Enhancing the Environmental Benefits of Golf Courses

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A GOLF COURSE provides many benefits to the environmental quality of streams, lakes, and tidal waters. Today the golf course architect can take advantage of a variety of recently developed tools that have the potential to turn fairways, greens, and tees into clean water generators. Many of these same tools can also be applied to courses constructed decades ago.

The opportunities to enhance the environmental benefits of a golf course lie in five areas: buffers, pesticide and fertilizer use, irrigation, and stormwater runoff from parking lots, rooftops, and other impervious surfaces.

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Buffers

In the context of the aquatic environment, a buffer is a dense growth of vegetation established along the periphery of a waterway. Generally, the most effective buffer measures 75 to 150 feet in width and consists of trees and shrubs. Such a buffer provides a number of extremely important benefits:

- Shade-casting vegetation prevents the sun from excessively heating a waterway, benefiting trout and other fish that cannot tolerate warm or hot waters.
- The buffer contributes leaves, twigs, and other plant parts which serve as the basic source of food that supports the ecosystem of small streams.
- Tree trunks and root systems retard floodwaters, protecting downstream structures and slowing channel erosion.
- The buffer may intercept and absorb runoff flowing along the surface, reducing the quantity of pollutants reaching the waterway.

Naturally, a buffer will not resolve all of the potential water quality concerns associated with a golf course. They tend to provide the greatest benefit when applied to small headwater streams, those which are less than 50 feet in width. But even a broad river, lake, or pond will benefit from the presence of a dense shoreline buffer.

Pesticide and Fertilizer Use

Integrated Pest Management (IPM) programs can do much to minimize concerns related to pesticide and fertilizer use. Most golf courses should become clean-water generators through the use of IPM practices such as:

- The selection of drought- and pest-resistant turfgrass varieties.
- Proper irrigation practices.
- Reasonable mowing heights.
- Restricting pesticide use to spot-treatments with products having a low mobility in the soil column, a short half-life, and low toxicity.

If a portion of the fairways, greens, or tees reside upon very sandy soil, or the depth to groundwater or bedrock is less than four feet, then additional precautions may be warranted. Potential concerns associated with pesticide and fertilizer use on such areas can be reduced by:

- Converting the area to rough or some other use, if practical.
- Increasing the organic matter content by mixing peat, sludge, compost, or some other material into the soil surface.
- Filling the area to either increase the clay content of sandy soils or to raise the elevation above the water table and bedrock.
- Lowering the water table through a subsurface drainage system.

If a green or tee is sited on a sandy soil, particularly where the water table lies close to the surface, then consideration should be given to the use of an underdrain and directing the collected groundwater to a peat-sand filter. The peat will absorb much of the pesticide associated with groundwater flowing from beneath the green or tee.

Irrigation

In my home state of Maryland, an 18-hole golf course may use a daily average of 75,000 to 100,000 gallons of irrigation water during the summer. Our state water resources agency assumes that 75% of the water used for irrigation will no longer be available for other uses. Ideally, an irrigation water supply source should be used which will have a minimal impact upon aquatic ecosystems and other users.

If a stream or river serves as the supply source and more than 5% of the low flow is withdrawn for irrigation, then the impact upon fish and other users may be significant. The same would apply if a pond serves as the water supply source and the pond was constructed on a flowing stream.

The use of groundwater as an irrigation supply may be a problem under some circumstances. If the withdrawal of irrigation water lowers the water yield to nearby wells, then other groundwater uses may be harmed. Also, a production well located close to a flowing stream may draw water from the channel and into the ground, thereby lowering stream flow. While some modest effect upon stream flow and other water users may be an acceptable trade-off for the benefits associated with a golf course, the ideal situation is one in which all users enjoy an adequate supply of water.

One alternative to tapping a limited water supply may be the use of stormwater runoff. I have seen several proposals which call for the construction of ponds to capture and store surface stormwater runoff for future irrigation use. The ponds should be constructed where runoff can be collected without placing a dam across a stream. Care should also be taken to bypass sufficient floodwater to maintain the health of downstream waterways.

(Above) Vegetation that casts shade on the water prevents the sun from excessively heating a waterway, benefiting aquatic wildlife.

(Left) More golf courses can become clean-water generators by using IPM practices.

Stormwater from Impervious Surfaces

Stormwater may wash a variety of water pollutants from roadways, rooftops, parking lots, and other impervious surfaces. The pollutants include: toxic compounds, nutrients, oxygen-consuming waste, and heat. Many of these pollutants are derived from automobile operation and air pollution.

Stormwater runoff from paved surfaces routinely contains sufficient toxic materials, particularly copper, lead, and zinc, to exceed the levels deemed safe for aquatic life. The nutrients associated with stormwater can stimulate excessive algal growth in ponds, tidal waterways, lakes, and large rivers. As the algae die, they combine with other oxygen-consuming waste to deplete the waterway of this life-giving gas. If you've ever walked barefoot across a parking lot in August, then you can easily imagine just how hot rainwater gets after flowing across the asphalt. This thermal pollution can combine with the other stormwater impacts to degrade the quality of a stream once more than 10% of the drainage area is rendered impervious.

The most effective method for controlling stormwater impacts is to allow runoff from paved surfaces to soak into the earth. This method of control, known as "infiltration," can capture 60% to 90% of the pollutants associated with stormwater and will mitigate the thermal effects as well. But infiltration cannot be practiced on all soils. A peat/sand filter is the next most effective control measure. While other control measures, such as a pond or a wetland, have been applied to stormwater, none can remove sufficient pollution to fully protect aquatic resources.

Further information on these methods to enhance the environmental benefits of golf courses can be obtained by ordering a copy of "Protecting the Aquatic Environment from the Effects of Golf Courses." To order a copy of this 70-page publication, just send a check for $12.00 to: CEDA, P.O. Box 206, Maryland Line, MD 21105. And please give me a call at (301) 329-8194 if I can be of further assistance.