

## **How to Slake California's Thirst**

**Following Australia's lead on water rights and water markets would solve the state's water shortage.**

[Ronald Bailey](#) | September 5, 2014

"Nature makes a drought, but Man makes a

shortage." That's the trenchant slogan that the Leiden University College water resource economist David Zetland uses to sum up how bureaucratic mismanagement of supply and demand misallocates water pervasively. California's current water crisis—exacerbated by a three-year drought—is a perfect illustration of Zetland's observation.

"Scarcity and shortage are the same for water as they are for other goods—except that most other goods are traded in markets in which rising and falling prices balance supply and demand to prevent shortages," Zetland [explains](#). The chief problem with water is that it is mostly supplied by government agencies or government-sanctioned monopolies whose prices are deliberately held below the actual costs of supplying water. This predictable result of these price controls is a shortage. "Underpricing (or zero pricing in some cases) has sustained overuse: if markets delivered Porsche cars at give-away prices, they too would be in short supply," [wryly observes](#) the United Nations Development Program's 2006 report *Beyond Scarcity: Power, Poverty and the Global Water Crisis*.

The surface water rights situation in California is significantly complicated by the fact that existing water rights have been [grossly overallocated](#). Surface freshwater flows average 70 million acre-feet. (An acre-foot is the amount that would cover an acre to the depth of one foot—about 326,000 gallons). But the state has allocated rights to 370 million acre-feet, over-allocating by more than 500 percent.

Obviously, not all of the state's water is used up. Water rights in California follow the rule of prior appropriation, which allocates water to the first person to claim the right to divert a set amount from a stream, giving him seniority. Later users can claim rights to water if there is enough left over for them to take, and so have junior rights. A seniority allocation system operates on a use-it-or-lose-it basis, requiring that the water be diverted and used beneficially or the user will relinquish his claim to the water. This means senior rights holders have little incentive to conserve.

Another big problem is that water rights in California are often controlled by irrigation districts. These districts were established a century ago with the goal of getting water to arable land. Districts generally [don't oppose](#) water trading within their boundaries, but they often resist transfers of water to outsiders, such as municipal or industrial customers. This is partly the result of an institutional defect in which irrigation district water rights are communally owned, making negotiations to transfer water to outsiders difficult. How could better-defined property rights and markets end water conflicts and shortages in the Golden State?

Australia has already pioneered many policies that could help. Supplying free and below-cost water encourages users to drain rivers, leaving fish and riparian species high and dry. So the first step is to decide how much water based on the best available science should be allocated to environmental flows. Obviously this process will be politically fraught, but after water rights are allocated they can be purchased to further enhance environmental flows. In Australia, the government has spent \$2 billion to purchase private water rights to increase river flows. Currently in California, about 50 percent of freshwater flows are reserved for the environment, although that varies greatly by river basin.

In Australia, water rights were historically tied to specific pieces of land. The reform severed these ties and divided rights into water access entitlements and water allocations. For example, if there is a moderate drought, state agencies might set water allocations to 80 percent of each water entitlement. A person owning

10 acre-feet of water would be able to use eight acre-feet of water that year. Owners can sell their entitlement or their annual allocations. If an irrigator who is allocated 8 acre-feet adopts methods that cut his water use to 6 acre-feet, he can then sell the extra 2 acre-feet for whatever price the market will bear.

Fortuitously, Australia began the process of allocating private property rights in water before the 10-year "Millennium Drought" struck that country's southeastern states. The rights were allocated and put into a public register open to all, thus enabling potential sellers and buyers. The emerging water markets enabled farmers irrigating low-value crops like rice to [sell their water allocations](#) to high-value vineyards and orchards. The income earned from selling water kept the rice farmers in business and prevented the vineyards and orchards from dying. During the long drought, [water prices](#) reached about \$500 per acre-foot, falling to around \$25 per acre-foot after the drought broke and water was more abundant.

Robust water markets also reduce the risks to towns and cities during a drought or other supply shocks, because the municipalities can always purchase additional water. During the Millennium Drought, the city of Adelaide in South Australia bought water from irrigators to meet consumer demand. Today about 20 percent of water supply in southeastern Australia is bought and sold on the market.

A 2012 Public Policy Institute of California report [estimated](#) that the "water market now accounts for roughly 5 percent of all water used annually by California's businesses and residents (about 2 million acre-feet of water trades are committed annually, with around 1.4 million acre-feet in actual flows exchanging hands)." The report also noted that agricultural production in California in 2007 amounted to \$22.4 billion, which is 1.2 percent of the state's \$1.85 trillion gross domestic product.

The current drought is spurring sales even in California's less developed water markets. For example, water that earlier sold for \$60 per acre-foot has been auctioned off this summer for as much [\\$1,750 per acre-foot](#) to high-value almond orchards in California's San Joaquin Valley. Since farmers are willing to pay that much, this suggests that regulated prices for water are far too low. The Public Policy Institute of California has calculated that the revenue generated per acre-foot of water applied to field crops such as alfalfa, rice, and corn amounts to \$200 to \$600. Irrigating fruits, nuts, and vegetables on truck farms generates \$2,000 to \$5,000 per acre-foot of water. Meanwhile, towns and cities are paying an average of nearly \$1,000 for each acre-foot they use.

Freeing up water from irrigation district controls and other restrictions and making it available to a broader state-wide market would likely moderate the high prices incurred for today's limited supplies. The goal is to establish a price for water that approximates the marginal cost of supplying it to potential users. A [2001 analysis](#) in *Natural Resources Journal* found that, due to irrigation district restrictions, "the marginal value of water in municipal and industrial uses is typically three to four times greater than the marginal value in agriculture." Water that is not going to its highest economic use is water wasted. Unable to buy cheap water from farmers has forced towns and cities to pay for expensive infrastructure projects like [desalination plants](#) to meet their needs.

The drought, combined with limited water markets, is encouraging municipalities and farmers to drill for and pump more groundwater. Currently about 60 percent of California's water supplies are coming from underground. Historically, farmers and other property owners have had the right to pump as much water as they can from aquifers beneath their property. But aquifers are common pool resources, giving landowners a strong incentive to drill and drain before their neighbors beat them to it. This dynamic unsustainably depletes groundwater.

Oil and gas companies have developed "[unitization](#)" as a way to manage underground common-pool resources. Under unitization, a reservoir is run as a single unit with the goal of maximizing its economic value for all of the rights holders. A similar scheme could be applied to groundwater rights; however, organizing thousands of landowners is difficult, to say the least. Draining groundwater leads to undesirable outcomes, including land subsidence, saltwater intrusion, and compaction that prevents the aquifer from being refilled. Last month the California legislature [passed a bill](#) that would require some 500 different groundwater basins in the state to formulate sustainable use plans for pumping groundwater. Depending on how such plans evolve, this could be a step toward preventing water waste and making more supplies available to a growing water market.

Finally, Zetland has an even more radical proposal, all-in-all auctions. Once water rights are securely assigned, all owners must offer their water in an annual auction. Owners can bid for their own water—say, \$1,000 per acre-foot. If someone else offers \$1,200, the farmer can decide to sell at that price or raise his own bid, in which case no cash changes hands. Such an auction would inform everyone of the real value of

water.

In any case, moving in the direction of the Australian water market reforms would mean that while California must endure a drought, there is no reason its residents must suffer from water shortages.

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