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CAN YOUR COURSE LIVE WITHOUT WATER?

January rain eased some turf problems, but superintendents should be prepared for future dry spells

by Scott Credon, assistant editor

Superintendents from west of the Mississippi River might have politely nodded their heads, attempting to be gracious listeners, if anyone from the Lake Geneva, Wis., Playboy Club resort complained to them last summer about their impending water shortage.

Some of the underground wells that supply a 20-acre lake, which irrigates one of the resort's golf courses were beginning to dry up, and the lake level had dipped 4 feet in the last 2 years. By the end of July, the club's 178 golf cars were riding over near-barren rough. Superintendent Gene Palrud had even started using less water on the perimeter areas of the Playboy Club golf course.

Any concerned agronomists from Texas, or Colorado, or California, can unfurl their brows because only 6 months later, things again are calm. It rained 29 inches from August through September and heavy snows this winter may push the lake level back to normal by spring.

But wait! The North Shore Country Club outside of Milwaukee was lucky its members didn't bring their own hydrants and fire hoses until those autumn showers, it was getting so dry. And the Toftrees Country Club in State College, Pa., was so bad off it had to use treated sewage to keep its turf from dying.

Did someone hear a wry chuckle, some muffled laughter, from the men out West? Experts from their region have been saying for two years that golf courses will never again have an unlimited water supply, and some superintendents in other parts of the company are finding out it's not a lie.

The shortage means that some courses and clubs will be looking for other sources either to supplement or to replace the water they have now. For the majority of U.S. golf courses, it will mean conservation.

Conservation measures

Dr. James B. Watson, vice president and agronomist for The Toro Co., has suggested numerous methods to combat any short-term lack of water. He suggests using just enough water to sustain plant life and irrigating when there is little wind, low temperatures, and high humidity. Dr. Watson also advises superintendents to take optimum advantage of dew:

"When there is dew on the ground, use a surfactant (wetting agent), or drag a hose across the grass to break the surface tension of the dew and send as much moisture as possible to the root systems. When watering trees and shrubs, use probes so the water will penetrate deeply."

Readings of the soil pH should be taken often to guard against too much or too little salt. If the pH is above 7.2, Dr. Watson says to use gypsum or sulphur nutrients to bring the level down. To increase the pH, which occurs more frequently in the East, lime is necessary. "Use dolomitic limestone if there's a deficiency of magnesium. Otherwise, just apply straight calcium carbonate."

The fertilizer may also have to be changed. Slow-release organic or synthetic nutrients, found in fertilizers such as Milorganite or Blue-Chip, should halt any excessive plant growth. The amount of nitrogen should also be decreased to lessen growth.

Another easy way to avoid turf stress is raising the height of the grass. Dr. Watson suggests that greens and fairways be kept ¼ inch higher than the normal height, but says even 1/32 of an inch can make a significant difference. Any time the turf height is raised it can more easily tolerate the lack of moisture.

The use of mulch and erection of fences or other types of barriers to block the wind is also recommended by Dr. Watson. He suggests placing organic debris around the base of trees, shrubs, and flower beds to hold in moisture. The barriers will help keep down the rate of transpiration when water is applied to turf. Dr. Watson says that any time water is applied to turf, only 3 percent is utilized by the plant. The remainder is lost in the atmosphere and an increase inwind speed, temperature, or humidity reduction means a greater loss.

Further advice is offered by Dr. Gene Nutter, president of GolfScape, a subsidiary of ChemLawn, in Atlanta. Dr. Nutter suggests aerifying slopes, changing tees and cups more often, and not allowing heavy golf car traffic consistently on the same areas of the rough.

Superintendents in the drought-stricken areas have also found other ways to combat problems caused by the shortage.

Jim Prusa, superintendent at Pasa Tiempo Country Club in Scotts Valley, Calif., about 80 miles south of San

Francisco, said the drought has amplified "all of the normal diseases" and has increased the amount of salt in the soil. He worked at Pala Mesa Country Club in Fallbrook, a Southern California community, during most of the drought and found that ample amounts of water were needed to leech the soil in the greens.

"The people who had newer, sandier greens probably stood up better than those with clay soils and those that were 'interfaced': those greens where different superintendents changed from sand to heavier soils over the years and created layers," he said. Those greens with top dressing made it difficult for water to penetrate into the subsurface, Prusa said.

The superintendent said he attempted to "baby" the course last summer; he raised the turf's height, aerified frequently, and applied a light mist to the greens during some afternoons to lower the temperature and respiration rate, even though this meant a salt increase.

Everyone wanted rain, but what happened caused considerable damage. A rainstorm that deposited 3 inches of water in 24 hours caused the loss of six greens at Pala Mesa, Prusa said.

"I can't even tell you how many courses lost greens," Prusa said. The late summer California sun that followed the rains burned the top off of Pala Mesa's annual bluegrass greens, a type of turf that is least resistant to drought conditions.

The oldest and newest methods of controlling turf stress have been accelerated due to the drought. The 18 golf courses in the Los Angeles County park system have been heavily planted with trees. Golf Director Philip Jackson feels the trees have increased the playability and aesthetic value of the courses, but also sees a savings of labor, fertilizer, and herbicide costs because of less turf.

Richard Eichner, superintendent at the Lakeside Golf Club in Hollywood, Calif., may stop overseeding his bermudagrass fairways with perennial ryegrass to cut back on costs, but installed a drip-irrigation system in some perimeter areas. Drip irrigation is a system of applying water to soil at a rate that does not exceed that soil's intake ability. The system basically consists of a waterline with a series of emitters that trickles the water into the soil. It has several advantages, including lower cost and more efficient water use. If used properly, it is a uniform method of watering. Unlike sprinkler irrigation, however, it cannot provide frost protection or cooling during hot weather.

EPA: "We're definitely encouraging using effluent for irrigation."

Implementing these techniques can provide sufficient short-term answers, but golf courses and clubs are facing climbing water costs and short supplies, and in some cases are competing with farmers for the same water.

A technique for the future

For many course owners and club officials, the shortage has left one viable alternative: treated sewage. Just a year ago, The Toro Co.'s group vice president for irrigation, James W. Adams, told Golf Course Superintendents Association of America members at their annual meeting:

"I predict it will not be many years before everyone in this room will be using recycled sewage. You may not use it for irrigation, necessarily, but you will use it. If not for irrigation, you will bathe in it, swim in it, and probably drink it."

An estimated 75 golf courses in the U.S. are using treated wastewater for irrigation and several others are checking into its possibilities. Nearly all of the courses are in the Southwest or Far West, or military installations that can easily draw on the treatment facilities of their compact community.

Numerous groups are advocating the use of treated effluent and some are making studies to determine its safety. "We're definitely encouraging this use," said Bill Thomas, a physical scientist for the U.S. Environmental Protection Agency. "In general, any sewage beyond secondary treatment is usable," he said.

Opponents of effluent use say it is uncertain if some viruses which cause disease are removed when sewage is treated. Dr. A. E. Dudak, professor of ornamental horticulture at the University of Florida, said he has taken samples of treated sewage from residences at about a dozen wastewater plants in Florida. He found such minute traces of contamination that the sewage would present no health hazards for anyone at a golf course.

Dr. Dudak will do further studies and report his findings in mid-1980 to the USGA Green Section and the American Society of Golf Course Architects, the groups that have financed a $5,000 grant to conduct the study. Included in the professor's report will be results about the buildup of small amounts of metals in wastewater over long periods. "The problem with metals is the effect of their continued use over a time," he said.

The scarcity and high costs of water have persuaded Pasa Tiempo officials to seriously look at treated sewage for irrigation.

Officials there have invested about $13,000 attempting to find wells on their property that would deliver enough water for several years. The oceanside course wasn't successful, so they are strongly considering paying up to $40,000 to hook into the city of Scotts Valley's treatment plant. The course now pays 66 cents for each 100 cubic feet of water, which totals between $50,000 and $60,000 each year. The treated effluent will cost about 35 cents per 100 cubic feet and club manager Lee Harris says he will get 70 million gallons annually for $25,000.

"The wastewater also has quite a few nutrients, which should help us cut down on fertilization costs. And there's no odor," he said.

The prospect of using treated sewage for irrigation apparently hasn't upset members at the semi-private, daily fee course, Harris said. He hasn't received any negative comments, possibly since greens fee increases, from $10 on weekdays 2 years ago to $12 now, had been due to water rate hikes.

If a superintendent in the East or Midwest still believes that his counterparts in the West are talking like used car salesmen, they can listen attentively to one of their own.

"We were frantic. We weren't concerned with money. We were concerned with the golf course," says Lew

Morgan, superintendent at Toftrees Country Club.

The driest Pennsylvania summer in 90 years helped drain Morgan's 5-acre pond "like a Texas river; a mile wide and an inch deep," he said. Dredging was impossible since it would break the bottom layer of blue clay that sealed the pond.

Morgan could see the bottom of the pump house foot-valve on Memorial Day, so he took his case to neighboring Penn State University. The school has its agricultural fields adjacent to the golf course, and it was experimenting with treated effluent on wheat and corn crops. Morgan contacted university and extension office officials, became convinced that the sewage would not present a health hazard to golfers or course personnel and received a monthly permit from the State Department of Environmental Resources to use the effluent.

The state agency was somewhat reluctant to grant the permit since treated effluent had never been used in the state, Morgan said. They required him to use the effluent pumped from the university within 8 hours. None could be stored in the pond since the department was concerned about possible contamination if children would swim in or drink the water at night. The total cost to the club was about $1,400, Morgan said, including a mile of pipe.

So the Toftrees course was saved from brown, wilting, ugly grass because of its close location to a wastewater treatment plant. Maybe the only more fortunate golf facility in the country was the 63-hole Innisbrook resort in Tampa, Fla.

A new county sewage treatment plant is pumping ½ million gallons of sewage daily through an underground pipeline into the resort's five pumphouses. The county built a $600,000 pipeline and does not charge Innisbrook a penny for the sewage, since its only alternative was to build a 45-mile pipeline from the Florida shore into the Gulf of Mexico. The plant can treat 16 million gallons daily and Innisbrook has signed a contract giving it the first 3 million gallons, since its own wells are suffering from salt intrusion. The county benefits since it does not have to dump treated sewage into natural bodies of water.

It is more obvious now than two or three years ago that the future of the golf business may be controlled by how its officials decide to use our water supply and modern technology. An official at the George Air Force Base in Victorville, Calif., admits that the course there could not operate without treated wastewater. Not only will the game become stale if managers do not pursue alternatives, but the expansion plans of many courses and clubs will never see an architect's drawing. □

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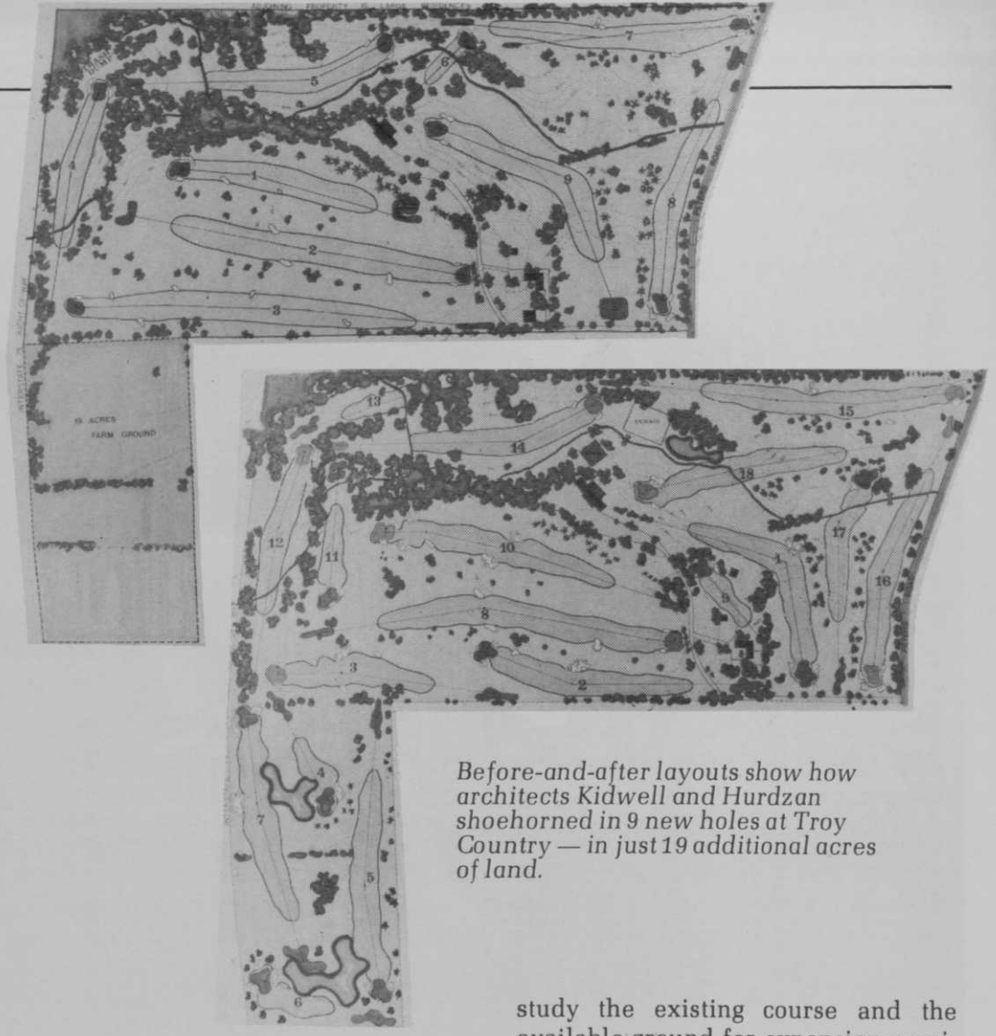
CASE HISTORY:

A new 9 holes on 19 acres



Before-and-after layouts show how architects Kidwell and Hurdzan shoehorned in 9 new holes at Troy Country — in just 19 additional acres of land.

There are very few golfers who have never fantasized about designing the perfect golf hole or golf course. This pipe dreaming is fired by the thought that Pebble Beach, Pine Valley, and Merion were designed by amateurs. However, this flow of thoughts is slightly slowed by the remarks of Bobby Jones when asked why he, the leading golfer of the day, had hired golf architect Dr. Alister Mackenzie to help him with the Augusta National.

Jones wrote in his book *Golf Is My Game;* "I think Mackenzie and I managed to work as a completely sympathetic team. Of course, there was never any question that he was the architect and I his advisor and consultant. No man learns to design a golf course simply by playing golf, no matter how well." This statement is perhaps more true today when one considers the precise technology and strict specifications used in all aspects of golf course construction. But be that as it may, the urge to play the role of golf course designer still stirs in the restless spirit of most golfers.

The problem

To help sharpen your skills and understanding of golf architecture, a practical design problem is here presented with its real solution. The situation was that Troy Country Club in Troy, Ohio, had grown to the point where the membership felt it was time for a second nine holes and a tennis complex. But like many clubs, by the time they decided on their expansion, Troy Country Club found there was only 19 acres of available ground adjacent to their existing course. All other directions for expansion were blocked by Interstate 75, a heavily traveled secondary road, and very large expensive homes.

The existing course had originally been built in 1923 on approximately 88 acres of ground. The land was bisected on its long axis by a small stream that, since the last ice age, had carved a valley 250 to 300 feet wide and about 30 feet below the surrounding level land. Because during the initial construction horses and mules and slip-scrapers were the only earthmoving equipment, most of the existing nine holes were laid out on the flat ground above the creek with only two fairways near the creek.

Therefore the problems for you the architect are:

1. Add another 9 holes with only 19 acres of new ground.
2. Design the course to accommodate all golfers' abilities, but still test the expert.
3. Keep the par at least 70.
4. Holes 9 and 18 should end near the clubhouse.
5. Allow for four to six tennis courts.
6. Keep the existing golf course in play during construction.
7. Stay within a construction budget decided feasible by the expansion committee.

With these design criteria and limitations in mind, use some onion skin paper to make some overlays to find a solution, and then compare it to the one the golf architects decided worked best.

The solution.

Troy Country Club decided to employ Jack Kidwell (currently an officer in the American Society of Golf Course Architects) and Dr. Michael J. Hurdzan from Columbus, Ohio, to study the existing course and the available ground for expansion possibilities. Since the most critical part of expansion was the initial planning, many revisions were made until one layout was developed that would allow for a par 70 golf course and fulfill all the other requirements as well. But to make it possible required using imaginative golf architecture, including converting a trash dump into a spectacular par 3. In addition, to insure that the construction cost would not exceed the approved budget, very detailed plans and specifications were prepared to permit competitive bidding and the posting of a performance bond. The result was 2 percent of the architects' estimate and actually below the club's budget.

Kidwell and Hurdzan began by identifying problem areas, such as locating the possible starting and finishing holes. Since the tennis courts could best be built in the location of the hole, the possible starting holes were existing numbers 1 or 7 or a new hole built by reversing the 9th fairway. The possible finishing holes were numbers 5 or 9 or a new hole built using the 9th green. Since movement to the next hole is so important, the decision on starting and finishing holes was based on the best overall hole continuity.

The second problem was to find all possible locations for holes within the existing golf course. This meant examining the trash dump, the creek

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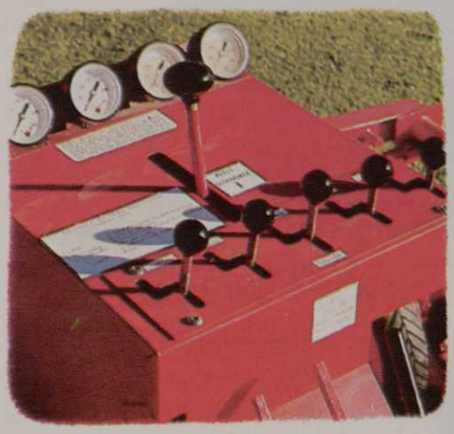

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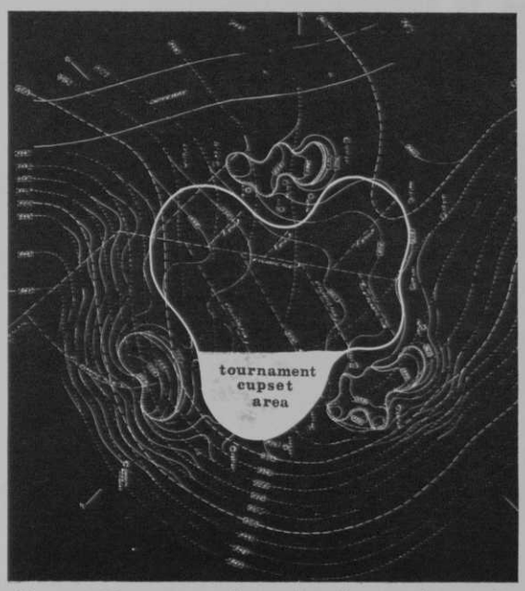

Above: Green number 2 has been planned so the cup may be placed in the rear for average golfers and near the hazards next to the front for low handicap players. The unkept wooded area (upper right) was later turned into the 13th green.

valley, hills, and all other unused land. Then it was necessary to study the 19 available acres to see what combination of holes would make maximum use of the ground.

Jack Kidwell says, "Properly and safely planning the second nine required using all of the open areas created by the original design, and building on ground considered unusable 40 years ago. The early builders avoided earthmoving operations, such as digging large ponds, and hill cuts that are easy with modern equipment."

It was immediately evident that the new course design would be no more congested than the old, and that most construction could proceed without disturbing the existing golf course until after Labor Day.

The course construction actually began on the new 19 acres where two par 4 and two par 3 holes were planned. Two large ponds were planned and built to provide not only fill material for tees and greens, but also to be safety buffers and stragetic installations. Many sandtraps were used to control wild shots, define play areas, and challenge the better golfer. "Because of limited acreage, Troy was not going to be a long golf course, so we felt it should be designed to require more skill the further you hit the ball," explains Dr. Michael Hurdzan. "A good example is the 7th hole. If you only hit the ball 200 yards, your landing area is about 60 yards wide. But if you hit it 250 yards, your landing area is narrowed to 15 yards by a large trap on the left, and the lake on the right. A smart player must balance the advantage of the long drive against the risk of the hazards."

Kidwell and Hurdzan are also proponents of greens design that permits 80 percent of the green to be used for moderate pin placements and the other 20 percent to be used for pin placements to test the accomplished golfer. This is done as is shown in the drawing of green number 2. As can be readily seen, the unshaded area is relatively open, allowing a wider margin of error to an approach shot, compared to the shaded area. The shaded area requires a precisely hit shot which must carry to within a 40-foot circle or stand a chance of landing in a hazard.

Another design feature used to make the short yardage a test for the better player was to provide the most hazard from the longest tees. This was done by building the tees at an angle to the line of play. This is shown by the 4th hole where the short tee is virtually free from a hazardous carry while the longer tee must carry a sizable amount.

The contrast of the new holes to the old ones is noticeable, but since they are intermixed, few people detect a design change. The new holes are distinguished by the large raised greens, flowing putting surfaces, and sweeping traps. But the architectual expressions were not based only on aesthetics, but on a combination of aesthetics and functionalism. Kidwell and Hurdzan believe that the size of the green is governed by the amount of usable cupset space, not by the total size. To build a green of 8,000 square feet that has only five acceptable cupset areas is more foolish than building a 3,000-square-foot green with only five acceptable cupset areas. With most clubs playing 30,000 to 40,000 rounds a year, the superintendent is probably changing cups every day, and during the hot, stressful, slow turf growing part of the summer, it may take 3 weeks to completely heal a cupset area. Thus, greens should be designed to provide a minimum of twenty cupset areas. Since the worn-out area is usually a 20-foot-diameter circle, the total area needed for twenty cupsets equal about 6,200 square feet.

Dr. Hurdzan explains, "All things in nature are selected forms as a result of the function they must serve. If a golf course or even a golf green is to "survive," it must take on a form compatible with its function. A golf green must have good surface and internal drainage, so it must be raised and have roll and should drain in more than one direction. Raising a green above grade also defines the green and makes sand trap faces easier to see. Greens and sand traps should be able to be maintained by power equipment. Therefore, we feel that traps should not be closer than 8 feet to the putting surface to permit turning of greens mowers and other maintenance equipment on the fringe. Slope of sand traps and greens should be steep enough to enhance visual display, but gentle enough to accommodate power equipment."

The plan in action

The work at Troy Country Club was begun in May by Salyers Golf Course

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