

Orange County has led the way as a model for recycling water, but here's what's being done to do more

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Mehul Patel is program manager for the Orange County Water District's Groundwater Replenishment System. He's standing amid vessels that use reverse osmosis membranes to filter treated wastewater and produce purified water. BILL ALKOFER, STAFF PHOTOGRAPHER

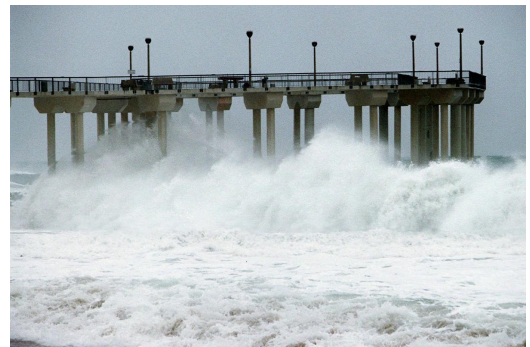
BY AARON ORLOWSKI / STAFF WRITER

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In the 1960s, when most of Irvine was farm fields, planners realized the value of recycling water. In a remarkable act of foresight, they built an extra set of pipes into plans for the master-planned city to carry treated wastewater to those fields.

“We could work with developers to put in main distribution lines as development was happening,” explained Mark Tettemer, the Irvine Ranch Water District’s recycled water development manager, who likened the young city to a “blank slate.” “We could hook people up Day One. When that park went in, it went in with recycled water in mind. That’s a lot easier to do than convert people.”

Originally, the water district supplied recycled water to farmers. Today, subdivisions have replaced citrus groves, and the Irvine Ranch Water District treats and distributes nearly all the wastewater it takes in.

More than 20 million gallons per day of recycled sewer water floods through the district’s 500 miles of purple pipes – a color Irvine Ranch chose that now is an industry standard – to irrigate parks and lawns, to fill industrial cooling towers and to flush toilets in office buildings.

During this historic drought, more cities and counties across the state are looking to Orange County as a model for how to efficiently recycle their water.

Indeed, recycling wastewater for irrigation through purple pipe systems was only the first step for Orange County.

Since 2008, Orange County Water District has operated the largest recycling plant in the world for creating drinking water not immediately destined for home faucets in Fountain Valley. The plant churns out 100 million gallons a day of purified wastewater – water that is put back in the ground for later consumption.

That’s what water managers across the state want to model, and build on, with more and more novel methods of reusing water emerging. As officials write the playbook for these new recycling methods, they’re

turning to Orange County for expertise on regulating recycling and defining the standards.

Those new methods include the golden goose of recycling: putting treated water directly into people’s homes. That’s a possibility state officials are only just beginning to study.

Money is flowing

Plenty of money is flowing for recycling projects, with \$625 million reserved out of \$7.5 billion in water bond money raised from Proposition 1, passed in 2014.

“In my mind, there’s really no better time to move forward with this kind of thing. The need is there with the drought, and the state is willing to fund it,” said James Hawkins, the policy analyst for Santa Barbara environmental nonprofit Heal the Ocean and author of a recent report on recycling.

There’s plenty of potential for more recycling in Orange County, which still discharges more than 100 million gallons of wastewater into the ocean every day.

Even though OCWD recently expanded from 70 million gallons a day of recycled water to 100 million gallons at its plant in Fountain Valley, it could handle more if a planned expansion proceeds.

The wastewater the water district treats is essentially the low-hanging fruit of wastewater: It comes from the sanitation district plant next door and is relatively low in salts and other solids.

Additional wastewater for an expansion to 130 million gallons a day would have to be pumped in from Huntington Beach. Because it comes from coastal areas and Inland Empire brine flows, it’s saltier – meaning it requires more electricity to treat.

The district’s recycling efforts go back to the 1970s, when water agencies began work on Water Factory 21, a treatment facility that took treated wastewater and

injected it into the aquifer to form a barrier against saltwater intrusion.

Today's Groundwater Replenishment System replaced that program when it came online in 2008. The water is both injected to maintain the saltwater barrier and pumped up to Anaheim, where it is dispersed on spreading grounds to percolate into the aquifer underneath.

Shifting attitudes

It wasn't long ago that disgust over drinking recycled water derailed projects in San Diego and Los Angeles.

But OCWD's persistent messaging – that recycled water is safe, it's good for the environment, and it's a locally controlled, drought-proof supply – gradually won people over during the decade before the replenishment system came online.

In focus groups, messaging on those three points increased acceptance of recycled water by 20 percent, said Mark Millan, principal at Data Instincts, a public relations firm that has worked on recycling and desalination issues.

"The initial response from most people is typically characterized as a yuck factor," Millan said. "When they learn about the treatment process, they're impressed with the technologies and the testing and the scrutiny."

It's easier for people to feel comfortable with recycled water that passes through an environmental buffer like the aquifer, said Mike Wehner, OCWD assistant general manager.

"It's no longer perceived as recycled water once it's been blended," Wehner said.

Current state regulations only have rules for storing recycled drinking water in a groundwater basin. Other methods of storing it aren't yet allowed. But that could soon change.

In the coming years, San Diego water officials plan to pump highly purified wastewater 25 miles to San Vicente Reservoir, mix it with other reservoir water and serve it to customers as part of a \$3.5 billion recycling scheme.

Breaking new ground

Such a surface water augmentation scheme has never been done in the state, and the rules governing how it must work are not yet written.

"We're trying to figure out right now what requirements we want to set for the environmental buffer," said Randy Bernard, the recycled water chief at the state's Division of Drinking Water. "What's the size, what's the capacity, what's the input-output."

Mixing recycled water into reservoirs is an outgrowth of mixing it into groundwater aquifers, with a key difference.

Though both methods preserve an environmental buffer between the recycled water and customers' taps, aquifers are easier to monitor.

Water usually seeps through the ground at a relatively steady rate and moves in a predictable direction. In a reservoir, winds and water levels can easily affect where the water moves and how quickly water dumped in the reservoir makes its way to exit pipes.

Specifically, in a reservoir, the cold water lingers near the bottom and warm water near the top. So when the warm, treated wastewater is dumped in, it stays near the top. But at certain times of the year, the reservoir "flips" and warm and cold water get mixed.

With water more difficult to track in a reservoir, officials will likely require wastewater to be diluted a certain amount.

"Dilution is one thing, looking at that as a buffer. And if a reservoir can maintain a certain amount of dilution, you can maintain public health," Bernard said.

A state committee is drafting rules to regulate how recycled water might augment supplies in reservoirs and is also examining what experts consider the final frontier of recycling: routing treated water directly into pipes bound for people's houses.

By the end of December 2016, state officials must also submit a study to the Legislature detailing the feasibility of direct potable reuse.

Wastewater to tap water

The appeal of sending recycled water straight to people's homes is simple: efficiency.

"That could save tens of millions, if not hundreds of millions, of dollars," said Millan, the PR analyst. "You're no longer ripping up streets laying purple pipe, you're no longer building some kind of indirect potable treatment plant. You're building this facility that monitors and treats so well you can go directly to pipes."

Direct potable reuse, as the process is also known, would also be more efficient because of where treatment plants are located. Wastewater treatment and recycling plants are usually at lower elevations, while reservoirs and drinking-water plants are at higher elevations. If recycled water were treated at low elevations and put directly in pipes, it wouldn't have to be pumped to higher elevations for storage in reservoirs, or for a second round of treatment.

Before officials can begin pouring purified wastewater into taps, though, monitoring methods will need to improve.

Right now, it takes at least a couple of days and sometimes a week to detect problems in drinking water sources. To make direct potable reuse safe, officials will need to know of problems instantaneously.

Orange County has led the pack so far with recycling. Whether it will continue to do so by turning wastewater

into drinking water will probably be determined more by necessity than desire.

With a groundwater basin ideally suited for storing water, there's little reason for most of the county to shift to direct potable reuse. The one place it might make sense is South Orange County, which lacks a major groundwater basin and doesn't have large reservoirs.

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