

MINNESOTA GOLF COURSE WATER CONSERVATION

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Abstract. Golf Courses are part of the community and economic base of the state. As users of water, it is important for golf courses to utilize the best management practices for water conservation. These practices not only help conserve water but also can improve the success of the facility through power savings, increased revenue, and overall reduction of inputs. Conservation techniques include conducting a site assessment, performing irrigation system audits, staff scouting, utilizing advanced irrigation technologies, applying proper cultural practices, and utilizing drought tolerant turfgrasses. The future of water use in Minnesota is changing. Golf courses share the responsibility as part of a community. By relying on the proper water conservation strategies, golf course superintendents will be helping to maintain low water consumption, while improving the health and playability of the golf course.

Golf in Minnesota is a \$2.3 billion industry. Golf courses are part of the community providing jobs, tax base and recreation for citizens. Golf courses are a much-needed green space within urban areas and provide wildlife habitat, erosion control, pollutant filtration, and a cooling effect.

Golf courses are large properties with significant acreage of plants. These plants require water for growth and optimum health. Golf uses a small percentage of the outdoor water and an even smaller percentage of overall water, 0.6 percent. Still, public perception often views golf as a major water user and some would say a water abuser. Golf course superintendents and personnel are educated users of water, possessing knowledge of plant water requirements, microclimates and soil types, irrigation systems, and the environment. The following best management practices demonstrate the strategies that golf course superintendents rely on to efficiently use water for maintaining plant health, while considering the economic and environmental implications of water use.

The first step to managing water efficiently is doing a site assessment. A site assessment involves documenting the characteristics that influence plant water use and water movement on a site. For example, a clay soil will hold more water than a sandy soil, but roots work harder to extract water from a clay soil. Understanding these relationships help us to conserve water. Sloping terrain is more prone to runoff and must be treated differently than flat land. Every golf course has unique situations and each superintendent adjusts irrigation techniques to that

specific site situation.

Irrigation system auditing and inspection are important components of good water conservation. Trained golf course staff conducts annual inspections of the irrigation systems on their property. Additionally, a system audit performed by a certified auditor every five to seven years will help ensure that the systems are functioning as originally engineered. Irrigation monitoring systems and controls help reduce loss through leak detection, pressure regulation to reduce breaks, rain cut off devices, and water management software. Most watering is done at night, which reduces loss to evaporation and wind deflection. A trained staff member performs daily system checks as well as needed repairs to heads, nozzles, and pressure based on the needs of the plants.

The pump station, irrigation controls and distribution systems have become more sophisticated over the years. Modern golf course irrigation systems often utilize individual sprinkler head controls to optimally apply water to only the areas in need. The idea behind these more sophisticated irrigation systems is more effective and efficient water application across the property. Low flow heads and drip systems are being used in appropriate areas such as landscapes and slopes. Water savings, power savings and improved growing environments for the turfgrass offset the initial costs of the irrigation system. Improved growing environments are achieved by applying the correct amount of water to the landscape based on daily plant/soil water use, a term referred to as evapotranspiration. Too much water applied will result in puddles, erosion, stressed plants, algae and diseases.

As technologies continue to advance in irrigation systems, golf course superintendents remain at the forefront by adopting many of these advancements for improved efficiencies, and they will continue to do so. New computer software, sprinkler technology, drip irrigation breakthroughs and even underground watering systems are implemented as they become available. Recent advances in remote access and controls, GPS systems, water flow management, and soil moisture sensors are providing ever increasing methods for optimizing water use efficiency.

Golf course personnel are trained to look for wet and dry areas. Excessively wet areas not related to precipitation suggest overwatering and/or drainage issues. Conversely, dry areas might be hydrophobic (or

water-repelling) or have some other soil issue, or there simply may be failure of an irrigation head. Dry spots are regularly hand watered with hoses thereby using only the amount of water required for those small areas. Scouting is performed throughout the day in an effort to identify changing conditions. The staff then makes adjustments to the night watering schedule, up or down, to again ensure proper soil moisture.

Cultivation techniques, including sand topdressing, aeration and, vertical mowing, help to reduce water usage. Cultivation of the soil produces deeper roots and topdressing with sand protects the crown of the plant. Cultivation reduces compaction, allowing water to better infiltrate the soil reducing runoff of water. Cultivation practices that improve plant health will improve water use efficiency and increase water infiltration into the soil.

Golf course superintendents understand the importance of good nutrient management and the role that it plays in conserving water. Excessive fertilizer use can result in increased water use by the plant as well as an increase in other maintenance practices. There is no benefit to applying more fertilizer than is necessary for optimal plant health. In fact, some level of nutrient deficiency is actually desirable to reduce excessive growth.

Pest management is another critical best management practice for water conservation. Proper use of Integrated Pest Management, including the use of plant protectants, can help to maintain healthy plants. Healthy plants will require fewer additional inputs such as water and fertilizer than plants that need to be brought to a healthy condition following a pest infestation.

Other important best management practices for water conservation include traffic control and mower adjustment. Maintenance equipment and golf cart traffic must be carefully dispersed throughout the property in an effort to avoid soil compaction and turf loss. The height of cut of the turf can affect the water use of turfgrass. Mowing turfgrass at proper mowing heights results in reduced stress the plants and therefore more efficient use of water being applied. Dull mowers can also increase water usage by leaving a larger wound from which water can be lost. Sharp mowers leave a clean even cut that reduces water loss. Clean cuts reduce the risk for pest infestations as well requiring fewer inputs.

Many golf courses are reassessing their entire site for seldom-used space that can be converted to naturalized areas. Creating more naturalized areas around the golf course will save water as well as other inputs. These naturalized areas, once established, are not mown, fertilized or watered. In addition to reducing inputs and maintenance costs, this conversion also increases wildlife habitat. Additionally, breeding programs throughout the country are working on developing and implementing grass species and varieties that require fewer inputs. Drought tolerance, disease resistance, wear tolerance are

all good qualities to have in golf course grasses. Reducing irrigated acreage is a very effective way of reducing water use.

Finally, the game of golf, like any other sport played on turfgrass, is best played on a surface where the soil firm. Excessively wet soils can cause the golf ball to lodge in the soil, reduce how far the ball rolls, and can lead to slippery conditions for the participants. Therefore, it is in the best interest of the golf course to use only enough water to keep the site in optimal playing condition.

The future of water in Minnesota is changing. Good water management is essential for everyone in the community. Golf courses are part of the community and share the responsibility. Golf course managers understand the best management techniques of water management and willingly share those with the community. Golf courses do use a small amount of the total water used in Minnesota however, they also provide the community with many benefits including being an economic contributor, a wildlife sanctuary, erosion control and water filter as well as the recreational benefits.

REFERENCE: *Proceedings of the 2007 Georgia Water Resources Conference*, held March 27-29, 2007, at the University of Georgia. MGA Economic Impact Study 2008. Special consideration and thanks to Mark Esoda for his professional insight and sharing of critical information.