

For Drinking Water in Drought, California Looks Warily to Sea

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Credit Damon Winter/The New York Times

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CARLSBAD, Calif. — Every time drought strikes California, the people of this state cannot help noticing the substantial reservoir of untapped water lapping at their shores — 187 quintillion gallons of it, more or less, shimmering so invitingly in the sun.

Now, for the first time, a major California metropolis is on the verge of turning the Pacific Ocean into an everyday source of drinking water. A \$1 billion [desalination plant](#) to supply booming San Diego County is under construction here and due to open as early as November, providing a major test of whether California cities will be able to resort to the ocean to solve their water woes.

Across the Sun Belt, a technology once dismissed as too expensive and harmful to the environment is getting a

second look. Texas, facing persistent dry conditions and a population influx, may build several ocean [desalination](#) plants. Florida has one operating already and may be forced to build others as a rising sea invades the state's freshwater supplies.

In California, small ocean [desalination](#) plants are up and running in a handful of towns. Plans are far along for a large plant in Huntington Beach that would supply water to populous Orange County. A mothballed plant in Santa Barbara may soon be reactivated. And more than a dozen communities along the California coast are studying the issue.

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The Parched West

Articles in this series will explore the impact of the drought that has hit states from the Pacific Coast to the Great Plains.

The facility being built here will be the largest ocean desalination plant in the Western Hemisphere, producing about 50 million gallons of drinking water a day. So it is under scrutiny for whether it can operate without major problems.

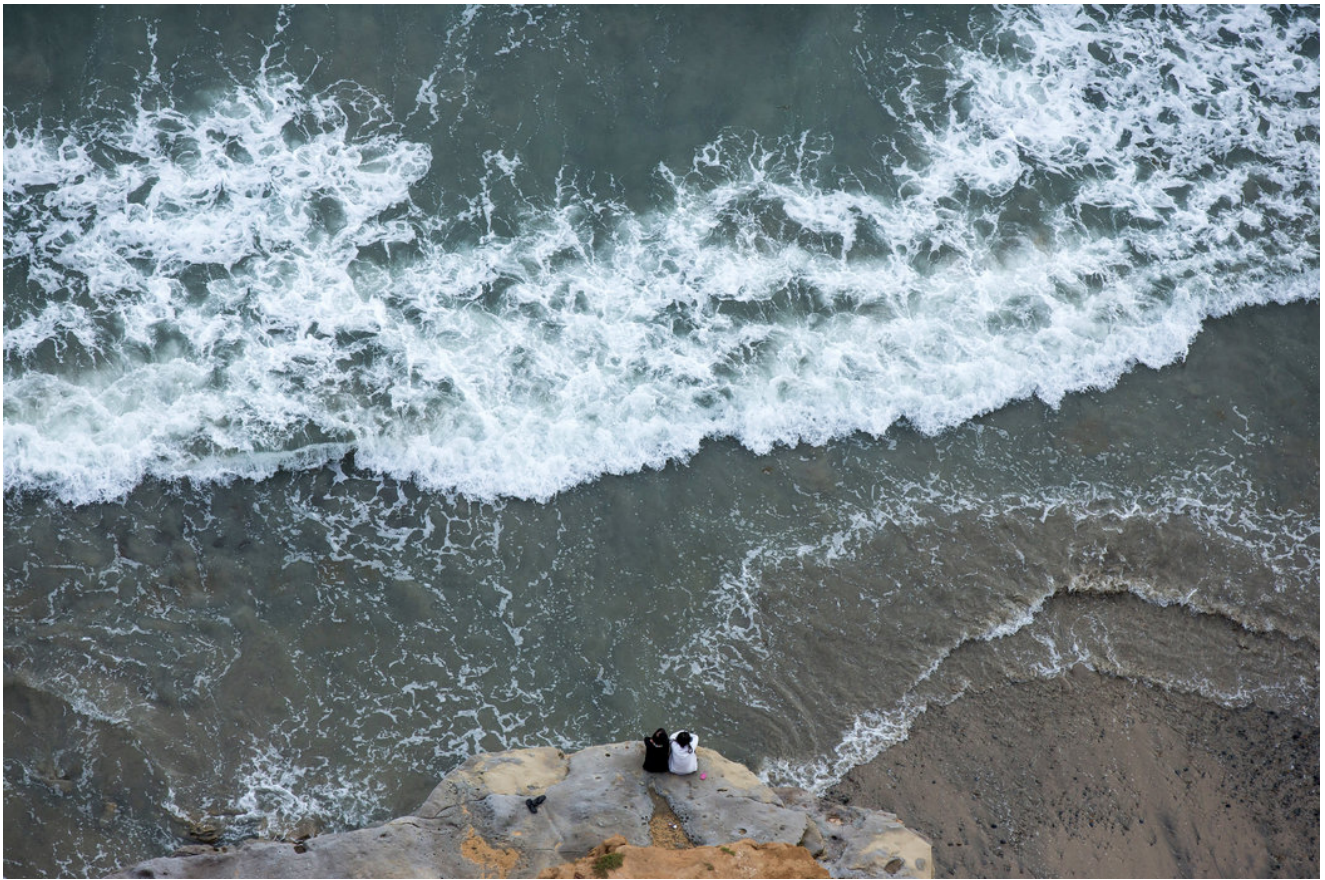
"It was not an easy decision to build this plant," said Mark Weston, chairman of the [agency](#) that supplies water to towns in San Diego County. "But it is turning out to be a spectacular choice. What we thought was on the expensive side 10 years ago is now affordable."

Still, the plant illustrates many of the hard choices that states and communities face as they consider whether to tap the ocean for drinking water.

In San Diego County, which depends on imported freshwater supplies from the Colorado River and from Northern California, water bills already average about \$75 a month. The new plant will drive them up by \$5 or so to secure a new supply equal to about 7 or 8 percent of the county's water consumption.

The plant will use a huge amount of electricity, increasing the carbon dioxide emissions that cause [global warming](#), which further strains water supplies. And local environmental groups, which fought the plant, fear a substantial impact on sea life.

Photo



The Pacific Ocean will feed a desalination plant in Carlsbad, Calif. The intake of seawater and the disposal of salt into the ocean can harm sea life, environmentalists say. Credit Damon Winter/The New York Times

The company developing the plant here, [Poseidon Water](#), has promised to counter the environmental damage. For instance, it will pay into a California [program](#) that finances projects to offset emissions of greenhouse gases.

Still, some scientists and environmental groups contend that if rainy conditions return to California, the plant here and others like it could become white elephants. Santa Barbara, northwest of Los Angeles, built its desalination plant a quarter-century ago and promptly shut it down when rains returned.

Australia is a more spectacular case: It built six huge desalination plants during a dry spell and has largely idled four of them though water customers remain saddled with several billion dollars' worth of construction bills.

"Our position is that seawater desalination should be the option of last resort," said Sean Bothwell, an attorney with the [California Coastkeeper Alliance](#), an environmental coalition that has battled California's turn toward the technology. "We need to fully use all the sustainable supplies that we have available to us first."

The rising interest in desalination is not simply a matter of desperation, though that is certainly a factor in states with growing populations and few obvious sources of new water. Advocates say the technology has improved markedly over the past 20 years. While the water can cost twice as much as conventionally treated water, it is still less than a penny a gallon, and that is starting to look tolerable in parched regions.

Desalination has grown into a huge industry, with more than 15,000 plants operating around the world. Many are small and treat brackish groundwater, requiring much less energy and costing less than seawater treatment. The United States already has scores of these smaller plants.

Huge plants treating seawater have been rare here, but they exist elsewhere, particularly in chronically dry regions

like the Middle East. In little more than a decade, Israel has moved from perpetual water crisis to a point where it will soon get half its water from desalination. Israeli engineers have become sought-after partners in many cities, and are involved in the Carlsbad project.

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Interactive Graphic: How Water Cuts Could Affect Every Community in California

The technological approach being employed here, and in most recent plants, is called reverse osmosis. It involves forcing seawater through a membrane with holes so tiny that the water molecules can pass through but larger salt molecules cannot.

A huge amount of energy is required to create enough pressure to shove the water through the membranes. But clever engineering has cut energy use of the plants in half in 20 years, as well as improving their reliability.

Future desalination plants also have the potential to blend well with the rising percentage of renewable power on the electric grids in California and Texas. Since treated water can be stored, the plants could be dialed up at times when electricity from wind or [solar power](#) is plentiful, and later dialed down.

However, as interest in desalination spreads, California and other states confront major decisions about the environmental rules for the new plants.

Both the intake of seawater and the disposal of excess salt into the ocean can harm sea life. Sucking in huge amounts of seawater, for instance, can kill fish eggs and larvae by the billions. Technical solutions exist, but they can drive up costs, and it is still unclear how strict California regulators will be with the plant developers.

Environmental groups argue that the embrace of desalination represents a failure to manage freshwater effectively. They want much more aggressive programs focused on conservation and on reuse of existing supplies, pointing out that half of municipal water here still goes to grass and other lawn plants. These arguments have sometimes carried the day, as they did when voters in Santa Cruz effectively killed a desalination plant.

Mr. Weston, the chairman of the San Diego County Water Authority, said his agency and others in the area had gone a long way toward embracing conservation. Since 1990, water use in the county has been cut 12 percent, even as the population has jumped 30 percent.

Long worried about water scarcity, the San Diego region helped to pioneer measures that ultimately spread across the country, including low-flow bathroom fixtures, more efficient washing machines and other innovations.

But these steps have not been enough to secure the region's water future, Mr. Weston said. Thus, the water authority decided years ago, long before the current drought began, to move forward on the desalination plant.



Photo



San Diego County, which includes the coastal neighborhood of La Jolla, could receive as much as 50 million gallons of drinking water a day from the desalination plant. Credit Damon Winter/The New York Times

It is in the late stages of construction, by an artificial bay opening to the sea in Carlsbad. On a recent day, the faint smell of glue wafted through the air as workers sealed joints on huge pipes. When it goes into operation, the plant will pump water through 16,040 cylinders containing the membranes that trap salt.

Peter MacLaggan, a vice president of Poseidon Water who is overseeing the project, said the plant was in some ways a response to longstanding public interest in desalination.

“Every time California has a drought, we get letters to the editor pointing out that there’s a lot of water in the Pacific Ocean,” he said as waves broke on the shoreline in the distance. “They say, ‘Hey, guys, what are we waiting for?’”

Santa Barbara, a chic tourist destination on the coast, could face severe water shortages within a year if the drought continues. The city is on the verge of spending \$40 million to reactivate the long-mothballed desalination plant there.

That step would drive water bills up sharply, acknowledged the mayor, Helene Schneider. But, she added, “no water is a worse option than very expensive water.”