

Report: Central Valley leads nation in falling groundwater levels; crisis blamed on almonds and drought

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Groundwater levels appear to be sinking faster in the Central Valley than anywhere else in the United States, the U.S. Geological Survey says in a new report.

The paper does not pinpoint causes, but a USGS expert on Thursday blamed, in part, increased agricultural pumping to make up for drought, now entering its fourth year.

While state water officials mull new restrictions on lawn watering and tap water served in restaurants, almond growers enjoying record profits are feeding millions of new trees in the San Joaquin Valley with groundwater. That helps explain fast-dropping groundwater levels, said Claudia Faunt, a hydrologist with the agency's California Water Science Center.

The study urges unspecified "improved water management" to ward off disaster.

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"This is a complex issue" because science is "intertwined with political, legal and socio-economic issues and constraints," says the paper, evoking ongoing and intense battles over groundwater, a prime California resource. The paper is titled "Long-Term Groundwater Depletion in the United States" and appears in the most recent issue of *Groundwater*, a USGS journal.

The report, by Leonard Konikow, updates his widely quoted 2013 study of the nation's 40 most endangered aquifer systems, which concluded that global overpumping contributes to sea level rise. That report sounded an alarm for the High Plains aquifer from Nebraska to Texas, with lesser crises developing around the Mississippi River delta and California's Central Valley, based on total groundwater loss.

For the recent update, Konikow added a new parameter called depletion intensity by factoring in elements of time and area. That moved the Central Valley to the top of the crisis for measurements captured from 2001 to 2008; by comparison, the much larger High Plains aquifer is sinking at one-third the Valley's rate.

The Valley's aquifer "may be the system having the most serious groundwater depletion problem in the United States," the study says. The only cure is to reduce demand or increase supply, Konikow observes.

California water officials last year adopted emergency rules to help cope with drought, restricting lawn watering and prohibiting car washing without shutoff nozzles. On Tuesday, the State Water Resources Control Board contemplated new regulations that could force people to ask for water at restaurants and for fresh sheets and towels at hotels, and face fines for watering lawns in the winter.

Some homeowners near Valley Home and Denair whose wells went dry have blamed agricultural pumps that can suck water from nearby properties.

"It's expensive to drill new wells, and that expense may be caused by a neighbor," Faunt said.

Meanwhile, growers continue drilling wells at record rates to satisfy thirsty trees as almond profits soar.

The Modesto-based Almond Board of California two months ago estimated a record \$7.3 billion in almond income last year – mostly thanks to exports – up from \$5.8 billion in 2013 and \$4.9 billion in 2012. Almonds, which require less labor than vegetable and fruit crops, now are the state's No. 1 export by value and surpassed milk products a couple of years ago as Stanislaus' highest-grossing commodity. Almond nut, hull and shell values increased sevenfold from 2003 to 2013.

Mother Jones magazine in January reported that the amount of water needed annually for California's almond exports would provide water for all Los Angeles homes and businesses for almost three years.

Nut advocates say almonds put 21,000 people to work throughout California, and advances in technology enable them to use a third less water than needed 20 years ago.

"It's an economic thing," Faunt said. "You can't fault them for planting and making money off their land. But it does cause a groundwater deficit; the more you pump, the more water levels drop, and some (other) wells go dry."

Excessive pumping also causes subsidence, where soils collapse. That can cause costly damage to roads and canals and may be irreversible.

Overpumping has drained about 70 million acre-feet of groundwater since 1962 from the Valley's aquifers, Faunt said; that's about the size of Lake Don Pedro when it's full – times 35.

Stanislaus leaders adopted a groundwater ordinance last year, but critics say it doesn't go far enough to monitor pumping or restrict well drilling.

"In my opinion, this will be the hot topic as we approach summer," Modesto Councilman Bill Zoslocki said.

Konikow was elected to the National Academy of Engineering, the USGS announced this week, citing his "substantial contributions" to simulating groundwater flow and assessing its depletion throughout the United States. He becomes the fourth agency scientist so honored; the last was named in 1994.

See the report at <http://onlinelibrary.wiley.com/doi/10.1111/gwat.12306/full>.

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