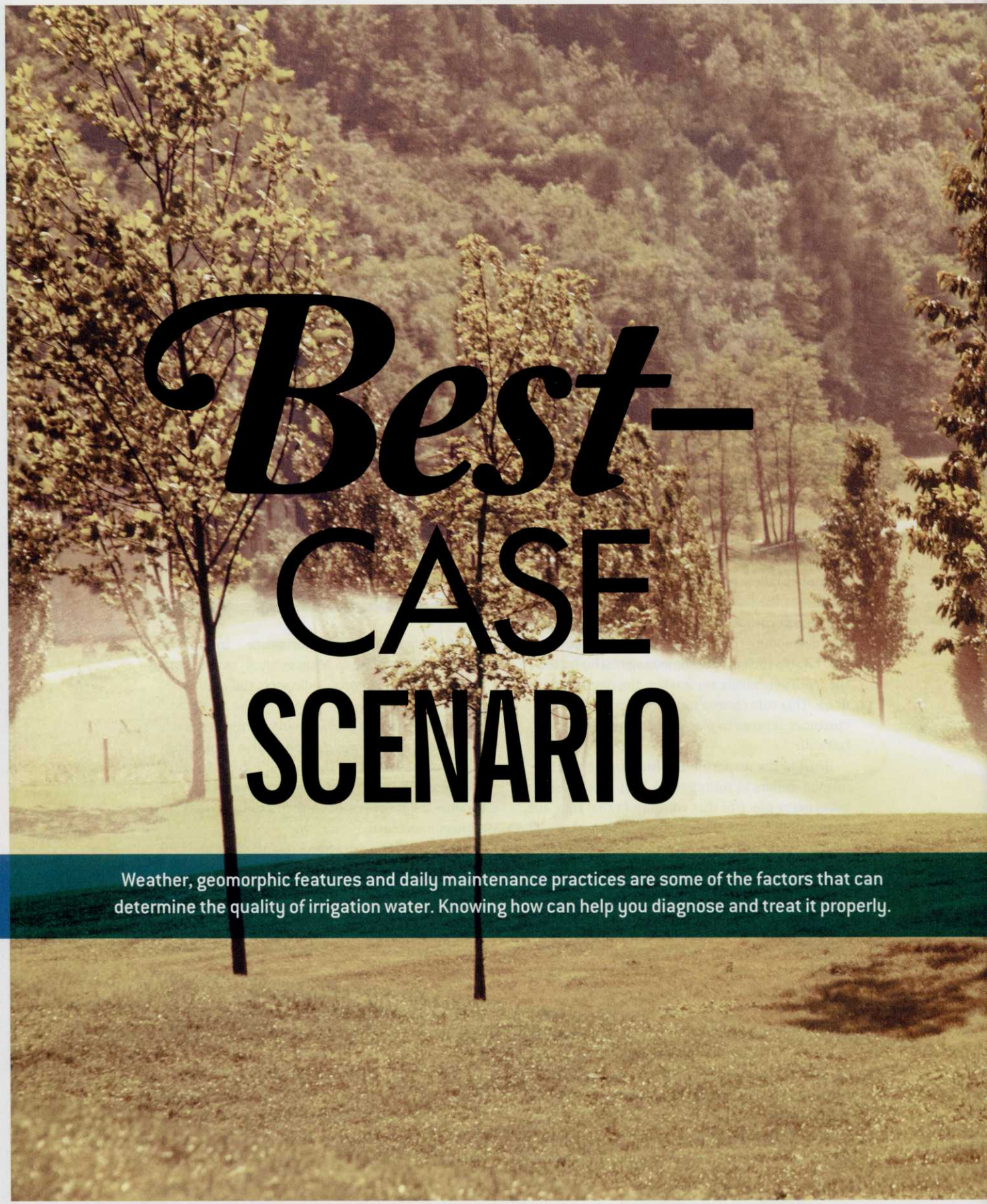

Best-CASE SCENARIO

Weather, geomorphic features and daily maintenance practices are some of the factors that can determine the quality of irrigation water. Knowing how can help you diagnose and treat it properly.

BY JASON STAHL

Whenever the topic of water quality comes up, Dr. Dara Park, a soil and water specialist with the Clemson University School of Agricultural, Forest and Environmental Sciences, likes to relate the story of a superintendent in Boston she worked with. He has tertiary-treated wastewater, which is one step better than secondary-treated wastewater, which can be applied to landscapes. Besides that, he has two wells. But the irony is that his treated wastewater is of better quality than his well water, which has salt and high bicarbonates.

"So he asked me what he should use, and I told him to definitely use his tertiary-treated wastewater over the well water," says Park.

The moral of this story? It all depends on what you have to work with.

The most common issue with irrigation water that Park sees is salinity. A close second she says is bicarbonates and carbonates, which come from groundwater as the result of the dissolution of rocks and minerals. She sees that problem frequently in South Carolina where she is located, but says it also occurs across the country.

"It's one of the things you always want to look at," says Park.

As far as salinity goes, Park says it isn't an issue that only coastal golf courses have to deal with.

"You can run into [salinity] issues inland, too, especially out west in the arid region," she says. "The reason is because you have all this evaporation and minerals, and they just end up accumulating in the soil because you don't have the rainfall to leach them out."

Demand for potable water is increasing, and thus pressure is being placed on superintendents to look at using non-potable alternatives, such as recycled water. This water presents its own challenges.

"Salts, chloride and particulate matter or organic material can be found in reclaimed water because it only has to meet certain standards," Park says. "It comes from bleach or sodium hypochlorite or chlorine

KEY POINTS

- Superintendents can no longer relay on potable water sources for irrigation.
- There is no single, magic solution to correct poor water quality.
- Pure water – sans minerals or positively charged ions – can compact soil and prohibit water from reaching roots.
- Hydrologically connected surface water can transport soil contaminates from areas far outside of your facility.
- When a drought conditions persists, salt buildings up in the soil and causes problems.

TESTING 1-2-3

As far as testing irrigation water quality, superintendents can initially do it themselves and then, depending on the results, they may want to turn to a land grant university or extension.

"Land grant universities tend to be cheaper in the cost of analysis, but a lot of private labs give discounts if you're going to use them over a certain number of years," says Park.

The most important thing is to take the sample correctly and get it to the lab on time. The lab will offer detailed instructions on how to take the sample correctly. "Once [the superintendent] takes the initial sample and sees what they have to work with, it may be that they monitor the water themselves or need to keep taking samples and sending them in," Park says.

There are some components of water, such as pH, salinity and electrical connectivity, that can be monitored via a pocket meter. If superintendents suspect there is an issue with any of these three things, they can monitor it easily themselves.

"What I always tell my superintendents is to monitor for more than a year because weather changes, water quality changes, etc.," Park says. "If you see you're going into a drought or you have a lot of rainfall, monitor right then just to see where you're at. Then once you have at least one year of data, you can determine what you need to do."

gas that most of our wastewater treatment plants use as a disinfectant, so those end up being found in high quantities in the final product. If that isn't managed over time, you can have a lot of organic buildup in soils and have 'black layer' occur."

Geomorphic or land features can have an impact on water quality, too. In South Carolina, as you move closer to the coast, the aquifers are closer to the surface. Between those aquifers are confining units or layers, which are also thinner near the coast. Those thinner layers can cause problems, as Park explains.

"You can have water being transferred from an underlying aquifer to an above aquifer if you draw too much water from the overlaying one," she says. "If the below aquifer is saltier and the above aquifer is freshwater, obviously the above aquifer is going to all of a sudden have salts in it. That's not so much the case as you go further inland because usually those confining units are thicker."

Plant materials and soil type also influence water quality. For example, Piedmont, South Carolina has a lot of clay, which is high in iron. Thus, superintendents in that area can potentially have a lot of iron in their water. Park is quick to point out, however, that iron can be found all over the country. The rocks that groundwater moves through can affect water quality, too.

Surface water in flat areas like South Florida is hydrologically connected. As a result, if someone puts too much fertilizer out upstream or somewhere in the landscape and it runs off into the surface water body or percolates through but then moves horizontally through the soil (because everything is hydrologically connected), you can have nitrogen or that fertilizer show up a mile or two down from the original source.

"So if you have very flat land and all your water sheds are hydrologically connected, you may be taking good care of your water and practicing good management but someone else not too far away may pollute it," says Park.

In areas like Aiken, South Carolina and Augusta, Georgia, and even Clemson, South Carolina, there is "pure" water that has nothing at all in it. This can also be a problem, says Park.

"Because there's nothing in the water, you could have soil structure issues in that your soil falls apart because there is nothing to hold it together," she says.

Without any minerals such as calcium or magnesium, or positively charged ions, to hold the soil together, it can become compact and make it difficult for water to penetrate and get to turfgrass roots. Plus, air movement gets limited. That's why pursuing reverse osmosis isn't always the answer, says Park. A lot of courses on the coast that have really bad water can afford to put in a reverse osmosis system in, but Park tells them, "You know, you're taking everything out of the water, which isn't necessarily a good thin. As you can see, there's no perfect water source out there."

Turf care practices come into play, too. Park advises the spoon-feeding technique when it comes to fertilizers – less but more frequently. That goes for amendments, too. When it comes to pesticides, Park says superintendents need to know what they're applying and how to calibrate their spreader/sprayer.

"I'm always shocked by the number of turf managers who still can't do that properly," says Park. "That's not just big for the environment but their pocketbook as well. If they're putting out too much, that costs more. And if they don't put out enough, they'll have to go out again and reapply, which costs more."

There's usually not one magic thing to manage water quality when you have poor water, no matter what the problem is, Park concludes. **GCI**

Jason Stahl is a Cleveland-based freelance writer and frequent GCI contributor.

Treatment Options: CHEMICAL VS. BIOLOGICAL

There are many different ways to chemically treat irrigation water before it's applied. Which one you should use depends on the problem. And cost ranges widely, too.

"It could be just using a UV light, or as expensive as the reverse osmosis system or as cheap as sand filtration," says Park.

But there are ecological treatments, too. For those superintendents who are concerned about the water leaving the course and polluting another area, like a pond, floating wetlands, or floating mats, can be used. According to Park, they consist of plants that are known to be better at accumulating or cycling out nutrients or even certain metals.

"[The floating mats] are really catching on," Park says. "They can be decorative, changed out seasonally, harvested and sold for decorative plants or food such as different kinds of lettuces, etc."

However, what is still the most common method, says Park, is planting these wetland plants around the edges of a pond.