

Veles Water Weekly Report

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VelesWater



WATER FUTURES MARKET ANALYSIS

Welcome to ***WATERTALK***

by Joshua Bell

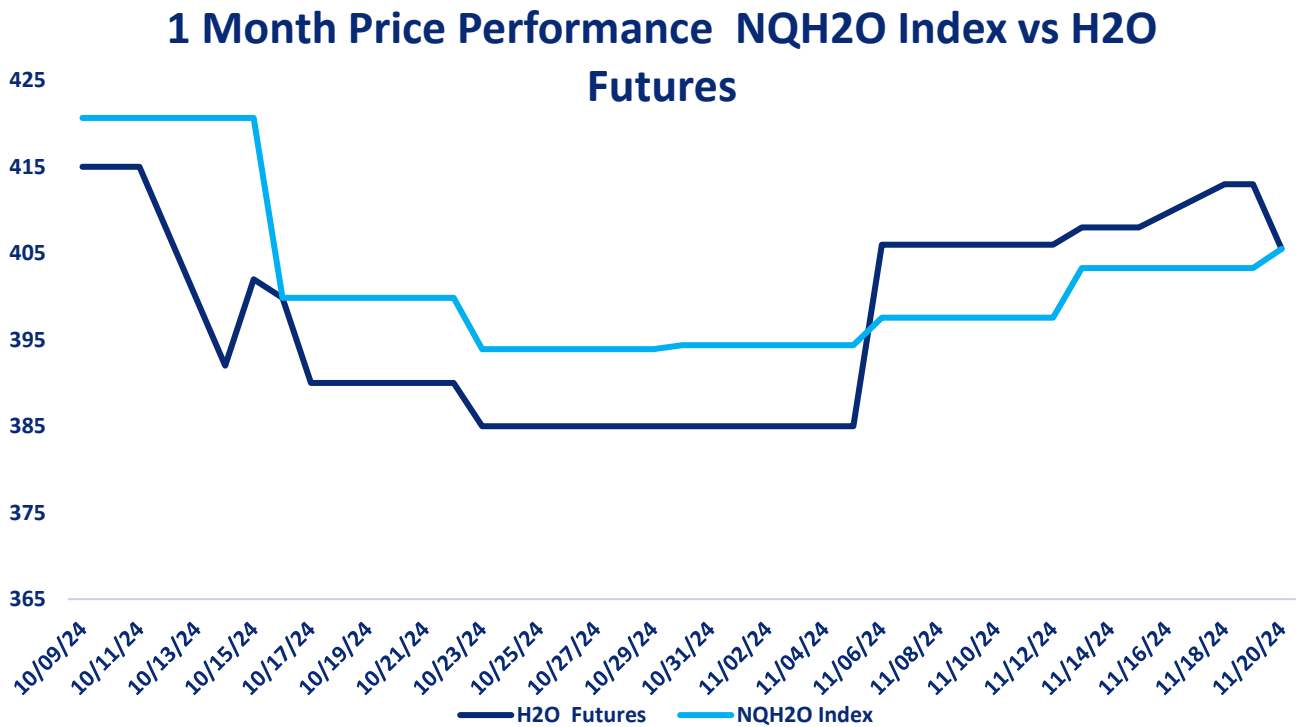
CLICK THE LINK BELOW

"A 2 minute technical analysis video of H2O futures"

<https://vimeo.com/1031836487?share=copy#t=0>



NQH2O INDEX PRICE vs H2O FUTURES PRICE



Price Chart Based upon Daily Close

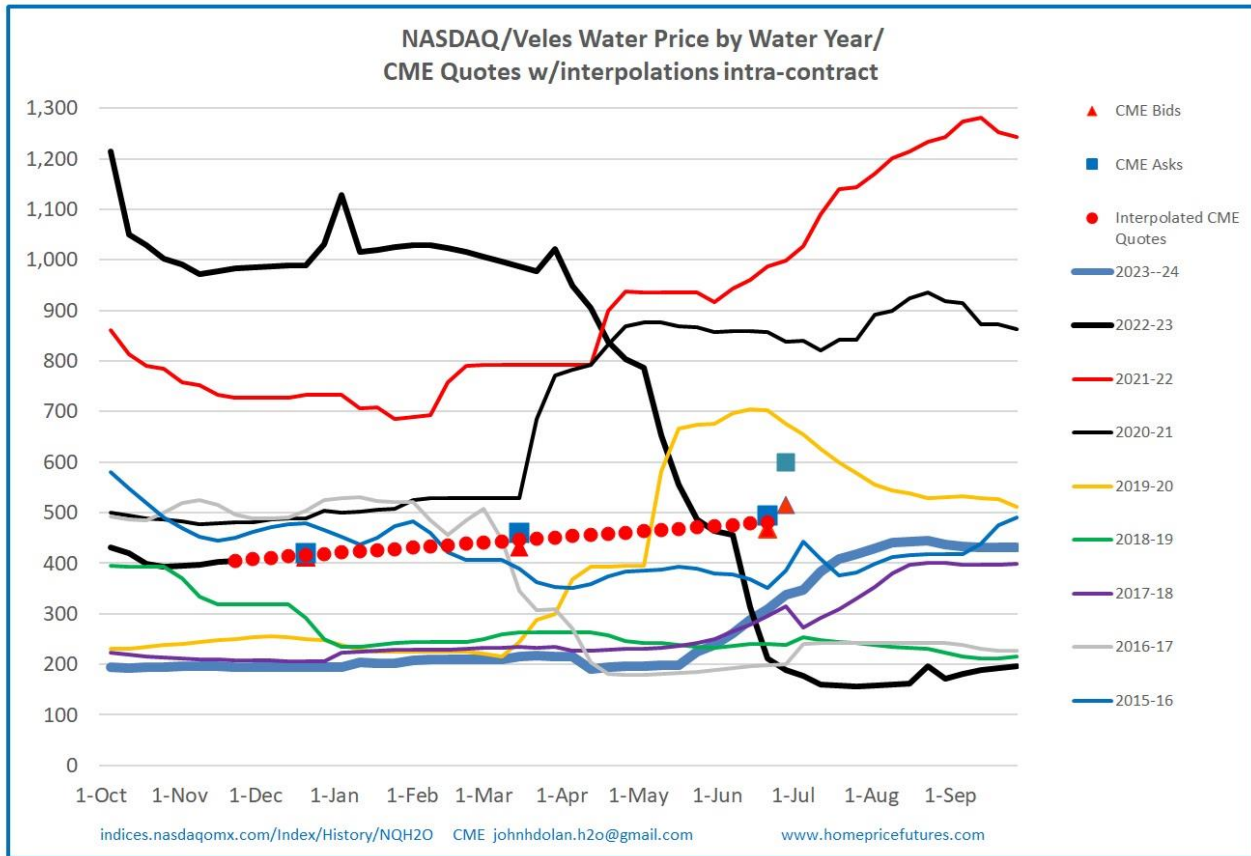
The new NQH2O index level of \$405.51 was published on November 20th up \$2.23 or 0.55% from the previous week. The November settled at the new index level and the December contract is considered the front month. The futures prices have closed at a premium of \$4.72 to \$9.72 versus the index over the past week.

Below are the bid offer prices on different expiries being quoted in the market.

Dec 24	412@420
Mar 25	432@460
June 25	467@495
June 26	515@600



NQH20 INDEX HISTORY

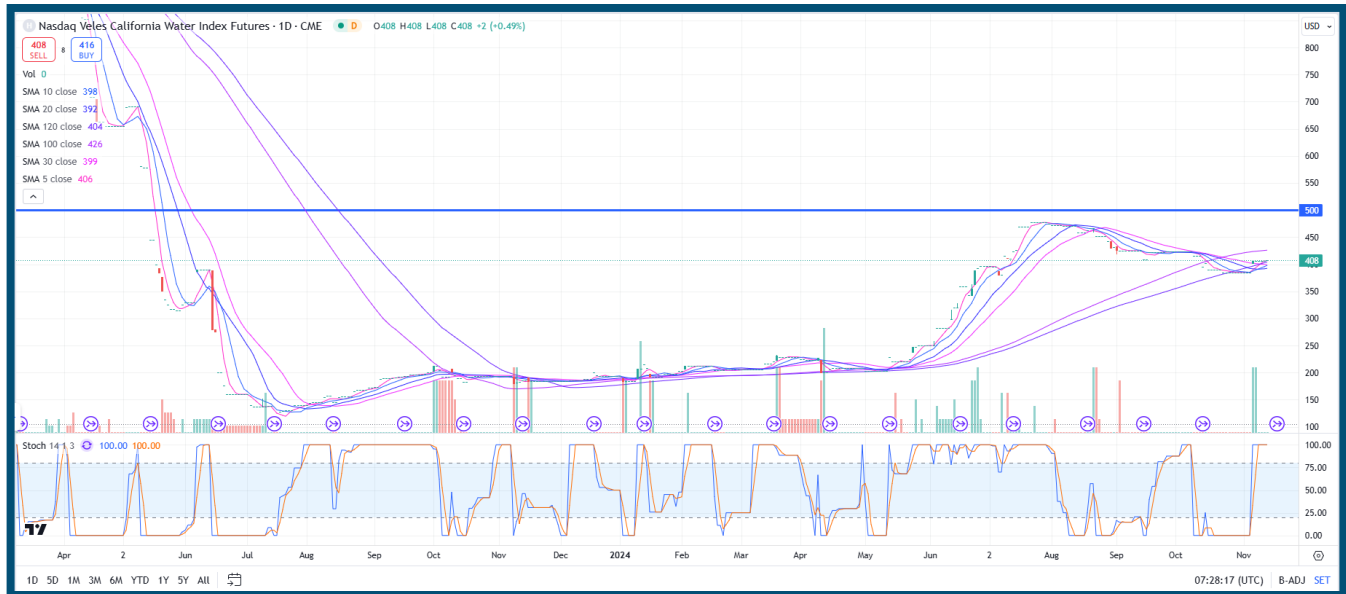


The graph above shows the CME water contracts for Dec 2024, March 2025, June 2025 and June 2026 superimposed over historical NASDAQ Veles water indices. The interpolated curves for 2024-25 and 2025-26 (to include June 2026 contract) are shown in red dots.

(John H Dolan, CME Market Maker)



H2O FUTURES TECHNICAL REPORT



Price Action

- **Current Price: 413**
- The price has remained flat in this trading session, indicating no change in momentum.

Moving Averages (MA) Analysis

- **MA 5 (5-day Moving Average): 411**
 - The current price is slightly above the MA 5, suggesting mild short-term bullish momentum.
- **MA 10 (10-day Moving Average): 409**
 - The price is also above the MA 10, reinforcing continued short-term bullish momentum.
- **MA 20 (20-day Moving Average): 398**
 - The price is above the MA 20, signalling strength in the short-term trend.
- **MA 30 (30-day Moving Average): 397**
 - The price is above the MA 30, indicating medium-term bullish momentum.
- **MA 100 (100-day Moving Average): 427**



- The price is below the MA 100, confirming that the long-term trend remains weak compared to recent bullish sessions.
- **MA 120 (120-day Moving Average): 411**
 - The price is slightly above the MA 120, indicating slight improvement in the long-term outlook.

Support and Resistance

- **Immediate Resistance: 500**
 - This level has been tested multiple times and remains a key resistance point for a breakout.
- **Immediate Support: 413 (current price level)**
 - The current price may act as support. If it drops below this level, the next significant support would be around the MA 100 at 427.

Stochastic Oscillator

- **Stochastic (K%: 100, D%: 100)**
 - The stochastic indicator shows that the market is in overbought territory, suggesting that while bullish momentum is strong, there could be short-term downward pressure or consolidation ahead.

Summary

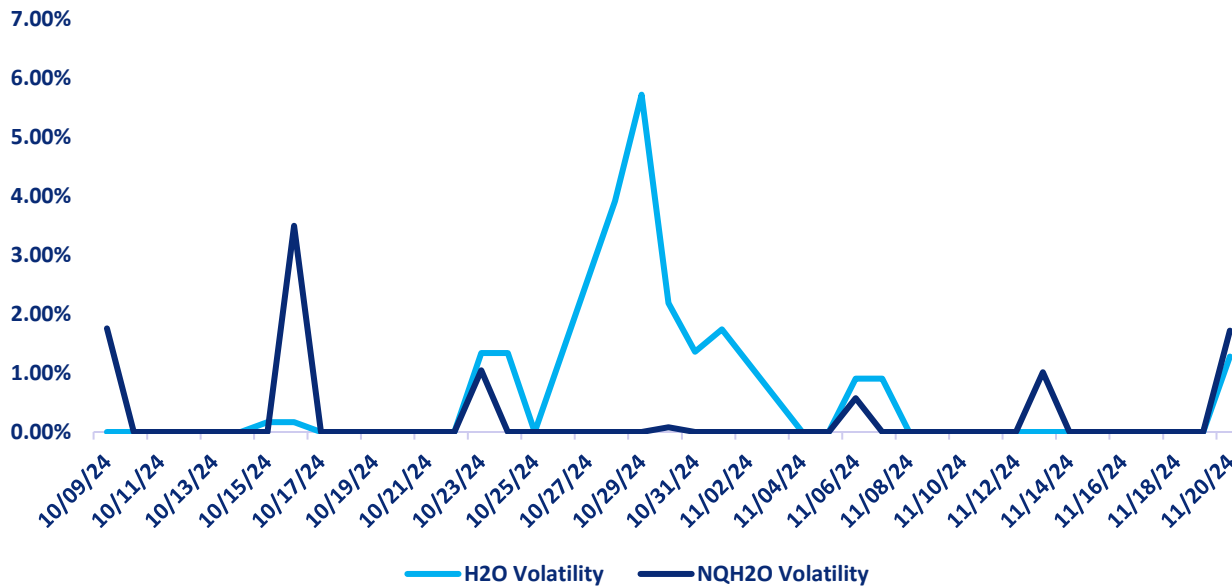
- The price is currently showing short-term and medium-term bullish momentum, as it is sitting above the MA 5, MA 10, MA 20, and MA 30.
- However, the long-term trend remains cautious, as the price is still below the MA 100, though it has moved above the MA 120, indicating some improvement.
- The stochastic indicator signals that the market is heavily overbought, suggesting the potential for a pullback or consolidation in the short term.

Key levels to watch: Immediate support at 413 and resistance at 500. If the price continues to rise, breaking above the MA 100 at 427 would be a positive long-term signal. Conversely, if the price declines, support around the MA 100 should be monitored closely.



H2O FUTURES AND NQH2O INDEX VOLATILITY ANALYSIS

Daily H2O Futures Volatility vs Daily NQH2O Index Volatility



DAILY VOLATILITY

Over the last week the November contract daily future volatility has been 1.74%.

ASSET	1 YEAR (%)	2 MONTH (%)	1 MONTH (%)	1 WEEK (%)
NQH2O INDEX	29.16%	5.34%	0.91%	0.88%
H2O FUTURES	N/A	9.24%	5.92%	2.43%

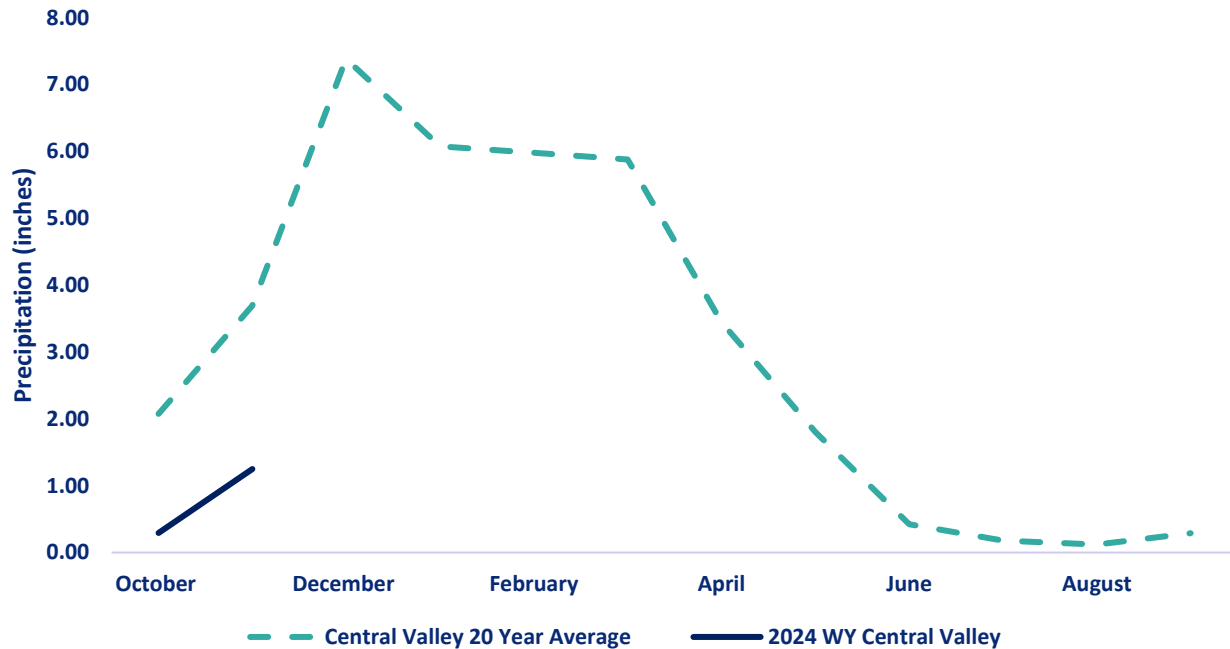
For the week ending on November 20th, the two-month futures volatility is at a premium of 3.73% to the index, up 0.30% from the previous week. The one-month futures volatility is at a premium of 5.02% to the index, up 0.06%. The one-week futures volatility is at a premium of 1.55% to the index, volatility.

*Above prices are all **HISTORIC VOLATILITIES**. All readings refer to closing prices as quoted by CME.*



CENTRAL VALLEY PRECIPITATION REPORT

Central Valley Precipitation Index



Central Valley average is calculated using data from 19 weather stations in the Central Valley, California.
Data as of 20/11/2024

STATION	MTD (INCHES)	WEEK ON WEEK CHANGE (INCHES)	% OF 20 YEAR AVERAGE MTD	2025 WYTD VS 2024 WYTD %	2025 WY VS 20 YEAR AVERAGE TO DATE %
SAN JOAQUIN 5 STATION (5SI)	0.78	0.27	22.64	26	23
TULARE 6 STATION (6SI)	0.69	0.39	27.97	21	25
NORTHERN SIERRA 8 STATION (8SI)	2.28	1.02	44.10	40	50
CENTRAL VALLEY AVERAGE	1.25	0.56	33.84	29	33

RESERVOIR STORAGE

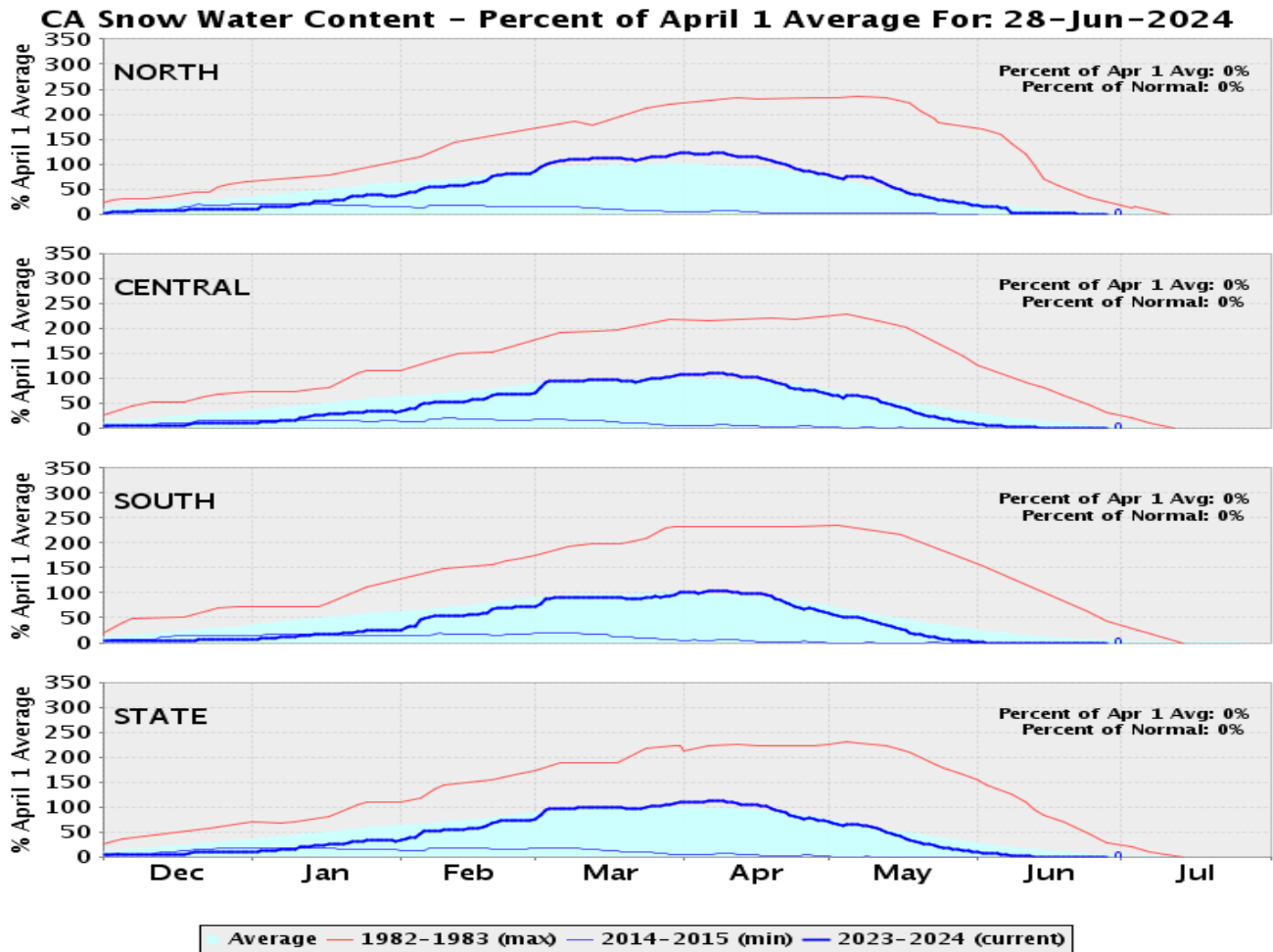
RESERVOIR	STORAGE (AF)	% CAPACITY	LAST YEAR % CAPACITY	*% HISTORICAL AVERAGE
TRINITY LAKE	1,603,854	66	50	114
SHASTA LAKE	2,525,387	55	68	104
LAKE OROVILLE	1,643,942	46	67	92
SAN LUIS RES	1,051,131	52	60	105

*% Historical Average is based on a daily average that is interpolated from historical monthly averages. The monthly averages are computed using monthly data from water year 1991 to 2020. The monthly averages are updated every 5 years using a sliding 30 year period.

[Reference: California Water Data Exchange](#)



SNOWPACK WATER CONTENT



REGION	*SNOWPACK WATER EQUIVALENT (INCHES)	WEEK ON WEEK CHANGE (INCHES)	% OF AVERAGE LAST YEAR	% OF 20 YEAR HISTORICAL AVERAGE	% OF HISTORICAL **APRIL 1ST BENCHMARK
NORTHERN SIERRA	0	0	0	0	0
CENTRAL SIERRA	0	0	0	0	0
SOUTHERN SIERRA	0	0	0	0	0
STATEWIDE	0	0	0	0	0

*Snow Water Equivalent, or SWE, is a commonly used measurement used by hydrologists and water managers to gauge the amount of liquid water contained within the snowpack. In other words, it is the amount of water that will be released from the snowpack when it melts. SWE has regional variance.

** April 1st is used as the benchmark as it when the snowpack in California is generally deepest. It has been used the benchmark date since 1941 by DWR and can be used to predict spring river flow.



DROUGHT MONITOR

California

[Home](#) / California

Map released: Thurs. November 14, 2024

Data valid: November 12, 2024 at 7 a.m. EST

Intensity

- None
- D0 (Abnormally Dry)
- D1 (Moderate Drought)
- D2 (Severe Drought)
- D3 (Extreme Drought)
- D4 (Exceptional Drought)
- No Data

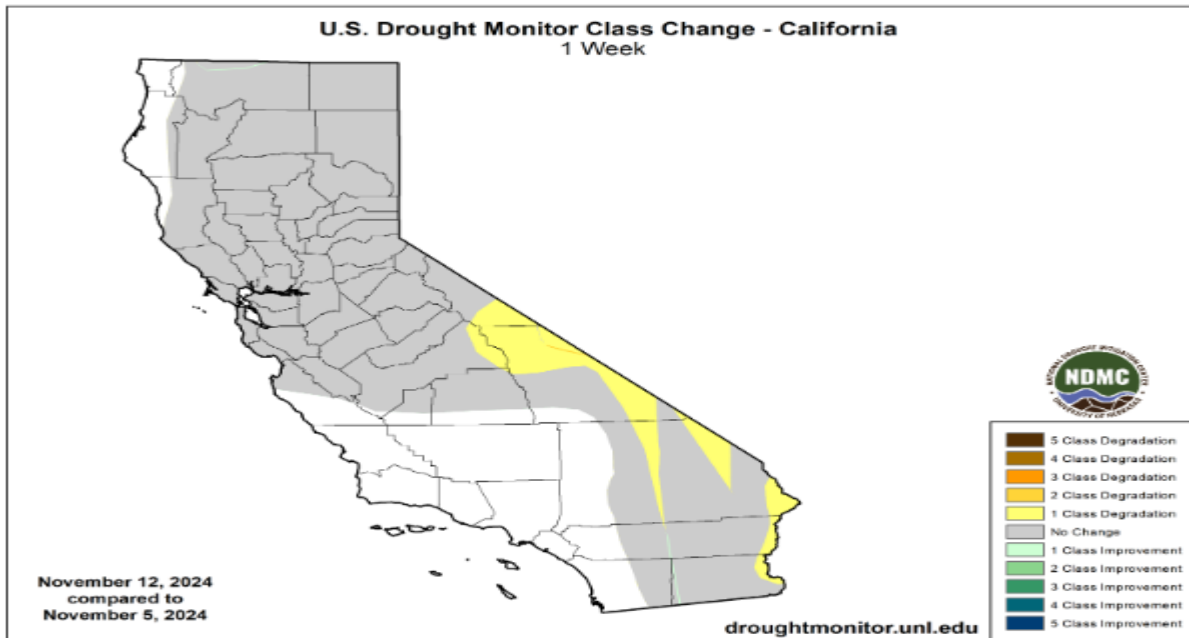
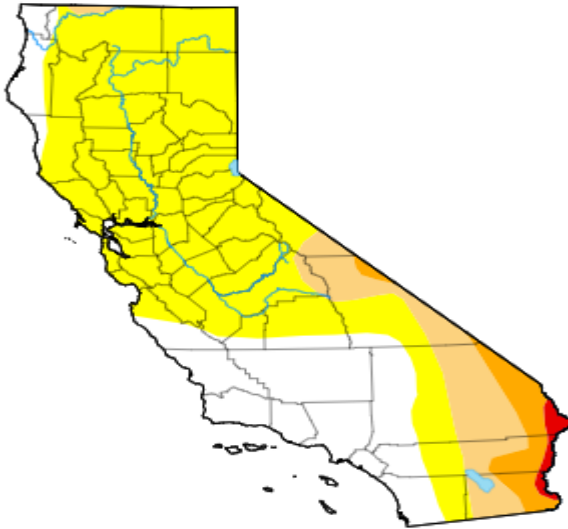
Authors

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[Richard Tinker](#), NOAA/NWS/NCEP/CPC

Pacific Islands and Virgin Islands Author(s):

[Tsegaye Tadesse](#), National Drought Mitigation Center



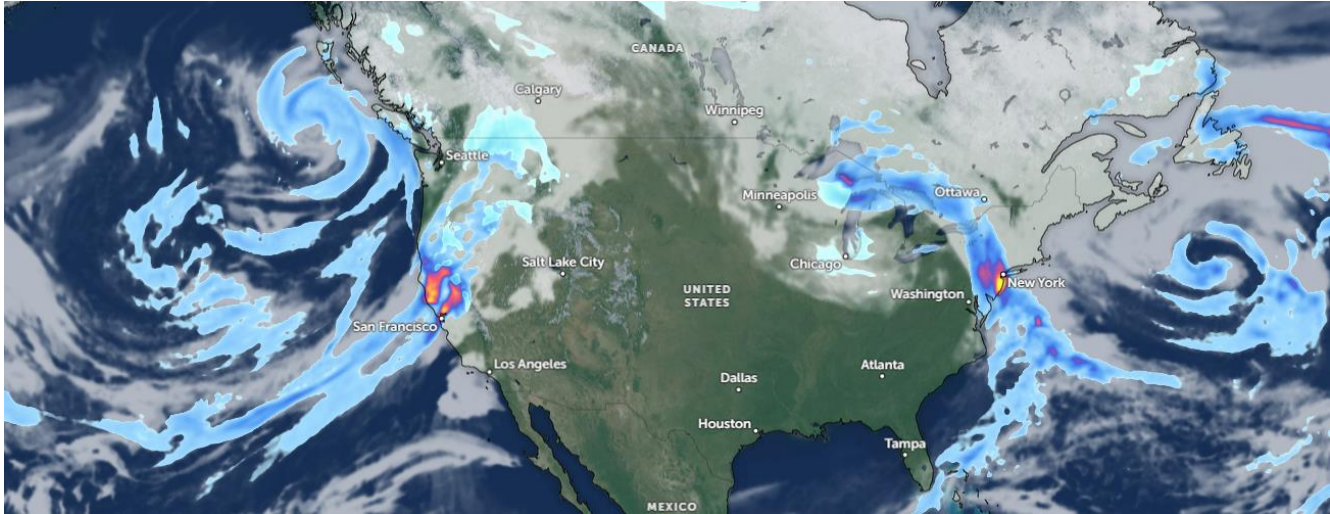
Week	Date	None	D0-D4	D1-D4	D2-D4	D3-D4	D4	DSCI
Current	2024-11-12	25.51	74.49	17.00	5.50	0.95	0.00	98
Last Week to Current	2024-11-05	25.53	74.47	12.26	4.30	0.00	0.00	91
3 Months Ago to Current	2024-08-13	77.29	22.71	5.32	0.00	0.00	0.00	28
Start of Calendar Year to Current	2023-12-26	96.65	3.35	0.00	0.00	0.00	0.00	3
Start of Water Year to Current	2024-10-01	28.40	71.60	10.67	0.08	0.00	0.00	82
One Year Ago to Current	2023-11-14	95.32	4.68	0.00	0.00	0.00	0.00	5

The U.S Drought Monitor is jointly produced by the National Drought Mitigation Center at the University of Nebraska-Lincoln, the United States Department of Agriculture, and the National Oceanic and Atmospheric Administration. Map courtesy of NDMC.



CURRENT SATELLITE IMAGERY

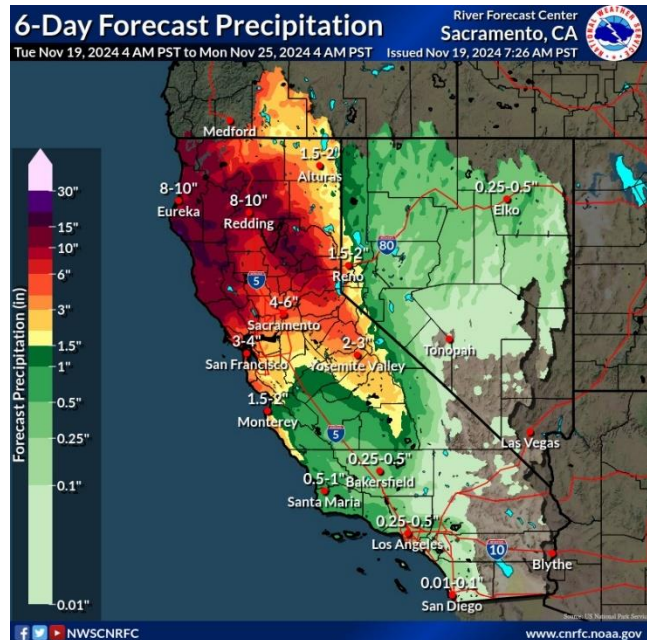
Two storms, one on each coast. A massive West Coast storm hitting the northwestern region wreaking havoc on the ground in that area stretching as far south as San Francisco. The Midwest and central southern US is dry but a line of storms stretching from the tip of Florida stretching up northwards past New York and curving westward over Ottawa and Minneapolis.



10 Day Outlook

Map Ref: Zoom Earth

With the upr ridge axis continuing downstream along the Continental Divide and a deep area of low pressure spinning across the northeast Pacific...deep and moist diffluent onshore flow continues early Friday across the region with the moisture plume remaining focused on northern CA stretching back to the southwest to the lower latitudes of the eastern Pacific. PW values within this feature are still peaking just over 1.50-inches...with PW values just over the 1.00-inch mark intersecting the coast with good inland transport as southwesterly winds are peaking from 50- to 70-kt at 700-mb across northern CA. The associated cold front will finally begin to drop southward and inland across the region on Friday as the offshore system slowly makes its way toward the west coast and the upr jet noses toward northern CA. This will push the deep





moisture plume over the SF Bay Area and inland along the I-80 corridor during the afternoon hours before reaching down to central CA Friday evening into early Saturday morning. Heaviest precip on Day 4 (Friday) will fall across northern CA with 1.50- to 3.00-inches (locally to 4.00-inches over the Feather/Yuba River basins)...but areas south of I-80 will finally start to see some of the moderate to heavy precip amounts with the SF Bay and Monterey Bay Areas from 0.75- to 1.50-inches (locally reaching 2.50-inches over the Santa Cruz Mountains and Big Sur Coast)...and inland the central Sierra will generally range from 1.00- to 2.00-inches.

Into Saturday...the moisture plume will make its way across southern CA to near the MX border. And although the moisture plume will still bring 1.00-inch PW values to the coast...the divorce from the better forcing to the north will bring only light precip to portions of southern CA between Point Conception and the CA/MX border. Back behind the cold front...although moisture will have dropped considerably and freezing levels come down...the onshore cyclonic onshore flow will continue precip across northern/central CA and northern NV with the best totals along the west slope of the Sierra as upslope flow continues with 700-mb winds in the range of 15- to 30-kt. Sunday into Monday will see the core of the upr trof beginning to swing across the west coast with an uptick in precip expected across northern CA and the length of the Sierra.

Reference: National Weather Service / California Nevada RFC / Sacramento CA



WESTERN WEATHER DISCUSSION

Heavy precipitation in northeastern New Mexico, with snow reported in some of the higher elevations, produced areas of improvement to dryness and drought. A few high spots in New Mexico reported near 3 feet of snow, including locations near Las Vegas NM and Folsom NM. The only other area of improvement in the West Region was in eastern Washington. Meanwhile, continued dryness for the past several weeks prompted some deterioration in the Southwest, with extreme drought (D3) introduced in and around western Arizona near the Lower Colorado River, an expanded area of severe drought (D2) through southwestern Nevada and adjacent California, and increased coverage of moderate drought in parts of southeastern California and southwestern Arizona, as well as a portion of northeastern Arizona. These areas in the Southwest have averaged considerably cooler than normal for the past couple of weeks (generally 2.5 to 6.0 deg. F below normal), but looking at the last 3 months as a whole, average temperatures have been unusually warm, averaging 2.0 to locally 6.0 deg. F above normal for the period from mid-August into mid-November as a whole, with the greatest departures observed in later summer and early autumn, including record triple-digit heat that lasted a few weeks in some areas, which has served to aggravate the dryness and drought.

Reference:

Lindsay Johnson, National Drought Mitigation Center

Richard Tinker, NOAA/NWS/NCEP/CPC



WATER NEWS

CALIFORNIA WATER NEWS

California Water Institute projects provide regional perspective for Prop. 4

The California Water Institute at Fresno State is positioning its current projects to help inform work related to California’s Proposition 4, a \$10 billion climate resiliency bond that overwhelmingly passed on the November ballot.

The historic measure is the largest single climate bond in state history and includes \$3.8 billion for state water projects that address drought, flood and water supply issues. The California Water Institute targets some of those key areas with two grant-funded programs already underway; the Unified Water Plan and Climate Resiliency through Regional Water Recharge in the San Joaquin Valley.

“As climate change intensifies, our infrastructure faces unprecedented challenges. Californians have recognized this urgency by passing this historic bond measure,” said Laura Ramos, interim director for the California Water Institute’s Research and Education Division.

Under the [Unified Water Plan](#), the California Water Institute partnered with [Water Blueprint for the San Joaquin Valley](#) for a two-year, \$1 million project awarded by the Bureau of Reclamation to track various water projects happening across the Valley. It’s an effort to compile the information into a single, unified water plan that could inform future investments. The plan will provide an overview of the Central Valley’s water quality, supply, conveyance, reliability, conservation efforts, flood control and population growth.

The project, [Climate Resiliency through Regional Water Recharge in the San Joaquin Valley](#), addresses drought and flooding by planning for sustainable use of surface water and groundwater. The Governor’s Office of Land Use and Climate Innovation, formerly the Office of Planning and Research, awarded nearly \$569,000 to the California Water Institute to educate rural communities on groundwater recharge. The project also aims to establish a collaborative response team and plan for effective floodwater management.

One of the main goals of the project is to prioritize vulnerable communities – similar to Proposition 4 – in which 40% of the bond is required to help disadvantaged communities. “To build true resilience, we must take a strategic approach — protecting our most vulnerable communities while viewing the San Joaquin Valley as an integrated system. Through California Water Institute’s research and educational initiatives, we aim to advance this vital regional perspective,” Ramos said.



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With these grant-funded projects underway, the California Water Institute remains at the forefront of water research and education programs and services, at a time when California is investing more than ever in a sustainable water future.

Original Article: [Fresno State News by Soreath Hok, California Water Institute student assistant](#)

Biden-Harris Administration Announces \$125 Million Investment for Large-Scale Water Recycling Projects

The Department of the Interior today announced a \$125 million investment for five projects in California and Utah that will help create new sources of water and improve drought resiliency.

These investments support the Department's new [Large-Scale Water Recycling Program](#), launched in 2023 with new funds from the Bipartisan Infrastructure Law. The new program incentivizes conservation projects at a larger scale, with no cap on project size, and will play an important role in helping communities develop local, drought-resistant water supplies by turning unusable water sources into clean, reliable ones.

"The President's Investing in America agenda is making transformational investments in climate resilience in communities across America," said **Secretary Deb Haaland**. "Through the Large-Scale Water Recycling program, the Department is ensuring that communities in the West have the resources they need to safeguard water supplies and ensure this precious resource is available for generations to come."

"This effort to diversify our tools by taking previously unusable water sources and turning them into new supplies will be instrumental in managing through drought," said **Bureau of Reclamation Commissioner Camille Calimlim Touton**. "These historic investments are allowing these communities to build and expand infrastructure to recycle large amounts of water to meet growing needs."

President Biden's Investing in America agenda represents the largest investment in climate resilience in the nation's history and is providing much-needed resources to enhance Western communities' resilience to drought and climate change. Through the Bipartisan Infrastructure Law, Reclamation is investing a total of \$8.3 billion over five years for water infrastructure projects, including rural water, water storage, conservation and conveyance, nature-based solutions, dam safety, water purification and reuse, and desalination. Since the Bipartisan Infrastructure Law was signed in November 2021, Reclamation has announced more than \$3.5 billion for more than 530 projects.

Original Article: [US Dept. of the Interior](#)



McCarthy-Jacobs partnership to lead \$160 million groundwater desal project in Southern California

A joint venture between McCarthy and Jacobs has been chosen to design and construct the Torrance Groundwater Desalter Expansion. This initiative is a vital part of the Water Replenishment District (WRD) of Southern California's Brackish Groundwater Reclamation Program, as well as its broader "WIN 4 ALL" initiative. The project will treat brackish water from the West Coast Groundwater Basin, enhancing the region's water supply for over 88,000 residents while reducing dependence on imported water.

The expansion will incorporate advanced reverse osmosis membrane technology to remove salts from groundwater, delivering high-quality drinking water. This facility could be among the first in the U.S. to combine nano-filtration and reverse osmosis for a municipal brackish water system.

With a planned budget of approximately \$160 million, the project will expand the Robert W. Goldsworthy Desalter Facility's capacity, producing an additional 9 million gallons of drinking water per day for the City of Torrance. The facility is expected to reach full operational capacity by 2027.

"Jacobs and McCarthy bring innovative water treatment solutions, paired with design-build experience to create a highly skilled team for this significant groundwater desalination project in southern California," said Jacobs Senior Vice President Katus Watson. "The progressive design-build delivery model allows us to work collaboratively to minimize cost, reduce risk, streamline construction and improve schedule performance to fast track the completion of this state-of-the-art facility that will provide a sustainable drinking water supply for the near term and well into the future."

The project will also include the construction of new groundwater extraction wells and raw water pipelines to support the expanded desalination facility.

"As water resources in the West are increasingly strained, advanced water treatment technologies are providing excellent solutions for communities like Torrance to ensure a sustainable and resilient water supply," said McCarthy's Water Group Vice President Sagrado Sparks. "Projects like this are proactively addressing water supply issues through proven technologies and continue to position California as a leader in protecting and preserving its fragile drinking water supply."

Original Article: [Smart Water Magazine](#)

Hydrologic outlook issued by the NWS for Northern California

A hydrologic outlook was issued on Sunday at 5:23 p.m. The alert is for Coastal Del Norte, Del Norte Interior, Northern Humboldt Coast, Southwestern Humboldt, Northern Humboldt Interior, Southern Humboldt Interior, Southern Trinity, Mendocino Coast, Northwestern Mendocino Interior, Northeastern Mendocino Interior, Southwestern Mendocino Interior, Southeastern Mendocino Interior and Southern Lake County as well



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as Lake County. A strong and prolonged atmospheric river will impact NW California mid to late week. Moderate to locally heavy rainfall will bring the potential for rapid rises on rivers, streams and creeks across the region. Rain will be heaviest on Wednesday with 2 to 4 inches of rain. High peaks in the King Range could see 6 to 9 inches of rain over 24 hours. Most models show more moderate but persistent rain continuing Thursday through next Saturday with most likely rainfall of 1 to 3 inches each day. Total Storm amounts could easily reach between 6 and 14 inches over 4 days, with up to 21 inches for the King Range for the greatest risk is for Humboldt and Del Norte counties where soils are already near saturation. Significant rain are also expected for Mendocino and Lake counties, though generally drier soils will reduce the flood risk. Much of the precipitation in Trinity County will likely fall as snow with snow levels in the eastern half of the county as low as 2500 feet greatest risk of heavy rain during the day on Wednesday. More moderate but prolonged rain Thursday through Saturday. The forecast is more uncertain further out. Long range models show the potential for rain to continue into Thanksgiving Week. TOP VIDEOS "Such rain amounts will greatly increase the risk of flooding, especially for the northern half of the area where soils have already been saturated by previous rain events. Expect flooding on in low-lying areas, areas with poor drainage, and increased risk of debris on roadways. Rivers, streams and creeks will rapidly rise. The Eel River is around 20 percent chance of exceeding flood stage Thursday evening. The Mad River and the Russian River are showing 5 to 10 percent of reaching flood stage," adds the NWS.

Original Article: [The Sacramento Bee by CA Weather Bot](#)

Groundwater pumping drives rapid sinking in California, study shows

A study published Nov. 19 in [Communications Earth and Environment](#) shows land in California's San Joaquin Valley has been sinking at record-breaking rates over the last two decades as groundwater extraction has outpaced natural recharge.

The researchers found that the average rate of sinking for the entire valley reached nearly an inch per year between 2006 and 2022.

Researchers and [water managers](#) have known that sinking, technically termed "[subsidence](#)," has been occurring over the past 20 years. But the true impact was not fully appreciated because the total subsidence had not been quantified.

This was in part due to a gap in data. Satellite radar systems, which provide the most precise measure of elevation changes, did not consistently monitor the San Joaquin Valley between 2011 and 2015. Stanford researchers have now estimated how much the land sank during those four years.

"Our study is the first attempt to really quantify the full Valley-scale extent of subsidence over the last two decades," said senior study author Rosemary Knight, a professor of



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geophysics in the Stanford Doerr School of Sustainability. "With these findings, we can look at the big picture of mitigating this record-breaking subsidence."

The new study offers ideas on how to stop the sinking through strategic regional water recharge and other management approaches.

Rapid and uneven declines in land elevation have forced multimillion-dollar repairs to canals and aqueducts that ferry critical water through the San Joaquin Valley to southern California's major cities. By damaging local wells and irrigation ditches, this subsidence is also exacerbating water supply issues for one of the most agriculturally productive regions in the world.

"The bill for repairing major aqueducts like the Friant-Kern Canal and the California Aqueduct is exceptionally high," said lead author Matthew Lees, Ph.D., a research associate with the University of Manchester who worked on the study as a Ph.D. student in geophysics at Stanford.

"But the subsidence is having other effects, too. How much was last year's flooding worsened by subsidence? How much are farmers spending to re-level their land? A lot of the costs of subsidence aren't well known."

Original Article: [Phys.org by Stanford University](#)

California water recycling plant gains \$26M to feed Lake Mead

Toilet water in Los Angeles will soon reduce the strain on Lake Mead, thanks in part to a \$26.2 million boost that was announced Monday.

The recycled water will benefit Nevada and other states and tribes that depend on the lake for drinking water.

Named the Pure Water Southern California project, when it's active, it will [generate enough water](#) to serve nearly 386,000 households, according to a news release from U.S. Sen. Catherine Cortez Masto, D-Nev.

The funds, from the Bipartisan Infrastructure Law that President Joe Biden signed in 2021, are going toward the construction of the project. It received \$99 million in May from the same pool of federal money.

"I created the large-scale water recycling program through the Bipartisan Infrastructure Law to support this cutting-edge initiative to strengthen our water supply and protect critical water resources like Lake Mead," Cortez Masto said in a statement. "I'm pleased to see these funds coming to help us combat drought throughout the West."

Las Vegas has been a leader in the [water reclamation space](#) for years, recycling hundreds of millions of gallons of toilet water and sewage every day and sending it back to Lake Mead via the Las Vegas Wash.

To this new project, the Southern Nevada Water Authority contributed \$750 million in 2021 in exchange for a share of California's water in Lake Mead. The Metropolitan Water District estimates that the project will be functional in 2032.



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“This investment will keep more water in Lake Mead, reduce demand on our precious water resources, and build long-term resiliency for sustainable water use in the West,” U.S. Rep. Susie Lee, D-Nev., said in a statement about the extra funding.

Original Article: [Las Vegas Review Journal by Alan Halaly](#)

US WATER NEWS

About 19% of Oregonians at risk for PFAS groundwater contamination

A federal study estimates how many Americans drink groundwater that contains traces of “forever chemicals”

About 800,000 Oregonians might rely on private or public well water contaminated by toxic chemicals called “forever chemicals,” or PFAS, according to a federal study.

Researchers with the [U.S. Geological Survey](#) analyzed over 1,200 untreated groundwater samples across the country, then used those results to predict how surrounding regions may be impacted. They published their results in late October.

Compared to other states, Oregon ranks 25th for the number of people using water from public or private wells that are possibly contaminated with PFAS. Washington ranks 9th, with an estimated 3.1 million people using potentially contaminated groundwater.

Researchers published an [interactive map](#) showing where the most people may be impacted. Oregon shows concentrations of affected water users along the Interstate 5 corridor, where more people live.

Nationally, more than half of people in the lower 48 states drink water that could contain traces of PFAS.

“That’s a pretty striking number that I don’t think they expected going in,” said lead author and USGS research hydrologist Andrea Tokranov.

PFAS are man-made chemicals that don’t break down, giving them the name “forever chemicals.” They accumulate in people’s blood over time, increasing people’s risk for cancer, high blood pressure and other harmful health effects that scientists are still studying.

Consumer product chemists created PFAS in the 1940s. The chemicals are often used as a surface coating due to their unique ability to repel oil, grease and water. Lagging environmental regulations over the last eight decades have allowed these toxins to make their way into a dizzying array of consumer products, including makeup, waterproof clothing and non-stick cookware.

A long list of polluters can contaminate surrounding water sources with PFAS. The four major sources are firefighter training sites, industrial sites, landfills and wastewater treatment plants or their resulting sewage, called biosolids. The chemicals can travel



through waterways or rain clouds. They seep into the ground, infiltrating aquifers — layers of rock and sand saturated in water — that public and private wells tap into. This study doesn't look in detail at specific cities or zip codes, and it doesn't provide information about how much PFAS may be in these groundwater sources. Still, Tokranov said, it can help groundwater users see if they're in a high-risk area.

"We especially think it's useful for private well owners who might not have a lot of information on their water quality," Tokranov said.

This model could also serve as a guide for public groundwater suppliers, who will have to start testing for — and mitigating — PFAS [by 2029](#). PFAS treatment systems can cost tens of millions of dollars.

Vancouver is [among those public groundwater suppliers](#). The city gets its water entirely from wells tapping into three underground aquifers, and much of that water has PFAS levels exceeding new federal regulations. Vancouver officials say they're on track to build a series of filters by 2029.

Original Article: [OPB by April Ehrlich](#)

Penn State water-energy-food nexus project takes a global approach

The Chesapeake Bay faces increasing human and environmental challenges, according to [Michael Jacobson](#), professor of forest resources in the [Department of Ecosystem Science and Management](#) in the Penn State [College of Agricultural Sciences](#), including rapid population growth, environmental impacts from energy development and water quality deterioration.

Focusing on these challenges within the water-energy-food nexus framework, Jacobson co-led the second [Collaborative Learning School](#), a year-round virtual networking community of faculty, students and early career professionals that culminates in a two-week summer field workshop with U.S. and African scientists and practitioners. The school, [which was held in Uganda last year](#), is funded by a five-year, \$2 million [U.S. National Science Foundation grant](#) and is an initiative of the [SustainFood Network](#).

This year's Collaborative Learning School brought together 22 early career researchers from institutions in 14 countries on five continents — including Penn State, the University of Michigan, Texas A&M University and African and European Union institutions — who were divided into four research categories within the water-energy-food nexus: soil health, waste management, renewable fuels, and livestock and water quality. The groups met remotely from January to May to discuss their research goals before coming together in June to complete research and training at sites within the Chesapeake Bay watershed.

"The key of the Collaborative Learning School is to help train the next generation of scholars to think about the problems surrounding the water-energy-food nexus from an international perspective," said Jacobson, who also is a fellow in [Ag Sciences Global](#).



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“With a wide variety of research specializations from all over the world, this year’s participants were uniquely qualified to design practical solutions for the problems afflicting the bay that can then be supported by governmental policy initiatives.”

During the first week of the Collaborative Learning School, participants engaged with soil, water, plant and air quality experts at the Dickinson College Farm in Carlisle and conducted research in their respective study areas. They also spent time canoeing in Yellow Breeches Creek, which eventually empties into the Chesapeake Bay.

Original Article: [PSU by Mariah Lucas](#)

SRP to drain parts of 131-mile canal system to maintain Arizona's water supply

A 7- to 8-mile stretch of canal in northwest Mesa will be out of commission as SRP begins a round of annual repairs over the next month.

Crews will remove fish, drain the canal and perform maintenance work from Nov. 20 to Dec. 20. The sections between Arizona Avenue and Gilbert Road belong to a 131-mile long canal system that delivers water to 2.5 million Valley residents.

The fish being removed are weed-eating, white amur fish. They're used in the system to help manage overgrowth in aquatic vegetation. SRP released 1,800 of them into the canal system in 1989 in hopes of keeping the canals clear and clean, the organization said.

Patty Garcia-Likens with SRP said they’ll work with cities to ensure that residents continue to have water during the maintenance period.

“The delivery of water is never interrupted. We just have different ways of delivering to our various customers, and our customers are the cities,” Garcia-Likens said. “So the cities take that water, they treat the water and they deliver it to the residents.”

Portions of land along the canal will be closed to traffic including bicycles and pedestrians, and signs will be posted to note increased construction traffic.

Original Article: [KJZZ by Nick Karmia](#)

Arizona, California push study of century-old policy that’d force cuts on upper Colorado River states

Arizona and California officials are turning to the threat of a “compact call” in the Colorado River Basin to ratchet up the pressure on four Upper Basin states, including Colorado, in stalled negotiations over how the river will be managed in the future.

The century-old legal concept raises the prospect of forced water cuts in the Upper Basin states if inter-basin water sharing obligations aren’t met. The details of how a compact call would work are not entirely clear — it has never been enforced since it was first introduced in the 1922 Colorado River Compact.



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In a meeting Monday, Arizona officials said the Upper Basin states could be forced to cut about twice as much water under a compact call compared to cutbacks outlined in a proposal put forward by the Lower Basin states — Arizona, California and Nevada — earlier this year.

The argument is meant to drive home the risk to the basin states if they keep refusing to budge in ongoing negotiations over the river's future, according to Tom Buschatzke, Arizona's top negotiator and director of the state's Department of Water Resources.

"This is something that is necessary to create some risk in both the Upper Division states and the Lower Division states," Buschatzke said. "We still think that's the path forward for everyone in the alternatives process ... to feel some risk. That's what drives negotiations."

The Colorado River flows from its headwaters in the Upper Basin — Colorado, New Mexico, Utah and Wyoming — through key reservoirs Lake Powell and Lake Mead, three Lower Basin states, the lands of about 30 Native American tribes, and Mexico.

Basin officials are negotiating to replace a set of rules, established in 2007, that outline how the basin manages water in its key reservoirs in times of shortage. After these rules expire in 2026, the next agreement will govern how reservoirs store and release Colorado River water in the midst of a changing climate.

With an already overstretched river — and reservoirs hitting all-time lows — the stakes are high and will impact the water supply that supports 40 million people and Western economies.

States, tribes and interest groups have submitted different visions for how the basin should be managed to the Bureau of Reclamation, which is expected to announce the main alternatives it will consider in December.

If the seven basin states can agree, then the federal government will likely align with their plan, according to several water officials representing their states in the negotiations.

Consensus, however, seems far off. Basin states [released competing proposals in March](#) and have yet to reach a seven-state consensus for how the basin should be managed.

Arizona and California want the Bureau of Reclamation to analyze the compact call scenario as part of its process.

"While we continue to be open to exploring solutions beyond strict Compact compliance, as demonstrated by our proposed alternative, if the Upper Basin isn't interested in engaging in a compromise, then Compact compliance is required," JB Hamby, California's top negotiator, wrote in an email to The Colorado Sun.

Nevada declined to comment.

Colorado officials have said a compact call is a far-off prospect. In fact, the state does not have rules outlining exactly how it would respond to a compact call.



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In Arizona, however, communities from Phoenix to Tucson rely on recent water rights that are often first in line for cuts in times of shortage.

“I believe that Arizona is aware that they are at risk ... and this is an effort to look anywhere but (at) themselves,” said Colorado River Commissioner Becky Mitchell, who represents Colorado in the negotiations.

Original Article: [Colorado Sun by Shannon Mullane](#)

GLOBAL WATER NEWS

Pricing Energy for Groundwater: A Path to Sustainable Irrigation and Climate Resilience

Pricing energy for groundwater extraction could promote more efficient use of both water and energy, arrest groundwater depletion, and make irrigation more sustainable. As Azerbaijan hosts the Conference of the Parties (COP29), it is worth noting that this water-scarce nation heavily depends on water inflow from upstream countries to meet its needs. Groundwater, often termed the ‘invisible resource’ that buffers against surface water shortages, is essential for water, food, and economic security — not just in Azerbaijan but globally. It [accounts](#) for about half of the world’s water withdrawn for domestic use and about a quarter for irrigation. The United States, China and India, three of the world’s [largest](#) economies, are also the largest consumers of groundwater. However, concerns are growing about the sustainable use of this resource. Anthropogenic and climate change-induced pressures are resulting in a decline in groundwater levels, [particularly](#) in north-western India, the north China plain, Iran, and the western US. But the declining water tables are not the only concern.

Globally, most groundwater is withdrawn for irrigation, largely using fossil fuels. A 2024 [study](#) published in Nature estimates that the annual energy use for groundwater-based irrigation is about 1,670 petajoules (PJ), with associated carbon emissions of 193 metric tonnes (Mt) CO₂ to pump and deliver water for irrigation. This represents 89 per cent of the total energy use and 90 per cent of the carbon emissions from irrigation. Further, at 74 per cent and 57 per cent respectively, the annual energy use and carbon emissions from diesel-based groundwater pumping for irrigation are substantially higher than electric-based sources.

In the agricultural countries of the Global South, such as India, Mexico, and Pakistan, energy supply for groundwater pumping is either free or highly [subsidised](#), driving over



withdrawal. The solution lies in pricing energy for groundwater extraction, which could also promote more efficient use of both water and energy, arrest groundwater depletion, and make irrigation more sustainable. However, implementing this approach is challenging, as water is often viewed as a public good, and free energy for irrigation has become deeply entrenched in the political economy. Four pathways are proposed to enable this implementation of a more environmentally and economically sustainable model that can limit the groundwater crisis.

First, establish tradable groundwater rights that could make saving water financially attractive to farmers. In many countries of the Global South, such as India and the Philippines, and in more than half of states in the US, groundwater is considered as part of [property rights](#), with landowners considering it as a private resource. By introducing tradable groundwater extraction rights—allowing farmers to use a specified volume over a fixed period but not own it—governments can nudge farmers to adopt low-water consuming crops, use water more efficiently, and earn money by selling their unused groundwater entitlement to other users. This will also help provide additional income to farmers, who might then be willing to pay for the energy used for extracting groundwater. Such groundwater rights systems have been already implemented in southwestern US, New South Wales and Victoria in Australia.

Second is developing formal groundwater markets where trading can occur and strengthen groundwater data availability. [Informal](#) groundwater markets already exist in South Asia, but in the absence of clear entitlements, they often disadvantage small and marginal farmers who don't own wells. This is because large farmers monopolise energy subsidy benefits for irrigation and sell groundwater to them at a high price. Formal groundwater markets, managed by a state within a right-based system, would create a level playing field, allowing farmers to trade their unused groundwater shares with transparency and oversight. This would require strengthening local groundwater monitoring to track aquifer recharge, withdrawals, usage, and savings. An online public platform, accessible via a mobile app, could provide this information to potential buyers and sellers. While public institutions currently handle large-scale groundwater monitoring for recharge and extractions, citizen science-based initiatives can be adopted for generating data at a granular scale. [Such initiatives](#) have been tested in countries like Lebanon and India, where local volunteers collect, digitise, and make data publicly available.

Additionally, these markets should extend beyond agriculture to other sectors, such as domestic manufacturing, which will drive future water demand. Trading should occur between users – including farmers, industries, and domestic water suppliers – tapping the same aquifer to be economically viable. Total groundwater withdrawal must remain within mandated safe limits. Such markets can serve as an effective mechanism for water reallocation. The cost of inaction – if water is not used efficiently and reallocated



for other social and economic uses – can be substantial, with potential economic losses estimated at USD 2.5 trillion by 2050 for India alone, according to [analysis](#) by the Council on Energy, Environment and Water (CEEW).

Third, community engagement is crucial for realistic gains in pricing energy for irrigation and its cost recovery. Marginalised communities are the ones most affected by the misuse of energy and groundwater because they have limited financial resources to cope with declining groundwater levels. Further, such misuse and extraction increase carbon emissions and accentuate groundwater stress. Energy pricing is essential, and community buy-in for it is crucial for sustainable groundwater use. Examples from China, the Philippines, and Spain show how community-based institutions can play a role in setting and recovering irrigation fees, mainly for irrigated areas served by surface water. These experiences can be leveraged to identify champions among farmers, build their capacity to understand water-energy linkages, and entrust them with disseminating the need for pricing energy for groundwater extraction and cost recovery to the wider community.

Fourth, and equally important, is finance. In many countries, farmers are reluctant to pay for energy due to poor service quality and reliability. In South Asia, for example, continuous electricity supply for irrigation is often unreliable, primarily due to the poor financial health of electricity distribution companies (DISCOMs). Subsidies are often recovered by DISCOMS with long delays, leading to inadequate funding for routine operation and maintenance or electrical infrastructure improvements. This vicious cycle needs to be broken by ensuring that DISCOMs receive past subsidy dues from the government, allowing them to charge enough to at least cover the operation and maintenance, and providing access to risk-free public or private funds to upgrade the distribution infrastructure. In regions like Sub-Saharan Africa, where energy access for irrigation is limited but groundwater irrigation has potential, investments in renewable energy-based smallholder systems, like solar pumps, could address the energy gap and ensure future irrigation development is sustainable.

The climate co-benefits of introducing energy pricing and adopting clean energy for groundwater extraction are substantial. The pace of progress depends on governance and market-based reforms in these sectors; community willingness to value energy and groundwater and their participation in strengthening groundwater data availability at source; and policies and finances to support the transition to clean energy. Implemented well, green groundwater irrigation can become crucial to mitigate and adapt better to the adverse impacts of climate change in one of the most at-risk sectors — agriculture.

Original Article: [Carbon Copy by Nitin Bassi](#)



Groundwater resources: challenges and future opportunities

Ensuring the sustainability and security of groundwater resources requires identification of region-specific challenges and solutions to accommodate water needs in diverse sectors, including ecosystems. They are related to extensive variations in natural conditions (e.g. geology, geomorphology and hydrology), human interventions, and political, cultural and socio-economic realities that need to be considered in working towards sustainable development. To achieve this goal, it is important to understand social transformations and societal drivers, as well as management and governance challenges which hinder effective groundwater management and access. Unlocking the future opportunities of groundwater require to integrate the existing knowledge and emerging tools and techniques to explore the unknown resources, and device governance strategies to improve livelihoods and health, build more resilient water futures, and move towards long-term sustainable and equitable groundwater use.

Original Article: [Mukherjee, A., Jha, M.K., Kim, KW. et al. Groundwater resources: challenges and future opportunities. Sci Rep 14, 28540 \(2024\).
https://doi.org/10.1038/s41598-024-79936-5](https://doi.org/10.1038/s41598-024-79936-5)

Is there less fresh water available for everyone on earth? Nasa reveals shocking details

Suggesting concerns for people ahead, an international team of scientists using observations from [NASA-German satellites](#) found evidence that Earth's total amount of freshwater dropped abruptly starting in May 2014 and has remained low ever since.

The researchers suggested the shift could indicate Earth's continents have entered a persistently drier phase.

"From 2015 through 2023, satellite measurements showed that the average amount of freshwater stored on land — that includes liquid surface water like lakes and rivers, plus water in aquifers underground — was 290 cubic miles (1,200 cubic km) lower than the average levels from 2002 through 2014," said Matthew Rodell, one of the study authors and a hydrologist at NASA's Goddard Space Flight Center in Greenbelt, Maryland.

As per Nasa's study, during times of drought, along with the modern expansion of irrigated agriculture, farms and cities must rely more heavily on groundwater, which can lead to a cycle of declining underground water supplies: freshwater supplies become depleted, rain and snow fail to replenish them, and more groundwater is pumped. "The reduction in available water puts a strain on farmers and communities, potentially leading to famine, conflicts, poverty, and an increased risk of disease when people turn



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to contaminated water sources," reported Nasa citing UN report on water stress published in 2024.

Fresh Water Level on Earth: Why the abrupt drop?

The team of researchers identified this abrupt, global decrease in freshwater using observations from the Gravity Recovery and Climate Experiment (GRACE) satellites, operated by the German Aerospace Center, German Research Centre for Geosciences, and NASA.

"GRACE satellites measure fluctuations in Earth's gravity on monthly scales that reveal changes in the mass of water on and under the ground. The original GRACE satellites flew from March 2002 to October 2017. The successor GRACE–Follow On (GRACE–FO) satellites launched in May 2018," revealed Nasa's study.

Global warming causing it?

Global warming leads the atmosphere to hold more water vapor, which results in more extreme precipitation, said NASA Goddard meteorologist Michael Bosilovich. While total annual rain and snowfall levels may not change dramatically, long periods between intense precipitation events allow the soil to dry and become more compact. That decreases the amount of water the ground can absorb when it does rain.

Original Article: [Economic Times by ET Online](#)

Rio Tinto faces \$400m bill amid Pilbara native title water squeeze

Rio Tinto says it may be forced to build a second, \$400 million desalination plant for its Pilbara iron ore operations after traditional owners demanded the government halves the amount of groundwater extracted in the region.

The Yindjibarndi Aboriginal Corporation dropped a bomb on the country's major iron ore and gas exporters last week, when it formally asked the Western Australian Environment Protection Authority to limit groundwater extraction in the West Pilbara to 4 billion litres a year.

Original Article: [Financial Review by Peter Ker](#)

CBN to refund \$22m as World Bank detects \$32m unaccounted funds in water project

The World Bank recently found \$32 million missing from a Nigerian water project, according to its Sanctions System Annual Report for 2024.

Breaking down the missing money, \$22 million needs to be returned by Nigeria's Central Bank. Another \$6 million was found sitting unused in a local account, which is enough to complete the project.



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The World Bank believes this missing money might have been stolen and has taken steps with local officials to protect the remaining funds.

“INT followed up on risks identified regarding a project in Nigeria’s water sector and flagged to Operations the risk, which was associated with \$32 million of unaccounted funds. INT met with the Task Team Leader, Operations Manager, Program Leader, and Financial Management Specialist to identify steps to reduce the risk of embezzlement”, the report states.

While the specific project wasn’t named, this seems to be part of a larger pattern of troubled water projects in Nigeria.

Take the 2021 project, for instance. The World Bank put \$875 million toward improving water and sanitation in Nigerian cities and rural areas. But halfway through the six-year project, progress was rated as “moderately unsatisfactory” due to slow progress and poor management.

Read Also: [USAID commits \\$2.3m to malaria prevention in Nigeria](#)

Similar problems showed up in an older NUWSRP project from 2004 to 2014. The first part used \$202 million and was rated poorly in 2017 because states weren’t running it well.

A World Bank-sponsored independent review found Nigerian states were moving too slowly. The review stated, “Reforms progressed slowly and there were often mixed signals communicated within states regarding the need to achieve cost recovery... Performance varied and was often due to a mix of factors including the placement of SWAs within the state civil services. This reduced accountability and empowerment. SWAs remained dependent on state governments in terms of financing throughout the project, and were unable to achieve self-sufficiency.”

The second part of NUWSRP, which focused on two states and received \$210 million in funding, ran into corruption issues. In 2016, the World Bank flagged and barred a contractor for using fake certificates.

Morocco secures \$211m loan to improve water security

The European Bank for Reconstruction and Development (EBRD) has approved a €200 million (\$211 million) loan to Morocco’s phosphate-based fertiliser producer OCP Group to enhance water security by developing new desalination facilities.

The funding will support the construction of two seawater desalination facilities for OCP Group at its industrial complexes in El Jadida and Safi.

With a combined capacity of 35 million cubic meters annually, these facilities will ensure a sustainable water supply for fertiliser production, addressing the rising global demand for sustainable agricultural solutions critical to food security.

Morocco faces acute water stress, with annual water availability per capita at just 790 cubic meters. The industrial hubs of El Jadida and Safi are situated in highly stressed



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catchment areas, where water demand surpasses 80 percent of the available freshwater supply.

The new desalination facilities will enable OCP Group to further reduce its use of freshwater for its water-intensive industrial processes. This shift is especially crucial as the region faces increasing droughts, allowing the company to contribute to more sustainable water management in a highly strained environment.

The investment aligns with the EBRD's strategy for Morocco and its green economy transition approach 2021-25.

The company aims to reduce annual water consumption by 3 million cubic meters and transition to sourcing 100 percent of its water from non-conventional sources, including desalination and wastewater reuse.

Morocco, a founding member of the EBRD, has benefitted from the bank's resources since 2012. To date, the development bank has invested more than €4.7 billion in the country through 105 projects.

Original Article: [AGBI by Pramod Kumar](#)

Cambridge University Tech Transforms Polluted Water into Clean Energy & Water: Photothermal-Photocatalyst Innovations

Imagine a world where polluted water turns into clean fuel and refreshing drinking water, all powered by the sun. Cutting-edge hybrid photothermal-photocatalyst technology has made this exciting reality possible; it is not a scene from a science fiction movie. Researchers at the [University of Cambridge](#) have developed this revolutionary invention, marking a significant leap in both the renewable energy and water purification sector

Harnessing the Sun for a Cleaner, Brighter Future

At the heart of this innovation is a question: how can we use the abundant solar energy that bathes our planet each day to address the pressing challenges of water scarcity and clean energy? [This hybrid technology](#) offers a promising solution by performing dual duties—producing hydrogen fuel and purifying water simultaneously—using only sunlight. This innovative combination of nature-inspired engineering and sustainable technology has the potential to revolutionize our understanding of energy and resources, as reported by.

Join us as we dive deeper into the science behind this technology, explore its current applications, and ponder its social, economic, and environmental implications. Together, we aim to uncover how hybrid photothermal-photocatalyst sheets not only promise a brighter future with sustainability at its core but also pave the way for a world where clean energy and water are accessible to all.

Background on Photothermal-Photocatalyst Technology The Science Behind the Innovation



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At its core, the hybrid photothermal-photocatalyst technology harnesses solar energy much like plants do during photosynthesis. Photocatalysis involves using sunlight to initiate chemical reactions, while photothermal processes convert solar light into heat. These two concepts, when combined into a single efficient system, unlock incredible potential for sustainable practices.

[Here's how it works:](#) The system uses a floating sheet composed of a unique material that absorbs sunlight. The system features a photocatalyst on one side, a unique substance that accelerates chemical reactions without consuming itself. When sunlight strikes this catalyst, it splits water molecules into hydrogen and oxygen. This hydrogen can then be collected and stored as clean fuel. On the other side, the system uses photothermal processes to purify water by evaporating contaminants, which ensures that the resulting water is clean enough for consumption. This means that, simultaneously, the device provides fresh water and renewable energy.

A Leap from Past to Present

The journey to this technology is one filled with trial-and-error, built upon decades of scientific exploration in solar energy utilization and photocatalysis. The reliance on clean water sources, which isn't feasible for much of the developing world, limited previous attempts to create artificial leaves—devices that mimic the natural process of photosynthesis. However, this new device uniquely functions with polluted or seawater, opening the floodgates to broader applications.

The innovation extends the use of the solar spectrum, making use of parts of the light spectrum that other solar technologies may ignore. This efficiency, which captures both ultraviolet and other light wavelengths, maximizes the use of available sunlight to drive the water-splitting and purification processes. As a result, it represents a truly remarkable leap forward, giving life to devices that are more adaptable and robust against water pollutants.

This exciting leap in technology opens doors to a future where sustainability doesn't just limit itself to small-scale devices but can expand to industrial levels, potentially redefining resource management across the globe. By addressing both energy and water needs with one solution, hybrid photothermal-photocatalyst sheets are a perfect example of how tackling two problems at once can lead to a greener, more sustainable planet.

Original Article: [Intelligent Living by John Mills](#)

NASA Satellites Reveal Abrupt Drop in Global Freshwater Levels

A team of researchers identified this decrease in freshwater using observations from the Gravity Recovery and Climate Experiment (GRACE) satellites.

An international team of scientists using observations from NASA-German satellites found evidence that Earth's total amount of freshwater dropped abruptly starting in



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May 2014 and has remained low ever since. Reporting in *Surveys in Geophysics*, the researchers suggested the shift could indicate Earth's continents have entered a [persistently drier phase](#).

From 2015 through 2023, satellite measurements showed that the average amount of freshwater stored on land — that includes liquid surface water like lakes and rivers, plus water in aquifers underground — was 290 cubic miles (1,200 cubic km) lower than the average levels from 2002 through 2014, said Matthew Rodell, one of the study authors and a hydrologist at NASA's Goddard Space Flight Center in Greenbelt, Maryland. "That's two and a half times the volume of Lake Erie lost."

This map shows the years that terrestrial water storage hit a 22-year minimum (i.e., the land was driest) at each location, based on data from the GRACE and GRACE/FO satellites. A significantly large portion of the global land surface reached this minimum in the nine years since 2015, which happen to be the nine warmest years in the modern temperature record.

During times of drought, along with the modern expansion of irrigated agriculture, farms and cities must rely more heavily on groundwater, which can lead to a cycle of declining underground water supplies: Freshwater supplies become depleted, rain and snow fail to replenish them, and more groundwater is pumped. The reduction in available water puts a strain on farmers and communities, potentially leading to famine, conflicts, poverty, and an increased risk of disease when people turn to contaminated water sources, according to a [UN report on water stress](#) published in 2024.

The team of researchers identified this abrupt, global decrease in freshwater using observations from the Gravity Recovery and Climate Experiment (GRACE) satellites, operated by the German Aerospace Center, German Research Centre for Geosciences, and NASA. GRACE satellites measure fluctuations in Earth's gravity on monthly scales that reveal changes in the mass of water on and under the ground. The original [GRACE satellites](#) flew from March 2002 to October 2017. The successor [GRACE-Follow On](#) (GRACE-FO) satellites launched in May 2018.

The decline in global freshwater reported in the study began with a massive drought in northern and central Brazil, and was followed shortly by a series of major droughts in Australasia, South America, North America, Europe, and Africa. Warmer ocean temperatures in the tropical Pacific from late 2014 into 2016, culminating in one of the most significant El Niño events since 1950, led to shifts in atmospheric jet streams that altered weather and rainfall patterns around the world. However, even after El Niño subsided, global freshwater failed to rebound. In fact, Rodell and team report that 13 of the world's 30 most intense droughts observed by GRACE occurred since January 2015. Rodell and colleagues suspect that global warming might be contributing to the enduring freshwater depletion.



Global warming leads the atmosphere to hold more water vapor, which results in more extreme precipitation, said NASA Goddard meteorologist Michael Bosilovich. While total annual rain and snowfall levels may not change dramatically, long periods between intense precipitation events allow the soil to dry and become more compact. That decreases the amount of water the ground can absorb when it does rain.

“The problem when you have extreme precipitation,” Bosilovich said, “is the water ends up running off,” instead of soaking in and replenishing groundwater stores. Globally, freshwater levels have stayed consistently low since the 2014-2016 El Niño, while more water remains trapped in the atmosphere as water vapor. “Warming temperatures increase both the evaporation of water from the surface to the atmosphere, and the water-holding capacity of the atmosphere, increasing the frequency and intensity of drought conditions,” he noted.

While there are reasons to suspect that the abrupt drop in freshwater is largely due to global warming, it can be difficult to definitively link the two, said Susanna Werth, a hydrologist and remote sensing scientist at Virginia Tech, who was not affiliated with the study. “There are uncertainties in climate predictions,” Werth said. “Measurements and models always come with errors.”

Original Article: [NASA](#)

Brazilian govt acknowledges need to rapidly raise investments in water sector

The pace of [investments](#) in Brazil's water and sanitation sector needs to be accelerated, despite some positive [developments](#) in recent years.

"Our view is that progress in the sanitation sector has been positive, with an increase in investment levels. However, a greater boost to these investments will be necessary [to meet targets], and the pace will need to pick up moving forward," Leonardo Picciani, secretary of sanitation at the [cities ministry](#), told BNAmericas.

Brazil's water sector has seen a significant rise in investments since a regulatory change in 2020, which opened up greater opportunities for private sector participation in an industry that was previously dominated by [state-owned companies](#).

Under the new regulations, states and municipalities must achieve universal water and sewage service coverage by 2033, or they will face penalties from the federal government, including restrictions on access to federal funding.

According to the most recent data from the 2022 national sanitation information system (SNIS), Brazil currently invests 22.5bn reais (US\$3.94bn) annually in sanitation. However, this amount is insufficient to meet the target of full coverage by 2033, according to a study by NGO [Trata Brasil](#).

The organization estimates Brazil needs to invest 46.3bn reais per year until by 2033 to meet this target.



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While acknowledging the need for higher investment in the sector, the government views the progress with concessions, public-private partnerships (PPPs), and public sector investments as positive developments.

"In 2025, we will be fully engaged with the projects under the [PAC](#) [the federal government investment program], executing these ventures efficiently, quickly and with quality. We will also monitor and support the new rounds of concessions organized by [development bank] [BNDES](#), which will be on the agenda next year, along with the states involved," Picciani said.

The official also noted that the government has not yet received any requests from private companies to revise current contracts.

"To date, we have not received any requests for contract reviews at the cities ministry. It is true that many contracts are still in their early stages, but we expect everything to remain within normal parameters throughout their contractual terms," Picciani said.

Infrastructure works in Brazil, including those carried out in the highway, airport and port segments, have long attracted private sector participation through concessions and PPPs.

However, some of these contracts have been revised at times because the original targets outlined in the tender notices were not met. Brazilian legislation allows for the return of concession contracts, but the process is relatively slow as it requires approval from federal government oversight bodies, which also determine the compensation to be paid to the responsible parties.

In the meantime, Picciani emphasized that the federal government is closely monitoring the potential impacts of a recent decision to expand the use of debentures in the sanitation sector.

Recently, the government authorized companies that win concessions or PPP contracts based on the highest bid to finance up to [70%](#) of their offer using debentures, up from 50% previously allowed.

According to analysts consulted by BNamericas, the move could encourage local governments to hold auctions based solely on the highest fee, rather than on the model of lowest rates offered to consumers. Additionally, companies that aggressively make high bids to win auctions might, in the medium term, offset this cost by raising rates for the public.

"The issue of the concession fee is ultimately a market decision, and the ministry has limited ability to intervene in this regard. However, it is a point of concern that this does not result in higher rates for users. In the regulatory decree, the federal government specifies that its priority projects, eligible for federal financing, will be those that use a mix of concession fees and moderate rates," Picciani said.

Original Article: [bnamericas](#)



More contracts awarded for \$3.3B SA Water program

SA Water has partnered with three specialist pipeline companies for the delivery of its landmark \$3.3 billion capital program.

Announced at a special forum on 18 November 2024, BMD, Diona and Leed Engineering and Construction will share in up to \$700 million worth of work over the next four years, including laying trunk water and sewer pipes that will enable new houses to be built.

The capital program includes an unprecedented \$1.5 billion investment, announced as a key initiative of the South Australian Premier's Housing Roadmap, to increase capacity of the water and sewer network through upgrades to pipes, pump stations and tanks to unlock a potential 40,000 new allotments across the state.

Infrastructure projects will primarily target Adelaide's northern growth front, including areas such as Angle Vale, Riverlea and Roseworthy to maximise the number of new houses enabled through this investment.

The three companies will increase SA Water's capacity to deliver this infrastructure, which requires a significant volume of pipeline to duplicate and upsize existing trunk mains, with its supply chain already including three major framework partners.

Leed Engineering and Construction are already poised to start pre-construction work to inform the alignment for new underground trunk water mains, which are set to be installed from early 2025 and will unlock capacity for new houses in Angle Vale.

Beyond housing growth infrastructure, the specialist pipelayers will deliver a range of other projects across SA Water's capital program, such as upgrades to the Beetaloo and Port Pirie South major trunk mains.

The South Australian Government said that the breadth and scale of this program means there are also significant opportunities for more companies within the construction industry to work alongside SA Water.

South Australian Premier, Nick Champion said the State Government is investing in South Australia's future, by providing essential housing infrastructure and long-term job security for our skilled workforce.

"Work is already underway on this four-year project, with the first pipes going in the ground in the northern suburbs," Mr Champion said.

"These companies will play a pivotal role in delivering the record capital program which will build network capacity and enable future expansion.

"This investment will create hundreds of local jobs and future opportunities for SA subcontractors."

More than 250 industry members, including peak bodies such as the Civil Contractors Federation and Master Builders Association, were briefed on four tender opportunities to support the delivery of critical infrastructure across the state.

This included tenders for SA Water's Water Main Relay (metropolitan), Extensions and Connections, Engineering panel, and Capital Delivery Professional Services panel.



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Collectively, these new tenders represent \$398 million worth of direct work across the remaining three years of the utility's capital program, commencing from 1 July 2025. As part of the forum, SA Water also shared its two-year capital project forward plan and subcontracting opportunities available through its existing construction partners. Across these approximately 120 projects, which include the delivery of new infrastructure to support housing growth and an upgrade of the Morgan to Whyalla Pipeline, there will be \$799 million in opportunities for subcontracting work via SA Water's partners.

Original Article: [Utility Magazine by Katie Livingston](#)

Note the attachment is not an inducement to trade and Veles Water does not give advice on investments.