

ENVIRONMENT

Banking on Groundwater

Hydrologists experiment with a farming technique that could ease drought pains

California is parched. Rivers that usually surge now trickle, and once-large reservoirs stand as puny pools. Those most critically affected by the state's four-year drought are the Central Valley's farmers, whose livelihoods are threatened. Without rain to irrigate croplands, growers repeatedly turn to underground aquifers, but the overpumping has taken a toll, causing water tables to drop dramatically. Fortunately, this winter's forecast in California calls for plenty of rain, most likely amplified by strong El Niño conditions. Storm drainage systems typically redirect most floodwater out to sea, but given the region's intense water deficit, hydrology scientists at the University of California,



Intentional flooding of farmland, such as the walnut orchard above, has the potential to recharge California's aquifers.

Davis, are experimenting with so-called groundwater banking, which involves sending stormwater to flood fallow fields where it can percolate into the soil and replenish aquifers. Stormwater absorbed in the winter can then serve as a reservoir of summer refreshment for growing crops, says U.C. Davis's Helen Dahlke.

For two months this winter Dahlke and her team will flood almond orchards in the Central Valley near Davis to a depth of two feet by redirecting rainfall through a network of ditches

originally designed to divert floodwater away. To measure success, they will then monitor how much water filters into the water table over the course of two years. They will also test the quality of the infiltrated water and check trees for root rot, which could be detrimental to crop yield. If the method pans out, pear, plum and walnut tree orchards might also benefit from intentional flooding, according to a recent study led by Anthony O'Geen of the University of California, Division of Agriculture and Natural Resources.

Previous tests of the technique have proven successful. In 2011 Terranova Ranch manager Don Cameron diverted Kings River floodwater in Fresno County onto 240 acres of vineyards and other farmland, inundating them for five months. "They looked like rice fields, but the grapes did fine," Cameron says. Seventy percent of the water percolated into the water table, where it was available for pumping back onto fields during the next growing cycle.

Questions remain about groundwater banking's effects on tree physiology and the potential migration of salts and nitrates from fertilizers into groundwater that people drink. The costs of stormwater diversion and legal issues, including who owns the subverted water, also need to be sorted out. Still, some 3.6 million acres of agricultural land statewide could eventually serve as receptacles for groundwater recharge. And with climatologists expecting the state's rainfall deficit to continue long after a single season of strong winter storms, a growing number of ranchers are more than intrigued by the possibilities for their land. Says Cameron: "Drought makes people more creative."

—Jane Braxton Little

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