

How California can survive the drought

Groundwater expert Leon Szeptycki explains how the state's ineffectual water-management system is trying to come to grips with harsh, dry reality.

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Agriculture consumes roughly 80% of California's water supply each year.

In its fourth consecutive year of [severe drought](#), California is facing tough choices about who deserves water — and how much. As the Sierra Nevada snowpack hit a record low, on 1 April Governor Jerry Brown ordered the state's first-ever mandatory water-usage cuts.

Leon Szeptycki, executive director of the Water in the West programme at Stanford University in California, tells *Nature* that maintaining the state's groundwater reserves is the key to surviving dry times ahead. The following interview has been edited and condensed.

What will record low-snowpack levels mean for California?

Virtually all of the precipitation we had this winter fell as rain. Normally, we'd be sitting here in April with relatively full reservoirs and big snowpack. But instead of having two layers of storage, this year the state has only one. The bottom line, I think, is that this year is going to be slightly worse than last, even though we got more total precipitation.

How is agriculture reacting to the drought?

They are pumping more groundwater, and the state's aquifers are dropping at an alarming rate. That's in part because groundwater pumping isn't regulated on a state-wide basis.

The state has ordered water utilities to reduce usage by 25% compared to the 2013 level. How will it do it?

Last year, Jerry Brown asked domestic water suppliers to strive voluntarily to get to a 20% reduction, and state-wide we only managed 9%. So 25% is a very ambitious number!

The executive order has several mandates that might help get to that 25%. One is eliminating 50 million square feet (464 hectares) of lawn. Water suppliers will need to set up incentive programmes to pay people to change landscaping, for installing things like low-flow toilets and shower heads, which a lot of the state has already done. Domestic-water suppliers, such as mine in Santa Clara County, already have rules about which days you can water and about keeping the water off the pavement, that kind of thing. The rules are mandatory, but largely unenforced.

Are California's current water policies worsening this natural disaster?

The basic system for appropriating water is 'first in time, first in right'. The law creates a lot of incentives to take water out of streams and put it to use on the ground, and it doesn't have very good incentives for efficiency. For example, if you make your irrigation more efficient and you need less water, all that means is that you've lost part of your water right.

On top of that, there is a highly fractured local governance of water. Over 2,000 agencies in California have some authority for water. So it's very hard to have central decision-making, and it's why the state is not the sole entity for dealing with the drought. When the state tries to grab the steering wheel of the car with respect to water policy, it's not in complete control of the vehicle.

Can the state change its ineffectual system?

I don't know the answer and I'm not sure anybody does. There are certainly ways it's changing the system now. Consider the new groundwater law. California has not had a state-wide mandate for regulating groundwater pumping. It has been talking about doing it for over 40 years. And the drought was so bad last year that the legislature passed — and the governor signed — a state-wide, mandatory framework for regulating groundwater pumping. [*Limits on pumping will not come into effect until the 2020s.*]

That was a significant gap in the system that the legislature took a major step towards fixing. So it's certainly true that the drought will drive major changes to the state laws and policies regarding water allocation. But whether the whole fundamentals of the system will change, I think it'll take a lot more drought for that to happen.

How does California become drought resilient?

The long-term solution to more acute drought is to change the way we manage surface water when it's wet. Take some of that surface water, whether we've got a lot of rain or a lot of snow, and use it to recharge groundwater so it's there for us in times of drought.

What are the implications of California's drought for the western United States?

Here's a concrete example: There were several major transactions where southern Californian water districts bought Colorado River water from irrigation districts in California's Imperial Valley. Farmers got paid to fallow their fields. The agencies stored their water in Lake Mead — the huge reservoir behind Hoover Dam.

Now, the Colorado River basin is suffering a severe drought, and the lake's levels had been kept up by the California water that was in storage there. Last summer, southern California started to withdraw that water because of severe cutbacks from the state water project. Lake Mead levels dropped quickly, to levels very close to triggering cutbacks in deliveries to places like Las Vegas, Nevada and cities in Arizona. The [Colorado River basin system] won't be fully fixed until California deals with its water-supply problem.

Does California's drought foreshadow the region's future?

There are a lot of predictions for increased mega-drought in the west, particularly the southwest. But temperatures are rising everywhere, so I think this issue of figuring out how to manage water in the face of decreased snowpack is something all states will have to deal with.

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