

Sustainability: time to be proactive

Societal, regulatory, and political pressures are steadily moving toward environmental stewardship or “sustainability” for all public and private facilities or businesses; but, how it is defined in these realms can be very diverse. Rather than staying on the sidelines while others define sustainability related to sports turf industry, it is best to proactively address the issue ahead of time. I encourage STMA and managers of sports turf facilities to proactively develop and foster a “**sustainable sports turf management**” (SSTM) program.

Fostering sustainability encompasses: a) development of sustainable concepts and documents, adoption of the concept, and implementation at national, state, and site-specific levels; and b) promoting these concepts in state regulatory and political realms as the best, holistic, science-based management approach available.

While each individual sports facility could develop a sustainable program with associated documents, it is more efficient for an umbrella organization to develop the basic concept and materials that a state sports turf association or an individual facility could use and adapt to their specific situations.

UNDERSTANDING “SUSTAINABILITY”

Concern about how to manage environmental problems on a site-specific basis is the driving force behind the sustainable development and management. Society expects all enterprises to effectively address any environmental issue that may arise on their site. It is important to recognize that environmental issues can only be successfully addressed by site-specific management and not by one-size fits all bans or edits.

This was the reality that caused the US EPA in 1977 to evolve and adopt the Best Management Practices (BMPs) concept for protection of surface and ground waters from pesticides, sediment, and nutrient pollutants. **The BMPs concept is the “gold standard” management approach for any single environmental issue.** BMPs have been adopted by the turfgrass industry for both water quality and quantity challenges.

Most sites have more than one environmental issue so the Environmental Management Systems (EMS) concept became prevalent worldwide in the 1990s. **The EMS approach encompasses all environmental issues on a facility** where: a) the site is assessed or evaluated to determine environmental concerns that are present; b) for each environmental problem, BMPs are developed to manage it; c) BMPs for all environmental issues are combined together to form the EMS plan and document, and d) management aspects in the BMPs are expected to be incorporated into daily management decisions.

“Sustainable Management System” terminology has increasingly replaced the EMS name in recent years. Essentially, these two concepts are the same, except sustainable management emphasizes a more balanced approach that considers environmental issues plus economic and social aspects. The core concern in either sustainable management or EMS is the environment.

How “sustainability” is defined is critical. Some environmental activists groups define sustainability in narrow terms such as only environmental considerations; or even on a single environmental goal, such as protecting the spotted owl or the California delta smelt; but this leaves out adverse impacts on the economy, society, and even other environmental issues. Sustainability should be defined in the full dimension of potential impacts—**sustainable resource management relative to all the environmental issues at a facility and not just one; economic effects, and society impacts.**

PRIMARY COMPONENTS OF SSTM PROGRAM

While all sustainable programs include environmental, economic, and social components, sports fields have

TABLE 1. BMPs for community sports fields related to enhancing water-use efficiency and conservation while considering impacts to all stakeholders.

- Alternative irrigation water sources.
- Site design for water conservation – determining areas needing irrigation, water harvesting, appropriate soil media, surface and subsurface drainage, surrounding landscape;
- Irrigation system design, installation, and maintenance; the water audit assists in these decisions – also since soil surface moisture conditions are very important relative to player safety and field playability a water audit is critical for these aspects as well as water-use efficiency.
- Irrigation scheduling.
- On-site weather station is present
- ET data from weather station is used to adjust irrigation scheduling
- Soil sensors are used to assist in irrigation scheduling
- Water budget approach is used in scheduling irrigation
- Rain shut-off devices are incorporated into the irrigation control system
- Grass selection – permanent, overseeded, dormant;
- Additional management practices to foster water conservation – cultivation, fertilization, wetting agents, soil modification (topdressing, sand-capping, organic and inorganic amendments), mowing practices, etc.;
- Pest control during drought;
- Traffic control measures – site use policies;
- Alternative surfaces;
- Maintenance facility, buildings, surrounding landscape areas; water conservation measures for these
- Education of manager and staff relative to water-use efficiency practices
- Developing written water conservation and contingency plans for the facility;
- Monitoring and modifying conservation strategies;
- Assessing costs and benefits for all stakeholders – includes listing of current and past water conservation BMPs practices for the facility; economic, social, adverse effects on other environmental issues (e.g. loss of cover causing soil erosion). The information collected under item 14 will be used to address the economic, social, and impacts of water conservation measures on other environmental issues under the primary (MAV, 2007)

two other unique components – player safety and playability for the sport. In fact, the player safety aspect should be considered the most important “sustainable” issue. Sustainability in all its dimensions for sports facilities entails six components or “site goals”:

- **Player Safety:** player-surface interaction: surface hardness, traction, uniform surface, surface soil moisture, turf surface characteristics.
- **Playability for the Sport and Aesthetics:** ball-surface interaction: rebound height, uniformity of bounce, smoothness, speed of surface, soil and turf parameters affecting ball; coverage, weeds
- **Environmental:** water, soil, and energy resources; waste, etc. This is the central focus of all sustainable programs and includes a number of possible issues.
- **Economic:** viability of community in terms of providing goods and services, ability to attract individuals and businesses.
- **Social:** community sports programs, community pride and social activities, youth crime. For insight on the importance of economic and social components of a SSTM program, readers the document by MAV (2007) is very comprehensive and directly related to sports fields. Community sports fields SSTM impacts not just the site but the community.
- **Aesthetics and Future Use:** degree of turf and weed coverage as related to aesthetics and use in the future (i.e., will renovation be needed that may limit field use).

For each of the six SSTM components, it is necessary to develop an evaluation template to assess conditions on the site and arrive at an SSTMP score for each component and for a total overall SSTM score. Except for the economic and social components, a BMPs approach is suggested for use in the evaluation template since these entail site management decisions.

To illustrate, under the Environmental category one of the environmental issues would be water-use efficiency and conservation. To develop a template for water-use efficiency/ conservation, a list of all possible BMP strategies to address water conservation is developed such as shown in Table 1. For each individual BMP strategy, a list of practices that would enhance this strategy is developed that the turf manager would respond to concerning their site, such as the examples given under the BMP strategy No. 4 “Irrigation Scheduling” in Table 1. Reasons for a BMP-based template site assessment approach are: a) a template essentially provides an outline of all possible site management options for a particular goal (e.g., water conservation); and b) by assessing what is the current practices on a scale (e.g., 1 to 5 with 5 being a specific practice is being implemented to the fullest extent possible), it highlights the areas where improvement can be made in the future.

Player safety and playability of the sport has received considerable attention under the term “performance testing” (i.e. site assessment). Performance Testing includes five major areas:

- **Surface Characteristics of the Soil:** soil hardness; any depressions (level surface, irrigation heads too high or low); slope; soil compaction; traction; shear stress; soil moisture; water infiltration. Soil hardness is the most important factor in both player safety and playability; and it is a function of soil moisture (most important

factor), percent clay, soil structure, thatch/mat, and soil organic matter content. Spatial variability in soil hardness should be determined under normal irrigation conditions during dry periods since irrigation water application uniformity, as affected by system design and scheduling, strongly influences soil moisture spatial distribution, and thereby, soil hardness. Soil compaction also affects soil hardness, but it should be determined at field capacity – i.e. to eliminate the influence of irrigation system on soil moisture uniformity. Soil compaction spatial variability is a function of traffic patterns, soil type, and soil structure.

- **Traction** is the second most important surface characteristic related to player safety and is a function of soil moisture, grass type, degree of coverage, thatch/mat/OM content, soil structure (compaction), percent clay. Soil moisture plays a central role in traction as it does in soil hardness.

- **Surface Characteristics of the Plant:** grass height; grass uniformity and density; turf type; bare ground – percent; wear patterns; weeds – percent and types; rooting depth; thatch or mat.

- **Irrigation (Water Audit) (Two Parts):** First, evaluate and maximize system performance, like head to head spacing measurements; malfunctioning sprinklers, nozzles, pressure, head alignment; scheduling settings and capability; irrigation water quality test. Second, evaluate uniformity of water distribution by traditional catch-can assessment; or preferably by soil moisture spatial distribution.

- **Irrigation System Maintenance.** This was the first part of a water audit; however, there should be a routine means to maintain the irrigation system with responsibilities assigned to the appropriated person. The reason for emphasis on the irrigation system is that surface hardness and traction are most affected by spatial variability in soil moisture in the surface few inches.

- **Fixtures and Surrounds:** goals, fences, etc; sprinkler placement and maintenance; any safety issue with surrounds.

Performance testing has been by hand-held devices and visual ratings; but researchers are currently focusing on mobile multiple-sensor devices coupled with GPS (global positioning systems) and GIS (geostatistical information systems – a means to visually display and analyze spatial information). Mobile devices allow for using multiple sensors, sensor probes that can be easily inserted into hard soils, and more measurements per unit area with less labor. More detailed mapping (i.e. <10 ft. sample grid) and integration of data with GPS and GIS are critical to: a) define relationships between parameters, especially surface soil moisture and surface hardness and traction; b) adequately determine spatial variability in key parameters; and c) express data and relationships with GIS developed maps (i.e. the show and tell visualization of results).

DEVELOPING A SSTM

To develop a comprehensive SSTM program that can be adopted at state and site-specific levels, key aspects to consider are listed below. Miner recently noted several of these aspects:

- **National association vs. state/local.** As noted, considerable time and effort is saved if a national entity fosters environmental sustainability and stewardship by developing basic program documents.

- Couple with an environmental group that has environmental stewardship programs beyond the turfgrass industry. They assist in development of the plan and already have a number of BMP-based assessment templates for various environmental issues. Also, these groups can assist in the certification program development (see below).

- Allow multiple levels of sustainable management.

Environmental stewardship is an on-going and evolving process that allows a facility to be good, better, and best over time.

- Develop site assessment in a BMP template with BMP strategies for each issue and determining how comprehensive the site BMPs are for the issue. There may appear to be overlap in some areas but that is acceptable since each issue is evaluated on its own.

- Report in BMP Format should include suggested BMPs for each necessary issue to improve. Since site assessment is already in a BMP format, a final report can easily be presented as a BMP document; and when these are combined together, they form the final SSTM program document.

- Use online format for the basic program and as much as possible. Developing assessment tools that can be achieved by online input as much as possible allows site managers to develop their SSTM program over time as work schedule allows. There should be options for types of site assessment that may require outside assistance.

- Couple with academic entities to incorporate a sound science base, as the STMA has done.

- Include certification with multiple levels where there are options for improvement over time. Third party certification is best. By using a BMP-based template for site assessment, it is easy to evolve a multiple level certification program.

- Target governmental agency acceptance to this sustainable approach and the site sustainable plans that evolve. Certainly, at the state level, the state STMA organization may be able to work with the state environmental agency responsible for sustainability in the state. In reality, very few business organizations have proactively developed sustainable programs in cooperation with their state environmental agency. State STMA chapters can take leadership in doing this.

The sustainability emphasis is increasing and will not go away. If there is not a proactive response by each segment of the turf industry, we must accept what others develop, which likely would not include the best environmental management approaches being adopted into laws and regulations. As in sports, spectators do not have much to say about the outcome of the game. ■

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