CAST
COUNCIL FOR AGRICULTURAL SCIENCE AND TECHNOLOGY

INTERPRETIVE SUMMARY

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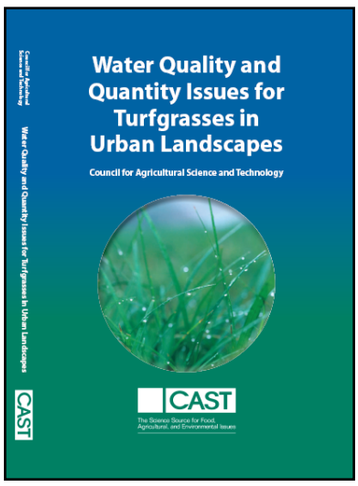
Water Quality and Quantity Issues for Turfgrasses in Urban Landscapes

This publication is the culmination of discussions and presentations from a 3-day workshop held January 23–25, 2006, in Las Vegas, Nevada. The workshop, hosted by the Council for Agricultural Science and Technology (CAST), provided an opportunity for researchers, scientists, environmentalists, and water specialists to join together to discuss the issues facing the turfgrass and water industries.



Proponents of maintained turfgrass argue its environmental and human benefits, including decreased runoff from storm events, erosion and air pollution control, heat dissipation, recreational and business opportunities, and enhanced property values. Critics, however, point out that turfgrasses in landscapes use excessive water, require excessive or unnecessary fertilizers and pesticides, disturb existing land use patterns, and waste time, money, and resources.

Pending Water Crisis

Several factors will have an impact on the magnitude of any potential water crisis: (1) the rapidly expanding population, specifically in areas of limited or unreliable water resources, (2) a growing economy with new home construction and business development, (3) a potential shift of environmental conditions for plants and animals that rely on water used by humans, (4) landscape plant water requirements, and (5) social and cultural aspects associated with the availability of clean, fresh water.

Indoor water use remains fairly constant throughout the year, but the peak demand for outdoor water use occurs during the summer. Therefore, conservation efforts target landscapes generally and turfgrasses specifically. Flattening the peak demand is an objective of water agencies.

Water Policy

The United States currently does not have a national water policy. Most policies are established at the state and local level, resulting in a drinking water system that is extremely decentralized. It is structured in four basic ways: (1) local government ownership, (2) independent government authority ownership, (3) privately owned companies, and (4) public-private partnerships.

Through the national government, however, the Environmental Protection Agency is responsible for implementing the Clean Water Act and Safe Drinking Water Act and targets its activities to prevent pollution and decrease the risk for people and ecosystems in the most cost-effective ways possible. Through integrated federal, state, and local implementation, these Acts have had a positive impact on water protection and conservation.

Water Use and Conservation

Water availability and conservation are a priority for the turfgrass industry. The first step is to select the correct turfgrass for the climate in which it will be grown. Though the available scientific data are incomplete, plant selection and landscape design also are key factors in urban landscape water conservation. In addition, communities must develop and implement sustainable water management plans for this purpose. The water program in San Antonio, Texas, is one example of citizen and government cooperation, resulting in decreased water use and economic savings.

Specific cultural practices can be used to decrease water use and enhance drought resistance in urban landscapes, including mowing height and frequency, turfgrass nutrition, and turfgrass irrigation. Secondary practices—soil cultivation, topdressing, wetting agents, plant growth regulators, and pest management—also influence potential water conservation.

The elimination of turfgrasses from open areas in urban landscapes should be implemented only as a last resort in arid climates. Turfgrasses not only use water, but also collect, hold, and clean it while enhancing subsequent groundwater recharge and contributing to transpiration cooling.

Efficient Irrigation and Alternative Water Sources

The use of alternative water for irrigation is another means of conserving potable water, in both high rainfall areas and regions of recurring drought. In dry regions of the country, and in highly populated metropolitan areas where water is limited, irrigation with municipal recycled water, untreated household gray water, or other low-quality (saline) water is a viable means of coping with potable water shortages. Much recycled water and all brackish water used for irrigation, however, contain elevated concentrations of dissolved salts that are potentially toxic to turfgrasses. Consequently, periodic monitoring with chemical water analysis is necessary for sound irrigation management. Very few water sources, however, are absolutely unsuitable for turfgrass irrigation.

Important aspects of any irrigation system design include efficient and uniform water application, regardless of the type of water applied, and filtration of suspended matter content in recycled and brackish waters. Additionally, groundwater quality monitoring programs may be required, and, depending on local regulations, sites irrigated with recycled water may be required to protect adjacent properties or bodies of water from irrigation runoff or overspray.

Leaching and Runoff

Beyond water conservation, extensive turfgrass use requires attention to pesticides and fertilizers and their potential for leaching and runoff. Turfgrass managers must adopt practices that decrease the potential for pesticide and nutrient leaching that can harm groundwater and, to some extent, surface water supplies. Most pesticides currently used in turfgrass, however, present fairly low risks of significant groundwater contamination. A healthy turfgrass provides considerable protection against leaching because of high levels of organic matter and associated microbial activity, serving to immobilize and degrade applied pesticides and nitrates.

Nitrate leaching may, however, present problems in some segments of the turfgrass industry where nitrogen fertilization rates have not been lowered to account for turfgrass age and clippings return.

Runoff is affected primarily by

- climate—temperature, evapotranspiration, and volume, intensity, and duration of precipitation;
- site and soil conditions—soil texture and organic matter content, bulk density, hydraulic conductivity, thatch layer presence, landscape slope, and proximity to water resources; and
- management—irrigation, drainage, fertilizer and pesticide application, and cultural practices.

Researchers, regulators, scientists, and engineers rely on mathematical models to predict the off-site transport of turfgrass chemicals to water resources. These models are important tools for risk assessment and risk management of turfgrass chemicals, but there are fundamental concerns about the reliability of the model applications.

Comprehensive Approaches

The 1977 amendment to the Clean Water Act established Best Management Practices, (BMPs) focused on a holistic, systems approach that addressed concerns for pesticides, nutrients, and sediments related to water quality protection. The Best Management Practices approach has a long track record for being successfully implemented because it

- is science-based;
- incorporates all strategies in the ecosystem;
- embodies all stakeholders and their social, economic, and environmental concerns;
- values education and communication outreach;
- allows integration of new technologies and concepts;
- has been applied at the regulatory, watershed, community, and site-specific levels, as well as in educational realms; and
- maintains flexibility to adjust to new situations.

Adoption of the BMPs model would be beneficial for the turfgrass and landscape industries, allowing them to go forward in a positive and unified manner, be an excellent environmental model, and demonstrate a high degree of environmental stewardship. It would also provide a model for research, education, and extension needs to serve the turfgrass industry and society.

Additionally, an Environmental Management System (EMS) approach brings under one umbrella all environmental issues and consequences on a site. Within an EMS, all environmental issues are addressed, including economic consequences and potential adverse effects.

Assessment

Even in areas where water supplies are ample, an economic or investment concern exists whenever peak demand becomes a driving force in decisions about providing water to the public. The tendency is to use a simplistic approach for eliminating certain water uses by enacting public laws. A single-issue approach, however, can lead to other potentially serious problems.

The nation's water issues need to be addressed in an integrated manner. The fiscal realities facing the nation need to be recognized in order to effectively coordinate the actions of federal, state, tribal, and local governments dealing with water.

Perceived environmental problems must not be addressed in isolation, but in terms of all the interrelationships and stakeholders associated with these landscapes. The ultimate goal is to provide quality urban areas for activities and recreation while conserving and protecting our water supply.

Water Quality and Quantity Issues for Turfgrasses in Urban Landscapes was written by a task force of 25 scientists, cochaired by Dr. James Beard, Texas A & M University and Dr. Mike Kenna, U.S. Golf Association. All current members of CAST may request one free copy; please include shipping amount indicated on the order form below. Linda M. Chimenti, Managing Scientific Editor. http://www.cast-science.org