Managing sports fields during water restrictions

By Dr. Robert N. Carrow

Some things are just not compatible. Severe drought restrictions and safe/playable athletic fields are an example. In fact, all the primary sports field attributes that relate to player safety and playable fields are influenced to the greatest extent by water as it affects the turf and soil conditions. Too often water restrictions are imposed on athletic fields without consideration of the true impact. A player on the field is much less concerned with the visual or aesthetic quality than the ability to maintain footing, avoid injury, and have a predictable playing surface.

Literature specific to maintaining sports fields during drought conditions and for enhanced water-use efficiency are rather limited, but Table 1 lists very good resource materials for a more in-depth treatment of this topic, especially the MAV (6) document. The article by Ernst (4) is unique in discussing water relationships on infield skin management and performance.

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BMPs for water conservation

Fortunately, there are a number of site-specific adjustments in management practices that can be implemented to achieve enhanced water-use efficiency and conservation while maintaining an excellent surface. This environmental best management practices (BMPs) approach can be applied to any environmental issue (Table 1, items 1,2). There is no "silver bullet" management practice that will achieve water conservation, but a number of smaller adjustments combined can result in appreciable water savings while not sacrificing field safety and playability:

Goals. Identify initial and long-term goals relating to the key issues: fostering safe fields and enhancing water-use efficiency and conservation. Goals should be developed and agreed upon by facility management. Short term goals are based on existing infrastructure and equipment, but a longer term plan may include improvements in infrastructure, equipment, or personnel.

Site Assessment. Site-specific management requires site-specific information. Thus, all sites should be intensively evaluated for information that could influence water management. This would include: irrigation audit; intensive assessment of soil physical and chemical properties and spatial variability; subsurface and surface drainage; evaluate potential irrigation water sources; soil and water quality tests. All water conservation practices implemented in the past or current time period should be identified along with estimated cost in money and labor since this information aids in defining what has already been achieved. The latter

Table 1. Key resource information on managing sports fields under drought conditions.

1. Carrow, R. N. 2008. Drought, water restrictions, and community sports fields. SportsTurf, June 2008, p. 8.

2. Carrow, R. N., F. C. Waltz, and K. Fletcher. 2007b. Environmental stewardship requires a successful plan: Can the turfgrass industry state one? Univ. of Georgia, GeorgiaTurf Web Site. http://www.commodities.caes.uga.edu/turfgrass/georgiaturf/Water/Articles/BMS_EMS_Success_Approach_Web.pdf

3. Carrow, R. N. and R. R. Duncan. 1998. Salt-Affected Turfgrass Sites: Assessment and Management. John Wiley & Sons, Hoboken, NJ.

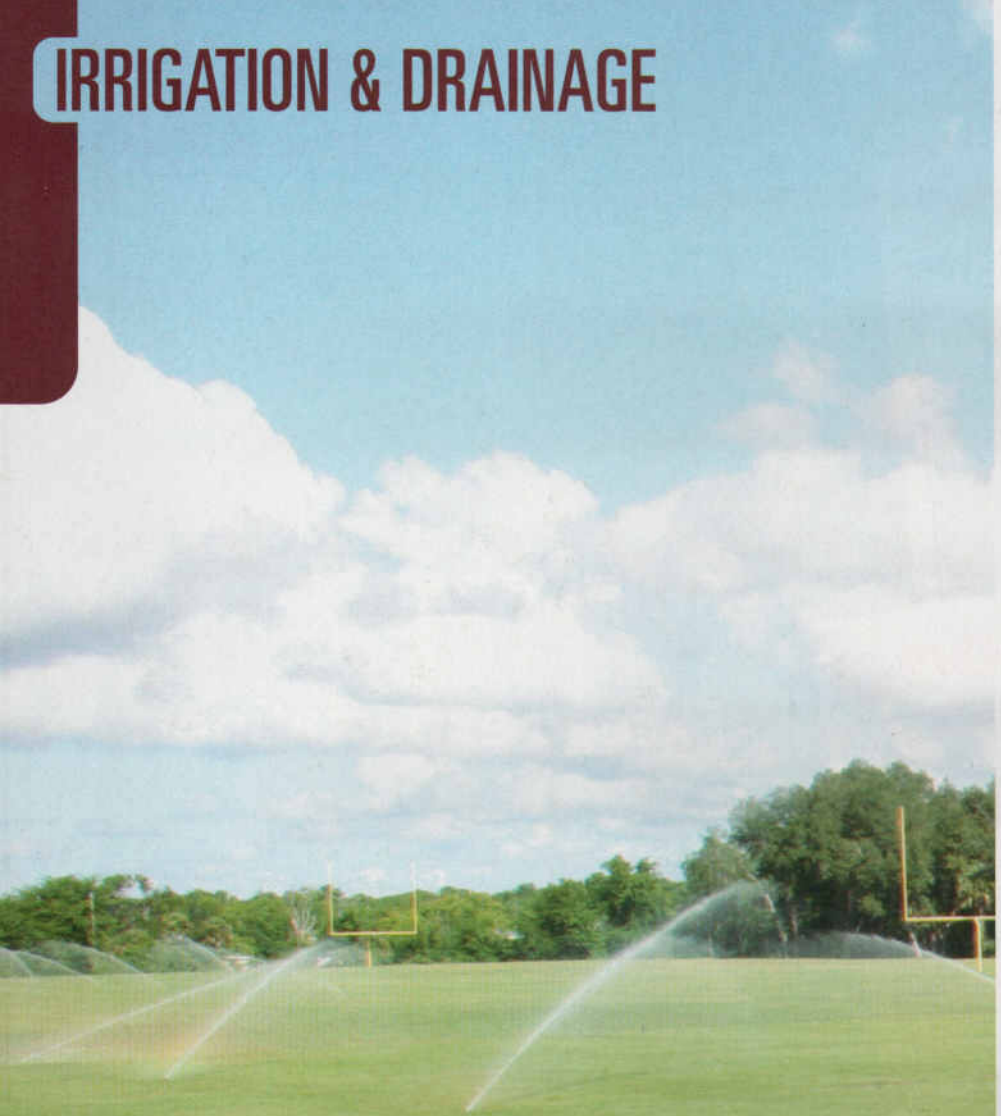
4. Ernst, T. 2006. Managing functional athletic fields. Article in special section on Proactive Water Use for Sports Turf Management. Sports Turf Association. Guelph, ON. http://www.sportsturfassociation.com/Portals/0/pdf/361_1_wateruse.pdf

5. Krum, J. and R. N. Carrow. 2008. Precision turfgrass management and irrigation scheduling. Golf Course Manage. 76(7): in press

6. Landry, G. and C. Waltz. 2008. Water management for sports fields. Univ. of Georgia Extension Service, Griffin, GA. http://commodities.caes.uga.edu/turfgrass/watercon servation/PDF_Files/Article-11.pdf

7. MAV. 2007. Strategies for Managing Sports Surfaces in a Drier Climate. Municipal Association of Victoria – Sports Surfaces Task Force. GHD Pty Ltd, Geelong, VIC. Australia. 121 pages. http://www.cricketvictoria.com.au/files/community/MAV%20Report.pdf

8. McAfee, J. A. 2008. Managing sports fields during drought conditions. Texas A & M Extension Service, Dallas, TX. http://jimmcafee.tamu.edu/CulturalPractice.htm



Water conservation should be a whole facility goal and not just on the sports fields

Winter Springs, FL Parks & Rec, courtesy of Chuck Pula

information is an excellent educational process for those that make the financial decisions and this information is valuable when BMPs are submitted to regulatory agencies.

Alternative Irrigation Water Sources. Non-potable irrigation water sources should be explored for short and long term availability. The most common sources would be: reclaimed (effluent, wastewater) water, storm water capture from the site for use in irrigation; drainage water reuse; for large facilities, sewage line mining with an on-site treatment facility to obtain irrigation water; use of saline aquifers not suitable for drinking purposes; and desalination. Once sources are identified, a complete irrigation water quality test should be conducted, especially relative to the presence of total soluble salts, sodium, and nutrient load. In arid and semi-arid regions, it is not unusual for the water from public wastewater treatment plants to have some degree of salt load and sodium. If this is the case, it has significant impact on possible infrastructure and equipment requirements to allow salt management, as well as the future nutritional and soil chemical amendment needs (Table 1, item 3).

Site Design for Water Conservation. This strategy includes initial construction as well as possible infrastructure changes on existing sites and should entail: soil modification to a allow water infiltration (sand capping, adding sand to alter surface conditions, adding organic matter); omitting or limiting irrigation on surrounds of recreational facilities where irrigation is not essential; water harvesting and capture form surrounds for irrigation use.

Irrigation System Design, Installation, and Maintenance. Proper irrigation system design is the most important factor. Without adequate spacing, nozzles, and layout for uniform application of water, the site will either be over-irrigated in areas to apply sufficient water on the drier areas; or there will be adequately irrigated areas with dry, hard conditions in the poor coverage areas. However, remember that soil moisture conditions directly relate to player safety and field playability—it is more that a conservation issue

The irrigation system is the main means to achieve adequate surface conditions in terms of turf conditions and proper soil moisture. Proper installation of irrigation components is the next point and must be followed by good maintenance including rapid repair of leaks. Essentially a good design should be for uniformity of application and flexibility for site-specific application (where water is needed, when it is needed, and at the correct rate). Rain shut-off devices should be used. **Irrigation Scheduling.** Even with a well-designed irrigation system, irrigation scheduling is ultimately determines the quantity of water. To enhance efficient scheduling consider: developing a budget approach to irrigation; using irrigation scheduling tools that are plant, soil, or climatic based methods to estimate when to irriga-

tion and how much to apply. As a side note, my current research is focused on more robust and cost effective means of site assessment of large landscape sites using truckster pulled mobile sensor arrays (determines soil moisture content, soil compaction, and plant stress maps with GPS coordinates that can be used in Geographic Information Systems computer programs for mapping and analysis), determination boundaries of similar site areas (areas that should receive similar irrigation), and science-based means of soil sensor placement (Table 1, item 5).

Selection of Turfgrass. The key selection criteria for athletic field grasses will continue to be tolerance to traffic stresses, adaptation to the mowing height requirements for the sport, and adaptation to the local climatic conditions, and pest tolerance/resistance; however, with the trend toward water conservation, drought resistance (avoidance and tolerance), salinity tolerance, and high temperature stress tolerance (often induced by drought and/or salinity) must be increasingly considered.

Additional Management Practices for Water Conservation and Field Safety/Playability. Surface cultivation programs are especially important to capture rainfall, allow efficient irrigation scheduling, and maintain a resilient surface. Deep cultivation programs to promote deep rooting and water percolation are also necessary. On fields receiving soluble salts and sodium via the irrigation water, proper cultivation equipment and programs are even more important since cultivation must be applied more often. Other maintenance aspects to consider are: traffic plan to prevent undue wear and rutting in localized areas; topdressing to level the field and modify surface conditions; promotion of deep rooting by fertilization, liming, etc.; wetting agents; proper mowing height; consider soil modification or sand-capping if necessary.

Maintenance Facility/Buildings and General Grounds Water Conservation Strategies. Water conservation should be a whole facility goal and not just on the sports fields. This includes indoor conservation programs for any office buildings, equipment maintenance, or other facilities whether on the site or at another location but associated with the facility.

Develop Water Plans. The initial level of planning is to develop and implement a formal BMPs water conservation plan for routine conditions. However, this should include specific plans for various levels of drought restrictions that may be triggered by drought conditions. During water restrictions, priority areas for irrigation should be identified both on the fields and for surrounding areas for limited irrigation. Turfgrasses allowed to achieve drought resistance can survive for relatively long period of times depending on the climate. But, minimal irrigation during prolonged drought induced dormancy can extend the life of dormant turf. Re-establishment will certainly require more time, water, and inputs that maintenance for survival.

Another aspect of drought contingency planning is the adjustments to fertilization, pesticide, mowing and other maintenance operations that will be necessary at various water restriction lev-

els; as well as during drought recovery periods. Certainly the time period prior to heavy site use is critical to bring a field up to standard, while during non-use or low use periods inputs can be reduced.

Education. Water conservation is a complicated issue. Educated turfgrass managers are an integral component of BMPs, just as education has been essential in fostering BMPs for water quality protection and in IPM. Formal education and continuing education that relates to enhancing management skills related to water conservation should be encouraged for all staff. Additionally, the sports field manager is often an educator for other audiences concerned with water conservation on sports facilities, such as policy makers, water management authorities, turf management students, site users, crew members, etc.

Monitoring and Modifying Conservation Strategies. Monitoring and plan revision with respect to the initial goals will be an on-going process. But other aspects should be noted as well, such as associated costs in time and money for these activities—including record-keeping and increases monitoring costs. Monitoring a water conservation program may include assessing its success by documenting water use (e.g., by water meters) and relating it to turfgrass performance. Periodic site assessment monitoring can identify leaks, irrigation head malfunctions, design limitations, irrigation scheduling problems or other wasteful water use. Monitoring could include use of instruments to quantity soil hardness or traffic torque estimates.

Assessment of Costs and Benefits for All "Stakeholders." If a BMPs plan is to be submitted to water regulatory or political entities, then this section is important. Assessment of costs and benefits associated with developing and implementation of a long-term BMPs water conservation plan and of the benefits of sports sites is necessary not only for facility planning, but also to demonstrate to regulatory agencies and possible critics of turfgrass sites that substantial effort and cost has been involved in water conservation by the facility. Additionally, the BMPs document is an opportunity to state the benefits of the facility to the local/state area; and to denote potential costs to society when a rigid regulatory (command and control) approach is targeted to the industry. Articles specific to community sports fields related to this topic are found it Table 1 (items 1, 7).

The potential conflict between drought restrictions and community sports fields is likely to be on-going. One essential response by the sports field users and managers should be to foster state or water district BMPs regulations that allow reasonable irrigation on community sports fields for player safety. The second response is to develop and implement site-specific BMPs on the sports facilities to participate in community water conservation efforts and proactively demonstrate a water conservation and sustainable mind-set within our industry. ■

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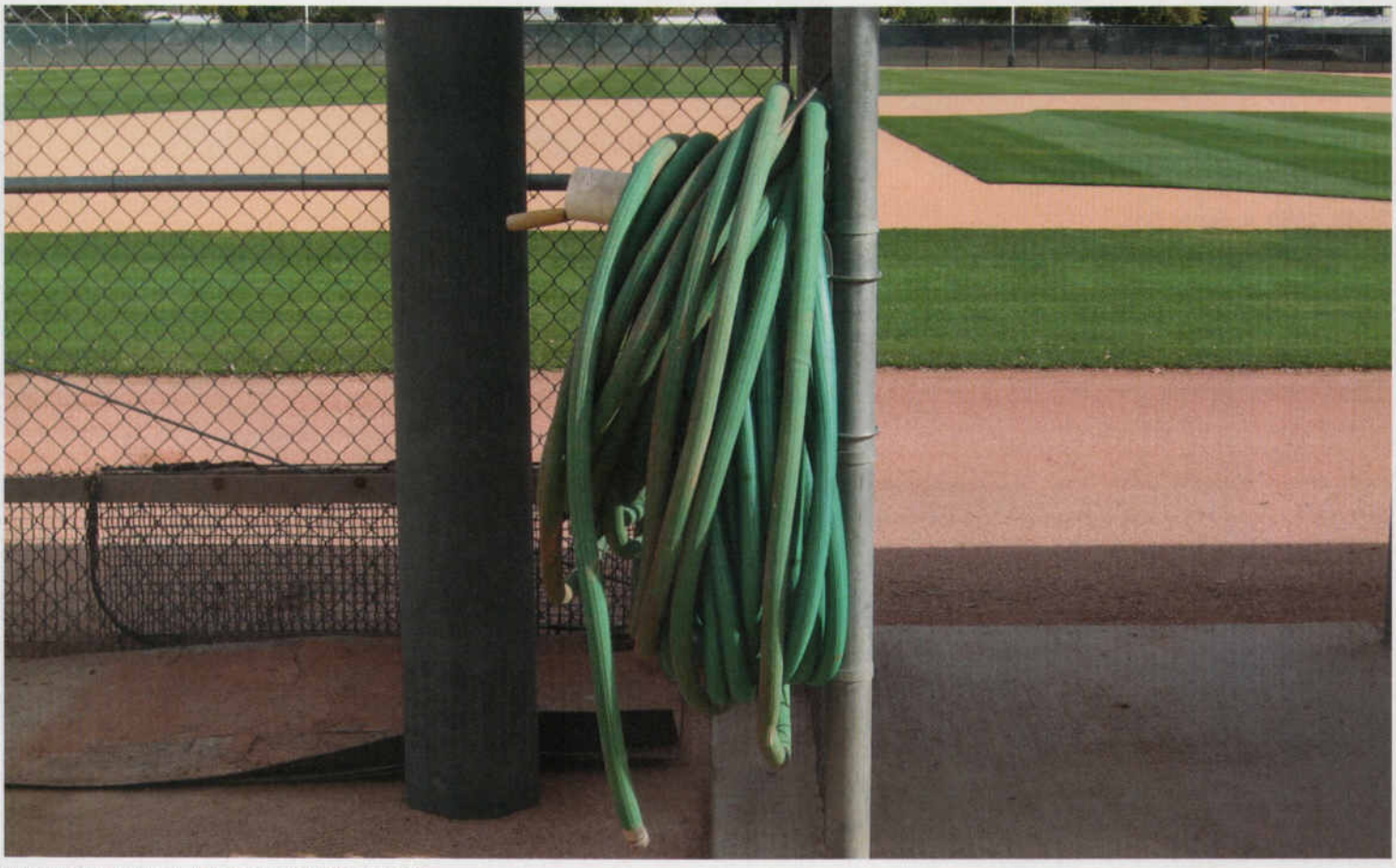

Maryvale Baseball Park, Arizona. Photo by Eric Schroder.