

Despite progress, California’s cities face water management challenges

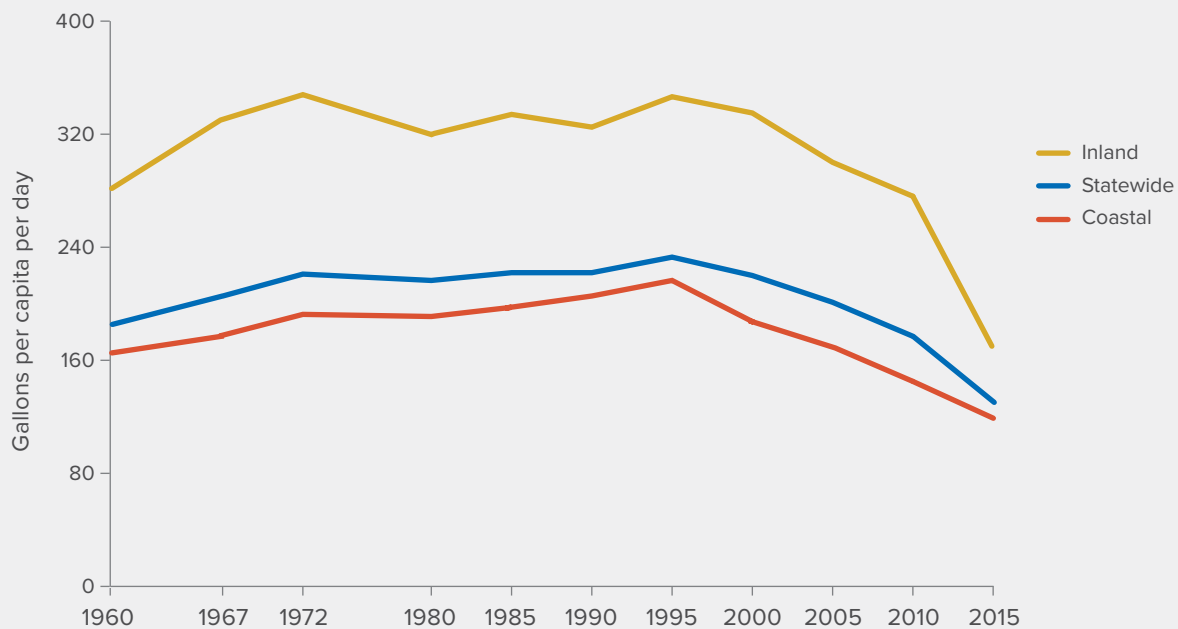
The water systems that supply California’s households, businesses, and industries are vast and complex. Nearly 400 large utilities—each serving more than 10,000 people—supply more than 90 percent of the state’s residents. Thousands of smaller utilities provide water to rural communities. Most utilities are public agencies with locally elected governing boards. Privately owned utilities serve about 16 percent of Californians.

Large utilities enjoy many advantages. They can spread fixed infrastructure costs over a wide customer base. They often have several water sources and extensive technical expertise. In recent decades, they have expanded connections with neighboring utilities, which allows water sharing during shortages. By contrast, smaller utilities are often geographically isolated and face high costs per customer for new investments. They usually rely on local groundwater and have limited in-house resources.

Despite the addition of 9 million new residents, the state’s large urban systems were better prepared for the latest severe drought than for the last one (1987–92). This improvement reflects significant investments in conservation, storage, new supplies, and interconnections. Some small systems have not fared as well.

Large and small utilities face water supply and quality challenges. Many large utilities import water from the Sacramento–San Joaquin Delta and other distant locations. Infrastructure weaknesses and claims on water for the environment are making these sources increasingly vulnerable. Many utilities that rely on groundwater must contend with contamination and protect basin supplies. Utilities also need to prepare for a growing population and the likelihood that climate change will bring more frequent and sustained droughts.

PER CAPITA URBAN WATER USE HAS FALLEN SHARPLY DURING THE LATEST DROUGHT



SOURCE: Author calculations (for 1960–2010) using data from California Department of Water Resources, *California Water Plan Update* (various years) and urban water conservation reports from the State Water Resources Control Board (2015).

NOTES: The figure shows “applied” water delivered to homes and businesses. “Net” water use—i.e., the volume consumed by people or plants, embodied in manufactured goods, evaporated, or discharged to saline waters—is lower. The totals exclude water used by power plants and groundwater recharge projects and water lost during conveyance. Except for 2015 (a severe drought year), the estimates are for normal or “normalized” rainfall years (i.e., adjusted to levels that would have been used in a year of normal rainfall). Estimates are for water years (October to September), except for 2015, which is for the calendar year. Inland per capita use in 2015 was 168 gallons per capita per day (gpcd) and coastal use was 119 gpcd. Inland areas tend to have higher per capita use because of higher temperatures and larger landscaped areas.

Water use in cities is changing

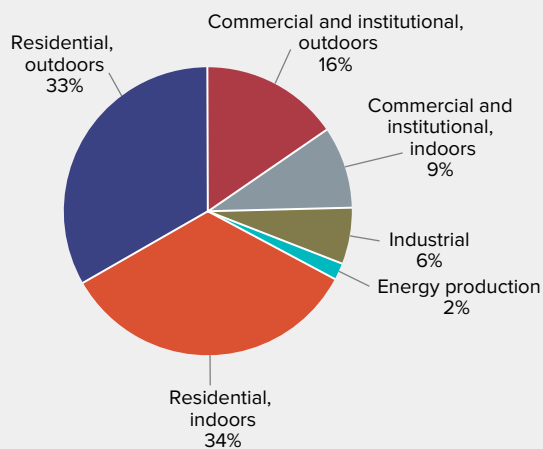
Following decades of increases, total urban water use began to flatten in the mid-1990s, reflecting declines in per capita use. Cities now consume about 10 percent of California's available water, farms 40 percent. The remaining half is categorized as environmental, such as flows in wild and scenic rivers along the state's north coast.

- **Per capita water use has been falling since the mid-1990s ...**

In 2010, average urban daily water use was 178 gallons per capita, down from 232 in 1995. The adoption of low-flow plumbing fixtures and appliances has been a major factor. Since the early 1990s, low-flow toilets and shower-heads have been required in new construction and encouraged in older buildings by rebate programs.

LANDSCAPING ACCOUNTS FOR ROUGHLY HALF OF TOTAL URBAN WATER USE

Urban water use, 2006–10
8.5 million acre-feet (maf)



SOURCE: California Department of Water Resources.

NOTES: The figure shows the average "applied" urban water use, as defined in the notes to the preceding figure. "Net" urban water use (also defined above) was lower (5.9 maf). Commercial and institutional outdoor use includes official estimates for "large landscapes" (parks, golf courses, cemeteries, etc.) and a third of the total estimate for commercial and institutional demand, which includes other outdoor water use.

- **... and communities have significantly cut use during the latest drought.**

In response to voluntary local programs and a statewide conservation mandate announced in April 2015, urban areas cut water use by nearly 25 percent between 2013 and early 2016, bringing per capita use down to 130 gallons per day. In 2016, urban agencies were given more flexibility, and some have relaxed restrictions in response to local supply conditions. It is too early to know how much of the recent savings will persist.

- **The urban economy has become less dependent on water-intensive activities.**

Some activities that require a lot of water, such as computer chip manufacturing, have moved out of state, and manufacturing now uses only 6 percent of urban water, down from 8 percent in 1990. Overall, businesses have been reducing water use while continuing to grow. In 2014, water used by cities generated more than three times the economic value per gallon that it did in 1967, measured by output of goods and services in inflation-adjusted dollars.

- **Landscape irrigation is the largest urban water use.**

Outdoor watering accounts for roughly half of statewide urban use and more in inland areas, where summers are hotter and lots tend to be larger. Savings can come from installing more efficient irrigation systems and replacing thirsty lawns with less thirsty plants. Many conservation efforts during the latest drought focused on reducing landscape watering.

Cities need to manage for reliability, cost, and financial stability

Utilities are pursuing a range of strategies to manage demand and diversify water sources. These investments are mainly funded by revenues from local water sales.

- **Pricing is important for managing demand ...**

Many utilities use regulations and rebates to encourage conservation. But water prices provide fundamental incentives. Many agencies now use tiered rates, with higher prices per gallon for higher use levels. Such rate structures can be effective. So can providing information on bills about how a household's use compares with similar homes. Bills also need to be simple enough to understand.

- **... and pricing must also keep utilities fiscally strong.**

To avoid financial problems, rate structures should recover costs when water sales fall or when supply costs increase. This has been a challenge during the latest drought, when sales fell much more rapidly than costs, leaving many utilities in the red.

- **To increase resilience, many utilities are developing local supplies.**
Some investments can be relatively low cost, such as recharging local groundwater basins with recycled wastewater or stormwater. Others are often more costly, such as building new surface storage facilities or seawater desalination plants. Some local sources require agencies to work together in new ways. For instance, several water utilities may share the cost of new interconnections or a desalination plant. Expanding recycled water use or stormwater capture usually requires water utilities to work with other agencies that have traditionally operated separately.
- **Imported supplies remain critical for many cities.**
Cities in the San Francisco Bay Area and Southern California get more than half of their water supplies from other regions. Some of this water—notably imports from the Delta—will require major new investments to remain reliable. In developing their water portfolios, cities must weigh the relative cost and reliability of imported versus local supplies, while keeping in mind the value of diversifying water sources.
- **Water trading is a growing supply source.**
In several regions, cities are reaching long-term agreements to lease water from farmers. More than 10 percent of Southern California urban supplies comes from such trades. Storing water in rural groundwater basins is also on the rise. And leases and exchanges with neighboring cities have proven very valuable during the latest drought.
- **Proposition 218 poses challenges for water management.**
This constitutional change, adopted by voters in 1996, specifies that certain rates and fees cannot exceed the cost of providing a service. Narrow court interpretations question the feasibility of tiered water rates. Proposition 218 also restricts the use of water rates to fund lifeline programs, which help low-income customers. The proposition also limits the ability of larger communities to share the cost of annexing smaller systems—a promising way to ensure safe drinking water in some rural communities.

Looking ahead

Although local agencies bear most frontline responsibility for providing safe and reliable water supplies, state action is also important to shape the regulatory environment and provide financial incentives. The following actions address top concerns.

Establish state drought policies that incentivize local action. The 2015 conservation mandate proved Californians can reduce water use quickly. But it may also have undermined the ability of local programs to build resilient supplies by requiring some agencies to save much more than local conditions warranted and exposing them to added financial risk. The state needs a predictable policy that incentivizes both conservation and continued local investments in diversified supplies.

Guide the courts on water management priorities. Legislation can guide courts in interpreting Proposition 218's cost recovery requirements. The legislature should emphasize the importance of supply diversification and conservation as strategies for responding to growing water scarcity.

Use new bond funds for cutting-edge actions. Urban agencies are eligible for more than \$2.3 billion in state bond funds for regional water supply and water quality projects under 2014's Proposition 1. The state should ensure these funds go primarily to innovative projects—especially those that require new types of investment and collaboration—rather than simply substituting for money that urban utilities can raise from water bills.

Consider local solutions within a regional context. As utilities develop local sources such as recycled water and stormwater capture, they should consider the regional impacts. By reducing discharges, these local projects can reduce streamflows that now provide important environmental benefits or supply water to communities downstream.

Develop flexible and resilient water pricing. Utilities need to hone their rate structures to provide incentives for water efficiency while maintaining financial stability. They must anticipate how to remain financially healthy while encouraging conservation—for instance, by charging higher prices per gallon during droughts.

Encourage more outdoor conservation. Although indoor water conservation efforts must continue, the greatest potential source for urban water savings is outdoors, particularly with shifts to low-water landscaping. Turf replacement programs set important examples but cost too much for widespread use. A combination of new technologies, economic incentives, and education and consumer awareness campaigns are needed to make significant progress.

Step up public education. Public concern about water has been very high during the latest drought, but it will probably wane once the drought abates. Wide-reaching education programs are needed to encourage Californians to use water more sustainably and to explain why higher prices are often needed to maintain resilient local systems. Information on the safety of highly treated recycled water is critical, as are campaigns to encourage less water use in landscapes and gardens.

Keep an eye on costs. Utilities must weigh the relative costs and reliability of different supply options. And, when setting prices, they need to consider efficacy, fairness, and affordability for low-income households.

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