified April 2, 2005).
7. Firewise. 2005. Firewise landscaping. www.firewise.org (verified April 2, 2005).
8. Gibeault, V.A. 2002. Turf protects the environment, benefits health. UCRTRAC Newsletter, December 2002. University of California, Riverside.
9. GreenCO and Wright Water Engineers Inc. 2004. Green industry best management practices (BMPs) for the conservation and protection of water resources in Colorado. Second release. GreenCO, Denver, Colo. www.greenco.org (verified April 2, 2005).
10. The Irrigation Association. 2005. Turf and landscape irrigation best management practices. Online publication. September 2004. www.irrigation.org (verified April 2, 2005).
11. Muckel, G.B. 2004. Understanding soil risks and hazards. USDA online publication. http://soils.usda.gov/use/risks.html (verified April 5, 2005).
12. Rawson, J.M. 1995. Congressional Research Service Report to Congress: Sustainable agriculture. CRC Report for Congress, 95-1062 ENRD. Congressional Research Service, Committee for the National Institute for the Environment, Washington, D.C. www.ncseonline.org/NLE/CRSreports/Agriculture/ag-14.cfm?&CFID=962773&CFTOKEN=76886153 (verified April 5, 2005).

THE RESEARCH says . . .

- **Natural resources will** be protected, and environmental crises such as drought will be addressed, either through rigid regulations or implementation of best management practices.
- **Environmental stewardship will** become an intrinsic part of the golf industry.
- **Rigid regulations are** driven by politics and can result in extreme measures that may cause more harm than good.
- **Best management practices** offer a science-based, whole-systems approach to conservation and environmental protection.
- **The golf industry** should adopt and promote the BMPs approach to the environmental challenges it faces in order to protect the environment and preserve and promote the industry.

Robert N. Carrow, Ph.D., is a professor and turfgrass physiologist at the University of Georgia, Griffin. Ron R. Duncan, Ph.D., is vice president of Turf Ecosystems LLC, San Antonio, Texas, and a retired professor from the University of Georgia. Carrow and Duncan were instructors at GCSAA's 2005 Education Conference in Orlando. David Wienecke, M.S., CPAg, is director of golf course maintenance at Braemar County Club, Tarzana, Calif.