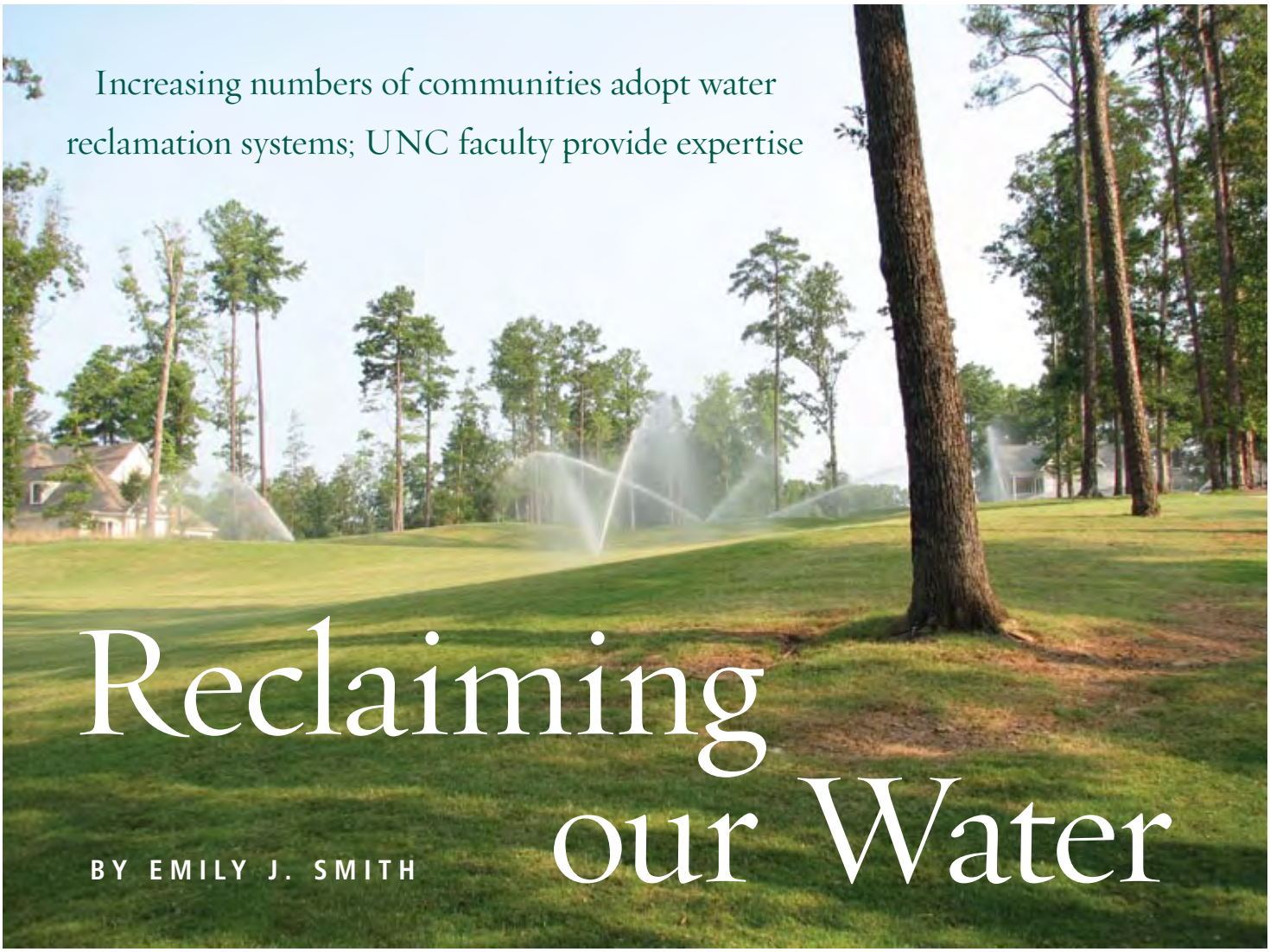


PHOTO BY LINDA KASTLEMAN

Increasing numbers of communities adopt water reclamation systems; UNC faculty provide expertise

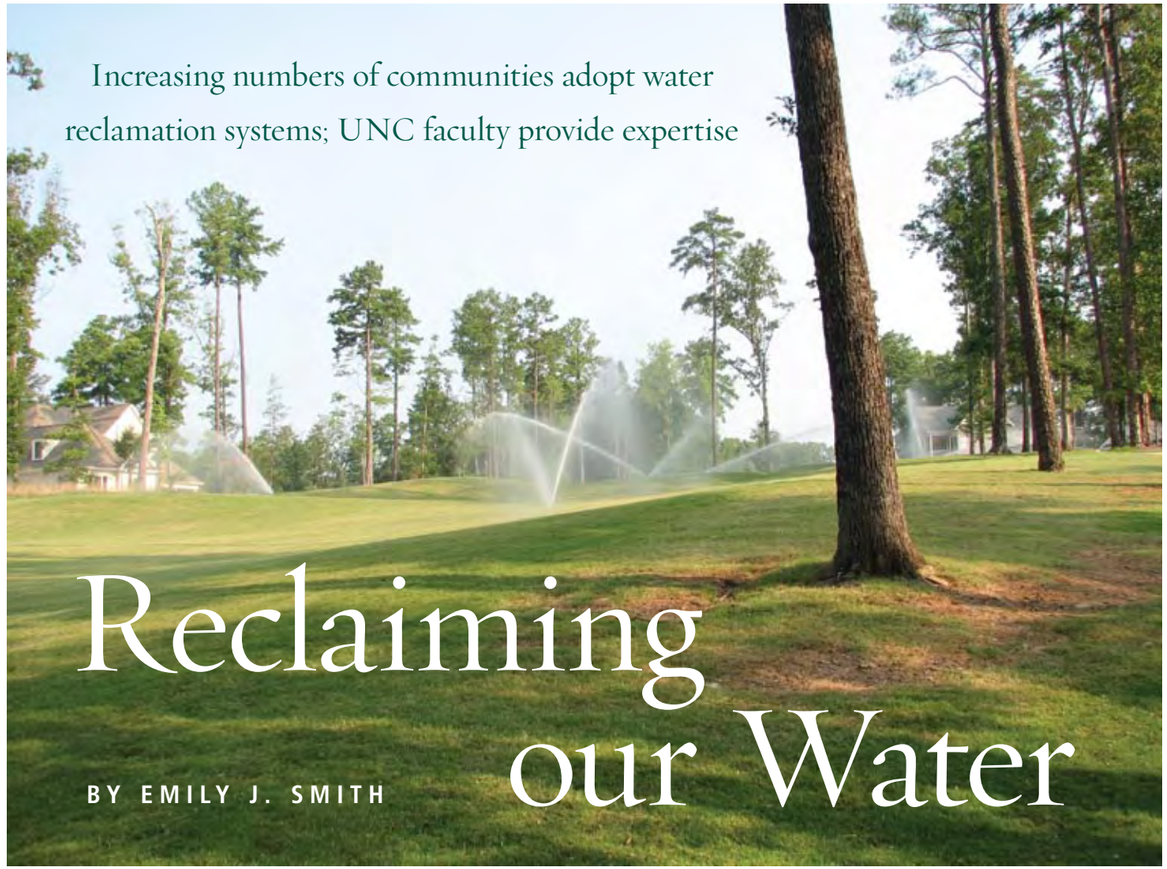
Reclaiming our Water

BY EMILY J. SMITH

Cities across the United States and throughout the world face water shortages due to drought and increased demand from burgeoning suburbs. Global climate change soon may further exacerbate shortages. To help relieve the problem, increasing numbers of cities, and even small communities, are implementing reclaimed water systems for non-potable (non-drinking) purposes. While perhaps only 3 percent of all wastewater generated in the United States is reused, 30 to 40 percent of the total water demand someday could be met by reclaimed water.

Four decades ago, reclaiming wastewater for landscaping, crop irrigation, fire protection, toilet-flushing or similar uses was controversial. During that era, Dr. Daniel Okun, now Kenan Distinguished University Professor Emeritus of environmental engineering at Carolina's School of Public Health, authored a journal article on the topic and submitted it to a prominent sanitary engineering academic journal. The article was initially refused. The journal editor later agreed to publish it only if rebuttals could be published alongside it. Okun was way ahead, but the times have caught up with him.

"These days, hundreds of cities worldwide have reclaimed water systems and many—especially those in California and Florida—couldn't survive without them," says Okun.



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Increasing numbers of U.S. golf courses like The Preserve at Jordan Lake, in Chapel Hill, N.C. (left), use reclaimed water to irrigate the green.

In 1973, he helped plan the first, and one of the largest, municipal reclaimed water systems in the world in St. Petersburg, Fla.

In many communities around the world, reclaimed water also is used in air conditioning cooling towers, industrial processing and construction. It's also used for irrigating golf courses, ball fields and playgrounds, cleaning vehicles, buildings and streets, and creating environmental enhancements such as ponds, fountains and urban streams. Its cost ranges from half to equal the amount paid for drinking water.

Water reuse involves a "dual water system"—a conventional potable (drinking) water distribution system and a similar system for the reclaimed water. Since most U.S. cities already have water supply and wastewater collection and treatment facilities, those adopting reclaimed water systems must retrofit their systems to include more steps of wastewater treatment that can produce higher quality water for reuse. Also, they must construct distribution pipes and a storage tank for the reclaimed water.

Many communities believe the trouble and expense is worthwhile. In predominantly suburban Cary, N.C., reclaimed water is used for lawn irrigation. Some water municipalities, like the Irvine Ranch Water District in California which serves the city of Irvine and portions of Tustin, Newport Beach, Costa Mesa, Orange and Lake Forest, are installing dual systems in new areas and retrofitting older communities with water lines. In fact, California, in 1968, was the first state to adopt standards for water reclamation. The state hired Okun as a consultant for more than a decade during that era to help refine those standards.

TIP: Support projects that use reclaimed wastewater for irrigation and other uses. For more information about reclaimed water, visit: *www.wateruse.org.*

"Since California was a leader in this area, they were setting the stage for other states to follow," Okun says. "While I was working with them, the Irvine Ranch Water District became the first U.S. utility to require that all high-rise buildings in the city use reclaimed water for toilet-flushing and air conditioning. I worked with them to set the regulations for this."

Since then, more than 40 states have adopted reclaimed water guidelines or standards.

Some communities have adopted water reclamation systems because of the need for additional water supplies; others have initiated systems to reduce the costs of wastewater disposal. For St. Petersburg, it was both. Since the 1920s, the city had been drawing water from wells in adjacent counties, some as much as 40 miles away. In the 1970s, legislation drawn up by the neighboring counties of Pasco, Hillsborough and Hernando prevented St. Petersburg from developing further municipal wells in those counties.

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With St. Petersburg's population continuing to grow, the city realized that without other water sources, it soon would be facing water shortages.

Additionally, new state regulations passed by Florida at that time required stringent removal of nutrients, such as phosphorus and nitrogen, from treated wastewater before it was discharged into Tampa Bay or other surface waters. Upon investigation, city officials realized that it would be less expensive to upgrade their water plants with a reclaimed water treatment system than to meet the state's requirements for discharging into surface waters.

Today, St. Petersburg's reclaimed water system provides 37 million gallons per day to more than 10,600 customers, primarily for lawn irrigation, and significantly contributes to reducing demands on the city's potable water system. Hydrants, pipes and fittings for the potable and non-potable systems are color coded to avoid cross connections between the lines.

Raleigh, N.C., soon will be joining the hundreds of communities nationwide that have implemented reclaimed water systems for non-drinking purposes. The first phase of a 30-year plan is under design. The completed system is expected to have approximately 145 miles of pipeline, two pumping stations and three storage tanks.

Raleigh, like many North Carolina communities, faces increasing periods of drought and water-use restrictions. The new water reclamation system could solve many of the city's water problems. The project is predicted to cost around $86 million, paid with funds from sewer and water fees. City officials say the new system will save the city approximately $18.5 million when fewer gallons of the state's precious drinking water are diverted for other purposes. Furthermore, less demand on the city's potable water system will mean the city won't be forced to search for new water sources or plan for expansions as quickly. ■