

# California is missing out on billions of gallons of stormwater each year, report finds

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For too long, California and other states have viewed stormwater as either a threat or an inconvenience—something to be whisked away from cities and communities as quickly as possible.

But as traditional sources of water face worsening strain from [climate change](#), population growth, agriculture and other factors, those unused gallons of rainwater pouring across asphalt or down rain gutters are starting to be viewed as an untapped resource that can help close the widening gap between supply and demand.

In a report released Feb. 29, researchers with the Pacific Institute determined that every year, 59.5 million acre-feet of stormwater go uncaptured across the United States—or roughly 53 billion gallons per day. The amount is equivalent to 93% of the water withdrawals for municipal and industrial uses in 2015, the most recent year for which national data were available.

"The numbers are clear. It's time to elevate the role of stormwater capture in the national water conversation," said Bruk Berhanu, the report's lead author and a senior researcher with the Pacific Institute, a California-based water-focused think-tank.

Of the 10 states with the most "untapped potential," California ranks ninth with approximately 2.27 million acre-feet of [urban area](#) runoff each year. (An acre-foot is about 326,000 gallons—enough water to supply up to three homes for a year).

What's more, Los Angeles represents the urban area with the greatest stormwater runoff potential in the West, ranking 19th in the country. The census-defined urban area includes L.A., Long Beach and Anaheim, and experiences approximately 490,000 acre-feet of runoff each year, or roughly 437 million gallons per day.

It would not be feasible or desirable to capture every drop of that missed water, as some stormwater is needed for environmental use, ecological health, recreation and other purposes, Berhanu said. Yet the sheer volume indicates that far more could be done, and that stormwater could

become a significant supply alternative in communities across the country.

Texas was the state with the most untapped potential, 7.8 million acre-feet of urban area runoff each year. The analysis accounted for the size of each urban area as well as its historic annual rainfall, the researchers said.

The findings come at a critical moment. In California and many other parts of the world, traditional water sources—including underground aquifers and fresh water from rivers, streams and snowmelt—are becoming less reliable.

The Fifth National Climate Change Assessment found that the American Southwest can expect extended periods of reduced precipitation in the years ahead, which will be interrupted by bursts of extreme rainfall and flooding. The Colorado River—a water lifeline for 40 million people across the region—is projected to see flows reduced by as much as 30% by 2050.

In response to tightening supplies, urban water managers are turning to strict conservation measures and alternatives such as desalination and recycled wastewater to help keep taps flowing. But stormwater is also an asset, and a growing number of cities and states are beginning to implement projects to take advantage of rainfall when it comes.

For years, stormwater "was seen as a problem, as a burden you've got to push somewhere else, whereas today, we're looking at it more as a resource," said Seth Brown, executive director of the nonprofit National Municipal Stormwater Alliance. "That's the big paradigm shift that's been going on in the stormwater sector."

Despite this growing interest, the report found that greater uptake of

stormwater is hindered by a lack of comprehensive data characterizing the national volumetric potential, as well as the lack of a nationwide framework for stormwater capture, treatment and reuse, among other barriers.

Water rights and public health codes governing use and pollutants are also challenges, Brown said. Funding can also be a hurdle because stormwater efforts often require long-term thinking and investments.

But the payoff is worth it—particularly as the limitations of past unsustainable practices become clearer, he said. While stormwater likely would not replace all other supplies, it could be a key piece of a city's or region's water portfolio.

"What we're going to see in the future is going to be an all-of-the-above kind of thing—it's going to be water recycling as well as stormwater capture and reuse," Brown said. "It's going to play a significant enough role where we should talk about it, and think about it, and start addressing it now."

In California, officials are working to achieve this through a number of projects. During the 2023 water year, state agencies permitted more than 1.2 million acre-feet of groundwater recharge—including nearly 400,000 acre-feet that were recharged after Gov. Gavin Newsom temporarily lifted regulations to allow more floodwater from storms to be diverted into areas where it could percolate into the ground.

The state is also moving forward with plans for a proposed tunnel that would capture and move more water from the Sacramento-San Joaquin River Delta during wet years. Had the tunnel been operational this winter, the Department of Water Resources could have captured about 481,000 acre-feet of stormwater between Jan. 1 and Feb. 22, or enough water for about 5 million people for a year, officials said.

"The recent winter storms have brought a lot of water that has the potential to be captured and stored underground to replenish groundwater basins," said Margaret Mohr, the DWR's deputy director of communications. She noted that since 2019, the state has invested more than \$160 million in projects that help urban areas capture, store and reuse runoff.

"As we face a hotter, drier future brought on by climate change, we are going to continue to see less snowpack, meaning we can't rely as heavily on snowpack for future water supply as we have in the past," Mohr said. "California must continue to invest in water management strategies like stormwater capture, groundwater recharge and recycled water to ensure that our water supply remains safe and reliable and to provide continued flood protection for communities."

Los Angeles too is taking steps to improve its stormwater capture capabilities. In 2018, Angelenos passed Measure W, a tax aimed at capturing and cleaning more stormwater before it reaches the ocean. The program, which allocates about \$280 million annually to stormwater projects, has seen some success, although a recent assessment found its progress has been slow.

The work often includes removing concrete, asphalt and other aspects of the built environment to create more opportunities for stormwater to seep into the ground, where it can recharge the aquifers that feed the city's supplies.

The program's ultimate goal is to capture 300,000 acre-feet of water per year by 2045. On average, L.A. County now captures and infiltrates about half that, according to Vision 45, a report released by the Natural Resources Defense Council, Heal the Bay and Los Angeles Waterkeeper last year.

That report provides a road map for a more sustainable water future in L.A. and includes several recommendations to improve stormwater capture. Among them are newly constructed regional projects; better use of existing projects; and the implementation of projects at the parcel and neighborhood scale.

"[E]ach year, whether we have above- or below-average rainfall, billions of gallons of stormwater flow over paved surfaces, through the storm drain system, and out to the ocean without the opportunity for infiltration because we do not yet have the infrastructure to capture all the rain that falls in a single rain event," it said.

The Pacific Institute's assessment also outlines a number of recommendations to improve stormwater capture, beginning with more detailed quantification of opportunities at local, regional and state levels, as well as the creation of national guidelines.

Other recommendations include expanded funding and financing opportunities for stormwater capture; enhanced regional approaches and collaboration between agencies; and reduced restrictions on how stormwater can be used. Public-private partnerships can also make a big difference since "runoff is generated on privately owned land just as much as publicly owned land," said Berhanu, the lead author.

That could mean rain barrels or rain gardens on front lawns, or increased interest from corporations with large real estate portfolios. San Francisco, for example, now requires large new developments of 100,000 square feet or more to install onsite reuse systems, such as graywater or stormwater systems, for irrigation, toilets and other nonpotable uses.

"We definitely don't want to point to one particular strategy over another, but it is very clear that there needs to be a mix of strategies



involved," Berhanu said.

Heather Cooley, director of research with the Pacific Institute, noted that stormwater capture has other benefits as well.

"Urban runoff into waterways is a major source of pollution," she said. "Metals, nutrients, chemicals, pesticides—all sorts of things we're using in our urban spaces and discharging those into waterways. So it not only helps to avoid downstream water supply impacts, but it can provide water quality benefits as well."

Stormwater capture is also a key component of flood control, as channels such as the Los Angeles River help to prevent water from flowing into neighborhoods during heavy storms.

But all of those needs and uses could be better addressed through improved [stormwater](#) capture capabilities and making sure more drops are saved, the report says.

"This research shows it's a lot of water," Cooley said. "It could be a significant component of our water supply, and could help to fill that supply-demand gap in communities across the U.S."

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