

The natural approach

By STEVE BEEMAN

Historically, water hazards on golf courses have been open bodies of water, with manicured turfgrass shorelines. In recent years, however, golf course designers have begun to work more with the natural features on new construction sites and to incorporate native habitats into their designs.

Shoreline grasses stabilize slopes and control erosion. Emergent aquatic plant communities along the banks pro-

vide habitat, nesting sites, cover and food for a wide variety of animals. Wetlands and vegetated shorelines also have an important function in the improvement of water quality.

Erosion control

Planting shoreline grasses on slopes and emergent aquatic plants below the water line can effectively control erosion. The roots stabilize the substrate and the plant stems in the water column act as wave buffers. Establishing native shorelines also eliminates the requirements for expensive hand maintenance on slopes that are too steep for conventional mowers. While it may not be practical to have wetlands along shorelines that regularly come into play, planted slopes and littoral zones can provide efficient and cost-effective erosion control around tees, greens and in out-of-play areas.

Wildlife habitat

Natural areas created by planting shoreline grasses, rushes and trees serve as habitat and shelter for a variety of upland creatures that live or forage near water. An extensive shoreline community may provide corridors for animals traveling between areas of natural cover. Marsh rabbits, raccoons, foxes, birds, reptiles and amphibians use these low-growing canopy areas.

The shallow water littoral

◀ **Steve Beeman started Ecoshores, Inc., in May 1978. Based in Port Orange, Fla. His firm promotes proper wetland management systems.**



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zone provides room and board for a diverse array of birds, fish, crustaceans, reptiles, amphibians and mammals. As aquatic plants die off, they produce soluble carbon compounds that feed plankton and microbial populations in the water body. Plant production is the basis of the aquatic food web.

Shallow water plants provide shelter from predation for small animals, including the juvenile forms of some species that will grow up to become predators. Because wetland fringes provide cover for prey species, predators feed along the edges. Wading birds patrol the shoreline, stalking and spearing. Carnivorous fish species cruise the borders in

search of smaller animals which may stray from the protective screen of emergent plants.

Water purification

Perhaps the most important but least understood or appreciated function of vegetated wetlands is their role in water quality improvement. This feature can be beneficially exploited in lakes around golf courses. Ponds and lakes that don't have vegetated shorelines or wetlands associated with them frequently experience problems with floating algae mats or blooms which can inhibit water clarity and are unsightly. Rooted aquatic plants assist in the removal of nutrients from the water column. In fact, constructed and natural wetlands are now commonly used



to water features



by water treatment facilities to treat waste water effluent.

When nutrients such as nitrogen and phosphorus occur in excessive quantities they fuel population explosions among several species of algae. Wetland plants help control these nutrients. One way that nitrogen (and phosphorus to a lesser degree) is taken out of the water is through assimilation into plant tissues by vascular plants and the microbes which adhere to them. Microbes (bacteria, fungi, algae and protozoa) that are attached to the underwater portions of aquatic plants and on submerged soils, account for a substantial reduction in dissolved phosphorus and nitrogen. The more attachment surfaces for microbial populations, the more potential there is for nutrient removal. As the vegeta-

tion slows water flow, sedimentation occurs, trapping phosphorus in layers of fine mineral soils where it is immobilized by metallic ions like calcium, aluminum and iron.

The principle pathway for the removal of nitrogen from aquatic ecosystems is a process called denitrification, which is dependent upon rooted aquatic plants. Most submerged soils are oxygen poor (anaerobic), but the area surrounding the roots of aquatic plants (the rhizosphere) is rich in oxygen (aerobic). Dissolved nitrogen is converted to nitrate in the aerobic rhizosphere and then changed by microbes in the adjacent anaerobic soils to nitrogen gas, which rises to the surface and leaves the water column permanently.

Wetlands along can't completely purify a water body that is receiving excessive nutrient runoff, but they can help maintain a balance, especially if incorporated into an integrated plant management (IPM) program for the surrounding golf course.

Aquascaping for aesthetics

Aside from the benefits to wildlife and the aquatic environment, planted shorelines enhance the beauty of a golf course in the same way upland landscaping does. Waving fields of cordgrass (*Spartina bakeri*), blending into shoreline hedges of rushes (*Juncus* or *Eleocharis*) form native plant savannahs that bridge the aquatic and terrestrial zones. Flowering herbs like duck potato (*Sagittaria*),

pickerelweed (*Pontederia*), canna lily (*Canna*) and blue flag (*Iris*) provide bright colors at different times of the year, framed by variable shades of green foliage. Tall plants like bulrush (*Scirpus*) or fire flag (*Thalia*) can be used as accents

or to warn golfers of hidden hazards. □

The author is President of Ecoshores, Inc., Port Orange, Fla., and spoke at the Southeastern Turf Conference in Tifton, Ga., in May



Shoreline grasses and trees give shelter to upland creatures that live or forage near water.

Shoreline grasses on slopes can effectively control erosion.

