

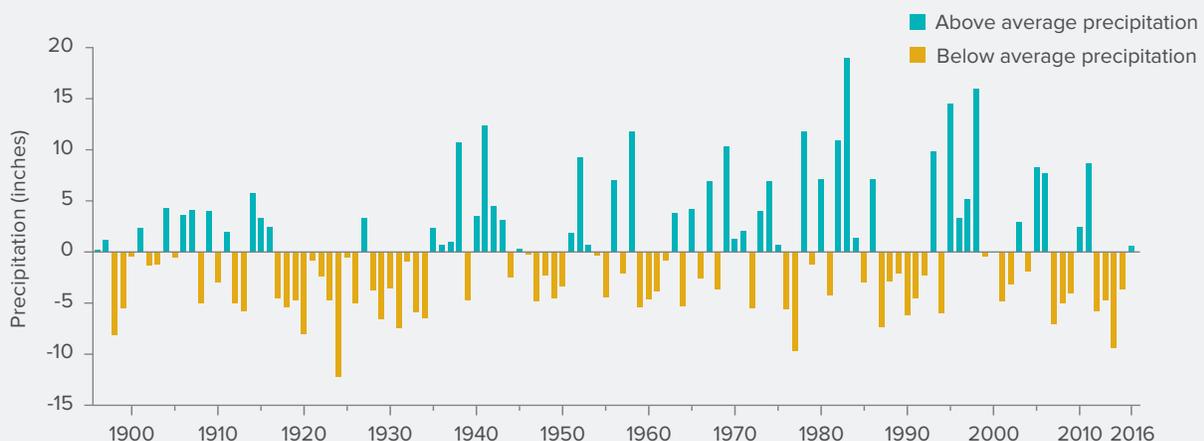
California faces growing water management challenges

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 has adapted by building a vast network of storage and conveyance facilities that deliver water from the wetter parts of the state to population and farming centers in the Bay Area, the San Joaquin Valley, and Southern California.

The Sacramento–San Joaquin Delta is a fragile, weak link in the state’s water supply network. Agricultural demand is becoming less flexible, as farmers are increasing tree crops (especially nuts), which must be watered every year. Conflicts are growing between human water use and water needed to support fish and other wildlife. And the current drought is stressing all water management systems in California, giving a glimpse into an uncertain future under climate change.

Solutions to water management challenges in California are not easy, but they are achievable. They will involve difficult and sometimes costly trade-offs, as well as contentious legal and political changes.

CALIFORNIA'S VARIABLE CLIMATE LEADS TO DROUGHTS AND FLOODS



SOURCE: Western Regional Climate Center.

NOTE: Bars show number of inches above or below the long-term California statewide average precipitation (21.43 inches) based on water year (October–September) since 1896.

California’s latest drought reveals strengths and weaknesses

The year 2016 marked a fifth year of drought. Rains in Northern California in early 2016 provided some relief, but Southern California remained critically dry. This drought has set records for lowest river flows, smallest snowpack, and highest average temperatures—a “stress test” of California’s water systems that provides key lessons for drought management today and in the future.

- Managing demand and investing in diversified water supplies pays dividends during drought.**
 The drought has not significantly affected California’s overall economy. This is because most urban and suburban areas—the source of 98 percent of the state’s gross domestic product—have been coping fairly well, benefiting from conservation and significant past investments to improve and diversify supplies.
- Groundwater is the state’s most important drought reserve, especially for agriculture.**
 During droughts, farmers rely heavily on groundwater to make up for reduced surface-water supplies. However, unsustainable groundwater withdrawals are making this resource less reliable and causing other problems, including sinking lands (which damage infrastructure) and reduced river flows (which harm aquatic habitat). The 2014 Sustainable Groundwater Management Act requires local water users to manage their basins sustainably over time.

- **Drought increases hardships for disadvantaged rural communities.**

Many small, poor rural communities have lost drinking water supplies as their wells have gone dry. Well water is also contaminated in some regions. Although emergency response has improved, long-term solutions are needed to ensure safe and clean water supplies.

- **Drought stresses the state's rivers, wetlands, and forests.**

Low river flows and high water temperatures have pushed 18 fish species close to extinction, including most salmon runs. Shrinking wetlands threaten waterbirds. Severe wildfires threaten public safety and the long-term health of the state's conifer forests.

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

The Delta supplies water to more than 25 million people and 3 million acres of farmland in the Bay Area, the San Joaquin Valley, and Southern California. Sea level rise and earthquakes threaten the levees that protect water quality. Water management to help declining native fishes—many protected as endangered species—disrupts water exports. Solutions to the Delta's problems have been plagued by political indecision and an unwillingness of many parties to craft a negotiated solution.

- **A strategic decision is needed on Delta exports.**

The current system relies on moving water directly through Delta channels to pumps in the southern Delta. An ambitious new management plan, known as California WaterFix, would construct two tunnels to tap water upstream on the Sacramento River and move it underneath the Delta to the pumps. This plan would improve export water reliability and quality and provide flexibility in managing water for the environment. The investment is costly and entails many uncertainties, but failing to resolve the Delta's problems will also be costly in terms of declining water supply reliability.

California has only just begun to address extreme flood risks

One in five Californians live in areas with significant flood risk, and most are not insured. Flood risks are expected to grow with climate change and sea level rise. Although the state has recently increased investments in flood control infrastructure, more work is needed to keep development out of harm's way.

- **Local governments and residents need incentives to limit flood risk exposure.**

Federal flood insurance regulations only restrict new development in areas of extreme flood risk (susceptible to a "100-year flood"). State legislation from 2007 requires that local governments within the Central Valley provide double that level of protection for new homes, but the weaker federal standards still apply elsewhere. Neither federal nor state policies adequately account for increasing risks from climate change and sea level rise.

- **Local governments should also consider future conditions when approving new development.**

State law requires cities and counties to consider sea level rise and climate change in hazard mitigation planning. But they are not required to reduce development in areas likely to be at higher risk in the future.

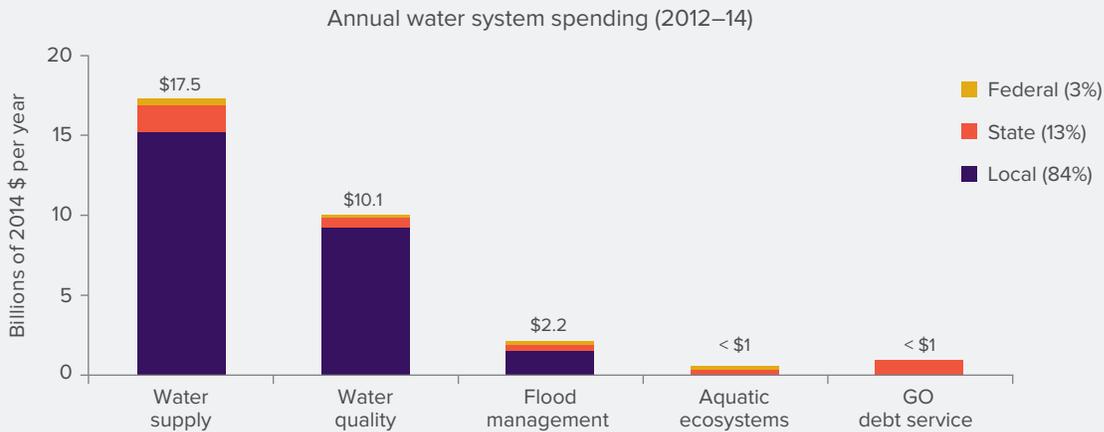
Californians must decide how to fill funding gaps

California's local agencies raise most of the \$30+ billion spent annually in the water sector, and urban water and wastewater agencies are doing reasonably well at raising funds to provide safe and reliable service. In contrast, the state faces critical funding gaps in five "orphan" areas: provision of safe, affordable drinking water in small, disadvantaged communities; flood protection; management of stormwater and other polluted runoff; aquatic ecosystem management; and integrated water management.

- **California needs to move beyond bonds.**

Californians pay for the vast majority of water system expenditures through their monthly water and wastewater bills, but since 2000 the sector has been relying more heavily on state general obligation (GO) bonds. These bonds—reimbursed with general tax dollars—have helped local water agencies fund some innovative projects. Yet even with the passage of a new \$7.5 billion bond in November 2014, other funds are needed; bonds provide at most \$1 billion per year, and they do not address all critical gaps.

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



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

NOTES: The figure reports average spending for 2012–14. Local expenditures are net of grants from higher levels of government. The water quality category includes management of wastewater and approximately \$500 million for polluted stormwater and other runoff.

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

Three constitutional reforms 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 and services. Legal uncertainty also threatens the funding reliability of water and wastewater agencies. With minor changes, the state’s water pricing and funding laws could be better aligned with the goals of modern water management.

California must improve management of aquatic ecosystems

The demand for environmental water, healthy watersheds, and clean beaches has been increasing and is likely to grow. And the drought has highlighted major challenges in meeting some environmental goals.

- **The state needs to arrest the decline in native fishes.**

Populations of native fish species—an important indicator of overall freshwater ecosystem health—are declining across California, despite several decades of well-intentioned efforts and expense. These declines heighten conflicts with other water management goals because they lead to tighter and costlier restrictions on water supply, wastewater, and flood management projects.

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

Environmental management is often siloed, with each agency and each project addressing particular issues in specific locations—water quality, wetlands, flows, habitat—with no integrated vision of how to contribute to the overall improvement of ecological conditions. Coordinated, flexible approaches that seek to improve environmental performance for entire watersheds would be much more effective in protecting native species—and would enable California to allocate its dollars (and environmental water) more efficiently.

Looking ahead

California has the tools to help secure a safe and reliable water supply, improve the health of wetlands and rivers, and reduce flood risks. Water managers have made significant progress toward these goals. But the challenges are increasing with population growth and climate change. Increased momentum toward policy reform—coupled with new investments—is essential to the state’s future. Some changes will be politically difficult. The following issues require sustained attention.

Drought preparation. California should learn from the latest drought to be better prepared for the next one. The state must improve its management of water rights, water transfers, ecosystems, and interagency coordination.

The Delta. If the state moves ahead with the WaterFix plan, it must address uncertainties over governance, financing, benefits for the environment, and mitigation for Delta residents and landowners. Alternatively, the state will need a plan to adapt as water supply reliability from the Delta declines.

Ecosystem protection. Across California, a more comprehensive and coordinated approach is needed to support the state's aquatic ecosystems and the native species that depend on them.

Groundwater management. The groundwater law is likely to improve management of most basins in California. But implementation will be challenging, especially for agricultural regions that rely heavily on unsustainable groundwater withdrawals.

Flood risk exposure. To reduce risks to new development, floodplain mapping should account for climate change and increasing flood risks. The state should also create incentives for communities to reduce risk.

Funding. Legal reforms are needed to enable local and state agencies to fill funding gaps for drinking water quality, flood protection, stormwater management, aquatic habitat, conservation, and integrated water management.

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