



Agricultural and Resource Economics ARE UPDATE

Giannini Foundation of Agricultural Economics, University of California

Vol. 25, No. 6 Jul/Aug 2022

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How Are Urban Water Suppliers Responding to Drought?

Mehdi Nemati and Juhee Lee

In July 2021, Gov. Newsom requested 15% voluntary statewide urban water conservation compared to the same months in 2020. However, thus far, suppliers have reduced water use by about 2% statewide, and only about 5% have complied with the conservation target. This article provides an overview of the urban water suppliers' progress toward the 15% water conservation target and describes their demand management strategies during the current drought.

Water conservation in California has been a significant concern for urban water suppliers working to satisfy their residential demand while coping with the frequent, prolonged, and severe droughts. One common approach California cities and counties promote for coping with drought is to impose short-term water-use restrictions (voluntary or mandatory). Under such a policy, city officials or water managers inform the utilities' customers that they must bring their water use below some defined threshold, often specified in terms of the customer's historical use.

This type of short-term policy was implemented in California by Gov. Jerry Brown during the 2012–2016 drought. In April 2015, Gov. Brown issued an executive order for cities and counties to take mandatory actions to reduce water usage by 25% statewide from 2013 levels. This was the first mandatory call to reduce urban water use in California's history. In 2020, California faced another major drought, with drought conditions worsening in 2021. On April 12, 2021, Gov. Gavin Newsom declared a drought emergency for water systems along the Russian River watershed.

Then, by May 10, 2021, the governor expanded the drought emergency proclamation to include the Klamath River, Sacramento-San Joaquin Delta, and Tulare Lake watershed counties, covering 39 counties. On July 8, 2021, the governor extended the drought emergency declarations to nine counties, resulting in state-of-emergency directives in 50 California counties. In addition, the governor requested 15% voluntary statewide urban water conservation compared to the same months in 2020.

Finally, by October 19, 2021, Gov. Newsom declared a drought emergency for the entire state of California. The first three months in 2022 were recorded as the driest in history. So, on March 28, 2022, the governor signed an executive order requiring local water suppliers to move to "level 2" of their water shortage contingency plans, meaning a 10%–20% reduction within a district.

Conservation Achievements From July 2021–May 2022

The California State Water Resources Control Board (Water Board) is the primary agency that adopts regulations to increase water conservation by the urban water suppliers (419 agencies). The Water Board adopted an emergency water conservation regulation in July 2014 that required mandatory reporting of water usage by urban water suppliers. Since the water use accounting began in June 2014, the urban water suppliers covered by the regulation have reported their water usage to the Water Board. The regulation required the state's urban water suppliers to provide monthly water conservation and production reports to the Water

Table 1. Potable Water Production and Conservation from January 2020–May 2022

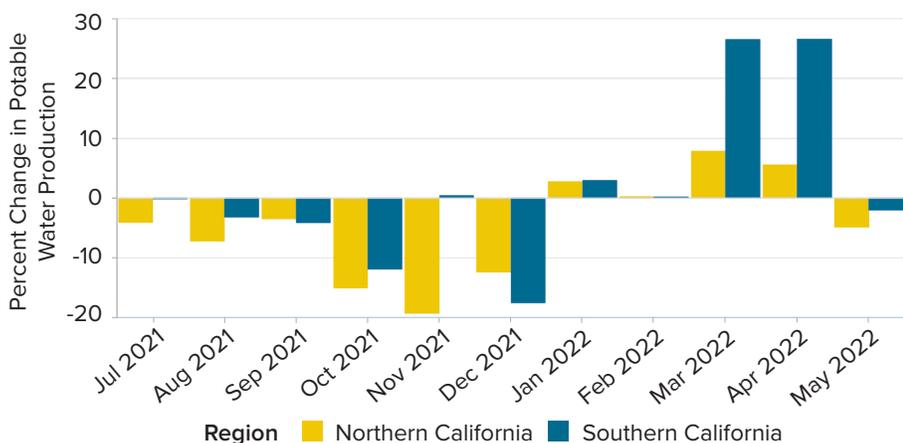
	Number of Suppliers	Baseline 2020 Production (MG)*	July 2021–May 2022 Production (MG)*	Cumulative Conservation (Percent)
California	362	1,551,408	1,520,656	-1.98
Northern California	172	623,862	591,379	-5.21
Southern California	190	927,546	929,277	0.19

Notes: The baseline period covers all the months from 2020, except for June. The conservation period covers July 2021–May 2022 (inclusive). *Production numbers are in million gallons (MG) and are based on total potable water production, excluding agriculture, in each supplier service area.

Source: Authors’ calculations using the reports provided to the Water Board.

Available at: <https://bit.ly/3cDyXJM>.

Figure 1. Percent Changes in Monthly Water Production Compared to the Same Months in 2020



Notes: Production numbers are based on total potable water production, excluding agriculture.

Source: Authors’ calculations using the reports provided to the Water Board.

Available at: <https://bit.ly/3cDyXJM>.

Board until the emergency regulation expired in November 2017. Since then, most urban water suppliers have continued to report voluntarily.

In May 2018, Gov. Brown signed into law water-efficiency legislation that created water-use efficiency standards and authorized the Water Board to require monthly reports on a non-emergency basis. The water-use reports from urban water suppliers include information on residential water use, total potable water production, measures implemented to conserve water and improve efficiency, and local enforcement actions. The Water Board adopted the monthly urban water conservation reporting regulation, which became effective on October 1, 2020.

Using the reports submitted to the Water Board, we calculated the conservation achievements towards meeting the governor’s request in July 2021 for 15% voluntary statewide urban water conservation, compared to the same months in 2020 (Table 1). Statewide, suppliers reduced water use by about 2%, far below the 15% requested by the governor. Of the 362 suppliers reporting, only 20 agencies reduced water production by 15% or more, while 104 increased their production levels.

Although cumulative water conservation is subject to the Water Board regulations, we also look at month-to-month changes in water production (Figure 1). March and April 2022 show

a significant increase in water production in both regions compared to the same months in 2020, with a greater increase in Southern California. The low compliance and the difference in compliance between Northern and Southern California are striking, though it is difficult to attribute these to a single factor.

One primary reason for the increase could be that March and April were drier in 2022 compared to 2020. Subsequently, outdoor landscape irrigation could have increased water demand in Northern and Southern California. An essential feature of the Water Board’s request for 15% conservation is the flexibility afforded to individual suppliers to determine how the conservation target will be met. Supplier-level demand management actions such as prohibitions on certain categories of water use, conservation pricing, conservation incentives through rebates for lawn replacement and water-efficient appliances, messaging, and public information campaigns could explain these differences in compliance.

Who Are Urban Water Suppliers in California?

Community water systems (2,874 suppliers), which are public water systems that supply water year-round to a population, serve more than 97%, or about 40 million, of California’s population. The remaining water systems serve very small, transient, or temporary populations. Among community water systems, only urban water suppliers are subject to emergency conservation regulations by the Water Board. These suppliers are defined as those that serve more than 3,000 service connections or deliver more than 3,000 acre-feet of water in a year. 419 out of about 2,874 community water systems in California are categorized as urban water suppliers; they serve more than 91% of the state’s population. The urban water

suppliers are further classified by ownership under local government and the private sector (Figure 2).

Demand-Side Management Strategies During the Current Drought

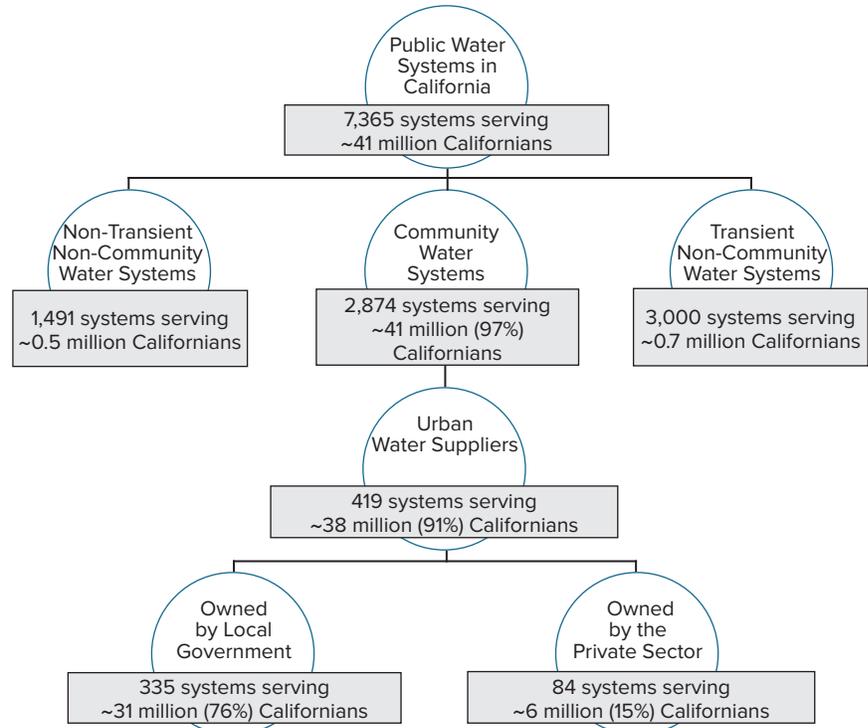
Our analysis of the reports on measures implemented to conserve water indicates that suppliers use one or a combination of the following demand management strategies in the current drought: 1) pricing strategies, such as increasing prices, applying drought surcharges, and reducing allocations for suppliers on budget-based rates; 2) expanding existing rebate programs, introducing turf replacement or removal rebate programs, or both; 3) restrictions (e.g., weekly watering restrictions, use-type restrictions, and application of potable water directly to driveways or sidewalks); 4) water audits; and 5) social norms and customer engagement (e.g., notifications via customer apps, U.S. mail, phone calls, door hangers, radio, television, and billboard advertisements, emails, and social media).

As indicated in Figure 3, in 2020 most suppliers reporting to the Water Board did not enact any demand management strategy. In July 2021, 132 out of the 193 (around 68%) suppliers reporting to the Water Board enacted at least one demand management strategy. The number increased to about 75% in August 2021, and remained roughly the same until May 2022, and then rose to 86% after drought conditions worsened.

Price and Non-Price Demand-Side Management Strategies

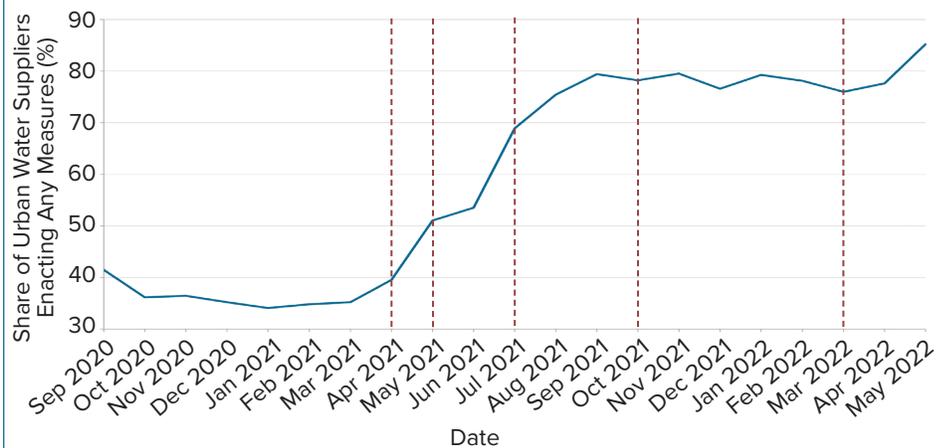
Demand-side management can be defined as a coordinated set of measures to improve water services by inducing changes at the point of consumption, such as changes to pricing, direct financial incentives, regulations, water quotas, and water-use restrictions. In general, pricing methods use market signals to reduce

Figure 2. Public Water Systems in California by Type and Population Served



Source: The authors' calculations are based on numbers from the EPA active water systems inventory data. Available at: <https://www.epa.gov/enviro/sdwis-search>.

Figure 3. Share of Urban Water Suppliers in California That Enacted Any Demand-Side Management Strategy by Month, September 2020–May 2022



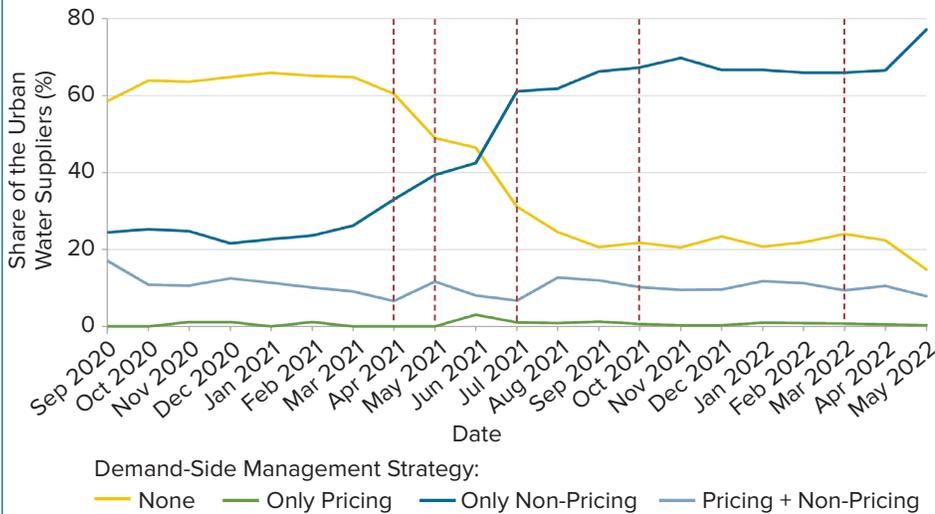
Note: Red dotted vertical lines indicate the major actions taken by Gov. Newsom at the state level. Source: Authors' calculations using the reports provided to the Water Board.

Available at: <https://bit.ly/3cDyXJM>.

water usage. They are more cost-effective than non-price methods, which often encourage behavior through prescriptive approaches. Pricing methods also have the advantage of easier monitoring and enforcement. In some cases, a mixture of price and non-price tools is used according to the needs of the local water utilities.

The percentage of urban water suppliers in California taking demand management actions increased in July 2021, but most of these actions were non-price based (Figure 4, page 4). In May 2022, out of the 359 suppliers who reported, approximately 14% did not implement any demand management action. About 77% enacted only

Figure 4. Share of Urban Water Suppliers in California That Enacted Demand-Side Management Strategy by Strategy Type and Month



Note: Red dotted vertical lines indicate the major actions taken by Gov. Newsom at the state level. Source: Authors' calculations using the reports provided to the Water Board.

Available at: <https://bit.ly/3cDyXJM>.

non-pricing demand-side management strategies. In this category, a mix of rebates, restrictions, and audits were most commonly adopted (28%), followed by restrictions only (23%), restrictions and audits (14%), and restrictions and rebates (9%). Only a few suppliers (0.29%) relied solely on pricing methods, and about 8% used a mix of pricing and non-pricing management strategies.

Concluding Remarks

Urban water managers and policymakers in California are adopting demand-side management strategies to encourage water-use reductions to buffer against short-term water supply shortfalls. During the current drought, there has been low compliance (statewide about 2%) with the 15% conservation target requested by the governor. The primary tool employed is water-use restrictions, either alone or in combination with other non-price methods.

So far, no statewide mandatory water-use restrictions have been imposed, emphasizing the local approach the state has taken to drought management thus far. While it is ultimately

individual suppliers in charge of determining how conservation targets are met, stronger messaging is needed at the state level on the conservation targets that must be met by these suppliers. Voluntary restrictions are less effective in reducing water use than mandatory ones.

Other studies have shown that prohibitions on categories of water use (e.g., landscape irrigation) result in larger reductions than other conservation strategies (e.g., conservation pricing), especially among high-income and high-volume users. More stringent mandatory outdoor watering restrictions combined with pricing measures are the most effective way to achieve the conservation targets. The Metropolitan Water District of Southern California executed an Emergency Water Conservation Program requiring member agencies dependent on State Water Project deliveries to immediately cut water use by implementing one-day-a-week watering restrictions, or the equivalent, by June 1, 2022. Therefore, in June, major suppliers in Southern California, such as the Los Angeles Department of Water and Power

(LADWP), implemented such a policy. While we do not have access to the reports yet, LADWP officials announced that water consumption from city residents plummeted 9% in June compared with the same month last year, and it was the lowest water use for any June on record.

Suggested Citation:

Nemati, Mehdi and Juhee Lee. 2022. "How Are Urban Water Suppliers Responding to Drought?" *ARE Update* 25(6): 1–4. University of California Giannini Foundation of Agricultural Economics.

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For additional information, the authors recommend:

Buck, Steven, Mehdi Nemati, and David Sunding. 2021. "Consumer Welfare Consequences of the California Drought Conservation Mandate." *Applied Economic Perspectives and Policy*. Available at: <https://bit.ly/3zEqzLP>.

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