

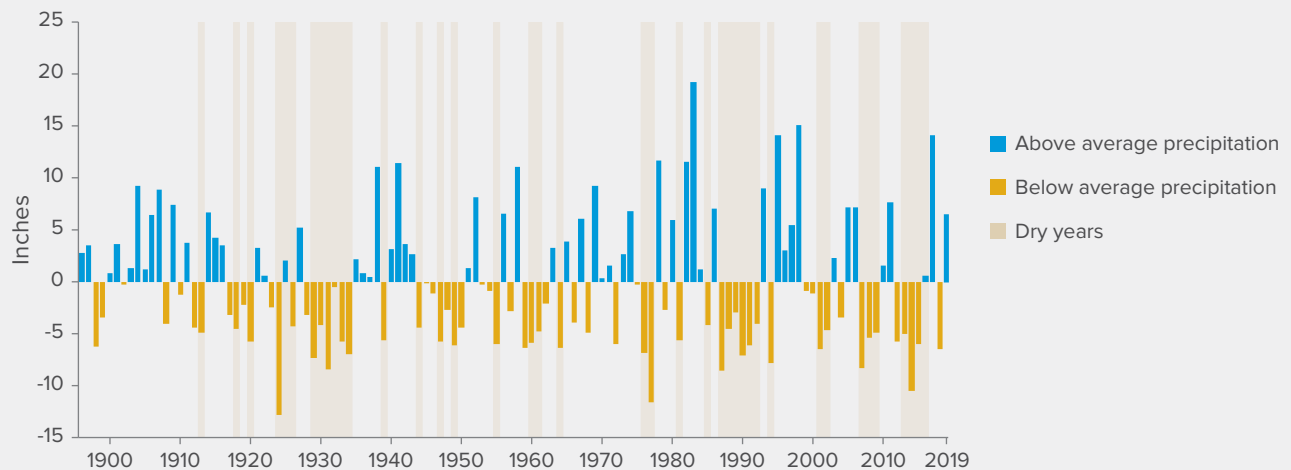
California faces growing water management challenges

Water management in California has always been challenging. The state’s variable climate is marked by long droughts and severe floods, with stark regional differences in water availability and demand. California’s “water grid”—the network of surface and groundwater storage and conveyance systems that connects most water use in the state—was designed to move water to population and farming centers in the Bay Area, the San Joaquin Valley, and Southern California, while also protecting residents from floods.

As the state has changed, its water challenges have intensified. The Sacramento–San Joaquin Delta is an increasingly fragile link in the water grid. California’s extensive network of dams is aging. Agricultural demand is becoming less flexible, as farmers increase tree crops (especially nuts), which must be watered every year. Some poor—mostly rural—communities lack safe drinking water. Conflicts are growing between human water use and water needed for fish and other wildlife. And the latest cycle of droughts and floods highlights the growing threat of climate change.

Climate pressures are making it harder to simultaneously store water for droughts, manage flood risk, and protect freshwater ecosystems. But leaders across the state are addressing the challenges of a more volatile climate, and the Newsom administration is developing a water resilience portfolio to adapt all aspects of water management to the “new normal.”

CALIFORNIA'S VARIABLE CLIMATE LEADS TO DROUGHTS AND FLOODS



SOURCE: Western Regional Climate Center.

NOTES: Bars show inches above and below the long-term California statewide average precipitation level of 23.62 inches since 1896, based on water years (October–September). Dry years are those classified as critical or dry in the Sacramento Valley. Because this classification factors in the water stored in reservoirs from the previous year, a single below-average year is often not classified as dry.

Climate extremes reveal strengths and weaknesses in California’s water system

The 2012–16 drought set records for lowest river flows, smallest snowpack, and highest temperatures. Then 2017 brought near-record precipitation that stressed dams and other flood infrastructure. These extremes offer key lessons.

- Managing demand and investing in diversified water supplies pays dividends during droughts.**
 During the latest drought, cities and suburbs reduced water use by nearly 25 percent. Yet the economy remained strong. This is because most urban areas—responsible for 98 percent of the state’s gross domestic product—reduced less-essential uses, such as landscape watering. They also benefited from past investments in supplies.
- Wet years create opportunities to recharge groundwater, California’s main drought reserve.**
 During droughts, farmers rely on groundwater to make up for reduced surface water. But unsustainable pumping makes groundwater less reliable and causes sinking lands (which damage infrastructure) and reduced river flows

(which harm wildlife). The Sustainable Groundwater Management Act (2014) requires water users to manage their basins sustainably. Restoring balance entails recharging more and, in some regions, pumping less. Moving water from lower- to higher-revenue uses through water trading reduces the economic impact of pumping less. In the San Joaquin Valley—the state’s largest farming region, with the biggest groundwater imbalance—local trading can cut these adjustment costs nearly in half.

- **Drought increases hardships for poor rural communities.**
Some rural communities rely on contaminated water sources, and some also experience shortages during droughts. More action is needed to connect these communities to larger systems or develop on-site solutions.
- **Drought also threatens freshwater ecosystems and headwater forests.**
Low river flows, shrinking wetlands, and high temperatures during the latest drought imperiled fish and waterbirds. Hot, dry conditions killed many trees in headwater forests, where wildfires are becoming more extreme.

California has begun to address extreme flood risks

One in five Californians lives in an area with significant flood risk, and most are not insured. Flood risk will be heightened by climate pressures such as rising seas and more intense storms. More investments in flood protection are needed, along with more efforts to limit development in high-risk areas.

- **California’s aging dams are under stress.**
Two-thirds of California’s dams are more than 50 years old, and all were designed for previous climate conditions. The 2017 Oroville Dam crisis—which required the evacuation of nearly 200,000 residents and more than \$1 billion in repairs—spurred efforts to evaluate dam safety and develop emergency plans. Setting levees back from rivers and allowing water to spread on undeveloped floodplains can also improve flood protection and boost habitat.
- **Local governments and residents need incentives to limit flood risk exposure.**
Federal flood insurance regulations restrict new development only in extremely high-risk areas—those that are susceptible to a “100-year flood.” A state law requires double that level of protection for new homes in the Central Valley, but the weaker federal standards still apply elsewhere. State law requires cities and counties to consider climate change in hazard mitigation planning, but it does not mandate reduced development in areas with growing risk.

Instability in the Sacramento–San Joaquin Delta is a major challenge

The Delta exports water to more than 25 million people and 3 million acres of farmland in the Bay Area, the San Joaquin Valley, and Southern California. It is also home to a complex and vulnerable ecosystem.

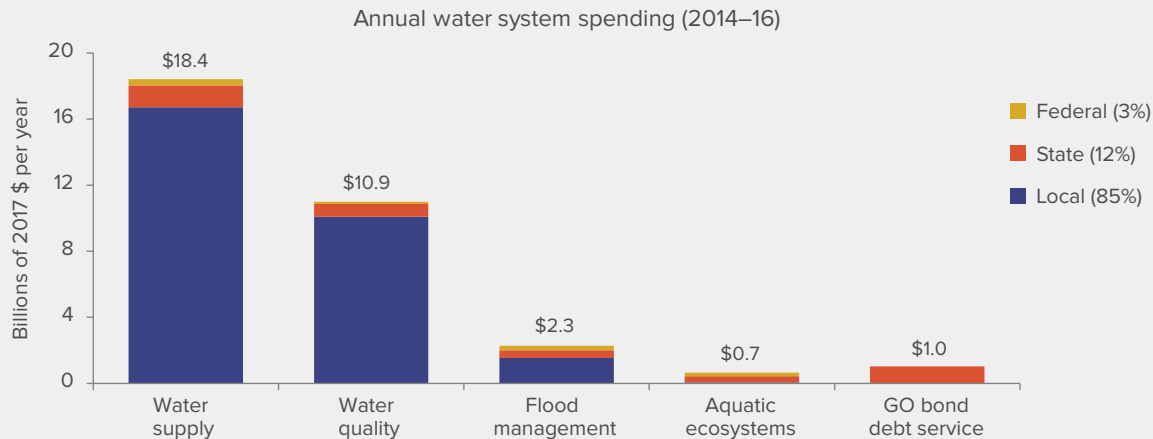
- **The quality and reliability of Delta water supplies are at risk.**
Earthquakes and sea level rise threaten levees that protect water quality and Delta farms. Managing water to help endangered fishes disrupts exports, which draw water through channels to pumps in the southern Delta.
- **Tackling the Delta’s problems will require strategic investments.**
The state has been considering a proposal to build tunnels underneath the Delta to move water from the Sacramento River to water users that rely on Delta exports. This controversial proposal—which has been scaled back from two tunnels to one by the Newsom administration—could improve the reliability and quality of exports and add flexibility to environmental water management. Investments in flows and habitat are essential to improving conditions for native fishes, and more work is needed to protect Delta residents from floods.

Californians must decide how to fill funding gaps

Urban water and wastewater agencies are covering costs reasonably well. There has been progress at the state level on safe drinking water, but other “orphan” areas—such as protecting residents from floods, managing polluted stormwater, and improving ecosystem health—face funding gaps.

- **California needs to use bonds strategically.**
Californians pay for most of the \$30-plus billion spent on water management each year through their water and wastewater bills and local taxes. But the sector also relies on state general obligation bonds—roughly \$10 billion has been approved for water since 2014. These bonds—reimbursed with general tax dollars—have helped, but additional sources are needed. Bonds should focus on areas for which other funding is not readily available.

LOCAL AGENCIES RAISE MOST OF THE MONEY SPENT IN THE WATER SECTOR



SOURCE: Updated from Ellen Hanak et al., *Paying for Water in California* (PPIC, 2014).

NOTES: The figure reports average spending for 2014–16. Expenditures exclude grants from higher levels of government. “Water quality” includes management of wastewater and approximately \$500 million for polluted stormwater and other runoff. “GO bond debt service” is repayment of state general obligation (GO) bonds.

- **Legal constraints are an obstacle to sustainable local funding.**

Three constitutional amendments approved by voters since the late 1970s—Propositions 13, 218, and 26—have severely limited the ability of local agencies to raise funds for some essential programs. Legal uncertainty also makes it harder for water and wastewater agencies to raise fees during droughts and offer lifeline rates to poor residents.

California must improve management of freshwater ecosystems

The latest drought highlighted major challenges in improving ecosystem health and responding to climate pressures.

- **A change in course is needed to arrest the decline in native fishes.**

Native fish populations are declining across California, despite several decades of well-intentioned efforts. These declines are leading to tighter and costlier restrictions on water supply, wastewater, and flood management projects, heightening conflicts among water management goals.

- **Ecosystem-based approaches can help.**

Environmental management is often siloed: agencies and projects address particular issues in specific locations with no overarching plan. Coordinated, flexible approaches that improve watershed health would better protect native species—and help California allocate environmental funding and water more efficiently.

Looking ahead

California has the tools to secure a safe and reliable water supply, manage droughts, improve watershed health, and reduce flood risks. But population growth and climate change are intensifying the challenges. Policy reform, better planning, and new investments are essential to the state’s future. Several issues require sustained attention.

A climate-ready water grid. Adapting to a more volatile, warming climate requires a more robust, integrated water grid to manage supplies and protect residents from floods. The state should assess weaknesses—including dam safety in light of bigger storms and conveyance to support underground storage—and launch a major upgrade.

The Delta. The state must decide whether to invest in new Delta conveyance—now a major bottleneck to moving water where it’s needed. Though this project is costly and controversial, not making an investment will also be costly. California also needs a viable long-term plan for strengthening Delta levees.

Safe drinking water. The Safe and Affordable Drinking Water Fund is an important step toward ensuring safe water in poor communities. The State Water Board now needs a comprehensive plan to prioritize support for communities that regularly lack safe drinking water and identify at-risk areas that may also need help.

Drought-resilient communities. Urban drought plans should include “climate stress tests” that evaluate supply reliability in the context of longer droughts and warmer temperatures. Some cities still need to diversify supplies.

Ecosystem stewardship. Watershed-level planning that informs water supply and flood management decisions can help make ecosystems more drought resilient. Priorities include water acquisition, habitat restoration, and prioritizing conservation areas for greatest impact—including protecting strongholds that can support species during droughts.

Sustainable groundwater. The groundwater law is pathbreaking. But implementation will be challenging, especially in farming regions that rely on excessive pumping. As water users launch local sustainability plans, regional coordination will be key. The state should support strong water accounting and facilitate groundwater recharge and water trading.

Funding. New state and local fees and taxes are needed to provide ongoing funding for fiscal orphans. Minor changes to state water-pricing and -funding laws could align them more closely with modern water management.

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