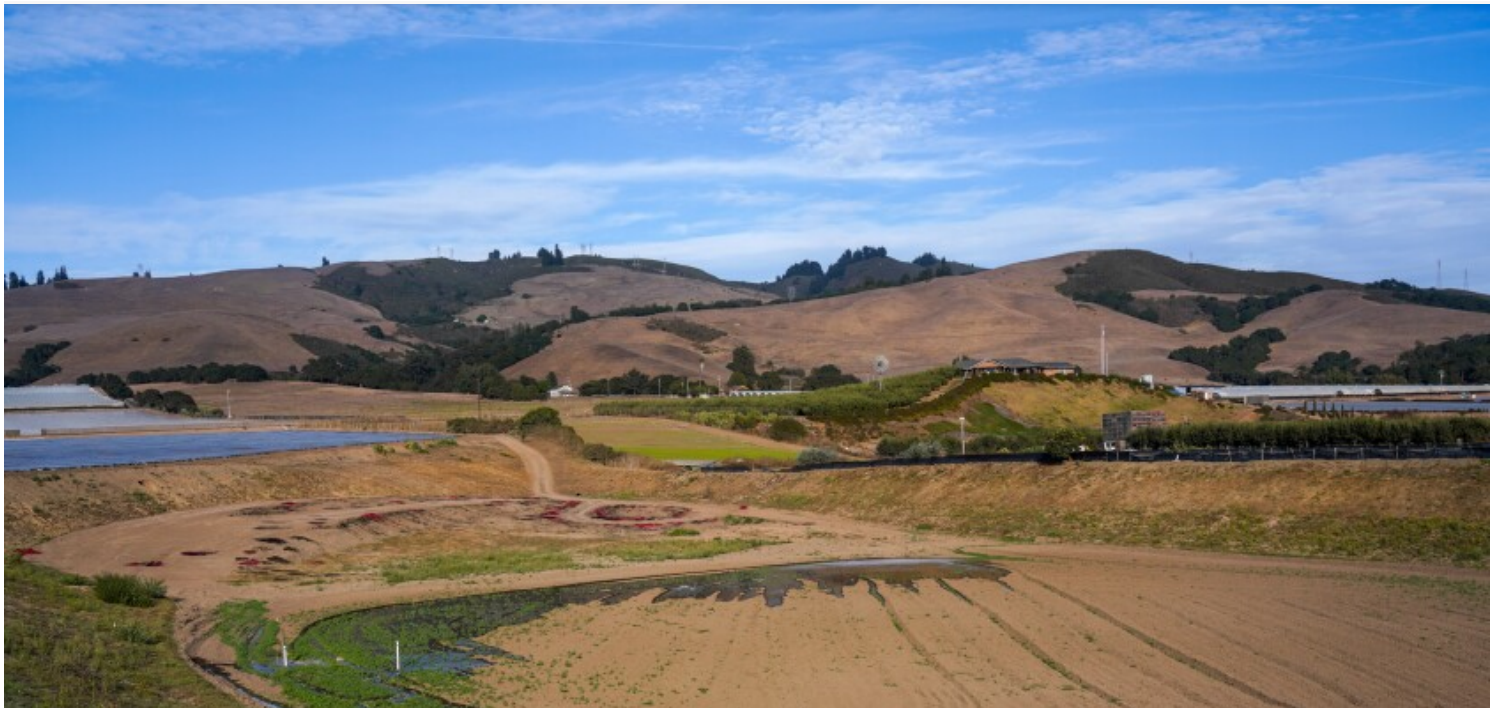


The Bokariza-Drobac Infiltration Basin on Driscoll's property east of Watsonville. (Alix Soliman / Lookout Santa Cruz)

ENVIRONMENT

How some Pajaro Valley farms are being tapped to help solve California's water crisis

BY ALIX SOLIMAN

Source: Lookout Santa Cruz

Quick Take

Can agriculture, long considered a drain on the state's water resources, help solve California's water crisis? In the Pajaro Valley, some farmers are being paid to return stormwater to the ground. The effort is part of a joint project among local agencies, landowners and UC Santa Cruz to install groundwater recharge basins on some local farms. Participating farms receive cash rebates based on how much water they capture. But while early results are promising, many challenges remain.

Published 5 Hours Ago

Neat rows of strawberries and lettuce reach for miles to meet the horizon on Driscoll's property east of Watsonville. Among the crops, a massive pit opens 15 feet into the earth and stretches across 4 acres in the shape of a trapezoid.

This is the Bokariza-Drobac Infiltration Basin, one of three groundwater recharge basins installed on private agricultural lands in the Pajaro Valley to collect stormwater runoff. It is part of a community-based effort to tackle the chronic problem of local farming operations drawing far more water from the Pajaro Valley aquifer than is replenished.

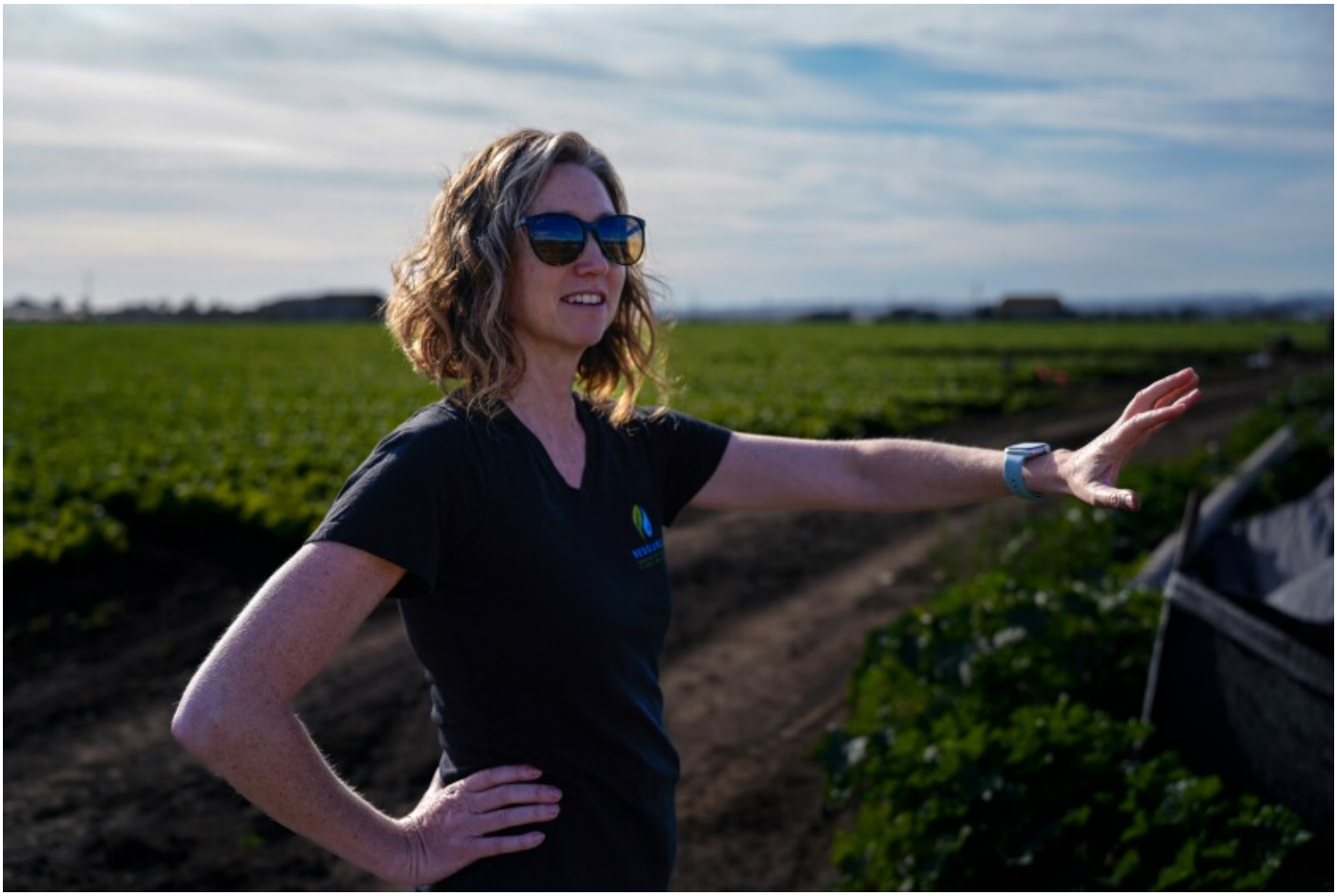
After a prolonged drought, last winter's onslaught of storms flooded the region and caused millions in damage to crops. While the rains formed a bandage over the wounded aquifer, water managers warn that the Pajaro Valley will continue to suffer from flooding, saltwater intrusion and groundwater depletion without the infrastructure to capture stormwater before it goes to sea.

Farmers here irrigate almost entirely with water pumped from the Pajaro Valley Groundwater Basin, sucking it up faster than it can be replaced by rain percolating down into the soil and causing what is known as "overdraft."

"We don't collect enough stormwater," said Marcus Mendiola, water conservation & outreach specialist at the Pajaro Valley Water Management Agency. "Humans struggle with things they can't see, so groundwater is a classic 'tragedy of the commons' problem,'" where people take from a shared resource bit by bit until it disappears.

$65M in storm-related losses just one of many challenges ag chief sees for Santa Cruz County farmers

The Pajaro Valley produced around 183,000 tons of fruits and vegetables in 2021 (a drought year), guzzling over 54,000 acre-feet of water — enough to provide a year's worth of water to 108,000 average California households. That year, the volume of water stored in the aquifer fell by more than 9,400 acre-feet. When the groundwater level drops, more salt water from the Pacific Ocean oozes into the aquifer, ruining soil, poisoning crops and forcing farmers to abandon wells or drill deeper.



Lisa Lurie, executive director of the Resource Conservation District of Santa Cruz County, next to the Bokariza-Drobac Infiltration Basin.

(Alix Soliman / Lookout Santa Cruz)

"To sustain agriculture in the valley, we need to sustain water," said Lisa Lurie, executive director of the Resource Conservation District of Santa Cruz County (RCD).

Local agencies and UC Santa Cruz teamed up with landowners in 2014 to install groundwater recharge basins on three farms in the Pajaro Valley: Driscoll's, Kelly Thompson Ranch and Storrs Winery and Vineyards. The program aims to incentivize farmers, who are collectively causing the overdraft problem, to capture and return stormwater to the aquifer.

Groundwater recharge basins work like giant bathtub drains to funnel stormwater back into the earth. They are placed strategically, using the landscape's geology to do most of the work. Recharge is best in natural depressions that already channel

runoff from the hills, and on top of loosely packed soil and rocks that water can filter through quickly.

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The costs of installing and maintaining each basin are shared among the Pajaro Valley Water Management Agency (PV Water), the Resource Conservation District of Santa Cruz County, UC Santa Cruz and the private landowners who've given up acreage for the project, with funding from state and university grants.

To encourage farmers to participate, PV Water gives each landowner operating a basin an annual cash rebate determined by the amount of water the basin captures.

The arrangement functions like net energy metering, where solar-powered households receive credits on their power bill for energy they add to the electricity grid. Just as the sun must shine for net energy metering, rain must fall for recharge net metering to work. In theory, water captured and stored underground during wet years can provide relief during drought years.

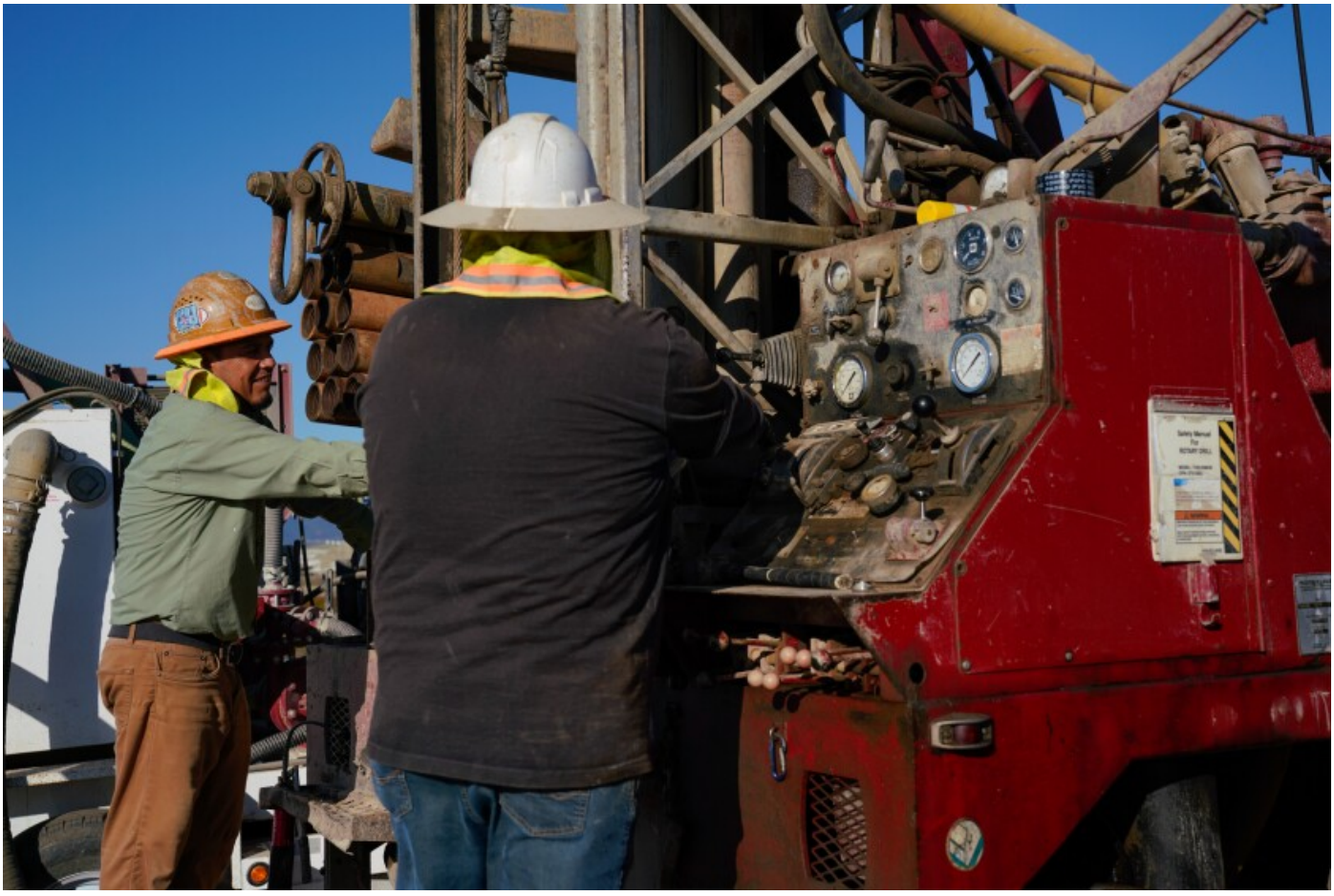
"Anything we can do during the wet years to just get more of that water in the ground, that's better for the next time it gets dry," said Andrew Fisher, a hydrogeologist at UCSC who acts as a third party to help choose sites for new projects and monitor water quality impacts.

Fisher and his students measure or "meter" the amount of water that recharges the aquifer from each basin to calculate the rebates. The calculation is conservative, subtracting the amount of water that evaporates into the air and the

amount that would have infiltrated into the aquifer at that site before a basin was installed.

New research published this month in Nature Water shows that recharge net metering is among the cheapest ways to address the overdraft problem. The study's lead author, Molly Bruce, a researcher at UC Berkeley's Center for Law, Energy and the Environment, and her colleagues did a cost-benefit analysis of the program, comparing it with other water-management projects in the Pajaro Valley.

One option the researchers assessed would be to increase the amount of recycled water that farms can access. The Watsonville Area Water Recycling Facility processes wastewater from homes and businesses in the area and sends about 6,000 acre-feet of purified wastewater, or "recycled water," to farms through an underground pipeline system.



Ramiro Zamora (left) and Jesus Zenteno (right) operate a water well drill to break through the clay layer so PV Water can pump water to farms in the Pajaro Valley.

(Alix Soliman / Lookout Santa Cruz)

The treatment plant discharges about 7,000 acre-feet of purified wastewater into the ocean during the winter, when farmers get their irrigation water from the sky for free instead. Some of that water could be captured for later use on farms, but the agencies would have to build expensive storage tanks.

Improving how water is used on farms is the second-cheapest option, according to the researchers. This can involve anything from switching irrigation systems to more conservative methods such as drip irrigation, altering crop rotations to prevent soil from losing moisture or leaving remnants of the previous crop in the field to slow runoff.

Upgrades to the existing Harkins Slough Recharge Basin, the third-cheapest option, are already underway. PV Water uses the basin to store water from Harkins Slough that would otherwise flow to Monterey Bay when it rains. A clay layer beneath the basin has blocked PV Water from channeling its full allotment of 2,000 acre-feet from the slough, allowing the agency to recover just 1,300 acre-feet annually. Drilling new wells around the basin will allow PV Water to supply farmers with more water captured here, reducing some pumping of the aquifer.

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Groundwater recharge basins on private farmlands provide additional environmental and social benefits that traditional water management methods don't. The program empowers farmers to actively participate in protecting the aquifer, a critical agricultural resource that could cease to exist without their careful management.

"One of the challenges with managing groundwater is you can't see it. I think it feels very much out of reach for a lot of people," Fisher said. "Projects like this

help to engage people in their groundwater basin."

Recharged water can raise the water table, diluting salt and nitrate (NO3) — a common pollutant caused by fertilizer — that become more concentrated in the aquifer when the water level drops. Fisher's team is also experimenting with adding layers of carbon to the soil at the bottom of the basins to further improve the quality of recharged water.

Groundwater recharge basins are a nature-based solution to California's water challenges, depending on rain and gravity for stormwater runoff and the natural process of water percolating into the soil. As such, they tend to be cheaper to build and maintain than engineered systems like desalination plants or injection wells, or similar projects that need to be paired with a water-treatment facility to work, Bruce said.

In contrast, desalination plants pull water from the ocean and use reverse osmosis to separate the water molecule from the salt. They are expensive to build and operate, producing water at around $7,500 per acre-foot while recharge basins produce water at $570 per acre-foot, according to the study. Injection wells pull water from rivers during storms or from water treatment facilities, which must be purified before it is mechanically pumped deep underground.

Strawberry fields, organized in raised rows with plastic stretched over them, expand out from the fenced groundwater basin.

(Alix Soliman / Lookout Santa Cruz)

Dennis Lebow, director of land and water resources at Reiter Affiliated Companies, which sells berries under the Driscoll's label, is in charge of managing the Bokariza-Drobac Infiltration Basin. Lebow said the basin works to make farm operations more sustainable. Last year, stormwater ran off from the southernmost part of the Santa Cruz Mountains and fed 106 acre-feet back into the aquifer. The farm pumps out an average of 120 acre-feet to irrigate berries and salad greens, meaning the basin captures 88% of its water consumption in an average year.

"We're really close to net neutral," Lebow said. "We're going to sustain ourselves with projects like this."

One of the main reasons the Bokariza-Drobac Infiltration Basin performs well is that it sits atop an ancient tributary to the Pajaro River. "Those coarse stream

deposits that are buried there are part of what lets that water percolate in pretty quickly," Fisher said.

As promising as groundwater recharge basins are, many more of them would be needed to make a big impact in the aquifer.

As desalination gains traction in parts of California, Santa Cruz weighs future of its water supply

The Pajaro Valley aquifer faces an estimated deficit of about 7,300 acre-feet of water. This is the amount of water pumped out minus the amount that naturally infiltrates back into the ground when it rains. The threshold for deciding if a groundwater recharge basin is worth building is whether it's projected to infiltrate about 100 acre-feet of water back into the aquifer annually.

"The overall goal of the program is to address about 1,000 acre-feet," Fisher said. "It's modest. It might be that with enough projects you could do better than that."

One of the major challenges to digging more basins is that a farmer has to give up 3 to 5 acres of high-value land to install a basin, which would bring in much more revenue if it was being used to grow crops.

"That was a big hurdle that was overcome here because this ground was essentially donated to this project," Lebow said of the Bokariza-Drobac Infiltration Basin. "This basin represents to us a commitment to sustainable farming."

Even when a landowner is enthusiastic about installing a groundwater recharge basin, their land has to be the right fit for the project.

Fisher and his colleagues mapped the Pajaro Valley to find suitable sites for groundwater recharge basins, finding that 35% of the land might have the right soil underneath to support infiltration. Around 20 landowners have come to him interested in installing a recharge basin on their property. But after conducting additional site-specific soil assessments and running hydrologic models, only three have had the necessary geology to complete projects so far, with one more currently under consideration.

Once a basin is installed, it needs upkeep to remain functional. This cost is borne mostly by the landowner. Groundwater recharge basins require weeding, grading and hauling out sediment that collects between rainy seasons, according to Lebow. He estimates that his company spent $30,000 on maintaining the basin last year, and received a $12,000 rebate through the recharge net metering program.

Even though Reiter Affiliated Companies is spending more on the basin than it gets back each year, Lebow says the benefits outweigh the drawbacks. The incentive of the program, he says, is the long-term ability to farm in one of the most agriculturally productive valleys in California.

"It's allowing people to work together and find local solutions to help offset the overdraft and manage our resources better, so the future generations of the Reiter family will be able to sustain berry production out of this valley," Lebow said. "Most importantly, it's not being told what we have to do, because we tend to find more meaningful and practical solutions when we work together locally."

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