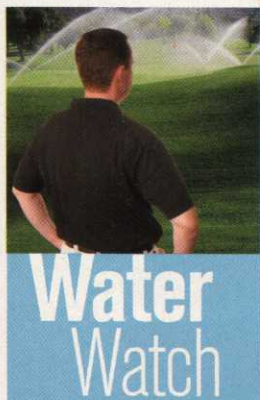


Learning how to deal with effluent and poor-quality water is taking on an increased priority in the golf industry — and for good reason

In Deep Wastewater?



Turf scientist Ronnie Duncan knows well the increasing problem of superintendents dealing with effluent water. He just had to look at the class he taught on the topic with fellow scientist Robert Carrow at the Golf Industry Show in February.

There were supposed to be 60 registrants, but the demand was so overwhelming that the Golf Course Superintendents Association of America (GCSAA) let 75 people squeeze their way into the room.

From California to Colorado to Arizona to Florida and beyond, learning how to deal with water that is either effluent or poor quality is taking on an increased priority in the golf industry. And in many states where the problem does not exist for now, the switch to treated water is on the near horizon. In fact, 10 superintendents in the class Duncan and Carrow taught had been notified recently that their courses will be switching to treated water.

The problems created by poor water,

especially when high in salts, are not just a concern to golf courses. They go well beyond closely mown turf, as municipalities and the private sector also irrigate with it.

“My greatest fear is that we create another Salton Sea, and everything we do impacts the environment,” says Duncan, president of Turfgrass Ecosystems, a water quality consulting firm in San Antonio, Texas. Located in Southern California, the Salton Sea — the largest freshwater body of water in the state — has a salt content that’s higher than the Pacific Ocean and rising. Years of runoff from agricultural farms and polluted leaching from local irrigation districts have caused the problem, resulting in massive bird and fish kills. Some predict the lake could become uninhabitable to aquatic life in the next few years.

Duncan, Carrow and others are concerned that the buildup of Total Dissolved Salts (TDS) in effluent water used for irrigation could have a disastrous effect on the environment. As Duncan points out, government regulations

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"The key is people don't realize that not all water is good water for turf."

SHAWN EMERSON,

DIRECTORY OF AGRONOMY
DESERT MOUNTAIN PROPERTIES

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are focused on human exposure and not the eventual deposition of the minerals and salts. Duncan says the latter problem should be a concern of the turf industry.

"If (salt) gets in the soil, then where is it going to go?" Duncan asks. "[But] this [problem] is much bigger than golf turf."

The use of effluent water and the problems it causes is a complex issue. There are no simple guidelines to follow or quick-fix chemicals to alleviate the difficulties.

Carrow, who co-authored with Duncan the book, "Salt-Affected Turfgrass Sites: Assessment and Management," says there are a few hard and fast rules when it comes to dealing with reused water. First, superintendents must have accurate water testing so they understand the specific problems. Second, constant monitoring of water to detect quality changes is imperative. There is also one very important rule to consider even before a course switches to effluent.

"Do not enter into a contract where you

have to accept a quantity of water constantly," Carrow says.

That scenario leads to problems when superintendents are forced to irrigate merely to make room for more water. With the subsequent overwatering, contaminants build up quicker and turf also suffers from being too wet.

Carrow breaks water problems into three categories: high total soluble salts, nutrient imbalance and high sodium content. But the issue is more in-depth. There can be 10 or 12 variables that come into play. "You have to understand, it's complex when you get poor water quality. It is site specific," Carrow notes.

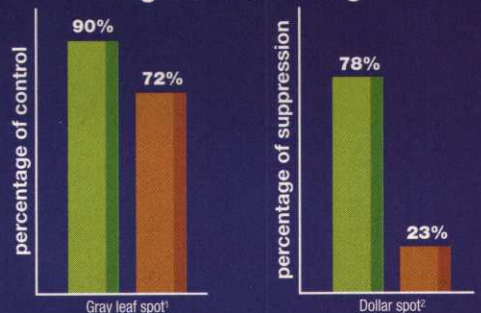
Some of the factors affecting water include quality of the original supply, method of purification used by the supplying municipality, soil type, weather patterns, and drainage and irrigation systems.

To illustrate how complex the issues are, Duncan points out that bicarbonates and calcium are found in high levels in areas of the West even before entering the municipal water supply.



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In another common scenario, over time a prolonged drought can turn good water bad or bad water worse. Duncan says he always knows when a dry spell has affected water quality in a specific part of the country. "That's when my phone starts ringing off the hook," he says.

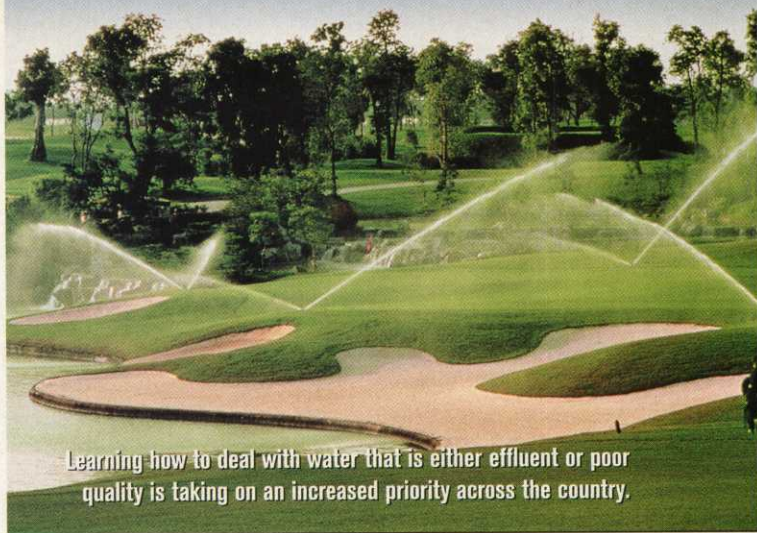
Maybe no other location in the country has as many water-related issues as greater Scottsdale. First, Scottsdale is arid, receiving about 6 inches of rain a year. Second, the crushed granite soil drains poorly. Third, what was poor water is getting worse as sodium levels have increased dramatically.

The reason for the drop-off in quality is directly related to humans. According to Shawn Emerson, director of agronomy at the six-course Desert Mountain Properties, nearly 40 percent of the sodium in his irrigation water is from home use of water softeners.

Once in the ground, the sodium ions pull water away from the plants. Sodium that makes its way into the plant structure restricts the flow of other nutrients, causing the plant to starve itself.

Desert Mountain switched to effluent in October of 1998 and Emerson says problems with the turf developed shortly after. He estimates the cost of balancing the effects of the water is more than \$100,000 a year per course.

To combat the problem, he is paying more in labor, fer-



Learning how to deal with water that is either effluent or poor quality is taking on an increased priority across the country.

tilization and sod. Overseeding has become more expensive because ryegrass is not tolerant to salt, so his germination rate has been lower since converting to effluent. Some smaller-budget courses in the Scottsdale region have foregone overseeding because they don't have the means to maintain the rye with such poor water, Emerson says.

One way Emerson is combating sodium build-up in fairways — his USGA greens allow the sodium to leach away — is aerifying six to eight times a year at varying depths to increase leaching. Another way is to actually overwater at times in an effort to flush the salts out of the soil.

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Superintendents are often advised to add amendments to soils, which in turn affect fertilizer programs. For some, a switch from granular to liquid nutrients is needed to help the turf take up the fertilizer. For Emerson and others with larger maintenance budgets, the management practices are working to a small extent.

"We are holding off the sodium," Emerson says. "We're not alleviating the problem. You have to attack it from multiple directions."

For superintendents who find they have problems, Duncan says it may take three to five years before they can get the problems under control.

This year a respite for Scottsdale has come in the form of increased rainfall. From Dec. 1 to March 1, 12 inches of clean, low-sodium water fell, improving soil quality and plant health markedly. "The rain has removed about 30 percent to 40 percent of the sodium (in the soil)," Emerson says.

It's not just maintenance costs that have risen dramatically as the water quality has waned. Construction costs have also skyrocketed. Emerson estimates that an additional \$800,000 was needed to build each of the last two layouts at Desert Mountain. To improve leaching, the courses were plated with 8 inches of sand. Also, irrigation heads were moved from spacing of 60 feet down to 55 feet in an effort to improve coverage and 60,000 linear feet of drain tile was installed compared to the usual 20,000 to help move water.

To try to cut down on costs of dealing with wastewater, more than 20 courses in the north Scottsdale area have banded together and are working with the city to come up with a solution to a problem that is also facing ball fields, parks and any other facility using the wastewater.

Emerson says one possible answer is the construction of a reverse osmosis plant, which is extremely expensive, about two to three times the cost of a standard water purification facility. Another plan is to educate residents about the problem in hopes of getting homeowners to change from sodium chloride water softeners to potassium chloride-based products. Sodium levels in re-used water would drop by 20 percent if half the residents make the switch.

"The key is people don't realize that not all water is good water for turf," he adds.

Emerson notes that it's important for the

general public to understand that golf courses want to help in conserving water by using effluent and that improved water quality will actually reduce the amount of water needed. With the current situations, courses use large amounts of water — up to 150 million gallons a year — in efforts to flush the contaminants from the soil structure. Better water would not require as much irrigation.

Not every course dealing with effluent has it as bad as those in Scottsdale. Winter Pines Golf Club in Winter Park, Fla., has been using effluent since 1984, a year after it opened. Joe Ondo is the only superintendent the course has ever had, and his course's water comes directly from the Winter Park Estates Treatment Plant about two miles from the course. The course does not have retention ponds, and a contract with the treatment facility does not require the purchase of a predetermined amount of water.

According to Ondo, not only did the treatment plant start putting out good water but the quality has improved over the years. The course averages about 150,000 gallons a day.

"We have to use a little more gypsum," Ondo says. "Our biggest problem is the smell of chlorine more than anything else, and we can live with that."

Winter Park is built on a mud/peat base and the greens are pushup, the certified superintendent says. The course has some problems with drainage, but he says improvements in surfactants and aerifying equipment have helped him deal with that problem over the years. The heavy rains that accompanied the Florida hurricanes in 2004 helped to flush contaminants from his soil.

Because Winter Park hosts about 65,000 rounds a year, Ondo keeps the green and fairway heights of cut a little higher than most — greens at 5/32 of an inch and fairways at 5/8 of an inch — which he says helps the turf deal with the stresses related to effluent. It's Ondo's response — raising mower heights — that Emerson says is one of the many answers to irrigating with effluent.

But for the issues to be dealt with in a way that also protects the environment, Emerson says there must be input from across the golfing spectrum. "It's going to have to be an industry solution," he adds.

In Duncan's mind, there never will be a solution. He also says the situation is getting worse.

"It's as good as it's going to be," he adds. ■



PHOTO BY: LYNN PELHAM

"Our biggest problem is the smell of chlorine more than anything else."

JOE ONDO,

CERTIFIED SUPERINTENDENT

WINTER PINES GOLF CLUB