

# Veles Water Weekly Report

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1. **WATERTALK**  
TECHNICAL ANALYSIS BY ROBIN BIEBER
2. NQH2O INDEX VS H2O FUTURES PRICE PERFORMANCE
3. NQH2O INDEX HISTORY
4. NQH2O INDEX AND H2O FUTURES VOLATILITY ANALYSIS
5. CENTRAL VALLEY PRECIPITATION REPORT
6. RESERVOIR STORAGE
7. SNOWPACK WATER CONTENT
8. CALIFORNIA DROUGHT MONITOR
9. CLIMATE FORECAST
10. WESTERN WEATHER DISCUSSION
11. WATER NEWS
  - I. CA WATER NEWS
  - II. US WATER NEWS
  - III. GLOBAL WATER NEWS

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October 7<sup>th</sup> 2021

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## WATER FUTURES MARKET ANALYSIS

Welcome to ***WATERTALK***

by Joshua Bell standing in for Robin Bieber

**CLICK THE LINK BELOW**

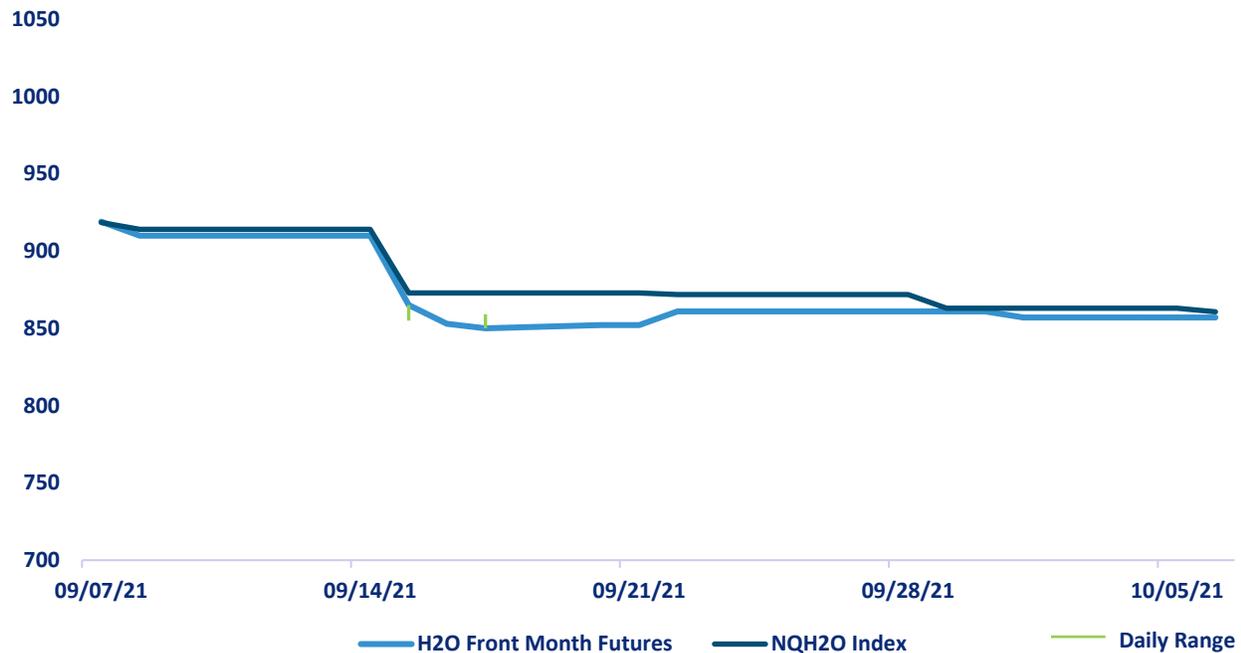
*“A 2 minute technical analysis video of H2O futures”*

<https://vimeo.com/625239206>



## NQH2O INDEX PRICE vs H2O FUTURES PRICE

### 1 Month Price Performance NQH2O Index vs H2O Futures



Price Chart Based upon Daily Close

The new index level out yesterday Oct 6<sup>th</sup> was \$860.69, down \$2.35 or 0.27%. Throughout the week the futures have closed at a discount to the index of \$2.04 - \$6.04. The futures have been closing flat this week at \$857. NQH2O is up 72.20% YTD.

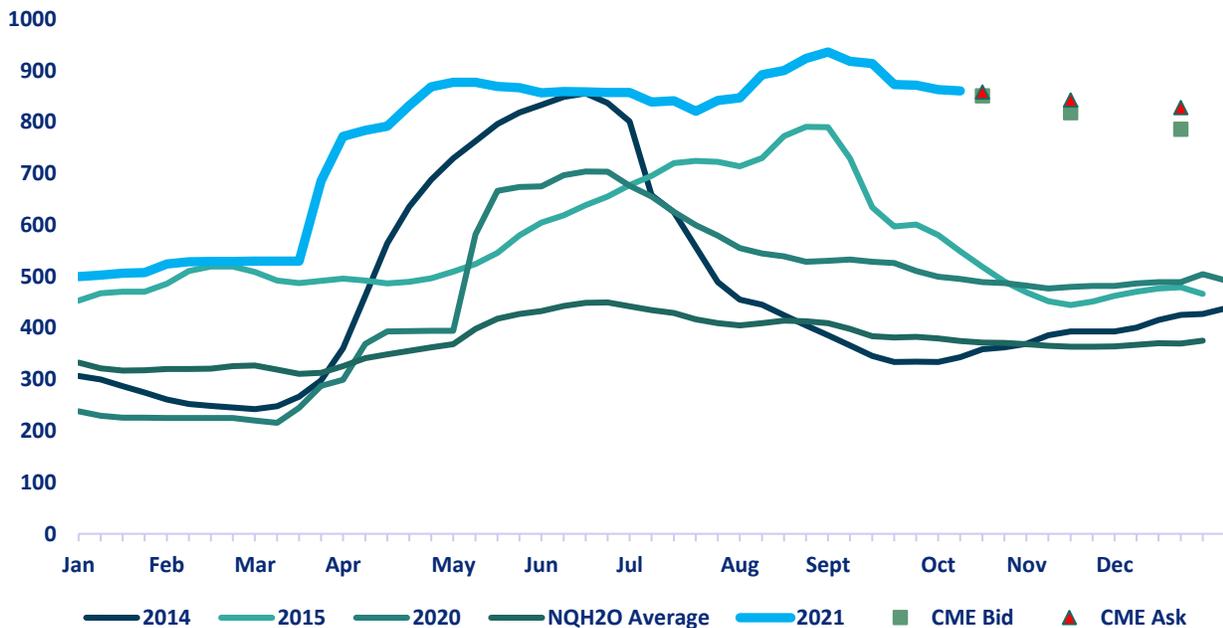
Below are the bid offer prices on different expiries being quoted in the market.

October	851@858
November	818@843
December	786@828
March 22	775@875
June 22	950@1025



## NQH2O INDEX HISTORY

NQH2O Seasonal Pricing/ CME H2O Futures Quotes



The graph above lays out the Nasdaq Veles water index by year, showing 2014, 2015, 2020, 2021 plus an average price of the last eight years. In very dry years, prices clearly rise through the spring, peaking in May to July (with the exception of 2015) as demand for water from farmers peaks. Prices then taper off heading into the winter on reduced demand, and the possibility of rain/snow.

The restricted ability to “carry” water, much like one can do with financial contracts, gives this index the same type of seasonal pattern that one sees on some other commodities.

The graph for 2021 is highlighted in light blue. It shows the same seasonal climb, but at record-high values above each of the last eight years since February.

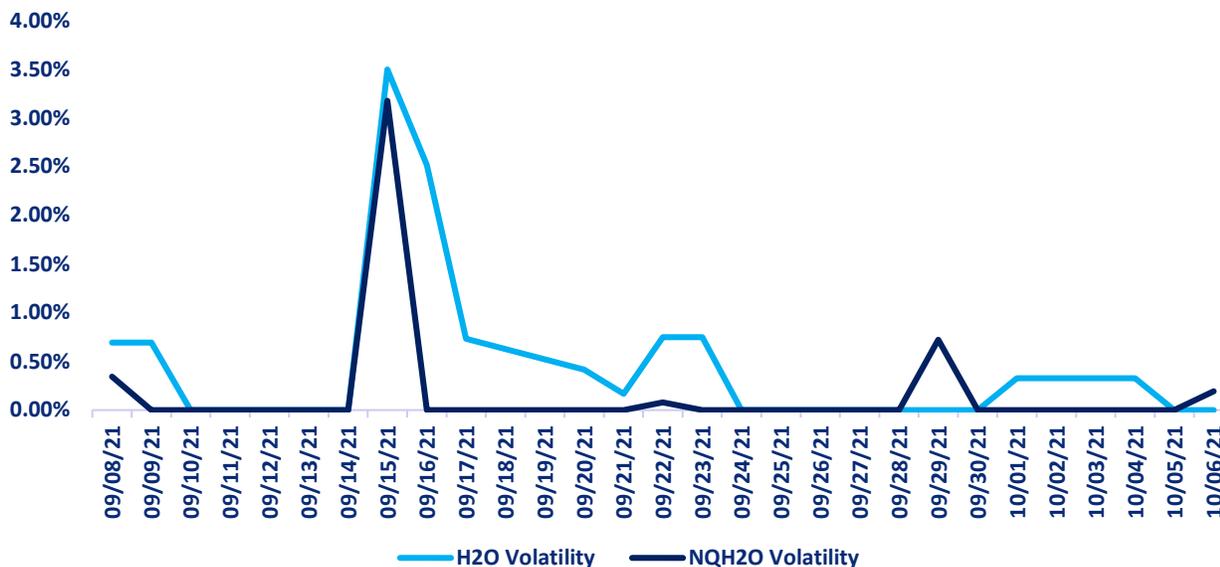
Current bids and offers in the market are still higher than historic prices showing that expectations are that this is an exceptionally dry year and prices may not fall seasonally as much as they have in prior dry years.

**(Reference: John H Dolan, CME Market Maker)**



## H2O FUTURES AND NQH2O INDEX VOLATILITY ANALYSIS

### Daily H2O Futures Volatility vs Daily NQH2O Index Volatility



#### DAILY VOLATILITY

Over the last week the October future volatility high has been 0.33% on October 1<sup>st</sup> and 4<sup>th</sup> and the low of 0% for the rest of the week.

ASSET	1 YEAR (%)	2 MONTH (%)	1 MONTH (%)	1 WEEK (%)
NQH2O INDEX	33.62%	7.45%	4.10%	0.751%
H2O FUTURES	N/A	6.53%	5.25%	0.42%

For the week ending on the 6<sup>th</sup> October the two-month futures volatility is at a discount of 0.92% to the index, down 0.18 from the previous week. The one-month futures volatility is at a premium of 1.15% to the index, down 0.11% from last week. The one-week futures volatility is at a discount of 0.33% to the index, a reversal of 0.38%. These volatility moves are indicating a market that is moving into a lower volatility range as the underlying price is moving slowly downwards.

*Above prices are all **HISTORIC VOLATILITIES** and **IMPLIED VOLATILITIES** will be introduced once an options market has been established. 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 06/10/2021

STATION	MTD (INCHES)	WEEK ON WEEK CHANGE (INCHES)	% OF 20 YEAR AVERAGE MTD	2022 WYTD VS 2021 WYTD %	2022 WY VS 20 YEAR AVERAGE TO DATE %
SAN JOAQUIN 5 STATION (5SI)	0	0.00	0.00%	0	0
TULARE 6 STATION (6SI)	0	0.00	0.00%	0	0
NORTHERN SIERRA 8 STATION (8SI)	0	0.00	0.00%	0	0
CENTRAL VALLEY TOTAL	0.00	0.00	0.00%	0	0

## RESERVOIR STORAGE

RESERVOIR	STORAGE (AF)	% CAPACITY	LAST YEAR % CAPACITY	HISTORIC ANNUAL AVERAGE CAPACITY %
TRINITY LAKE	693,978	28	55	42
SHASTA LAKE	1,052,949	23	48	39
LAKE OROVILLE	790,124	22	46	36
SAN LUIS RES	236,566	12	47	24





# DROUGHT MONITOR

## U.S. Drought Monitor California

**September 28, 2021**  
(Released Thursday, Sep. 30, 2021)  
Valid 8 a.m. EDT



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
<b>Current</b>	0.00	100.00	100.00	93.93	87.88	45.66
<b>Last Week</b> 09-21-2021	0.00	100.00	100.00	93.93	87.88	45.66
<b>3 Months Ago</b> 06-29-2021	0.00	100.00	100.00	94.73	85.44	33.32
<b>Start of Calendar Year</b> 12-29-2020	0.00	100.00	95.17	74.34	33.75	1.19
<b>Start of Water Year</b> 09-29-2020	15.35	84.65	67.65	35.62	12.74	0.00
<b>One Year Ago</b> 09-29-2020	15.35	84.65	67.65	35.62	12.74	0.00

**Intensity:**  
 None (White)      D0 Abnormally Dry (Yellow)      D1 Moderate Drought (Light Orange)      D2 Severe Drought (Orange)      D3 Extreme Drought (Red)      D4 Exceptional Drought (Dark Red)

*The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>*

**Author:**  
Brian Fuchs  
National Drought Mitigation Center



[droughtmonitor.unl.edu](http://droughtmonitor.unl.edu)

### U.S. Drought Monitor Class Change - California 1 Week



September 28, 2021  
compared to  
September 21, 2021



5 Class Degradation (Dark Brown)  
 4 Class Degradation (Brown)  
 3 Class Degradation (Orange)  
 2 Class Degradation (Light Orange)  
 1 Class Degradation (Yellow)  
 No Change (Grey)  
 1 Class Improvement (Light Green)  
 2 Class Improvement (Green)  
 3 Class Improvement (Dark Green)  
 4 Class Improvement (Teal)  
 5 Class Improvement (Blue)

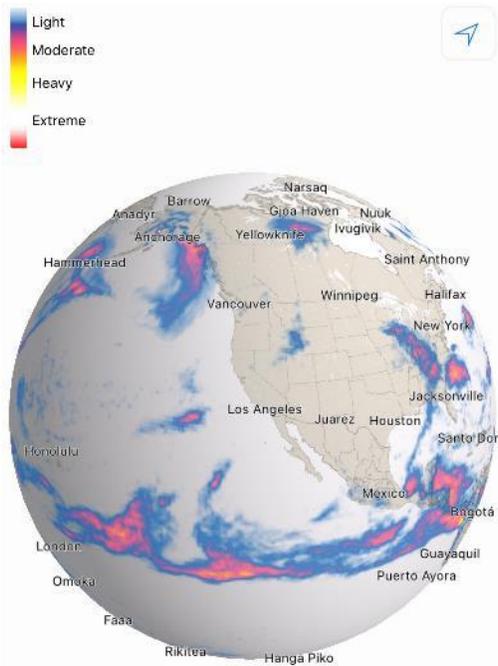
[droughtmonitor.unl.edu](http://droughtmonitor.unl.edu)

The US Drought Monitor release their statistics with a 1-week lag to this report. Over the past week there has been no change in drought condition in California.

*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



Ref. Dark Sky

The current satellite picture shows a dry western region of the US.

In this past week Monsoonal effects have brought moisture to Arizona and West Texas and this moisture can now be seen having moved eastwards towards the Carolinas and even up to the New York area. The Monsoonal effect is appearing to dissipate over Mexico.

There is a frontal activity over the NW Pacific but this may only bring some light precipitation to Northern CA with further frontal activity developing further NW in the Pacific. Pockets of moisture from coastal lows can be seen off CA and these have the potential of bringing further light rain to the region.

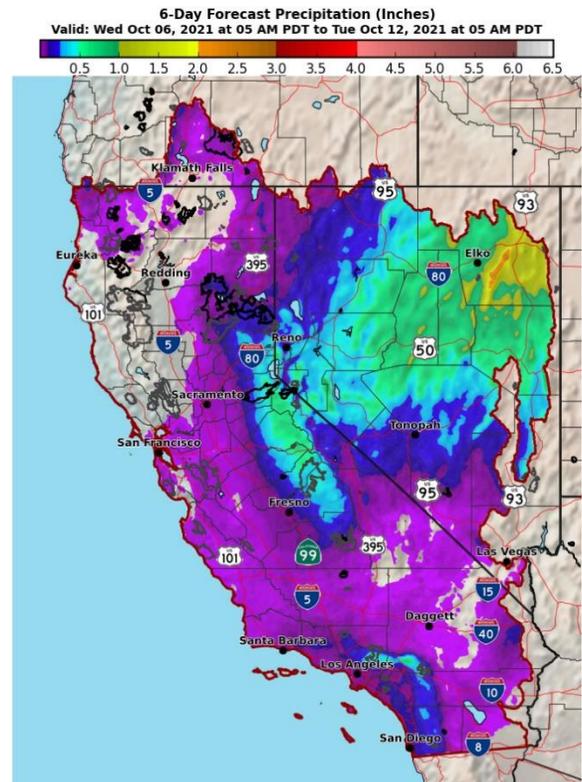
Our long-term models are still showing the potential for greater precipitation to reach the SW and Western US this winter.

### 10 Day Outlook

Upper level trough deepens off the west coast the next couple days bringing cooler temperatures and periods of precipitation to portions of the region. The first shortwave moves through the Pacific NW today with showers possible near the OR CA border and over NE Nevada.

Precipitation amounts around 0.25- 0.5 for the Ruby Mountains and less than a quarter elsewhere in NE NV.

Precipitation over the Northern Sierra and Northern NV on Thursday into Friday and over Central and Southern CA Thursday night into Friday. Precipitation amounts around 0.5-1.5 inches over the high terrain of Northern Nevada with (1-1.5 in over Ruby Mtns) and around 0.25-0.75 inches for the Central and Southern Sierra and generally half an inch or less for Southern Ca mountains and generally less than a tenth of an inch elsewhere. The forecast is mainly WPC but



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## **VELES WATER WEEKLY REPORT**

mixed with some NBM. Increased WPC amounts for western San Bernardino County down to San Diego County, especially over the mountains) Friday morning. Freezing levels above 9000 ft for the Sierra drop down to around 7500 ft Friday and drop down to around 8000 ft over Northern Nevada on Friday night.

The trough moves to the east on Saturday with weak high pressure before the next trough arrives in the Pac NW Sunday and deepens over the western US on Monday. A few lingering showers possible over Eastern NV into the day Saturday then a break in the precipitation Saturday night and possible precipitation along far NW CA Coast and upper Klamath Basin during the day on Sunday and into NV Sunday night into Monday. There are uncertainties in how fast the trough will move through and where it will dig (op 06Z GFS farther west than EC). Freezing levels may drop to around 4000 ft for the Srn Cascades Monday morning and around 5000 to 6000 ft over Northern Nevada Monday. Forecast uses WPC.

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

## **WESTERN WEATHER DISCUSSION**

Coastal areas from northern California to Washington as well as Arizona and western New Mexico did record some decent precipitation. For the water year ending at the end of September, the 2021-22 period will go down as one of the driest in portions of California and Nevada, where many areas are at 50% or less of their normal values for the time period. Temperatures this last week were near to slightly above normal, with most places 1-2 degrees above normal for the week. Portions of central and southern Arizona continued to record much-needed rains and areas of moderate drought were improved there this week, with the "L" designation being the prominent impacts in most of southern Arizona where long-term hydrological issues remain. Some exceptional drought was removed in northeast Nevada and into western Utah while exceptional drought was expanded over western Montana. Moderate drought was intensified to severe drought in the northwest portion of Montana while some exceptional drought was improved over northeast Montana.

Reference: Brad Rippey, U.S. Department of Agriculture  
Richard Heim, NOAA/NCEI



## WATER NEWS

### CALIFORNIA WATER NEWS

#### **Sacramento just set a record for longest stretch without rain. When will the streak end?**

Sacramento is now officially in its longest dry spell ever, breaking a record that stood for more than 140 years.

Thursday marked 195 consecutive days without measurable rainfall (0.01 inch or more) downtown, the National Weather Service's Sacramento office said this week. It last rained more than a trace amount on March 19.

The previous record of 194 days happened from March to November of 1880, the weather service said.

The current record will continue for at least a few more days. Forecasts show no chance of rain through the weekend or early next week, as high temperatures hover around 90 degrees to start October. There is a slight chance of showers next Thursday.

Friday also marked the beginning of the 2022 water year, after an "abysmal" 2021, the NWS Sacramento office tweeted. Precipitation in Sacramento from Oct. 1, 2020, through Sept. 30 came in at just 41% of normal.

Original Article: [Sacramento Bee by Michael McGough](#)

#### **California gets money for wildfire, drought as Congress temporarily funds government again**

Congress passed a government funding bill in a down-to-the-wire vote on Thursday in the face of a looming shutdown.

The continuing resolution bill, a short-term spending resolution that will keep the government funded through early December, delegates \$28.6 billion to disaster relief efforts, including for wildfire prevention and response and the consequences of drought. Here's some of what the bill addresses on wildfires and drought.

- **Firefighters:** The bill waives the federal overtime pay cap in 2021, which California Sens. Dianne Feinstein and Alex Padilla had suggested earlier this year. The pay cap limits the number of overtime hours that can be paid to fight wildfires.
- **Burnt crops:** \$10 billion will go to the U.S. Department of Agriculture's Wildfire Hurricane Indemnity Program to help agricultural producers affected by wildfires and smoke.
- **Cleaning forests:** \$175 million will go to the U.S. Forest Service for managing hazardous fuels, such as clearing dried vegetation that acts like kindle for fires, and \$175 million for rehabilitating burned areas. Overall, \$1.36 billion will go to



## VELES WATER WEEKLY REPORT

the U.S. Forest Service for dealing with repercussions of wildfires that have burned since 2019.

- Western drought: \$200 million will go to the Bureau of Reclamation, which oversees water resource management, for projects to address drought in the West.
- Water infrastructure: \$238 million will go to improving California's water infrastructure, including \$205 million for storage projects, \$21 million for nine water recycling projects in California and \$12 million for four desalination projects.

"After Senate Republicans repeatedly blocked legislation to fund the government and prevent a default, Senate Democrats came together to move forward and fund the federal programs that working families across America depend on," Padilla said in a release following the bill's clearance of the Senate. "I'm proud to support this bill that will provide billions of dollars in critical funding to California for wildfire disaster response and drought relief, as well as funding to help re-settle Afghan refugees."

Original Article: [The Sacramento Bee by Gillian Brassil](#)

### **Congress approves \$80 million for Sites Reservoir**

Congress approved a government funding bill last week that threw \$80 million at the Sites Reservoir in California in order to keep the project on track.

The project is meant to hold 1.5 million acre-feet of water for the state to be used during droughts for agriculture, community usage and environmental need, said a press release issued Tuesday by the organization behind the Sites Reservoir.

"We thank our federal representatives and project partners, such as the Bureau of Reclamation, for their continued support of Sites Reservoir, especially as the drought situation in California becomes more severe," said Fritz Durst, chair of the Sites Project Authority. "This critical funding helps us to continue advancing Sites Reservoir as a drought resilient water storage solution for the people of California."

The new funding, according to Durst, will go to planning and engineering costs for a portion of the project.

Original Article: [Chico Enterprise Record](#)

### **Groundwater markets may facilitate solutions to western water problems**

In the midst of historic droughts and changing rainfall patterns, the California desert groundwater market could serve as a template for future water management.

When landowners covering the Mojave groundwater system switched from open access management to a cap-and-trade system, it helped stabilize them. Groundwater resources.. Researchers at the University of California, Santa Barbara, Bren Graduate School of Environmental Sciences and the University of California, Institute of Public Policy, market. Other effects of. Their new study reveals that the switch also increased the value of assets in the groundwater market, even though the system limited the



## VELES WATER WEEKLY REPORT

amount of groundwater that landowners could pump. These benefits were more than 10 times the initial cost of establishing a market.

These promising findings are top notch Political Economy JournalCome, as many other communities are beginning to develop their own management strategies under California's new Sustainable Groundwater Management Act.

"The groundwater problem is actually a very old problem," said co-author Kyle Men, an associate professor of environmental economics at Bren School. "This is a classic example of the Tragedy of the Commons. No one owns groundwater. No one owns groundwater, so there is competition to extract groundwater." This pump The competition motivated an inefficient and short-sighted approach to water use, he added.

Although Mojave is the driest desert in North America, farmers have historically used groundwater basins and aquifers to grow water-intensive crops such as alfalfa. However, between 1960 and 1990, pumping from this basin depleted resources by 30 feet below the water table, causing problems for everyone involved.

In 1996, stakeholders completed a cap-and-trade market that spans most of the Mojave groundwater system. The market limited the amount of pumped water, but landowners allowed them to exchange their rights with other users in their commercial area.

The system succeeded in stabilizing the aquifer, but Meng and his co-authors Andrew Plantinga and Andrew Ayres sought to determine if this change would also bring economic benefits. To this end, they have developed mathematical models for formalizing groundwater use and human behavior before and after market implementation. "A conceptual understanding gives us an idea of what we are actually measuring when we look at the data," said Professor Plantinga, a resource economist at Bren School.

Original Article: [Florida News](#)

### **Drought expected to persist in much of the Western US through 2022 and beyond, according to NOAA report**

The thirst for water in the Western U.S. will likely not be quenched in the near future.

Drought conditions are expected to persist in the West, which is already amid a decades-long megadrought, through 2022 and beyond, according to the National Oceanic and Atmospheric Administration's drought outlook.

The drought will remain the worst from California to the Northern Plains, according to the report.

Precipitation totals in the Southwest over the 20 months from January 2020 and August 2021 are the lowest on record since at least 1895, according to the report. The 2021 to 2022 winter season is forecast to be drier than average.

The megadrought that's plaguing much of the West is a direct consequence of climate change, experts have told ABC News.



## VELES WATER WEEKLY REPORT

The new NOAA report did not outright blame warming temperatures across the globe for the regional drought, but stated the drought is occurring due to "successive seasons of below average precipitation that appear to have come from natural, but unfavorable, variables in the atmosphere."

NOAA scientists did concede that continued greenhouse gas emissions will exacerbate drought conditions in the Southwest and that "increasing atmospheric demand for water" will only end if human-caused greenhouse gas emissions are reduced.

"Continued warming of the U.S Southwest due to greenhouse gas emissions will make even randomly occurring seasons of average- to below-average precipitation a potential drought trigger and intensify droughts beyond what would be expected from rainfall or snowpack deficits alone," the report stated.

Original Article: [ABC News by Daniel Manzo](#)

### **California regulators warn of dry reservoirs, restrictions**

California's reservoirs are so dry from a historic drought that regulators warned Thursday it's possible the state's water agencies won't get anything from them next year, a frightening possibility that could force mandatory restrictions for residents.

California has a system of giant lakes called reservoirs that store water during the state's rainy and snowy winter months. Most of the water comes from snow that melts in the Sierra Nevada mountains and fills rivers and streams in the spring.

Regulators then release the water during the dry summer months for drinking, farming and environmental purposes, including keeping streams cold enough for endangered species of salmon to spawn.

This year, unusually hot, dry conditions caused nearly 80% of that water to either evaporate or be absorbed into the parched soil — part of a larger drought that has emptied reservoirs and led to cuts for farmers across the western United States. It caught state officials by surprise as California now enters the rainy season with reservoirs at their lowest level ever.

"Nothing in our historic record suggested the possibility of essentially that snow disappearing into the soils and up into the atmosphere at the level that it did," California Natural Resources Secretary Wade Crowfoot said. "These climate changes are coming fast and furious."

California's State Water Project — a complex system of dams, canals and reservoirs — helps provide drinking water to about 27 million people in the state. In December, state officials will announce how much water each district can expect to get next year.

Thursday, Department of Water Resources Director Karla Nemeth said the agency is preparing for what would be its first ever 0% allocation because of extraordinarily dry conditions.

"It's a done deal, we're sure that we will get a zero," said Demetri Polyzos, manager of resource planning for the Metropolitan Water District of Southern California that



## VELES WATER WEEKLY REPORT

provides water for about 19 million people. “These are uncharted territories, what we are seeing.”

The December announcement acts as an initial estimate. It could change later if things improve. That’s why this winter is so important. It’s impossible to predict with accuracy how much rain and snow California will get this winter. But if it’s anything like the last two winters, there will be even bigger problems.

California’s “water year” runs from Oct. 1 through Sept. 30. The 2021 year ends Thursday, and it was the second driest year on record, according to the Department of Water Resources. California had its warmest ever statewide monthly average temperatures in October, June and July, according to the National Oceanic and Atmospheric Administration’s National Centers for Environmental Information.

The 2021 water year began with reservoirs at 93% capacity. But California won’t have that cushion this year. The state’s reservoirs are at 60% of their historic average, state officials said.

The State Water Project provides about 30% of the Metropolitan Water District’s supplies, with the Colorado River supplying about 25%. The district also has some local supplies, including water it has in storage.

Last month, the agency declared a “water supply alert” and called for voluntary conservation. They’re offering rebates for things like more efficient shower heads and appliances and replacing grass lawns.

Despite the severity of the drought, Gov. Gavin Newsom has not declared a statewide emergency. Instead, he has declared emergencies in 50 of the state’s 58 counties, an approach his administration says is driven by lessons learned from the most recent drought when the state imposed restrictions statewide.

Original Article: [AP News by Adam Beam](#)

### **Temporary Power Generators Now Online to Support California’s Electricity Grid**

Four temporary mobile emergency power generating units totaling 120 megawatts (MW) deployed by the Department of Water Resources (DWR) are online and ready to support California’s energy grid in times of extreme stress on the grid.

Two units each have been temporarily installed at two sites in Northern California: Greenleaf Unit 1, operated by Calpine in Yuba City, and the Roseville Energy Park, operated by Roseville Electric. Each unit can produce up to 30 MW of power, totaling 60 MW of power at each site. The units run on natural gas but can run on a blend of up to 75 percent hydrogen.

In a July emergency proclamation, Governor Gavin Newsom’s administration directed DWR to work with the California Energy Commission (CEC) to develop additional energy capacity to safeguard the state’s grid from the impacts of climate-induced drought, wildfires, and extreme heat waves.

“DWR’s expertise as the fourth largest power producer in California allowed us to work quickly with the CEC, the California Independent System Operator, and our regional



## VELES WATER WEEKLY REPORT

partners in Yuba City and Roseville to bring these units online,” said DWR Deputy Director for the State Water Project Ted Craddock. “DWR is proud to play a role in safeguarding the state’s energy grid and doing everything possible to avoid power shortages and outages as a result of climate-induced conditions.”

The generators would be deployed under emergency conditions determined by the California Independent System Operator (ISO) under a contingency plan developed in coordination with the CEC and the California Public Utilities Commission. The plan includes a range of measures to address potential energy supply shortfalls, including Flex Alerts, coordination with adjacent balancing authorities, demand reduction strategies, and bringing online new resources such as the temporary generators.

“These temporary generators are an important last resort resource that can be relied on to support electricity reliability across California during grid emergencies,” said CEC Commissioner Siva Gunda. “The state’s energy agencies are committed to ongoing monitoring of these facilities in coordination with DWR and local partners to ensure any impacts are accounted for.”

The four generators are located next to existing powerplants operated by Calpine and Roseville Electric. They can be online within five minutes at the direction of the California ISO or the Western Area Power Authority.

The project cost for the four temporary emergency generator units is \$196 million which will be paid for through emergency funds. The units will be available until December 31, 2023.

Original Article: [California Department of Water Resources](#)

### **California water situation bleak as new rainfall year begins**

Thursday marks the final day of the water year in California, and it was one for the record books — and not just because much of the state saw less than 50% of average rainfall.

“While the water year that ends is our second driest on record, the manifestation of record-high ambient temperatures and dry soil conditions means the conditions in the reservoirs, the rivers and streams are actually much lower,” said Karla Nemeth, the director of the California Department of Water Resources, during a press conference to mark the end of the water year Thursday.

California received about 24 inches of water during the water year that began Oct. 1, 2020, according to the 8-station index. It’s 46% percent of the average, which is about 51.4 inches and is drier than any of the years that produced the last prolonged drought that began roughly in 2011.

The precipitation amount is 5 inches higher than the total achieved in the water year spanning 1976 and 1977, but because temperatures in April of this year were so well above normal, the impact on water availability was markedly worse.

“We had 70% of average snowpack on April 1,” Nemeth said. “We had zero snowpack in about six to eight weeks. That’s never happened before.”



## VELES WATER WEEKLY REPORT

California experienced record high temperatures in that period, which Nemeth said could become increasingly normal due to climate change.

Original Article: [Courthouse News by Mathew Renda](#)

### **Calif. regulators buckle up for the potential of 0% water allocation for 2022**

California's reservoirs are so dry from a historic drought that regulators warned Thursday it's possible the state's water agencies won't get anything from them next year, a frightening possibility that could force mandatory restrictions for residents.

This year, unusually hot, dry conditions caused nearly 80% of that water to either evaporate or be absorbed into the parched soil — part of a larger drought that has emptied reservoirs and led to cuts for farmers across the western United States. It caught state officials by surprise as California now enters the rainy season with reservoirs at their lowest level ever.

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Original Article: [The San Joaquin Valley Sun](#)

### **State and federal experts call for water conservation as 'exceptional' drought continues**

San Joaquin County communities are having their woes compounded as they struggle with the effects of one historic drought while still struggling with the effects of another. With constituents concerned about the ongoing drought and resources available, Rep. Jerry McNerney, D-Stockton, hosted a panel of state and federal experts to discuss the critical situation, its statewide effects and best water practices.

“Drought is a catalyst for other disasters such as the terrible wildfires we've experienced this summer,” McNerney said. “It also puts the health of our own Delta at risk of saltwater intrusion from the ocean and a buildup of the toxins when freshwater flow from the Sacramento River gets too low.”



## VELES WATER WEEKLY REPORT

Drought not only threatens the balance of the whole ecological system, but “when drought conditions get this bad, many communities face the risk (of) their wells running dry,” too, he said.

This drought is an unprecedented situation, “that we are not happy to announce,” said Tanya Trujillo, U.S. Department of the Interior Assistant Secretary for Water and Science.

According to the National Integrated Drought Information System (NIDIS), this year, 2021, has been the 9th driest in the last 127 that have been recorded and all 58 counties are under a U.S. Department of Agriculture disaster designation.

As of Oct. 1, 45.7% of the state’s land extension classified as “exceptional drought,” meaning it’s gone past the mark of extreme drought, where the conditions can lead to: Based on NIDIS’ data, all of San Joaquin County – all 100% of it – is affected by the ongoing drought, this past August was the driest August of all 127 years previously recorded, and our complete territorial expansion falls under the exceptional drought category.

“A number of communities haven’t recovered from the last drought,” from 2012 to 2016, and communities running out of resources now means the response effort will have to continue, said Joaquin Esquivel, Chair of the California State Water Resources Control Board.

In California, “we have a very de-centralized way in which we manage water in the state,” Esquivel said. “Some are incredible leaders, well prepared for this draught,” but a lot of smaller systems out there are very vulnerable to these climate extremes.

Original Article: [Record Net by Laura S. Diaz](#)

### **LADWP has saved enough water that it will start sharing with neighbors**

Los Angeles Mayor Eric Garcetti joined local water officials on Tuesday, Oct. 5, to detail a new partnership that will shift water from the State Water Project to the Colorado River to ensure that Southland residents have continued water access amid a historic drought.

The Los Angeles Department of Water and Power receives imported water via the Metropolitan Water District from the State Water Project and the Colorado River. Under the new partnership, LADWP will give some of the water back to the MWD to be distributed to regions that don’t have access to the Colorado River.

Los Angeles will use reserves built through past conservation efforts, and LADWP customers will not be penalized with increased charges for the water shift.

“Living with limited water resources isn’t just a phase — it’s the new normal, and we have to work together as a region if we want to ensure that we can count on access to water for generations to come,” Garcetti said. “This partnership is about more than how we respond in a dry year — it’s about how we prepare our region for tomorrow.”



## VELES WATER WEEKLY REPORT

According to the mayor's office, Southern California is more capable of managing the drought compared to other parts of California thanks to previous conservation efforts and investments in storage and new technology.

Garcetti noted the importance of continued water conservation and urged Southern California residents Tuesday "to do their part again to meet our goal to reduce usage by 15 percent."

Conservation efforts that have led to the city's water reserves include the county's safe, Clean Water Program through Measure W, which provides \$300 million in local, dedicated annual funding for projects that increase local water supplies, improve quality, enhance the public right of way and protect public health.

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Original Article: [Daily News by City News Service](#)

## **California's Feather River Fish Hatchery Seeks to Increase Production, Offset Drought Impacts to Feather River Chinook Salmon Populations**

The California Department of Fish and Wildlife (CDFW) and the California Department of Water Resources (DWR) have announced a joint effort at the Feather River Fish Hatchery in Butte County to aid in offsetting impacts to spring-run and fall-run Chinook salmon resulting from this year's extreme drought conditions.

Under this joint initiative, CDFW and DWR are taking a two-part approach supporting Feather River salmon populations to guard against impacts observed during the state's



## VELES WATER WEEKLY REPORT

last multi-year drought, as well as protect against impacts observed in recent years due to a nutrient deficiency.

“During California’s last extended drought, we observed significant declines in Sacramento Valley fall-run Chinook salmon stock contributions to the state’s sport and commercial fishery,” said Colin Purdy, environmental program manager for fisheries in CDFW’s North Central Region. “We’re trying to get ahead of any drought-related impacts this time by taking these actions and trying to keep these populations as stable and healthy as we can.”

First, the agencies will try to increase the number of spring-run Chinook salmon successfully spawning in-river by returning healthy adults that have returned to Feather River Fish Hatchery that are in excess of those needed to meet hatchery production goals and have been treated with a nutrient supplement. Second, in anticipation of decreased recruitment to the ocean fishery, fall-run Chinook salmon production at the hatchery will be increased from 6 million to 7.75 million smolts.

“Even though wild salmon and hatcheries are well studied throughout California and the Pacific Northwest, our community of dedicated state, federal and university scientists continues to uncover new information,” said Jason Kindopp, manager of DWR’s Feather River Program. “Managing hatcheries and salmon populations presents new challenges every season and using the best data available helps inform our actions to fit the moment.”

Earlier this spring, adult spring-run Chinook salmon collected at the Feather River Fish Hatchery were provided a thiamine supplement injection to protect against impacts from Thiamine Deficiency Complex (TDC). TDC was first observed in Central Valley Chinook populations in 2019, and results in early egg and fry mortality in progeny from affected adults. This year, once spring-run spawning production goals are met, the hatchery will return any excess, healthy adult broodstock that have been treated for TDC back to the river to spawn naturally and promote in-river production.

Original Article: [Sierra Sun Times](#)

### **California drought recovery possible but 140% of average rain needed**

A weather system is expected to bring significantly cooler temperatures to the Sacramento region this week.

“Weak La Nina events have historically favored near-normal or dry conditions across Northern California,” National Weather Service meteorologist Idamis Del Valle Martinez told FOX40 Tuesday.

According to Del Valle Martinez, who works in Sacramento, the weak La Nina is a weather pattern that is taking shape off the west coast.

She said a ridge of high pressure might prevent many storms from reaching Northern California.

“In La Nina events, the storm track sets up farther north. That means that there are wetter-than-normal conditions across the Pacific Northwest and drier than normal



## VELES WATER WEEKLY REPORT

conditions across Southern California,” Del Valle Martinez explained. “As for Northern California, we’re right in the middle. And that means that we’re dependent upon individual storms.”

Last season was a La Nina year for Northern California, and as feared, the weather pattern delivered few storms with long breaks in between.

But the National Weather Service said it is too soon to panic about the season.

There have been years when the storm track surprised the region, delivering more rain and snow than the long-range forecasts indicated.

“You know, we never really know what to expect. And therefore, we have to be prepared for whatever outcome,” said Jeanine Jones, an interstate resources manager for the California Department of Water Resources. “It would be nice if we had a really wet winter but more likely, we’re probably in store for continued dry conditions which really emphasizes the importance of conservation.”

Jones echoes Gov. Gavin Newsom’s call for a voluntary 15% reduction in water use statewide.

She told FOX40 that reducing landscape watering would make a big difference and she is not removing a spectacular drought recovery as a possibility because it happened in 2017, but it would be a very tall order for the water year.

“The estimate we have from a model run by a USGS model, called the Basin Characterization Model, suggests that we would need 140% of average precipitation to get to average runoff and we don’t have many years in which we get to 140% of precipitation,” Jones explained.

Original Article: [Fox 40 by Dennis Shanahan and Jonathan Taraya](#)

### **A plan to connect two reservoirs moves along but questions arise around funding.**

As dry times become a greater concern, taking full advantage of wet times becomes a greater priority. This is the idea behind a long – conceived \$150 million tunnel project that would connect two of the county’s most important reservoirs, allowing the more common superfluous flows in one to fill the other. However, as the design moves toward a public unveiling, support for the massive project is uncertain.

Lake Nacimiento and Lake San Antonio, the two South County reservoirs that feed the Salinas River and are crucial to the sustained health of the county’s agriculture industry, sit at 14 percent and 7 percent filled, respectively – the lowest levels since 2017. Gov. Gavin Newsom in July lumped Monterey County into his extreme drought designation now impacting 56 of 58 California counties. The diminished lake levels forced the county’s water resources agency to end reservoir releases for agricultural irrigation in July.

This is the reality of dry times in the Golden State. However, during wet winters, Lake Nacimiento can refill quickly because of its highly reactive watershed, says Brent Buche, general manager of the Monterey County Water Resources Agency. Buche says the lake can rise by 20 feet in a single rain event, sometimes causing the reservoir to overflow



## VELES WATER WEEKLY REPORT

and spill out. With climate change creating more extreme weather conditions, both dry and wet, the county and agricultural stakeholders are looking at ways to capture and store every ounce of water possible.

Lake San Antonio, though less than four miles away, is less reactive to rainfall. The interlake tunnel project would connect the two reservoirs with a 10-foot diameter pipe and allow water that might otherwise be lost to overflow from Lake Nacimiento to be transferred to Lake San Antonio and stored, balancing the production of the two reservoirs and potentially capturing an additional 34,000 acre feet of water per year. Buche says with both reservoirs full, the system could operate without rainfall for three growing seasons.

Design of the tunnel and analysis of its environmental impacts is being paid for by a \$10 million grant from the California Department of Water Resources, which former State Senator Bill Monning says required "moving heaven and earth" to obtain. A challenge in the tunnel design, Monning says, is the addition of a screen to filter out the striped bass that populate Lake Nacimiento. The bass, which the California Department of Fish and Wildlife added to the lake in the 1970s to boost recreation, are considered predatory and invasive and by law have to be kept out of Lake San Antonio and the Salinas River.

Original Article: [Monterey County Now by Christopher Neely](#)

### **EBMUD Begins Drawing Water From Sacramento River as Part of Drought Response**

As drought conditions persist statewide, officials with the East Bay Municipal Utility District said on Monday the agency has begun tapping into water from the Sacramento River to boost local supplies.

EBMUD, which delivers water to some 1.4 million people across Alameda and Contra Costa counties, typically draws from the Mokelumne River for its water supply.

The agency said the latest move is part of its drought response.

"We've planned and invested for decades to make our water supply resilient and now our plans are paying off," EBMUD Board President Doug Linney said in a statement.

"Ensuring reliable water supplies requires a diverse water supply portfolio including conservation, recycled water, and use of supplemental supplies -- we're doing it all."

Under the plan, EBMUD will pump 35,250 acre-feet of water, or about 11 billion gallons, through the Freeport Regional Water Facility on the Sacramento River between October 2021 and February 2022.

The supplemental water will travel through EBMUD's aqueducts to the San Pablo and Moraga creeks, and then flow into the San Pablo and Upper San Leandro Reservoirs. The water will then be stored for treatment and EBMUD's Sobrante and Upper San Leandro Water Treatment Plans.

Because the supplemental water is coming from a different watershed than the typical supply, customers may notice a change in their water's characteristics, EBMUD officials said.



## VELES WATER WEEKLY REPORT

"Supplemental supplies lessen the need for mandatory drought restrictions and rationing, which can take a heavy toll on customers, businesses and the Bay Area economy," EBMUD Director of Water and Natural Resources Michael Tognolini said. "We're grateful to our many partners and ratepayers for making this incredible investment possible."

The cost of this year's supplemental water is about \$15 million and was funded with budgeted operations costs, according to EBMUD.

The new water year for EBMUD began Friday, with the agency reporting 437,000 acre-feet of water in total storage, which is 76 percent of average levels and 57 percent of capacity. The water supplies remain slightly higher than projected because customers have headed conservation recommendations.

Back in April, the agency asked customers to voluntarily cutback water usage by ten percent due to the drought. Since July, EBMUD customers have conserved almost 8% compared to the same time last year, EBMUD officials said.

Original Article: [NBC Bay Area by Bay City News](#)

### **Water is scarce in California. But farmers have found ways to store it underground**

Aaron Fukuda admits that the 15-acre sunken field behind his office doesn't look like much.

It's basically a big, wide hole in the ground behind the headquarters of the Tulare Irrigation District, in the southern part of California's fertile Central Valley. But "for a water resources nerd like myself, it's a sexy, sexy piece of infrastructure," says Fukuda, the district's general manager.

This earthen basin could be the key to survival for an agricultural community that delivers huge quantities of vegetables, fruit and nuts to the rest of the country — but is running short of water. The basin just needs California's rivers to rise and flood it.

When rains come in the winter and swell the rivers, Fukuda and his colleagues open some gates and send water through irrigation canals to fill this basin and lots of others they've set up. That captured water will seep into the ground, eventually finding its way to a natural aquifer system hundreds of feet below.

Water underground has become a scarce and regulated asset in the state. Farmers have pumped so much water from aquifers in this part of California that they've become depleted, threatening water supplies for agriculture and communities that depend on wells for their household water. A 7-year-old law, just now taking effect, strictly limits the amount that farmers can pump from those aquifers, and those limits could put some farmers out of business.

Water-capturing basins like this one, however, offer farmers a way to survive. That's because the new law treats the underground aquifer like a bank account. If farmers deposit water into that account when water is plentiful, they can draw more water out when they need it, in years of drought. "It really is the difference between our community surviving and not," Fukuda says.



## VELES WATER WEEKLY REPORT

In the past, many Californians considered the winter floods a nuisance, Fukuda says. Now, that has now changed completely. "It's liquid gold," he says. "Cold, crisp floodwater is gold these days."

Farmers and water managers in the southern part of the Central Valley, where the water problem is most severe, are grasping at the water banking idea like a lifeline. Jon Reiter, a rancher and water consultant, works with some of them.

Original Article: [NPR by Dan Charles](#)

## US WATER NEWS

### **Plan to expand recreational water rights in Colorado faces stiff opposition**

American Whitewater floated a plan last year to expand protections for recreational river flows in Colorado. Maybe, the nonprofit protector of rivers thought, communities should not need to build whitewater parks to secure rights for recreational flows.

Colorado officially recognized recreation in a river as a beneficial use of water in 2001, enabling riverside communities to file for water rights to support whitewater parks. Those recreational in-channel diversion water rights, or RICDs, set a minimal stream flow between structures to support "a reasonable recreation experience."

The nonprofit river conservation group American Whitewater is advancing a plan that structures in the river are not necessary for river recreation and communities should be able to file for RICD water rights without expensively engineered features that create waves and holes for kayaking, rafting and stand-up paddling. While there are 13 official RICD water rights in the state, there are more than 130 stretches of whitewater that can be rafted, kayaked and stand-up paddled in the state.

Early talks with Colorado's sharp-elbowed water community have not gone well. No lawmaker took up American Whitewater's proposed legislation, which has been scrapped. And opposition to a plan that expands recreational protection of water is stiff. The gist of opposition, which was voiced earlier this month at the meeting of the statehouse Water Resources Review Committee, is this: If any community can file for RICD water rights without actually building anything in the river, the expansion of those recreational rights could muddy Colorado's already complicated water dealing.

Original Article: [Summit Daily by Jason Blevins/ Colorado Sun](#)

### **The Colorado River Is in Crisis. The Walton Family Is Pushing a Solution.**

The first-ever official shortage on the Colorado River has intensified a debate over how to provide water for 40 million people across the Southwest and irrigate fields of thirsty crops like wheat, cotton and alfalfa.

Few voices outside government are more influential than that of the Walton family, billionaire heirs to the Walmart Inc. WMT 0.23% fortune, who have long advocated



## VELES WATER WEEKLY REPORT

water markets as a key part to solving the region's woes. But some environmental groups say the Waltons drown out other, nonmarket approaches.

A Wall Street Journal analysis shows that a charitable foundation controlled by the Waltons, the Walton Family Foundation, has given about \$200 million over the past decade to a variety of advocacy groups, universities and media outlets involved in the river. No other donor comes close. Two federal officials once affiliated with the foundation have been named to key Biden administration posts overseeing the river.

Putting a monetary value on water has raised concerns among those who benefit from guaranteed access to water and those who believe markets benefit investors while hurting farmers and the poor. Water markets in Australia have been blamed for helping dry up waterways due to overuse by a handful of wealthy farmers and investors.

"Any time that the water starts becoming more valuable than the land, you end up with the possibility of outside speculators," said Andrew Mueller, general manager of the Colorado River District, a public planning and policy agency that oversees water use in western Colorado. Mr. Mueller said his state has been seeing continued interest in agricultural water and lands by outside investment groups.

The Walton foundation has for years held that water markets are among the best ways to distribute and conserve the water that flows along the 1,450-mile river. A number of environmental groups that take Walton money are prominent water-market boosters.

The Nature Conservancy, a public charity focused on conservation that has received funding from the Waltons, said in a 2016 report that such markets can "secure a regular flow of water back to depleted ecosystems and sell the rest back to irrigators or cities."

An added benefit, it said, is "a material return for investors."

"We need every tool in the toolbox, including guided water markets, to increase water security and protect the things we all care about," a Nature Conservancy spokeswoman said.

In the past decade, the foundation has accounted for a large chunk of institutional funding for Colorado River activism at major environmental charities such as the National Audubon Society, the Environmental Defense Fund and American Rivers, according to the foundation's database and the charities.

The Waltons have also given money to foundations run by the University of Colorado and the University of Arizona, among other universities. This year it helped fund a reporting team to cover water issues at the Associated Press. The AP said it has worked with other nonprofits besides the Walton Family Foundation and retains editorial control in all of the cases.

Original Article: [The Wall Street Journal by Scott Patterson](#)

### **Arizona failed to properly monitor groundwater pollution, report finds**

The Arizona Department of Environmental Quality is responsible for protecting the environment, but a new audit report says the agency has failed to perform many



## VELES WATER WEEKLY REPORT

required tasks in monitoring groundwater for pollution — in some cases the neglect has been for nearly three decades.

The department's director, Misael Cabrera, does not dispute the audit's findings, but says the contamination levels, while high, did not result in danger. But the report says the issue is getting ahead of pollution before it ends up in the drinking water and causing harm.

Also, the agency has not developed standards for uranium — something it was first required to do 20 years ago.

"We haven't prioritized setting of standards and asking for money for setting of standards. But we have prioritized getting funding and asking for funding to address known problems," Cabrera said.

From 1995 to 2015, 22% of the sites sampled by DEQ had arsenic levels that exceeded federal drinking water standards and 16% had uranium levels that exceeded those federal standards.

The report says the Department stopped conducting ambient groundwater monitoring in 2017 because the sole employee who was doing that retired.

Original Article: [KJZZ by Jill Ryan](#)

### **In term-opener, justices will hear Mississippi's complaint that Tennessee is stealing its groundwater**

Mississippi v. Tennessee is not only the Supreme Court's first oral argument of the 2021-22 term, but it is also the first time that states have asked the court to weigh in on how they should share an interstate aquifer. The court's decision could fundamentally restructure interstate groundwater law in the United States for decades — or the case could be dismissed immediately on the grounds that Mississippi has failed to allege the proper cause of action.

The case will be argued on Monday, and it will be the court's first in-person argument in a year and a half. In March 2020, the justices stopped meeting in person due to the coronavirus pandemic, and since then, all arguments have been conducted by phone. But the justices are returning to the bench for the start of their new term (though the courtroom will remain mostly empty aside from attorneys, members of the press, and the justices themselves).

Like most original jurisdiction water cases, Mississippi v. Tennessee has taken a few years to wend its way to Supreme Court oral argument, and that argument will be keyed to the parties' objections to the report of a court-appointed special master. Mississippi first came to the court in 2014. Its complaint alleged that Tennessee is stealing Mississippi's groundwater by allowing the Memphis Light, Gas & Water Division to pump large amounts of groundwater from the Memphis Sand Aquifer that straddles the Mississippi-Tennessee border, pulling Mississippi's groundwater across the border and to the surface for use in Memphis. Mississippi has asked the Supreme Court to enter a declaratory judgment "establishing Mississippi's sovereign right, title and exclusive



## VELES WATER WEEKLY REPORT

interest in the groundwater stored naturally in the Sparta Sand formation” of the aquifer, which lies entirely under Mississippi and would not, according to Mississippi, ever flow into Tennessee absent the pumping in Memphis. Mississippi is also seeking over \$600 million in damages.

Mississippi’s request for a declaration of groundwater ownership is simultaneously an argument that the “equitable apportionment” rules that the Supreme Court has used for over a century to resolve interstate surface water disputes do not apply to groundwater — or, at least, do not apply to this groundwater. Equitable apportionment cases started with *Kansas v. Colorado*, in which Kansas argued that upstream Colorado was taking too much of the Arkansas River. The doctrine of equitable apportionment is founded upon the equality of rights of all states, as well as the importance of fresh water to the sovereignty of each. As refined in its later jurisprudence, the court emphasizes four principles when engaged in an equitable apportionment analysis. First, as co-equal sovereigns, the states sharing a waterbody have co-equal rights to make reasonable use of that waterbody, but not to use the water inefficiently or wastefully. Second, the court seeks to equitably apportion the water based on the realities of the conflict in front of it, “without quibbling about formulas.” Third, as the court emphasized again earlier this year, the complaining state — almost always the downstream state — has a higher burden of proof than normal to show injury sufficient to induce the court to intervene. Finally, if the complaining state meets that burden, the court will consider all relevant factors (such as physical and climate conditions, the “consumptive use” of the water, the availability of storage water, among many others) in apportioning the waterbody. The key legal issue in *Mississippi v. Tennessee*, therefore, is whether the equitable apportionment doctrine (automatically) applies to groundwater resources. Notably, the Supreme Court has already made it clear that the equitable apportionment doctrine is not limited to surface water. In 1983, for example, it upheld the special master in *Idaho ex rel. Evans v. Oregon* in using equitable apportionment law to decide a dispute among Idaho, Oregon, and Washington over salmon in the Columbia River/Snake River system. However, the logic of that case cuts both ways for *Mississippi v. Tennessee*. For example, the court emphasized that “[t]he doctrine of equitable apportionment is neither dependent on nor bound by existing legal rights to the resource being apportioned” and that “although existing legal entitlements are important factors in formulating an equitable decree, such legal rights must give way in some circumstances to broader equitable considerations.” These statements suggest that Mississippi cannot avoid the equitable apportionment doctrine simply because it asserts a state law ownership claim to the groundwater beneath its territory. At the same time, however, the *Idaho v. Oregon* court also emphasized the flow of resources among states as the main reason that the equitable apportionment doctrine was applicable to salmon.

Original Article: [Scotus Blog by Robin Craig](#)



## **Monsoons make deserts bloom in the US Southwest, but climate change is making these summer rainfalls more extreme and erratic**

If you've never lived in or visited the U.S. Southwest, you might picture it as a desert that is always hot and dry. But this region experiences a monsoon in the late summer that produces thunderstorms and severe weather, much like India's famous summer deluges.

And this year, it generated a lot of rain.

July 2021 was the wettest month since record keeping started at the Tucson, Arizona, airport in 1895, with 8.06 inches (205 millimeters) of rainfall – equivalent to 70% of what the city receives in an average year. This year's monsoon is the third-wettest ever in Tucson, with 12.80 inches (325 millimeters) of rain.

It was completely the opposite in 2020: Tucson had a dry "non-soon", with less than 2 inches of rain. These conditions and record high temperatures fueled Arizona's largest wildfire season in a decade, including the Bighorn Fire, which decimated over 60% of the forest in the Catalina Mountains north of Tucson.

Our monsoon system impacts some 20 million people in the Southwest. As researchers studying water and climate, we investigate monsoon prediction, which is becoming more complicated due to climate change. Understanding monsoons is critical for educating communities about their benefits and risks, and about how to stay safe from effects like flash flooding.

The word monsoon comes from the Arabic word mausim, or season. Its most traditional use is to describe the large-scale wind shift into the Indian subcontinent from the ocean that coincides with intense summer rains there. But monsoons also occur in Africa, Australia and South America, as well as in Mexico and the southwestern U.S..

Monsoonal circulations carry warm, moist air inland from the ocean, which causes rainfall in the summer season. In the Southwest, this pattern starts when an area of high pressure, called a monsoon ridge, builds over the mountainous areas of Mexico and moves toward the western U.S.

In May and June, when the center of the ridge is directly overhead, the Southwest is very hot and dry. Monsoon rains begin when the warm, moist air moves into the region on the southern side of the ridge. The monsoon in Arizona officially begins June 15 and ends Sept. 30, with most rainfall usually occurring in July and August.

The monsoon has been vital to southwestern ecosystems for thousands of years. Many species have evolved and adapted to take advantage of monsoon rains. The first storms signal milkweed plants to bloom, attracting butterflies to lay their eggs. Great Plains toads and red-spotted tadpoles start their reproductive cycles in rain-filled puddles. Cactus fruits and insects provide food for hummingbirds, white-winged doves and many other birds and animals.



## VELES WATER WEEKLY REPORT

Monsoon thunderstorms occur when clouds develop over mountains during the day, producing rain in the afternoon and early evening. They create unique and severe dangers in the desert environment.

Flash flooding occurs when dry soil can't quickly absorb short-lived, high-intensity downpours. Washes and arroyos – drainage channels that are dry except during heavy rainstorms – can turn into raging currents within minutes, strong enough to carry away cars and people.

Strong thunderstorms can generate microbursts – strong surface winds that gust near hurricane force. They may also trigger dust storms known as haboobs – giant walls of dust a mile or more high that reduce visibility to near zero.

The dry, gusty thunderstorms that herald the beginning of the monsoon can start and spread wildfires. One of these storms ignited the infamous Yarnell Hill Fire in June 2013, which killed 19 firefighters. Monsoon rains on fire burn scars can trigger mud and debris flows, compounding the initial wildfire damage.

The atmospheric circulation pattern in July and August 2021 was especially favorable for an active monsoon and severe weather in the Southwest. Most of southern Arizona experienced torrential rains over multiple days and weeks. These storms caused flash flooding, high winds, dust storms, mud and debris flows and heavy lightning. Emergency responders carried out almost 100 swift-water rescues in Tucson. Forecasters in Phoenix issued more than 100 flash flood warnings in August.

This year's record monsoon also brought benefits. It replenished local water supplies throughout Arizona, which is in an intensive long-term drought. In the Tucson Basin, the monsoon generated sustained flows in tributaries of the Santa Cruz River, which helped to recharge groundwater. Water reserves rose by 5% in reservoirs managed by the Salt River Project, which supplies water to more than 2 million people in central Arizona, at a time when others elsewhere in the West are dropping to record lows.

Original Article: [Prescott News by Diana Zamora-Reyes, University of Arizona](#)

### **In Arizona, Drought Ignites Tensions and Threatens Traditions Among the Hopi**

On the bone-dry plateau where the Hopi people have lived for well over a thousand years, Robinson Honani pulled his truck to the side of a dirt road and pointed to a carcass.

"This is where the cows come to die," Mr. Honani, manager of the Hopi Office of Range Management, said one morning in September as he spotted the remains nearby of another bovine decaying under the sun. It was at least the 10th dead cow Hopi range officials had found in recent weeks.

Alarmed by the two-decade drought that has dried up springs, withered crops and killed cattle, the Hopi Tribal Council ordered ranchers in August to slash their herds in a bid to preserve water supplies and avoid the cruelty of an even larger death toll.

But an outcry by Hopi cattlemen, who say they are providing families with locally raised food, compelled the council to rescind its edict, a decision that has unleashed a fierce



## VELES WATER WEEKLY REPORT

discussion across the reservation over what traditions to safeguard in a time of climate change. The tensions involve farmers who need water to grow crops and ranchers who need water for their cattle. Some Hopi leaders say the tribe should do everything it can to preserve dry farming, a tribal tradition in which crops grow despite scant rainfall through drought-resistant seeds, small fields and terraced gardens.

What both the farmers and ranchers appear to agree on is that the difficult choices feel unfair to the Hopi, who are thought to descend from some of the Southwest's earliest inhabitants. They have been forced to feud over restrictions, they said, at the same time that cities in Arizona, experiencing breakneck population growth, have been depleting the state's strained reservoirs.

"Why isn't the governor cutting off water resources to southern Arizona?" asked Clark Tenakhongva, vice chairman of the Hopi Tribe, which is in the northeast part of the state.

"Cut out the pools. Cut out the water recreation areas. Cut out the golf courses, and you'll start resolving some of the issues the state of Arizona is looking at right now."

But while Arizona's booming population consumes ever larger quantities of water, the flaring tempers in one of the state's poorest corners have revealed how the drought, which has ranked among the most severe in recorded history, has inflicted pain unevenly around the West.

In a parched landscape where the Hopi honed water-harvesting methods over centuries, the tribe estimates the reservation has about 2,200 head of cattle that consume about 66,000 gallons of water a day.

Original Article: [New Times by Simon Romero](#)

### **River District report highlights Western Slope concerns with state water-savings plan**

The Colorado River Water Conservation District staff plans to present its own framework for a water-savings plan — separate from one the state of Colorado is developing — at its October board meeting.

The Glenwood Springs-based River District undertook its own investigation of a plan — known as demand management — that would pay water users to consume less and send the saved water downstream to Lake Powell. The Colorado Water Conservation Board is currently investigating the feasibility of such a program for the state, but the River District convened its own workgroup, made up of Western Slope water users, to look into the issue. Many of the workgroup's stakeholders represented agricultural interests. River District staffers will come up with their own market structure and rules for demand management to present to the board, according to general manager Andy Mueller.

"What we are presenting is not something we are necessarily as staff endorsing, but we are going to present more specifics than what the CWCB or our stakeholder group has come up with so far," Mueller said.

The framework will incorporate some of the findings and recommendations of the River District's stakeholder group, which were released in an August report. Among these was



## VELES WATER WEEKLY REPORT

the unanimous recommendation that the state not rely solely on a demand-management program as a solution to water shortages in the Colorado River basin.

“It was recognized that demand management can’t be the only way in which the state successfully handles the impacts of climate change on the Colorado River,” Mueller said. “It may be a component of that, but the state needs to be really looking at conservation in all water segments.”

At the heart of a demand-management program is paying Western Slope irrigators on a temporary and voluntary basis to use less water in an effort to avoid a Colorado River Compact call. Instead of being spread across hayfields, the water would be sent downstream to a special 500,000-acre-foot pool in Lake Powell, which was established as part of 2019’s Drought Contingency Plan.

A compact call could occur if the upper basin states (Colorado, Wyoming, Utah and New Mexico) can’t deliver the 7.5 million acre-feet of water per year to the lower basin states (Arizona, California and Nevada) as required by a nearly century-old binding agreement. Colorado water managers desperately want to avoid a compact-call scenario, which could result in mandatory water cutbacks.

The participation of Western Slope agriculture is key to creating a workable demand-management program, but the report highlights several reasons this may prove challenging. Stakeholders expressed a strong distrust of decision-making and programs driven by state government and fear that Western Slope agriculture will be sacrificed to meet the Front Range’s and lower basin’s urban interests.

Original Article: [Aspen Journalism by Heather Sackett](#)

### **Utah's 'dismal' water year ends, but drought likely to continue into next year**

Utah ended its water year on Friday, recording one of the most "dismal" in recent history.

"We experienced some of the worst water supply conditions in our lifetimes," said Candice Hasenyager, the director of Utah's Division of Water Resources.

Utah recorded record low stream levels, record low reservoirs and record dry soils. The Great Salt Lake, a critical part of northern Utah's ecosystem, hit a new low.

A little bit of good news came from local water districts, who reported that Utahns overall conserved billions of gallons of water, which stretched supplies a little further. As a result, Utah's Department of Natural Resources said it appeared there is enough drinking water for next year.

But projections show Utah's drought continuing into next year. State officials have asked the legislature to extend the state of emergency for drought.

"It’s going to take a lot to get out of this drought. We’re expecting we would need at least 150% of normal snowpack to feel comfortable going into next year, so we will likely ask people to conserve again next year," Hasenyager told FOX 13.



## VELES WATER WEEKLY REPORT

Zach Frankel, the executive director of the environmental group Utah Rivers Council, said he expected the bad water situation to continue for years to come.

"This has been one of the worst water years on record coming in a climate change mega-drought where we've had a series of bad water years in a row," he said in an interview Friday with FOX 13.

The Utah State Legislature is expected to consider a number of policy proposals aimed at water conservation when it meets in January. Frankel said lawmakers should have addressed the situation long before that.

"It's October 1 and we haven't seen any new legislation out of the legislature at all. That's been a complete and total failure," he said. "We've had no water conservation leadership from the statehouse whatsoever."

At his monthly news conference, Governor Spencer Cox said a number of drought-related policies are being crafted, aimed at water conservation, development and agriculture's big consumption of water.

"I think you'll see several bills coming out that are conservation related bills and making sure we're doing more," the governor told reporters.

The Utah Department of Natural Resources recently released a water management draft plan that prepares for growth over the next 50 years. The report suggested that Utah has enough water resources available to meet needs until 2070, even accounting for impacts from climate change.

Original Article: [Fox 13 by Ben Winslow](#)

### **Out of thin air: can hydropanels bring water to parched communities?**

On the dusty, often unpaved roads that cross the Navajo Nation, pickup trucks hauling water are a common sight. Navajo Nation residents are 67 times more likely than other Americans to lack running water in their homes.

But outside more than 500 homes on the Navajo reservation in Arizona and New Mexico are devices that aim to help tackle this plumbing poverty. These "hydropanels" absorb water from the air and deliver it straight to a dispenser inside the house. Each one produces around five liters (1 gallon) daily, and two panels are enough to supply a family's drinking water, according to Source, the Arizona-based company that produces them.

Jerry Williams, a former president of the Navajo's LeChee Chapter in northern Arizona, where the first panels were installed, said he initially doubted they would work. One family invited him for a look. "The older grandma, she turned the water on, and she said, 'Look, I'm getting water inside my house.' That's what made me a believer."

Where these families used to make water runs two times a week or more, said Williams, they now get their drinking water from the panels.

More than 2 billion people lack adequate access to water, and half the world will live in water-stressed areas by 2025. As the climate crisis accelerates – causing droughts to



## VELES WATER WEEKLY REPORT

intensify, glaciers to melt and freshwater sources to become more depleted – water shortages are predicted to become more acute.

Source is one of several companies that say they can offer a solution to the problem of water scarcity through a technology called atmospheric water generation (AWG): the process of pulling clean water out of the air. It's not a new technology but has traditionally required large amounts of energy and been limited to places with high humidity levels. Companies like Source say they have solved these challenges to create a technology powered by renewable energy and able to harvest drinking water from the air even in arid climates. But some water industry experts question the big claims being made about its potential.

Source (originally called Zero Mass Water) was founded by Cody Friesen, an associate professor of materials science at Arizona State University. Friesen said he became passionate about water scarcity on trips to Indonesia and Central America, which had "10 feet of rainfall" but "nothing to drink", he said.

Looking for a way to harness water in the air – the air holds six times as much water as the world's rivers – he developed panels that use fans to draw in air. Once inside the device, the water vapor is converted into liquid, filtered and then mineralized. The panel's only energy source is sunlight and it can work in a wide variety of locations, he said, including those with low humidity, high levels of pollution and areas that are entirely off grid.

Original Article: [The Gaudian by Shiva Nagaraj](#)

### **New 'risk triage' platform pinpoints compounding threats to US infrastructure**

Over a 36-hour period in August, Hurricane Henri delivered record rainfall in New York City, where an aging storm-sewer system was not built to handle the deluge, resulting in street flooding. Meanwhile, an ongoing drought in California continued to overburden aquifers and extend statewide water restrictions. As climate change amplifies the frequency and intensity of extreme events in the United States and around the world, and the populations and economies they threaten grow and change, there is a critical need to make infrastructure more resilient. But how can this be done in a timely, cost-effective way?

An emerging discipline called multi-sector dynamics (MSD) offers a promising solution. MSD homes in on compounding risks and potential tipping points across interconnected natural and human systems. Tipping points occur when these systems can no longer sustain multiple, co-evolving stresses, such as extreme events, population growth, land degradation, drinkable water shortages, air pollution, aging infrastructure, and increased human demands. MSD researchers use observations and computer models to identify key precursory indicators of such tipping points, providing decision-makers with critical information that can be applied to mitigate risks and boost resilience in infrastructure and managed resources.



## VELES WATER WEEKLY REPORT

At MIT, the Joint Program on the Science and Policy of Global Change has since 2018 been developing MSD expertise and modeling tools and using them to explore compounding risks and potential tipping points in selected regions of the United States. In a two-hour webinar on Sept. 15, MIT Joint Program researchers presented an overview of the program's MSD research tool set and its applications.

"Multi-sector dynamics explores interactions and interdependencies among human and natural systems, and how these systems may adapt, interact, and co-evolve in response to short-term shocks and long-term influences and stresses," says MIT Joint Program Deputy Director C. Adam Schlosser, noting that such analysis can reveal and quantify potential risks that would likely evade detection in siloed investigations. "These systems can experience cascading effects or failures after crossing tipping points. The real question is not just where these tipping points are in each system, but how they manifest and interact across all systems."

To address that question, the program's MSD researchers have developed the MIT Socio-Environmental Triage (MST) platform, now publicly available for the first time. Focused on the continental United States, the first version of the platform analyzes present-day risks related to water, land, climate, the economy, energy, demographics, health, and infrastructure, and where these compound to create risk hot spots. It's essentially a screening-level visualization tool that allows users to examine risks, identify hot spots when combining risks, and make decisions about how to deploy more in-depth analysis to solve complex problems at regional and local levels. For example, MST can identify hot spots for combined flood and poverty risks in the lower Mississippi River basin, and thereby alert decision-makers as to where more concentrated flood-control resources are needed.

Original Article: [Phys.org by Mark Dwortzan, Massachusetts Institute of Technology](#)

## GLOBAL WATER NEWS

### **Water Shortages Threaten the Economy and Our Food Supply**

This summer, around the world, we didn't just read about climate change; we lived it. Extreme heat baked the usually temperate Pacific Northwest. Wildfires raged in the Western United States, Canada, the Mediterranean, and Siberia. Heavy rains flooded Germany and Manhattan. The next victims of a changing climate may be our favorite foods and our wallets, as water scarcity hits American farmers.

Water shortages currently affect more than 3 billion people worldwide. In the United States alone, nearly half the country is experiencing a drought after the hottest summer on record, exceeding even that of the Dust Bowl. The drought in the West is also



## VELES WATER WEEKLY REPORT

persistent. The last 20 years have been drier than any similar period over the last 1,200 years. The effects are showing. This summer, Lake Mead—the country’s largest reservoir, formed by the Hoover Dam—recorded its lowest level since first filling in the 1930s, 200 feet below normal. This puts the Western U.S. in uncharted territory. The federal government has declared the first-ever shortages in the Colorado River, triggering water cuts through much of the seven-state water-sharing compact that has been in place for nearly a century.

Water cuts have a ripple effect throughout the economy. Farmers take the biggest direct hit, since they are responsible for two-thirds of total U.S. groundwater use, and greater total water use than any sector besides electricity generation. As climate change increases the frequency of both droughts and hotter temperatures, U.S. corn and soybean yields could fall by up to 20%. Moreover, many of our favorite foods—including almonds, avocados, rice, dairy, and meat—require a lot of water for production, making them particularly susceptible.

With severe droughts becoming the new normal, we need to start making an effort to reduce water consumption and allocate our scarce water resources toward the highest-value uses. The most efficient way to achieve this goal is through market-based regulation, such as a water-use fee. This approach avoids picking winners and losers. Instead, it ensures that water users—from farmers to downstream consumers of agricultural products—pay the full price for their water use. This empowers all consumers to decide for ourselves which uses of water are worth it and which are not. California, one of the world’s most valuable agricultural regions, is in the process of setting up this type of regulation on farmers’ use of groundwater, under the framework of the state’s Sustainable Groundwater Management Act. The act aims to achieve long-run sustainability by 2042, with a target of reducing groundwater use by 20% to 50%. In new research, we investigate whether this goal is achievable and measure the impact that these groundwater regulations are likely to have on the farmers growing some of the economy’s most valuable crops.

Using data on over 10,000 individual groundwater pumps spanning more than a decade, we find that California farmers indeed pump a lot less groundwater when doing so becomes more expensive. A 10% increase in the cost of groundwater causes farmers to reduce groundwater use by more than 10%, a much larger response than previously anticipated. We also discovered that farmers’ primary means of reducing groundwater consumption has been switching crops. For the same 10% increase in groundwater costs, we estimate that farmers increase land in high-value fruit and nut perennials (like grapes and almonds) by 1%, and reduce land in annual crops (like wheat) and low-value perennials (like alfalfa) by 1%. The shift toward high-value crops makes economic sense: As irrigation costs increase, farmers will need to earn more revenue per acre-foot of water in order to stay afloat.

As California looks to lower its groundwater usage, to what extent would an extraction fee alter the state’s agricultural landscape? We estimate that under a \$10 per acre-foot



## VELES WATER WEEKLY REPORT

fee on groundwater extraction (roughly 25% of the average pumping cost), farmers would reduce their groundwater use by 27%—primarily by reallocating 3.9% of cropland to other crops or out of crop production altogether. Because farmers are so responsive to water costs, the state’s long-run sustainability targets can be achieved using a groundwater fee that would be much more modest than many previous projections suggested. This is great news from a conservation perspective.

It is also great news if you like grapes and almonds. Even with regulations to achieve groundwater sustainability in the coming decades, high-value perennial crops should remain plentiful in grocery stores in the United States and worldwide. On the other hand, other foods could see prices increase. Such price fluctuations due to increased water scarcity would actually be a sign that the market is working. If food prices do rise, the economic burden of California droughts would not disproportionately fall on local farmers, but rather be spread across the world’s consumers. This is a way of getting consumers to take the full costs of agricultural production into account when choosing what to put into our grocery carts—getting all of us to pay our fair share for a sliver of climate change’s impacts.

Original Article: [Barron’s by Fiona Burlig,, Louis Preonas and Matt Woerman](#)

### **Do depressions in Canadian prairies hold the key to groundwater recharge?**

The water cycle is a delicate balance. In natural settings, water from rainfall or snowmelt can soak into soil or runoff to streams. Some of the water is stored in natural underground reservoirs – called groundwater. Plants use up the water to grow, and then new precipitation refills the groundwater – a process called groundwater recharge.

In dry climates, plants use up most of the water that enters the soil. So how does the groundwater get refilled? For Canadian prairies the answer is found in depressions located in the landscape. In these depressions, runoff from the surrounding land accumulates and moves into the groundwater.

The depressions in the landscape were left by glaciers when the last ice sheet left the Great Plains about 10,000 to 12,000 years ago. Like a rain garden, they take in runoff from the surrounding environment, but are typically bigger. They are 50 to 100 meters in diameter and 1 to 2 meters deep.

However, scientists are worried changes in climate could impact this delicate groundwater recharge process.

Currently, most of the water in the depressions comes in the form of runoff from snowmelt as it flows over frozen soil and into the depressions. Researchers in Canada studied how this process may be disturbed in the future as the climate changes. Masaki Hayashi and the team at University of Calgary recently published this work in *Vadose Zone Journal*, a publication of the Soil Science Society of America.

“The motivation for this research came from the need to estimate recharge for sustainable management of groundwater in the Canadian prairies,” says Hayashi. “We cannot manage a renewable resource unless we know how much is renewed every year.



## VELES WATER WEEKLY REPORT

It would be like trying to manage expenses from a bank account without knowing the amount of revenue.”

Experts predict that the future climate conditions of these prairies will be warmer and wetter. While it seems like this would result in more groundwater recharge, the scientists wanted to determine if that would be the case in these depressions.

These low areas collect snowmelt runoff and can even become ponds in the spring. Some of the larger depressions even have water that stays throughout the summer. Those are called prairie wetlands or prairie pothole wetlands and are home to many aquatic plants and animals in the area.

To determine how a warmer and wetter climate would impact groundwater recharge, the scientists used a model to simulate the environment. By placing instrumentation directly in the depressions (shown), they gathered information on soil properties, the weather, and the size of the depression and surrounding environment. Their work, a type of “soil water balance” model, used the data they gathered to simulate how the water may move from the surface into deeper soil layers in the future.

They found that snow accumulation as well as how much of and how long the soil is frozen in the winter will decrease. This means there will be less runoff to the depressions and less groundwater recharge.

Original Article: [Newswise](#)

### **Avoiding water bankruptcy in the drought-troubled Southwest: What the US and Iran can learn from each other**

The 2021 water year ends on Sept. 30, and it was another hot, dry year in the western US, with almost the entire region in drought. Reservoirs vital for farms, communities and hydropower have fallen to dangerous lows.

The biggest blow came in August, when the US government issued its first-ever water shortage declaration for the Colorado River, triggering water use restrictions.

In response, farmers and cities across the Southwest are now finding new, often unsustainable ways to meet their future water needs. Las Vegas opened a lower-elevation tunnel to Lake Mead, a Colorado River reservoir where water levels reached unprecedented lows at 35% of capacity. Farmers are ratcheting up groundwater pumping. Officials in Arizona, which will lose nearly one-fifth of its river water allotment under the new restrictions, even floated the idea of piping water hundreds of miles from the Mississippi River.

These strategies conceal a more fundamental problem: the unchecked growth of water consumption. The Southwest is in an “anthropogenic drought” created by the combination of natural water variability, climate change and human activities that continuously widen the water supply-demand gap.

In the long run, this can lead to “water bankruptcy,” meaning water demand invariably exceeds the supply. Trying to manage this by cranking up water supply is destined to fail.



## VELES WATER WEEKLY REPORT

More than 7,000 miles away, Iran is grappling with water problems that are similar to the US Southwest's but more severe. One of the driest years in the past five decades, on the back of several decades of mismanaged water resources, brought warnings of water conflicts between Iranian provinces this year.

As environmental engineers and scientists — one of us is also a former deputy head of Iran's Department of Environment — we've closely studied the water challenges in both drought-prone regions. We believe past mistakes in the US and Iran offer important lessons for future plans in the US Southwest and other regions increasingly experiencing drought and water shortages.

As the supply of water from the Colorado River diminishes, Southwest farmers are putting more straws into already declining groundwater that accumulated over thousands to millions of years. But that is a short-term, unsustainable solution that has been tried across the US and around the globe — with major consequences. The High Plains Aquifer and California's Central Valley are just two examples.

Iran offers a case study in what can go wrong with that approach, as our research shows. The country nearly doubled its groundwater extraction points between 2002 and 2015 in an attempt to support a growing agricultural industry, which drained aquifers to depletion. As its water tables drastically declined, the groundwater's salinity increased in aquifers to levels that may no longer be readily suitable for agriculture.

As water-filled pores in the soil are drained, the weight of the overlying ground compresses them, causing the aquifers to lose their water holding capacity and accelerating land subsidence. Iran's capital, Tehran, with more than 13 million residents, subsided more than 12 feet between 2003 and 2017. Similarly, some areas of California are sinking at a rate of up to 1 foot each year.

Original Article: [The World by Mojtaba Sadegh, Ali Mirchi and Amir AghaKouchak and Kaveh Madani](#)

### **Minimizing trade-offs for sustainable irrigation**

A more comprehensive understanding of the role of irrigation in coupled natural–human systems is needed to minimize the negative consequences for climate, ecosystems and public health.

Nearly 40% of global food production is reliant on irrigation, which directly aids crop growth and minimizes the effects of weather and climate variability. However, copious water use for irrigation is depleting many water supplies and increasing pollution levels. Furthermore, extensive irrigation is modifying local and regional climate and environmental conditions, with implications for both humans and natural ecosystems. New and cross-disciplinary approaches to irrigation research and decision-making are needed to better understand and predict irrigation–environment–public health



## VELES WATER WEEKLY REPORT

interactions, particularly to quantify the trade-offs and benefits of irrigation under global environmental change.

Original Article: [Nature Geoscience](#) by [Sonali Shukla McDermid](#), [Rezaul Mahmood](#), [Michael J. Hayes](#), [Jesse E. Bell](#) & [Zoe Lieberman](#)

### **Averting climate catastrophe is a huge investment opportunity**

The droughts and monsoon floods that have pummeled Asia in recent years are a clear indication that the impacts of climate change are becoming more frequent and intense. The cost of not addressing climate change sooner is already immense. If steps are not taken immediately to stop adding carbon dioxide to the atmosphere by 2050, we will lock in an even more harrowing future.

For example, as oceans and coral reefs are decimated, the more than 3 billion people who rely on fishing for their livelihoods, many of them in Asia and the Pacific, will see their livelihoods severely impacted.

Estimates suggest a global impact on gross domestic product of up to 13% relative to a prior trend baseline if we only implement the policies that we currently have. These losses would be particularly devastating for tropical regions.

As we head toward a critical U.N. climate summit in Glasgow this November, we need to look at the transition to net-zero carbon emissions as an unprecedented opportunity to clean up our economies, protect communities from the worst possible scenarios and create millions of jobs in the process, including for the poorest groups.

The transition away from fossil fuels and carbon-intensive production and consumption will involve a historic shift toward emission-neutral alternatives in almost all sectors of the economy, requiring the collaborative engagement of both the public and private sectors.

With its new Climate Change Action Plan, the World Bank Group is boosting efforts to tackle both climate and development issues. In the process, we will look at maximizing the development opportunities that this decarbonization entails and will bring in private sector investments.

Greater focus will be given to decarbonizing key sectors like energy, agriculture, cities, transport and manufacturing, which account for over 90% of global greenhouse gas emissions.

Governments will not be able to finance that transition alone, as increasing fiscal constraints deter long-term capital investments. Getting to net-zero emissions is impossible without private sector leadership. For banks and investors, this could be the investment opportunity of the century.

The International Finance Corp. (IFC) estimates that Asia is home to over 80% of potential climate-smart investments worth at least \$29 trillion between now and 2030, putting the region at the center of an emerging constellation of investment opportunities in everything from green buildings and electric vehicles to climate-smart agriculture.



## VELES WATER WEEKLY REPORT

The potential scale of investment should not be missed, with new instruments that will help to achieve this goal. Nascent products like sustainability-linked bonds, blue bonds and green loans mean that more opportunities to fight climate change are in sight.

These types of bonds can be linked to climate-specific targets that lower or raise rates, and can include penalties if the issuer fails to meet certain green benchmarks. This makes them a very strong instrument for sustainability investments and bond issuances, creating the right incentives on the issuers and providing a new asset class for investors interested in participating in the climate finance agenda.

While no single financing instrument can provide a viable long-term solution to bring in private sector investments, blended finance is also growing as a powerful tool that uses small amounts of concessional donor funds to attract private capital flows for sustainable development in emerging markets. This helps catalyze private financing that would not otherwise be available, supporting the creation of new markets.

The speed at which markets and the private sector fully adopt the climate objective and mobilize the necessary capital will depend, in part, on the coherence and credibility of climate policies and regulatory frameworks, as well as the standardization and transparency of reporting.

Original Article: [Nikkei Asia by Stephanie von Friedeburg and Alphonso Garcia Mora](#)

### **Europe's Power Crisis Moves North as Water Shortage Persists**

As the frontier of Europe's energy crisis moves north, the Nordic region faces a worsening power crisis with dwindling water reservoirs hampering the generation of hydroelectric power.

Nordic power prices were five times higher in September than a year ago. That's hitting everyone from power-hungry factories and miners, to students struggling with their bills. Inflation is rocketing.

Europe's northern corner can't hide from the global shortage of natural gas and coal, with falling water reserves curbing the region's most important source of electricity. Sweden is relying on a 52-year-old plant that burns oil to keep the lights on and a local utility is trying to convince industrial users to save energy as cold weather draws closer.

"The combination of low Nordic hydro reservoirs and low European gas storage levels is creating a perfect storm, with high coal and carbon prices on top of that," said Mats Persson, head of trading at Fortum Oyj. "With new power cables to Germany and the U.K., the big price variations we have seen in Europe are entering the Nordic system."

Norwegian hydro levels are at their lowest in more than a decade for this time of the year. While some rain arrived in the past few days, the situation in southwest Norway has been so bad that grid operator Statnett SF issued a warning to traders on Monday, saying the power balance stands at two on a scale where five means rationing. That part of the country has the largest reservoir capacity and links to Germany and Denmark, as well as a new cable to Britain.



## VELES WATER WEEKLY REPORT

The filling level was 52.3% for week of Sept. 20 in the area, the lowest since 2006 for that week. That's sparking concern just weeks before the critical turning point when reservoirs start to decline later in the fall.

"Normally the reservoirs fill up at this time of year, but in both August and September we have had heat records and very little rainfall," said Anders Gaudestad, executive vice president of power management at Agder Energi.

Data on the availability of water is as significant to the power market as the aggregate number for European gas storage levels, which traders watch like hawks these days. European gas surged to a record 100 euros (\$116) per megawatt-hour on Friday, and traded at about 95 euros on Monday morning.

Original Article: [Bloomberg by Lars Paulsson, Jesper Starn and Lars Erik Taraldsen](#)

### **Jharkhand's solar pump scheme aims to improve lives of farmers by increasing irrigation potential**

Parmeshwari Devi is a farmer who owns agricultural land in the Khunti district of Jharkhand. A few years ago, she would often lament that she was not able to fully utilise her three acres of cultivable land to grow crops, because of limited access to irrigation. Her family would regularly run around to get diesel to operate the fuel-based pump for water. But a switch to a solar pump, provided by the state government, changed things for her.

Last year, she produced 1,200 kilograms (12 quintal) of paddy (rice) on her land. But after installing the solar pump in early 2021, she has been able to increase her production to 3,000 kgs (30 quintal) of paddy this year, which she sold for Rs. 36,000. Buoyed by the good returns, her husband Jhagru Pahan now plans to also grow vegetables during the rabi (winter crop) season. If yields continue to improve, the couple dreams of sending their three children to a city-based school for a better education.

Similar to Parmeshwari and Jhagru, there are many other farmers in the central Indian state of Jharkhand who, due to lack of irrigation facilities, are unable to utilise their entire agricultural land for sowing crops. Many are now switching to clean energy sources for agricultural-related works by opting for the state government's JOHAR (Jharkhand Opportunities for Harnessing Rural Growth) scheme. The scheme, which started in 2017, aims to switch to solar pumps for irrigation to reduce the dependency of farmers on diesel, a source of pollution as well, and increase their income.

According to India State of Forest Report 2019, Jharkhand has a geographical area of 7.9 million hectares. Around 1.3 million hectares or 17.37 percent of the total geographical area, is net sown area. There is a significant potential agricultural area that remains unused.

Around 37 percent of the total land of the state is viable for cultivation, according to Jharkhand's State Water Resources Department. But agriculture here, is heavily dependent on the monsoon rains that occur for a few months each year. Out of the total



## VELES WATER WEEKLY REPORT

net sown area, irrigation facilities are confined to only 15 percent of the area and less than six percent of the farmers possess irrigation equipment.

Santosh Mali, a Ranchi-based senior scientist (Soil and Water Conservation Engineering) at the Indian Council of Agricultural Research (ICAR) Research Complex for Eastern Region, said that in comparison to the amount of groundwater recharge in the state, only 15 percent is extracted for irrigation.

The JOHAR scheme was launched in 2017 to distribute solar power operated irrigation pumps to farmers to increase the irrigation area on their lands and in turn increase produce. Jharkhand's State Rural Development Department received financial assistance of Rs. 143 million (Rs. 14.3 crore) from the World Bank and the state envisaged covering 13 districts and 39 blocks with the scheme.

"Till now, we have been able to take the scheme benefits to upto 11 districts and 36 blocks. This is a micro-lift irrigation-based scheme. There are two parts of the scheme. In one part, high power solar pumps will be given which have a capacity between 5-7.5 horsepower (HP). These could be installed at fixed places and have the potential to irrigate 15-20 acres (6-8 hectares) of land," said Sanjay Das, State Coordinator (Irrigation), for the JOHAR scheme. In the other part there is a provision for the small and marginal farmers to use mobile solar pumps, which are low power ones with a capacity between 0.5-1 HP, said Das. Solar pumps were given to a group of farmers instead of one farmer to ensure their adequate and regular usage.

Under the scheme, the government has planned to distribute 1,310 fixed solar pumps and 1,000 mobile solar pumps by June 2022 to assist in the irrigation of 26,220 acres (10,600 hectares) of land and benefit about 23,580 farmers families.

Original Article: [Mongabay by Srikant Chaudhary](#)

### **Big Tech needs to tackle its water addiction**

Skeptics (including me) assembled when Facebook, Google and Microsoft made respective pledges to replenish more water than they use within the next fifteen years. The main reason: private companies are beholden to shareholders, boards, bottom lines, and customers—not pledges.

Big Tech needs a big amount of water to keep big servers in big data centers cool. It's a fundamental element of the internet's backend and core to each company's business model. For some tech titans like Elon Musk, this is simply the cost of innovation. Regardless of where executives fall on the water conservation spectrum, global tech companies—as well as other organizations with water-positive ambitions like 3M and Pepsi—will need to get creative to convert corporate pledges from shallow PR plays into meaningful progress.

Running a global online business, powering consumer searches and purchases, and connecting users takes bandwidth. It also requires backend activity that heats physical



## VELES WATER WEEKLY REPORT

servers and requires billions of gallons of water to keep them cool in physical data centers sprinkled around the world.

Despite some creativity on the legacy side of data center construction from Microsoft, decreasing water requirements for digital business will prove difficult for most companies in pursuit of water positivity and relentless growth concurrently.

For context, Google accessed 2.3 billion gallons of water for use in three America-based data centers (out of 21 data centers in operation total) in 2019 alone. Facebook withdrew roughly 3.7 million cubic meters of water in 2020, with the majority of that water applied to cooling data centers and being lost to evaporation.

Achieving a water-positive future will involve transforming the way companies, operations, fulfillment centers, supply chains, offices, and consumer interactions tap into the global water supply. In parallel, authorities that provide water for community use will always be the priority for regulators, as they should be.

For tech giants like Facebook, building an \$800 million solar plant in Arizona while making water pledges, this will likely translate into more laws and regulations coming into play to protect community rights to drinkable water. This is a positive development.

The future will also entail looking outside of potable water to maintain stakeholder trust, attract conscious consumers and responsibly conserve the planet's finite water supply.

Facebook's Sylvia Lee outlined a few concrete steps the company has taken over the past few years to reduce water use on campuses around the world, including installing efficient plumbing fixtures, collecting rainwater and withdrawing treated wastewater for non-potable uses and planting low-water-use plants that reduce irrigation needs.

It might be a start, but we'll need every company that pledges to achieve water positivity or invest in water stewardship to follow up with actually doing the work.

Original Article: [Fortune by David Lynch](#)

### **Delivering Investable Water Solutions in Developing Countries**

One in three people do not have access to safe drinking water, and 3 billion people lack access to basic hand-washing facilities with water and soap<sup>1</sup>. The global water sector has struggled to receive sufficient public funding or private investment to provide accessible water and sanitation services.

A leading NGO in the space, Aqua for All, found that achieving clean water and sanitation for all requires an estimated \$114 billion per year, while less than \$5 billion of donor funds are currently available<sup>2</sup>. The sector needs innovative and investable solutions that can mobilize financing to developing countries<sup>3</sup>.

Traditional infrastructure capital seeks high profit margins quickly. The low margins of the water sector have led to reliance on government and municipal bonds, dedicated line-item funding and revolving funds even in highly developed markets. Private sector investment and ownership has typically been focused on advanced technology and higher margin companies in the water sector market.



## VELES WATER WEEKLY REPORT

Water and sanitation markets in developing countries also face lower and longer-term return on investment along with a dearth of public financing and insufficient donor funding. These challenges, along with a lack of recognition of WASH services as commercially viable and the elevated risk of developing country investments, have all served as barriers to both concessional and private sector investment in this sector.

But these are not insurmountable challenges. There are companies who have successfully implemented distributed solutions where investors are rewarded with bond-style returns that deliver a steady and reliable profit. What these water enterprises need is a catalytic spark so they can achieve their full impact potential.

There is a pathway for scaling the most promising entrepreneurial models – from catalytic grants as seed funding to blended finance from institutional investors to commercial investment. It starts with finding and nurturing those market-based enterprises that have the clearest road to low-cost solutions, rapid operationalization and commercialization.

A strong and committed ecosystem of public stakeholders is essential to advance to the next step. In addition to buy-in and the enabling policy and regulatory environment, they can provide budget line-item funding, bonds and concessions.

In order for these enterprises to thrive and grow, we need a bold community of both public stakeholders and impact investors who are willing to back these models. P4G bridges the gap between the public and private sectors to enable successful impact-oriented enterprises in water and several other sectors.

One partnership, the Finance for WASH Access, is expanding water and sanitation access by providing affordable financing for water lending in Kenya. The partnership, led by Water.org, is currently conducting a regulatory assessment in Kenya and plans to launch a Global Credit Enhancement Facility with the International Finance Corporation (IFC) to work with commercial banks and microfinance institutions that have traditionally lacked the capacity or willingness to lend in the sector.

By providing market-based loans, that when repaid are recycled into loans for additional households, the partnership will deliver a model that can be self-sustaining in the long-run and increase the capital flow to household water and sanitation solutions. Importantly, the work has shown that water sector micro-loans are repaid very reliably across developing world countries.

Original Article: [Water World by Robyn McGuckin](#)



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