Dr. Michael Hurdzan

'For golf to grow we must have "bunny slope" golf courses.'

Impacts of boom on development

By DR. MICHAEL J. HURDZAN

By any measure, the game of golf is expanding. More players are being attracted to the game, equipment sales are at all-time highs, a record number of golf courses are being built around the world, and more total rounds of golf are being played. It is hard to imagine there can be many negative aspects to this unprecedented growth. But there are.

- People just taking up the game usually are uneducated in its rules and traditions.
- Not enough golf facilities are geared for beginners.
- The boom has brought increased environmental opposition and restrictions.
- There has been an explosion in people calling themselves golf course designers.
- Competitiveness has lessened between experienced contractors.

Since beginning golfers have garnered ideas from watching the pros on television, this has led to very slow rounds of golf by people who think they are being individually harassed by rangers because they are beginners, and they often take it personally. They see no difference between their behavior and that of professional golfers on TV. They just have to do it more often.

Having a golf course full of slow players seriously complicates the fine art of "rangering," or the more politically correct "play coordination," for there are no big gaps between groups, just bunches of little ones like cars in a rush-hour creep.

Such situations can easily lead to flared tempers and harsh words, six-hour rounds of golf, and ill feelings for the game by everyone. Such things are not good for the game, and there are few places for beginners to learn golf etiquette and have a pleasurable introduction to golf.

Another problem of the boom is that there are simply not enough golf facilities geared for beginners. Imagine the problem if alpine ski resorts only built expert trails and ignored the novice and intermediate ones. In essence, this is what the golf industry has done since the emphasis shifted to upscale facilities and virtually ignored simple, low-cost beginner courses.

Convincing golf course developers that these are desirable, profitable investments and a wise use of land is another story. The First Tee program is a great start, but it cannot possibly satisfy the entire demand. For golf to grow we must have "bunny slope" golf courses.

The proliferation of golf courses has also been complicated by increasing environmental opposition and restrictions. Some people worry that there will be too many courses, so they take on a mission to make golf course permitting and build-

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Lakes and ponds: design, construction, maintenance

By MAC McCUNE

On nearly every golf course, water plays a major role in several ways — aesthetics, course hazards, drainage, irrigation and even, in some cases, wetland mitigation. However, lakes and ponds can be notoriously high maintenance, depending on geographic location, design and soil conditions.

Most golf course ponds are built to create a water hazard and use the dirt to elevate the course and/or greens. Because of this, the economics of spending a lot of money to minimize future problems usually isn't considered feasible.

However, most of these ponds will need major restoration work with time due to sedimentation, shoreline erosion, organic loading and a lack of proper maintenance.

When a lake or pond is constructed, an aquatic ecosystem is created that may have never have occurred naturally. Nature has a pre-chartered course for this impoundment. Unfortunately, this course is not conducive to urbanization. All lakes and ponds, whether natural or man-made, undergo a process called eutrophication. This is the aging of a body of water and leads to its eventual extinction and transformation into a swamp.

This process may take 100 years, or only 10. The design, construction and maintenance dictate the rate of eutrophication. Eutrophication involves a filling-in process from sedimentation, erosion, grass clippings, tree limbs and leaves, and the natural succession of aquatic plant communities which develop and die annually. This organic load, combined with incoming silt, becomes deposited on the basin, causing the pond to become shallower.

If aerobic conditions are not maintained, this muck will begin to rot, causing foul odors, algae blooms, low or depleted dissolved oxygen and dirty water.

The design and construction of a pond will determine most of the future problems it will encounter. Minimizing the filling in of the pond will eliminate the need for dredging it in the future. This becomes even more important due to the method and expense of dredging, the significant downtime, golf play alterations, foul odors and unsightliness.

Once the ponds are designed and built properly, they must be maintained just as with any living ecosystem such as a garden or even as a swimming pool.

Designing a pond is generally fairly simple once the location and soil conditions are determined, as well as any potential influencing factors like primary purpose(s), runoff, type of watershed, future accessibility, etc.

The first thing to be determined is if the pond will hold water. Soil with a Permeability Index (PI) of 25 to 40 is the most desirable. The best method to determine this is to have a geotechnical firm punch core samples down the center line of the pond. This will determine the soil type as well as any shallow subsurface ground water. If the soil falls below a PI of 20, the contractor will most likely need to line or seal the pond with either clay or bentonite (a premium grade drilling mud).

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Multiple methods can ensure clean water, ecosystem

By JEFF ALDERMAN

COSTA MESA, Calif. — Costa Mesa Country Club in Orange County, is enjoying clear lakes thanks to a combination of innovative technologies.

Previously, Costa Mesa's lakes and ponds were filled with algae, lacked clarity, emitted foul odors, and were stagnant. They are now clear, sparkling bodies of water, where golf balls are seen by moonlight at water depths exceeding 10 feet. Algae has greatly diminished, with no chemical treatment.

The systems complement the natural aquatic ecosystem, supporting healthy, growing populations of fish and hundreds of ducks and coots.

The design augments, and operates in conjunction with, the lake's natural ecological systems using durable, low energy-consumptive systems to attain and maintain water quality and clarity. Maintenance is much easier and less frequent with lower maintenance costs.

The main components and systems of this design include the following:

- **Gravel Bed Biological Filter System**: This consists of a large gravel bed, with a pump/mechanical system. Properly sized and designed, the gravel bed operates as a natural filter, where nutrients and organic matter are digested by bacteria colonies as the water gently passes through. It also mechanically filters out particulate matter and turbidity, and has a natural appearance. The vertical turbine pumps are very efficient, and there are no expensive underground vaults.
- **Aeration System**: This consists of an air compressor which provides cool air flow, and continuous distribution tubing installed throughout the lake bottoms. This continually adds oxygen to the water, oxidizing much of the organic matter and nutrients in the lakes. Properly designed and installed systems also thoroughly mix ("turn over") the lake water column. A uniform aerobic condition permits aquatic life to thrive throughout the lake, eliminating "fish kills" which normally occur at night, or during climatic changes.
- **Ozone System**: Operating in conjunction with the aeration system, this provides a greater degree of treatment to the lake water, giving it greater clarity. Ozone also prevents the build-up of calcium, other minerals, and matter which may tend to clog the slits of the aeration tubing, thus extending the life of the tubing and decreasing maintenance. An adequate ozone system breaks down much of the organic matter and nutrients which feed algae and "cloud" the water. Ozone also directly kills and destroys algae to some extent. The newer ozone generators are safer and more powerful, efficient, and cost-effective than those of the past.

Other, less vital, components which typically are included, are:

- Skimmer box intakes to continually remove unsightly debris on the water surface, eliminate stagnation "dead spots," and provide better lake-water circulation. Straining the water through the baskets of skimmers removes larger debris and particulates.
- Lake-edge discharge "jets" to better circulate the lake water, and to eliminate "dead spots."
- Waterfalls and fountain jets to give dramatic, aesthetic effects to water bodies. They also add some water circulation, and a small amount of aeration. However, the aeration benefit is very small, and is no substitute for the primary aeration systems.

One of the elements that ensured clear water for Costa Mesa Country Club.

Without proper treatment, the water quality and clarity of golf course lakes and water hazards is generally very poor, with a large amount of turbidity, organic matter, nutrients and algae. By contrast, successfully designed projects range from lakes and reservoirs of several acres in size, to small ponds and fountains — from newly constructed water bodies, to renovations of existing lakes. This includes the transformation of lakes which previously had appeared to have been beyond hope, as well as those which are fed by treated effluent.

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Lakes & ponds

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A clay liner should be at least 2 feet thick and bentonite should be spread, disked, rolled and compacted at 1 to 2 pounds per square foot. Clay should be installed in 6-inch lifts and compacted to 96 percent Standard Proctor Density (SPD). Either type of liner should be installed over the entire pond to a minimum of 2 feet above normal water level. If clay or bentonite are not available, an artificial plastic or rubber membrane can be installed.

The second aspect to determine is whether the pond will be runoff-dependent, or will have a makeup water source, such as a water well or stream. If runoff-dependent, the watershed (the area of drainage into the pond) will have a big impact on the quality of the water and will require a maintenance program itself. A makeup well will allow the golf course to maintain a constant water level, preventing fluctuations that enhance erosion and aquatic weed growth.

Shoreline erosion is very common in golf course ponds and can be prevented by installing a hard, vertical edge such as timber, sheet piling, concrete blocks, or a trenched, poured-in-place concrete wall.

Each of these measures has a certain time span of effectiveness. Timber will eventually have to be replaced, whereas concrete will last much longer.

A concrete bulkhead, however, will form its own expansion joints (minor cracks), which should be monitored for any ground sinking behind the wall. This is easily repaired and a concrete wall is the least costly of the various methods.

Alternative solutions to minimizing erosion include rip-rap, geotextile fabrics, slope paving and cement-stabilized sand.

The cross-section of a golf course pond should provide for a shallow safety shelf extending out from the edge horizontally about 6 feet. The slope should then drop off sharply on a minimum of a 3:1 ratio to the maximum depth. Pond depth is variable and dependant on certain climactic and regional circumstances.

In the Southern regions, maximum depth should range from 7 to 8 feet, and, in the Northern regions, 15 feet or more.

The safety shelf should be stabilized using 3-inch slope paving of cement-stabilized sand. This shelf will provide safety and allow a place to introduce desirable species of aquatic plants in containers or unstabilized planter areas.

Any watershed the pond may have should be sodded immediately after construction. Silt fence, sand bags or even hay bales placed around the pond's perimeter or at the top of the bank can greatly minimize sedimentation.

MAINTENANCE AFTERWARDS

Once the pond is constructed, it must be maintained to support the ecosystem. Aeration is a key factor in prolonging the life of the impoundment. Natural heat and wind-generated currents are seldom enough to provide adequate dissolved oxygen in highly nutrient-rich pond water. The addition of aeration equipment, such as through surface agitation or sub-surface compressed air injection, can greatly enhance the productivity and balance of the ecosystem and reduce future maintenance.

Finally, maintaining the pond requires the knowledge and experience to effectively implement a well-designed management program. The ability to recognize potential problems, and the knowledge and experience to fix them in a timely manner, is the key to successful pond management.

Performing water-quality analyses, controlling aquatic weeds, monitoring mechanical equipment and observing the overall ecology of the pond will help reduce the number of complaints. The management of a golf course pond should be as much a part of the overall course maintenance program as the greens.

Nature can act in cruel and strange ways. The finest 18th green is a waste and an eyesore with a smelly, stagnant, weed-infested pond in front of it.

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