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## Californians are going to have to learn how to get by with less water

Established in 1994, the Public Policy Institute of California (PPIC) is a nonprofit and independent think tank dedicated to enhancing public policy in California through independent and objective research.  OLIVIA TEMPEST

California is battling a long and hard fight against drought. Some experts even suggest that this phenomenon must be seen as a historical turning point as the state is on the verge of an abyss, faced with rising heat, an accelerated rate of groundwater depletion and growing water shortages on the Colorado River, where Southern California gets its external source of water. At the end of last year, the Public Policy Institute of California (PPIC) released a report highlighting the current state of water in California and what is expected in the near future. To learn a little more about the conclusions of this research, we spoke with Caitlin Peterson, associate director and research fellow at the PPIC Water Policy Center.

**Can you tell us briefly about your career path and your current role at the Public Policy Institute of California (PPIC)?**

I am an agroecologist by training, and my research has included topics such as climate-smart agriculture, soil health, diversified cropping systems, and inte-

grated crop-livestock systems. I worked abroad for a few years doing agricultural research for development organizations before coming to UC Davis to do my graduate work. My PhD research was on applying theories of ecological resilience to agriculture, so I spent some time in Brazil researching commercial soybean and beef grazing systems there and attempting to draw connections with agricultural systems in California. After that, I spent a few years as a consultant working in the regenerative agriculture space, and this included researching ecosystem services from agricultural and natural land covers in California's Central Valley. This background has informed a lot of the research that I am currently doing at PPIC, which so far has focused on groundwater sustainability and agricultural land use transitions in the San Joaquin Valley.

**PPIC released a report in November titled 'Priorities for California's Water: Thriving with less.' What are the main conclusions of the report?**

The report begins by laying out the facts about what our changing climate means for water and water users in California. The short story is: Californians are going to have to learn how to get by with less water. In fact, if done right, California can continue to thrive — even though we expect to see a reduction in total water supplies going forward. That's going to involve some

tough decisions and a lot of hard work, but some important groundwork has already been laid.

**How is climate change affecting California's water supply, and what should we expect in the near future?**

California's climate has always been cyclical, and we're used to seeing dry periods followed by periods of heavy rainfall and flooding. However, with climate change these cycles are becoming more intense — the dries are dryer and often longer, and the wet periods are infrequent but extreme. That creates a lot of challenges for managing the state's water resources. The general warming trend means that when we do get precipitation, more of it falls as rain rather than snow. Snowpack is one of the main ways that the state stores water — snow means water available later into the hot, dry summer periods — but we're losing that snowpack storage. That rain also tends to come as big "gulps." It's very difficult to capture and use huge amounts of water when it's only available for relatively short periods. The general "thirstiness" of the atmosphere is also increasing, which is also going to impact our water supplies. Drier, hotter air pulls more moisture from plants, water bodies, and the soil, leav-



ing less available for us to use. In turn, stressed vegetation feeds back into the drought cycle and makes droughts more intense.

**What strategies does the PPIC recommend for adapting to and mitigating the effects of climate change on California's water supply?**

More investments in water supply reliability are going to be needed - things like diversifying water sources, improving our ability to store water above and belowground, and making sure we have an adequate conveyance to take advantage of wet years. Smart demand management is also going to be critical. That means improving the capacity to store

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and trade water in transparent and accountable ways; capturing storm runoff; and continuing to promote increases in water use efficiency. Agriculture is a key industry for California, but it's also a big water user. We'll likely see a reduced footprint for agriculture in the most water-stressed areas of the state — which also happen to be the epicenters for agricultural production. What that means is it's going to be important to manage land use transitions in a coordinated and thoughtful way that minimizes undesir-

able impacts on agriculture, the environment, and communities.

**Scientists have recently discovered groundwater depletion in California's Central Valley has accelerated dramatically. How should groundwater be further protected?**

In an ideal world, groundwater should serve as the state's drought reserve. In fact, groundwater pumping does tend to increase dramatically in drought years, when surface supplies are scarce. We've had a very dry 10-year stretch, so it's no surprise that our aquifers are suffering. That said, the aquifer depletion we're seeing in the Central Valley is the product of decades of mismanagement of groundwater resources. It was not until recently, with the passage of the Sustainable Groundwater Management Act (SGMA) in 2014, that state and local governments had any way of regulating groundwater

withdrawals at all. SGMA was a landmark piece of legislation, and while it's far from perfect, it's the best tool we have to start to bring our groundwater use back into balance with replenishment. And it's not just quantity that needs to be considered, but quality as well. In theory, moving towards sustainable levels of groundwater use should improve some of the salinity issues we've been seeing in some basins. But care will need to be taken with some methods of recharging groundwater basins — for example, spreading floodwaters on agricultural lands — to ensure that sites with heavy nitrate or chemical loads are not being used for that purpose.

**How is the PPIC engaging with policymakers and other stakeholders to address climate change and water challenges in the state?**

PPIC's mission is to be the unbiased source of information that policymakers

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ers and stakeholders turn to. We engage regularly with folks in the water world, whether they be urban water agencies, farmers, conservation groups, or state agencies. This helps us understand what questions people have and where the public discourse is focused. Then we do the research to help fill the knowledge gaps. The main goal is to facilitate a healthy discourse on water issues in the state — one that's informed by the data.

**What recommendations does the PPIC propose for increasing California's water efficiency and conservation?**

In our cities and communities, conservation and efficiency are becoming a way of life. In fact, urban areas are using about the same amount of water as they did in the 1980s, despite continuing population growth. This is due in large part to retrofitting appliances and indoor fixtures, along with better leak detection. While these measures are important, there is room for more savings, especially in water used outdoors for landscaping. And it's important to note that it's not enough to rely on conservation to meet all our water demands. Cities and communities also need to do a good job of finding new sources of supplies and increasing the reliability of those supplies.

When it comes to agriculture, the industry is in a bind because it completely depends on irrigation to be as productive as it is. However, that same demand for irrigation water is threatening the continued viability of California's agriculture industry and the security of the state's groundwater resources in the long term. Achieving sustainability is going to require both demand reduction and supply augmentation. But even with new supply investments, we'll likely see at least 500,000 acres of cropland come out of intensively irrigated production. This will undoubtedly be a blow to agriculture, but with careful planning and coordination some of the



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worst downsides can be avoided — and even some new opportunities created.

**What are the potential impacts of sea level rise on California's coastal communities and infrastructure?**

Sea level rise is a significant threat to coastal communities. A large part of the threat comes from erosion and flooding caused by large waves, very high tides, and storm surges. Even modest storms could create massive damages that will be expensive and disruptive for millions of people. Rising seas will also impact the state's water systems. Coastal flooding may grow worse as runoff from intense storms meets extra-high tides in coastal creeks. Wastewater treatment facilities are vulnerable to damage from rising seas and heavy storms. Many coastal water systems are facing seawater intrusion into their aquifers, and saltwater could be pushed farther and farther upstream in the critically important Sacramento–San Joaquin Delta.

**What research has the PPIC conducted on California's water quality and water pollution? And how will climate change affect the state's quality of water?**

Water quality issues often go hand-in-hand with water quantity issues. Un-

safe drinking water is a chronic issue for some water systems, including tribal systems and small, rural systems in the San Joaquin Valley. As many as a million Californians have been exposed to unsafe drinking water. And increasing water scarcity, driven by climate change, will only make this worse as contaminants become more concentrated. The state is making a strong effort to improve water supply quality and reliability, particularly for the most at-risk rural communities. This involves grants to improve these systems, including new water treatment facilities, deeper wells, new sources of cleaner and more reliable water, or consolidating small water systems into larger systems to improve resilience. There has been a lot of progress on this — spurred on by the last two droughts — but the state has a very long way to go.

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