Veles Water Weekly Report

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December 2nd 2021

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Welcome to **WATERTALK**

by Joshua Bell

**CLICK THE LINK BELOW**

“A 2 minute technical analysis video of H2O futures”

https://vimeo.com/652376027
The new NQH2O index level of $728.30 was published on December 1st, up $0.30 or 0.04%. The discount of the futures to the index has narrowed from being in a circa $40 range to around $30, we expect this to narrow further in the coming weeks. NQH2O is up 45.71% YTD.

Below are the bid offer prices on different expiries being quoted in the market.
December  696@704
March 22   740@775
June 22    910@925
The graph above lays out the Nasdaq Veles water index by year, showing 2013-2022. 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 red. 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.
VELES WATER WEEKLY REPORT
H2O FUTURES AND NQH2O INDEX VOLATILITY ANALYSIS

Daily H2O Futures Volatility vs Daily NQH2O Index Volatility

DAILY VOLATILITY
Over the last week the December future volatility high has been 1.87% on December 1st with lows of 0% on November 26th-30th.

<table>
<thead>
<tr>
<th>ASSET</th>
<th>1 YEAR (%)</th>
<th>2 MONTH (%)</th>
<th>1 MONTH (%)</th>
<th>1 WEEK (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NQH2O INDEX</td>
<td>34.75%</td>
<td>4.84%</td>
<td>2.52%</td>
<td>1.745%</td>
</tr>
<tr>
<td>H2O FUTURES</td>
<td>N/A</td>
<td>10.37%</td>
<td>7.44%</td>
<td>1.58%</td>
</tr>
</tbody>
</table>

For the week ending on the December 2nd the two-month futures volatility is at a premium of 5.97% to the index, up 0.44% from the previous week. The one-month futures volatility is at a premium of 5.23 to the index, up 0.31% from last week. The one-week futures volatility is at a premium of 1.61% to the index, a reversal of 1.77% from the previous week. These future premiums in volatility are in line with the futures price closing in on the index, with the index showing more stability and the futures having more ground to cover to move to the index price.

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 01/12/2021

<table>
<thead>
<tr>
<th>STATION</th>
<th>MTD</th>
<th>WEEK ON WEEK CHANGE</th>
<th>% OF 20 YEAR AVERAGE MTD</th>
<th>2022 WYTD VS 2021 WYTD %</th>
<th>2022 WY VS 20 YEAR AVERAGE TO DATE %</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAN JOAQUIN 5 STATION (5SI)</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00%</td>
<td>32</td>
<td>135</td>
</tr>
<tr>
<td>TULARE 6 STATION (6SI)</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00%</td>
<td>22</td>
<td>76</td>
</tr>
<tr>
<td>NORTHERN SIERRA 8 STATION (8SI)</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00%</td>
<td>44</td>
<td>198</td>
</tr>
<tr>
<td>CENTRAL VALLEY TOTAL</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00%</td>
<td>33</td>
<td>136</td>
</tr>
</tbody>
</table>

RESERVOIR STORAGE

<table>
<thead>
<tr>
<th>RESERVOIR</th>
<th>STORAGE (AF)</th>
<th>% CAPACITY</th>
<th>LAST YEAR % CAPACITY</th>
<th>HISTORIC ANNUAL AVERAGE CAPACITY %</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRINITY LAKE</td>
<td>708,121</td>
<td>29</td>
<td>52</td>
<td>50</td>
</tr>
<tr>
<td>SHASTA LAKE</td>
<td>1,116,541</td>
<td>25</td>
<td>44</td>
<td>46</td>
</tr>
<tr>
<td>LAKE OROVILLE</td>
<td>1,054,253</td>
<td>30</td>
<td>37</td>
<td>60</td>
</tr>
<tr>
<td>SAN LUIS RES</td>
<td>483,255</td>
<td>24</td>
<td>46</td>
<td>46</td>
</tr>
</tbody>
</table>

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

**April 1st** is used as the benchmark as it when the snowpack in California is generally deepest. It has been used the benchmark date since 1941 by DWR and can be used to predict spring river flow.
The US Drought Monitor release their statistics with a 1-week lag to this report. Over the past week there has been a class 1 improvement in (D4) drought conditions in Northern CA by 9.35%.
The current satellite picture shows a dry South Western US. Frontal activity appears to be active in the Northern coastal regions of Canada.

There is a weaker frontal system in the Western Pacific which may bring some precipitation to the North Western US later in the week, but we do not expect this to bring any precipitation the South Western US.

The high pressure system is still evident over the SW hence limiting precipitation in this region.

There is very little moisture inflow from the South into Southern Arizona and New Mexico.

Monsoonal effects are not prevalent on this satellite picture at present as it appears this moisture inflow from the South may have ceased for the year. Our long-term models are still showing the potential for greater precipitation to reach the SW and Western US this winter.

10 Day Outlook
Dry conditions will persist through the weekend as a ridge of high pressure remains over the region. Sunday a surface low will move into the Gulf of Alaska before reaching British Columbia by early Monday morning. This system will have a surface front extending out southward just offshore of the Pacific Northwest with a moisture plume extending out over the eastern Pacific of roughly 1-2" PW. This frontal system will progress southeastward across the Pacific Northwest and into Northern CA/NV Monday morning through Tuesday morning. There are still some differences amongst the models in terms of the location and magnitude of this moisture plume with the ECMWF bringing it further inland on Monday/Monday night than the GFS. The ECMWF also shows a nice vortex max
VELES WATER WEEKLY REPORT

just off the Oregon coast Monday afternoon while the GFS shows no such feature. Altogether, this leads to some large differences in QPF between the GFS and the ECMWF most notably in the 18Z-00Z time frame Monday/Tuesday where the ECMWF shows 0.75"-1.00" over the Smith/Klamath Basins while the GFS has roughly between 0.10"-0.25". There is also still a good amount of spread amongst the ensembles. A good number of the GFS ensemble members during this time frame are dry while a couple are showing around half an inch along the north coast. The ECMWF also has a wide spread of QPF amongst its ensemble members with many below what the deterministic run shows and a few even higher. Bottom line is, looks like a frontal system will be moving through the northern part of the region Monday and into Tuesday bringing precipitation to the area. The highest totals are likely to be along the north coast north of Cape Mendocino around the Smith Basin and southern Oregon Cascades, though exact amounts remain uncertain at this time.

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

WESTERN WEATHER DISCUSSION

Half an inch to locally 2 inches of precipitation fell along coastal areas of Oregon and Washington, with half an inch over eastern Washington to northern Idaho. Less than half an inch occurred further south to northern portions of California and the Great Basin. Areas further south received no precipitation this week. Dry soils, high evapotranspiration, and severely dry SPI and SPEI values prompted expansion of D4 in northern Montana. According to November 21st statistics from the U.S. Department of Agriculture, 99% of Montana’s topsoil moisture was short or very short (dry to very dry) and 42% of the winter wheat crop and 99% of the pasture and rangeland were in poor to very poor condition. D1-D3 expanded in eastern New Mexico. Even though California and Nevada were mostly dry this week, the impacts from the atmospheric river event and frontal rains of October continued to be felt. With moist soils, wet SPI and SPEI indicators for the last 1 to 6 months, and slightly improved reservoir levels and snowpack, a reassessment of conditions resulted in the pullback of D4 in the Sacramento River Valley in California, and a pullback of D2 and D3 in northern Nevada. D3 was also pulled back slightly in southwest Montana and adjacent Idaho.

Reference:

Richard Heim, NOAA/NCEI
CALIFORNIA WATER NEWS

Arizona, California, Nevada agree to new Colorado River agreement to conserve more water

Arizona’s water authorities are close to entering into a new pact with officials from Nevada and California they hope will restore water levels at Lake Mead and stave off future rationing requirements.

A Tier 1 Colorado River water shortage begins in 2022, triggering a mandatory 512,000 acre-foot reduction to Arizona. The emergency stems from the Lake Mead reservoir reaching water levels not seen since its construction. The designation doesn’t affect Arizona residents, rather the state’s agriculture industry that represents the majority of water usage.

In hopes of keeping water levels in check, officials from the Lower Basin states and the federal Bureau of Reclamation are close to finalizing the 500+ Plan. The new pact doesn’t change existing water arrangements, but commits to additional conservation actions estimated to keep another 500,000 acre-feet of water that would have been distributed to remain in the river’s reservoirs.

The reduction, according to the Los Angeles Times, would be double what was agreed on in the 2019 drought contingency plan. Changes would begin in 2022 and last until 2026, if necessary.

The primary mechanism for reducing usage would be mustering funds to pay water users such as farmers, tribes and water authorities to further reduce their usage.

Tom Buschatzke, director of the Arizona Department of Water Resources, told the Times the estimated cost over the two years of the plan would be $100 million split between the states. According to ADWR, Arizona would be on the hook for $40 million.

“ADWR has the funds in hand to take action on the 500+ Plan immediately. No legislative appropriations are needed,” Shauna Evans with ADWR told The Center Square. “Legislative leadership has been briefed on the plan.”

Like the Tier 1 shortage, Evans said the 500+ Plan is not going to result in residential water rationing.

“A primary goal of the 500+ Plan is to stabilize Lake Mead at surface levels that preclude the need for draconian cutbacks,” she said.

Officials are working on a memorandum of understanding. Evans said ADWR and the Southern Nevada Water Authority are authorized to sign the deal, while the Central Arizona Project’s board is scheduled to consider the proposal Thursday.

Original Article: Just The News by Cole Lauterbach
Drought has big impacts on California agriculture
As California experiences a second year of drought, with no end in sight, the effects on California’s largest-in-the-nation agricultural industry are profound and perhaps permanent.
State and federal water agencies have cut deliveries to some farmers to zero while others, thanks to water rights dating back more than a century, still have access to water. Farmers are reacting to shortages in three, often intertwined ways — suspending cultivation of some fields or ripping up orchards for lack of water, drilling new wells to tap into diminishing aquifers, and buying water from those who have it.
All three have major economic impacts. They are driving some farmers, particularly small family operations, out of business altogether, accelerating the shift to large-scale agribusiness corporations with the financial resources to cope, changing the kinds of crops that can be profitably grown, and supercharging the semi-secretive market for buying and selling water.
By happenstance, all of these trends are occurring just as the state begins to implement a 2014 law aimed at limiting the amount of water that farmers can pump from underground aquifers.
A couple weeks ago, the state Department of Water Resources announced that it had rejected as inadequate the underground water management plans of four San Joaquin Valley agencies, including the huge Westlands Water District, indicating that the state will be aggressive in enforcing the Sustainable Groundwater Management Act.
“We’re not going to accept a plan to do a plan,” Paul Gosselin, deputy director for the California Department of Water Resources, Sustainable Groundwater Management Office, told the Sacramento Bee. “We’re looking for very concrete, measurable changes to address these deficiencies.”
If anything, however, farmers are drilling more wells to cope with the current drought, the Bee also reported.
“I could work seven days a week if I wanted to,” Fresno County well driller Wesley Harmon told the Bee. “In my area, everybody’s pumping. You can’t blame the farmers. They’re trying to make a living, they’re trying to grow food for everybody.”
The drought is obviously one motive for drilling hundreds of new wells that must go ever-deeper as the water tables drop from overpumping, sometimes leading to the collapse of land above. But another is that farmers know a crackdown is coming and are doing what they can before it arrives.
The Public Policy Institute of California has estimated that full implementation of the groundwater sustainability act could force 750,000 acres of California farmland out of production, or “fallowed.”
The increased activity in California’s water markets, meanwhile, is beginning to draw attention. It’s sometimes more profitable for farmers to sell water than use it to grow crops, with prices surging to over $1,000 an acre-foot (about 326,000 gallons). Environmentalists have complained that when Sacramento Valley rice growers received a major allotment of water from the federal government earlier this year, much of it was sold to water interests to the south while rice acreage continued to decline.

Recently, GV Wire, a San Joaquin Valley news site, published a lengthy article from an affiliate, SJV Water, about multi-million-dollar water sales by major agribusiness operations that left small farmers in Kings County in the lurch and forced them, if they can, to drill wells.

Original Article: Cal Matters by Dan Walters

Snowpack in California’s Sierra Nevada could disappear in just 25 years
As the climate continues to warm, more and more of the snow falling on California’s mountains will be replaced by rain. Already in recent decades, the snow season has shrunk by a month, according to one estimate, while snow levels have moved upward by 1,200 feet, according to another.

Scientists and water managers say that at some point California’s snowpack could simply disappear. This would leave the state without the crucial spring and summer melt-off that fills rivers and streams, nourishes plants and animals, and provides a huge chunk of the water supply. It would also be devastating for the ski industry.

This snowless future, according to a new study led by researchers at Lawrence Berkeley National Laboratory, could arrive in California’s Sierra Nevada in as soon as 25 years. The study is among many to detail the decline in snow, but it’s unique in synthesizing decades of research to nail down exactly when the snow might be gone. And it offers a timeline that is alarmingly short.

“Warming just doesn’t allow for snow to persist,” said Alan Rhoades, a hydroclimate research scientist at Lawrence Berkeley Lab and one of the lead authors of the paper. “Our one major goal was to identify how much time we have to roll out adaption strategies.”

Experts say that preparing for a Sierra with less snow won’t be easy, or cheap, but they agree it must be done.

The new study, published last month in the journal Nature Reviews Earth & Environment, projects that by the late 2040s, half of the area historically covered by snow in the Sierra will likely have “low or no” snow for five straight years, given current warming trends. By the late 2050s, it could be 10 straight years that the same area sees low or no snow.

The paper defines “low snow” as when snowpack — technically, the snow-water equivalent, or how much water the snow releases when it melts — falls within the lower 30th percentile of its historical peak. “No snow” is defined as when snowpack falls to or below the 10th percentile.
“It’s always shocking when I see the numbers,” said Rhoades, who grew up in California. “Snow has always been part of my life, since childhood.”

The study's findings are based on a review of hundreds of scientific papers on snowpack, 18 of which contain quantitative projections. The authors looked not only at the Sierra Nevada but at the Cascades in the Pacific Northwest and parts of the Rockies. In all of these mountain ranges, the study finds that at least half of the historically snow-covered spots will see low or no snow for five straight years by the 2060s, at the current rate of warming. By the 2070s, the same amount of area will see 10 straight years of low or no snow.

The Sierra Nevada is the first to be hit. The California mountains are more vulnerable because storm temperatures, moderated by the Pacific Ocean, are generally warmer. Already, the Sierra has seen a glimpse of its future. In 2015, at the height of a five-year drought, state snow surveyors marched into the mountains on April 1, when snow is historically at its peak, and found mostly dry ground. Their gauges measured the snowpack at 5% of average, the lowest ever recorded in decades of surveying.

This year marked another grim milestone. While the April snowpack was greater, 59% of average, the melt-off from the snow was extraordinarily low because of how much water was absorbed by parched soils amid the current drought or lost to evaporation amid extreme heat. State officials said runoff efficiency, essentially a measure of how much snow makes it to rivers and reservoirs, was 20% compared to the usual 60%.

Original Article: San Francisco Chronicle by Kurtis Alexander

Low-snow winters could impact local, state water reservoir supply

A recent study done by several institutions, including UC Santa Barbara, suggests that low-to-no-snow winters could become a regular occurrence in the Sierra Nevada in the next 35 to 60 years.

Mountain snowpacks have been declining for years as the climate has been changing and this new research says we could see persistent low-to-no-snow seasons in a matter of decades.

Naomi Tague is an ecohydrology professor at UC Santa Barbara and is one of the co-authors of this research. She said changing snowpacks have incredibly cascading impacts on things like the ecology of the land and human water supply.

“Really for decades I’ve been looking at, ‘What’s the implication of earlier snowmelt?’” Tague said.

A significant portion of California’s water has always come from snow. Tague said this research solidifies the need to plan for the future and start managing reservoirs differently.

“The first thing you need to do as a local water manager is think about where you’re getting your water from and how sensitive [it is] going to be from changing snow,” Tague said.
San Luis Obispo County has several local reservoirs which are primarily watershed and reliant on precipitation. They wouldn’t be impacted directly from changing snowpacks.

But according to Courtney Howard, the water resources division manager with County Public Works, low snow could impact SLO County because of the area’s allocation of water from the State Water Project.

Howard said the county uses roughly 5,000 acre feet of water per year that does rely on snowmelt up in Northern California. She said that amount of water is what is needed to run about 10,000 homes in a year. Howard said the county stores even more of that water for later use.

Original Article: KCBX FM Central Coast Public Radio by Rachel Showalter

California Backslides on Water Conservation Amid Drought

A severe drought prompted California Gov. Gavin Newsom last summer to ask the state’s nearly 40 million residents to voluntarily reduce water use by 15% this year. New data released Tuesday shows few people are doing that.

Californians reduced their water use by a measly 3.9% in September, down from 5.1% in August. Overall, California has reduced its water consumption by just 3.6% since July, when Newsom made the request.

“It’s not the news we want to see, for sure,” said E. Joaquin Esquivel, chair of the State Water Resources Control Board.

A megadrought fueled by climate change has enveloped much of the West. As California heads into what traditionally is its wettest time of the year, 80% of the state is classified as in extreme or exceptional drought, the two worst categories.

State officials had hoped Californians’ conservation would continue to improve each month as more people learn about the drought and water agencies promote their conservation efforts. Instead, data showed none of the state’s “hydrologic” regions met the 15% threshold and two in the Central Valley region that account for 10% of the state’s population actually used more water in September than a year ago.

Water agencies say California actually has reduced its consumption because of changes put in place during prior droughts. That means cutting more now is harder.

In Los Angeles, customer demand for water has dropped 30% since 2007. And during the drought that ended in 2017, customer demand fell by 20%, a reduction mostly maintained once that drought ended.

He expanded it to include all of Southern California. Vikki Vargas reports for the NBC4 News on Wednesday, Oct. 20, 2021.

For example, the Los Angeles Department of Water and Power has imposed mandatory irrigation restrictions since 2009 and incentivized customers to replace their lawns with turf. The agency has been hiring more people to enforce water use rules, beefing up patrols that search for leaks and violations.
Beyond those efforts, it will take lots of time and money to see any real savings “given most of the immediate savings potentials have already been accomplished in our service area,” said Terrence McCarthy, the department’s water resources policy manager.

The biggest water savings in September came in two sparsely populated regions in Northern California, where conservation increased by 12.4% or more. The San Francisco Bay area reduced its water use by 7.6%, and it fell 4.2% in the South Coast, which includes Los Angeles and San Diego and accounts for more than half the state’s population.

California’s most recent “water year,” which runs from Oct. 1 to Sept. 30, was the second-driest on record in terms of statewide precipitation. California had its warmest ever statewide average monthly temperatures in October 2020 and June and July 2021, according to the National Oceanic and Atmospheric Administration’s national Centers for Environmental Information.

Original Article: News Nation USA

'It doesn't look good': No rain in sight for San Francisco Bay Area

There’s no rain in sight for the San Francisco Bay Area in the next 10 days, a concerning dry weather spell for a region plagued by drought.

While there are hints of a shift to wetter and cooler conditions toward mid-December, some experts say the forecast for rain doesn't look convincing.

"We look out 10 to 14 days and even beyond that, there doesn't look like there's any substantial rain on the horizon," said Brian Garcia, a meteorologist with the National Weather Service. "This is just me, I really don't think we're going to get any substantial rain the rest of this calendar year."

Local forecaster Jan Null of Golden Gate Weather Services is more hopeful. Null said there's still more than a full month ahead of us to get rain before the end of the year. "I wouldn’t go that far," he said of the potential for no rain in December. "I’d be surprised if we didn't see any rain."

Null noted that in 1997, when he was working for the weather service, models showed high pressure over the region with no rain in the long-term forecast. Then, two days before New Year's Day, the models suggested storm activity. "It was an atmospheric river, the trail all the way to Hawaii," Null said. "In two days time, the models changed greatly. The models are obviously better now."

The weather service looks at a dozen forecast models that help pinpoint the weather as far as two weeks out. It's difficult to predict the weather with accuracy beyond seven days, but these models can provide a suggestion of conditions beyond a week. Garcia said the models are in a pattern where they have been pushing any signal of rain to the end of the forecast period. You run them one day, and they provide a weak signal of rain 14 days out. The next day, the chance for rain is still 14 days out.
San Francisco declares a water shortage emergency and urges residents to cut usage
San Francisco declared a water shortage emergency and is calling for a 10% reduction across its regional system, Mayor London Breed announced Tuesday.
“With California still experiencing devastating drought and the uncertainty around this rainy season, we need to make tough decisions that will ensure that our water source continues to be reliable and dependable for the future,” Breed said.
“Year after year, San Franciscans step up to conserve our most precious resource, resulting in one of the lowest water usage rates in California, and during this critical time, I know that our City will once again meet the call to reduce water use.”
The San Francisco Public Utilities Commission (SFPUC) unanimously approved the emergency measure, which applies to all 2.7 million customers in Alameda, Santa Clara, San Mateo, and San Francisco counties, according to the mayor’s office.
Breed in a news release urged San Franciscans to reduce water usage by taking voluntary steps “such as fixing leaky toilets, installing low-flow fixtures, reducing outdoor irrigation, and receiving water usage audits from SFPUC professionals.”
Gov. Gavin Newsom issued a statewide drought emergency proclamation last month. The proclamation allowed the governor’s office to help fund response to the drought and the delivery of water.
California has had a rough year, suffering through high temperatures and low precipitation. Both are factors, when combined with the existing climate change crisis, that contributed to a devastating wildfire season. The state is experiencing its worst drought since the late 1800s, as measured by both lack of precipitation and high temperatures, the governor’s office said.
The SFPUC declaration allows the agency to access water reserves and resources during an emergency. It also includes a temporary drought surcharge for customers of up to 5% on their bills which will go into effect April 1, 2022. The average residential customer surcharge is estimated at about $6 per month if they make no changes in water use.
“We are in a drought with far-reaching consequences, and it has become clear we all need to do even more to address it,” SFPUC General Manager Dennis Herrera said. “San Franciscans have been doing their part and have some of the lowest water usage in the state. This emergency water shortage declaration will help all of our customers pull together and move in the same direction.”
The mayor noted the average San Franciscan “uses 42 gallons of water per day at home ... less than half of the statewide average of about 90 gallons per person per day.”

Original Article: SF Gate by Amy Graff
VELES WATER WEEKLY REPORT
Water year 2021 — which ran from October 1, 2020, to September 30, 2021 — was California’s second-driest on record, based on statewide precipitation, with the driest being 1924, according to a report from the state’s Department of Water Resources.
Original Article: KESQ News Channel 3 by Stella Chan, CNN

Calif. water officials roll out $100mil in funding for Valley canal fixes
Four key San Joaquin Valley water arteries are set to see an infusion of cash to improve their ability to deliver water to farms and communities, California water officials announced Monday.
The Department of Water Resources announced it would commit to spending $100 million for capacity repairs on three key conveyance systems: the California Aqueduct, the San Luis Canal, the Delta-Mendota Canal, and the Friant-Kern Canal.
Each has seen its water delivery capacity diminish due to land subsidence as Valley communities and farms have relied upon heavy groundwater pumping to keep farm production and communities supplied with water resources.
In 2022, California water regulators will spend $37 million on two State Water Project arteries – the Aqueduct and the San Luis Canal (which is jointly operated by the Department of Water Resources and the U.S. Bureau of Reclamation).
Another $39.2 million will be sent to the Friant Water Authority for its work to improve capacity on the Friant-Kern Canal, particularly in the damaged, 33-mile middle reach in southern Tulare County.
The final $23.8 million will be provided to the San Luis Delta-Mendota Authority for the Delta-Mendota Canal.
“Fixing these canals is an important foundational piece to ensure a reliable and climate resilient water supply for California,” said State Water Resources director Karla Nemeth. “It enables us to move water during very wet conditions, which will be essential to adapting to more extreme weather. Restoring capacity in our existing infrastructure provides a critical link in diversifying water supplies by supporting groundwater replenishment throughout the Central Valley and water recycling projects in Southern California. It’s a prudent investment in our water future.”
Local water officials, who backed a competing measure – Senate Bill 559 – to fund subsidence repairs, celebrated the announcement as a step toward restoring water delivery capacity along the Valley floor.
“This first $100 million isn’t just an investment in water infrastructure, it is a down payment on California’s future,” officials with the San Luis Delta-Mendota Water Authority and Friant Water Authority said in a statement.
Original Article: The SJV Sun by Alex Tavlian
US WATER NEWS

Forecasters warn of a warm, dry winter in Arizona
October came out on the dry side in much of Arizona. That’s not surprising: October’s one of the driest months of the year. But bad news lurks right around the corner — especially for ski bums and snow lovers. The surface of the Eastern Pacific continues to cool more than usual — which usually means a dry winter in Arizona and much of the Southwest. And that means more stress on already falling reservoirs. The drying trend hasn’t quite erased the moisture benefits from Arizona’s record-breaking monsoon — with two or three times the long-term average in many areas of the state. However, most of the state’s in moderate-to-severe drought — with a few pockets of merely “abnormally dry,” according to the U.S. Drought Monitor, updated on Nov. 4. Only northern Navajo County languishes in “extreme drought,” mostly a big chunk of the Navajo and Hopi reservations. We’re in great shape compared to California, Oregon, Idaho, Montana, Utah, Nevada and Colorado — and in a little better shape than New Mexico. But you might wait a bit before buying a season ski pass. Better yet — Firewise the homestead. It looks like another bad wildfire year on the horizon. We’re due for at least a moderate La Niña event based on emerging trends, according to the National Weather Service. This could result in some relief from drought in Northern California and the Pacific Northwest, but will likely mean a warm, dry winter for the Southwest. It’s the same pattern that produced a winter so dry last year that the C.C. Cragin Reservoir never filled up and the giant reservoirs on the Colorado River emptied. Usually, the cooler than normal sea surface temperatures in the Eastern Pacific shift the high-altitude jet stream further north. When that happens, winter storms that would have blanketed Mount Humphries and the White Mountains with snow instead hit the Pacific Northwest and Canada. Forecasters called the impact on the Southwest “a major region of concern this winter.” The drought will likely settle in and strengthen across the Southwest and spread to the Great Plains.
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La Niña contrasts with a sea surface warming dubbed El Niño. That pattern usually results in a wet year in Arizona. The shift between the two conditions is called the El Niño-Southern Oscillation (ENSO). The sea surface temperature extremes are about 80% reliable in predicting large-scale rainfall shifts in Arizona and the Southwest. The current forecast calls for a “moderate” La Niña, with sea surface temperatures between 1.8 and 2.5 degrees F below normal. However, forecasters say the sea surface temperatures may drop even further, which would normally lead to an even more pronounced dry spell this winter in Arizona.

The projected dry winter will likely have a big impact on the Colorado River, which drains seven states — almost all of them covered by the forecast. The result will likely extend and deepen the rationing of Colorado River water next year.

Original Article: Payson Roundup by Peter Aleshire

SCOTUS Decision Impacts State Rights to Aquifer-Derived Water

In a unanimous decision this week, the United Stated Supreme Court denied Mississippi’s claim that the State of Tennessee was stealing Mississippi’s groundwater. The decision represents a first step in settling a years-long dispute related to the Middle Claiborne Aquifer, a reservoir spanning thousands of square miles beneath eight states, including Alabama, Arkansas, Illinois, Kentucky, Louisiana, Mississippi, Missouri, and Tennessee. In the suit, Mississippi complained that Tennessee, through the City of Memphis, pumped so much water from the Middle Claiborne Aquifer that it created a cone of depression extending across state lines, into Mississippi’s territory, causing “billions of gallons of groundwater” to cross the border from Mississippi to Tennessee. This water, Mississippi contended, would have otherwise existed under Mississippi for thousands of years. Mississippi sought over $600M in damages for this “tortious taking” of Mississippi property.

In a case of first impression, the Supreme Court determined that the Middle Claiborne Aquifer is subject to the doctrine of equitable apportionment, which aims to fairly allocate shared water resources between two or more states. The doctrine has traditionally been applied to other forms of interstate water resources such as rivers and streams, but has never before been applied to underground water resources. Noting that the aquifer is a “single hydrological unit,” albeit flowing slower than a traditional river, the Supreme Court determined that equitable apportionment should still apply. The Court did not determine how the Middle Claiborne Aquifer would be equitably apportioned among the states, only that it would be subject to equitable apportionment. This leaves the door open for future litigation over apportionment of the aquifer, which the Court noted would require the participation of all states under which the aquifer flows.

If Mississippi does seek equitable apportionment, the state will face a heavy burden. As the Supreme Court determined last term in Florida v. Georgia, the state seeking apportionment of water resources must demonstrate that the other state’s water use is
causing the complaining state “significant injury.” As the Florida case showed, proving that level of injury will be difficult.

Original Article: JD Supra by Adams and Reese/ Jennifer Bergeron and Rebecca Pritchett

Billions of federal dollars could replace lead pipes. Flint has history to share

On the day we visit Jeneyah McDonald, she has five pallets' worth of bottled water in a corner of her kitchen.
"Oh, that's low," she says.
McDonald buys more every week for cooking, drinking and brushing teeth. She also has a filter on her tap. She checks the light to see it remains green.
"I try and keep a clear glass by the sink so I can fill it up to see with some paper behind it," she says. "I mean, who else is doing that?"
These are, in fact, fewer worries than she once went through. NPR has been speaking with McDonald since the state of Michigan first declared a state of emergency over Flint's water crisis in 2016. Back then, she spent much of her days attaining enough clean water, and said she had joint pain from opening so many bottles.
"It can't consume my life anymore," she says. "It's just part of my budget now."
It's a significant part of her budget. She spends $50 each month on bottled water, another $100 a month on filters for the tap. Her monthly water bill from the city is almost $200 on top of that.

Beyond the continuing financial cost, the pain McDonald feels about what her government did to her family has not gone away, either. She and her husband — born and raised in Flint — have two boys. The younger one has developmental delays, and she wonders whether it had anything to do with lead in the water.
"It's not like we're talking about: We watered our grass, and it all turned brown," she says. "We're talking about: Our children drink this water, and they're damaged. They're hurt for life."

When the city of Flint switched its water supply in 2014, Flint officials failed to properly treat it, allowing the water to corrode the lead from service pipes. Officials insisted the water was safe, though internal emails have shown that they continued to tell people the water was drinkable even when state leaders knew it was poisoned.
Young children are at greatest risk for developing cognitive and other health issues from lead exposure. This month, a federal judge approved a $626 million settlement for victims of the Flint water crisis, where nearly 80% of the money is set aside for children. Almost $100 million later, the city of Flint has replaced more than 90% of the lead pipes that run to people's homes as of September. And the newly signed federal infrastructure legislation could pump $55 billion into clean water efforts, with $15 billion of those funds set aside toward lead pipe remediation nationwide.
Experts who follow the issue expressed excitement that lead pipe issues were being addressed, both in Flint and nationwide. But they also cautioned that the amount of federal funding being offered was only the first of many needed investments.
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And as the experiences of Flint residents prove, it will take more than spending to rebuild trust in the water supply — and in government.

The promise of national spending
Erik Olson is a senior strategic director at the Natural Resources Defense Council. He cites one report that estimates the total need for water infrastructure repairs and upgrades in the United States at $1 trillion.
He says the current amount allocated for revamping water infrastructure is "not sufficient" — but he says the funding is still an extremely important and overdue investment.
"Frankly, for decades we've had sort of a 'let them drink lead' policy at the federal government," Olson says. And many states and local governments simply have not addressed this problem, even though they've known for decades that it's a huge issue." Olson calls this a once-in-a-generation chance to "fix our aging, decrepit water infrastructure and remove these lead pipes ... if we can make the investment now."
Original Article: Nevada Public Radio by Ari Shapiro, Mia Venkat, Noah Caldwell, Patrick Jarenwattananon

Reclamation awards $9.9M to tribes for drought response
Last week, the U.S. Bureau of Reclamation announced that 31 tribes in 12 states will receive $9.9 million for drought response water projects through the Native American Affairs Technical Assistance to Tribes Program.
“Water 2021 was one of the most hydrologically challenging years to date,” said Bureau of Reclamation Deputy Commissioner Camille Calimlim Touton. “As the year unfolded, Reclamation recognized the need to reprogram $100 million dollars to directly deal with the drought and to build resiliency into the future. This funding is a part of that reprogramming and will help facilitate partnerships with Tribes and Tribal organizations as they address severe and continued drought conditions affecting their critical water resources.”
Reclamation's Native American Affairs Technical Assistance Program provides technical assistance to Indian Tribes to develop, manage, and protect their water and related resources. The program has supported a broad range of activities in each year since its inception in the early 1990s.
Given the historic drought conditions this year, the Department of the Interior made several investments to help mitigate effects of the west-wide drought on the ground, including reprogramming significant funding into drought-related programs and projects. This included a significant increase in funding for the Native American Affairs Technical Assistance Program to help Tribal communities throughout the West by increasing water supply sustainability and drought resiliency.
Original Article: Water World

Funding awarded to 10 projects to improve water quality
Ten projects that aim to improve water quality in eastern Kentucky have received funding, officials said.

Gov. Andy Beshear announced Monday that more than $2.5 million would go to one city and six utilities for projects in Floyd, Magoffin and Johnson counties. The funding comes from the Better Kentucky Plan’s $250 million Cleaner Water Program and will provide clean drinking water and improved sewer and water systems, a statement from Beshear's office said.

The funding will go to the city of Martin, the Wheelwright Utilities Commission, Southern Water and Sewer District, Prestonsburg City’s Utilities Commission, Paintsville Utilities Commission, Salyersville Water Works and the Magoffin County Water District.

Original Article: [The Argus Press/Associated Press](https://www.arguspress.com)

**States spend big money in the Texas v. New Mexico Supreme Court fight**

The state governments of Texas and New Mexico have spent more than $30 million combined on legal fees in the fight over Rio Grande water, which is now before the United States Supreme Court.

Invoices and contracts from both attorneys general offices show the states think that water is worth fighting over as Texas has doled out $21.1 million in legal fees to private firms since 2012, while New Mexico reportedly spent at least $9.9 million. And all signs signal the clash will continue, possibly for years.

The dispute over the Rio Grande’s water between the states and the federal government started a decade ago. In a 2011 federal lawsuit, New Mexico alleged the federal government shorted New Mexico its share of Rio Grande water, and gave too much to Texas.

It escalated when Texas filed a new lawsuit against New Mexico in the U.S. Supreme Court three years later alleging New Mexico takes more than its fair share of the water through diversion and groundwater pumping. Texas also accused New Mexico of violating the Rio Grande Compact, an 82-year-old agreement that spells out how Colorado, New Mexico and Texas split the river.

The United States Department of Justice intervened in the case, siding with Texas. (Colorado is also named in the lawsuit, but is not presenting a case, as the issues are between New Mexico and Texas.)

The first part of a virtual trial before Judge Michael Melloy, a senior judge on the 8th U.S. Circuit Court of Appeals, concluded in mid-November. The U.S. Supreme Court appointed Melloy to oversee and determine facts as a trial judge. The trial will continue sometime in the spring for the technical portion of testimony, which will include hearing from different experts regarding hydrological models, rather than less-complex testimony from state and local officials.

The lawsuit, called No. 141 Original Texas v. New Mexico and Colorado, is an extension of decades-long fights over rivers between Texas and New Mexico.
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In 2012 then-Texas Attorney General Greg Abbott signed off on hiring California-based firm Somach Simmons & Dunn. The firm was required to advise and represent multiple state agencies, including the Texas Commission on Environmental Quality, the attorney general’s office, the Texas Rio Grande Commissioner and the Texas Water Development Board. Stuart Somach, an attorney specializing in water and natural resources, has been the lead council for Texas since 2012. The contract originally included a reimbursement to the firm of up to $500,000 but has been amended since to increase the fees and extend the contract. The 12th and most recent amendment increased the state’s maximum obligation to the firm to $21,179,781 through December 2021.

Two divisions of the Texas Office of the Attorney General have also billed a total of $432,625 for their time, travel and overhead expenses.

Original Article: El Paso Matters by Daniel Prokop

SNWA general manager on the Colorado River and preparing for a drier future

Colorado River officials face a math problem. Already, there is not enough water flowing through the Colorado River to meet all of the demands on the watershed, which spans seven U.S. states and crosses into Mexico. And as the climate changes, scientists warn that those who depend on the watershed should plan to receive even less water each year.

This year, federal water officials with the U.S. Bureau of Reclamation declared the first official shortage on the Colorado as the two largest reservoirs for the river — Lake Powell and Lake Mead — dropped to their lowest levels since they were filled in the last century. Lake Mead, which is held back by the Hoover Dam, currently sits at 1,065 feet above sea level — that’s roughly 34 percent full (when Lake Mead is full, the reservoir can be filled to about 1,220 feet).

Already, the Lower Colorado River Basin states that rely on Lake Mead — Arizona, California and Nevada — have been meeting to discuss and find funding for a program that would keep more water in the reservoir in an attempt to stave off further shortages and cuts. That plan would keep about 500,000 acre-feet in the reservoir next year and in 2023. (An acre-foot is the amount of water that can fill one-acre, approximately the size of a football field, to a one-foot depth).

The states came together to develop the plan as part of a consultation clause in an existing 2019 agreement, known as the Drought Contingency Plan. That plan builds off of a set of operating guidelines for the river, approved in 2007 and set to expire in 2026. At the same time that water officials from the seven Colorado River states tackle near-term issues, they are all positioning to negotiate a new set of guidelines. The Colorado River is governed by a series of overlapping laws, contracts, compacts and agreements, including the guidelines. Working within these structures, the states face a major challenge — to reduce use on the river and prepare for the worst-case scenario of a future with far less water to go around. Next month, water officials from across the
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basin are set to meet in Las Vegas to discuss that challenge and other issues facing the river.
John Entsminger, the general manager of the Southern Nevada Water Authority, said he is “cautiously optimistic” that the states will be able to find a way to lower use “because of the structures we’ve already put in place.” He noted that if Lake Mead were to hit 1025 feet above sea level, current agreements would already trigger cuts of about 1.3 million acre-feet of water.
Original Article: The Nevada Independent by Daniel Rothberg

If Colorado River keeps drying up, a century-old agreement could be threatened
The West could be facing a water shortage in the Colorado River that threatens a century-old agreement between states that share the dwindling resource. That possibility once felt far off, but could come earlier than expected. One prominent water and climate scientist is sounding the alarm that the Colorado River system could reach that crossroads in the next five years, possibly triggering an unpredictable chain-reaction of legal wrangling that could lead to some water users being cut off from the river.
Brad Udall, a senior water and climate scientist at Colorado State University’s Colorado Water Institute, sits by the Blue River in Silverthorne, which is filled with the snow and rain that falls in the Rocky Mountains. Water from the Blue River feeds the Colorado River and the tens of millions of people who rely on it across seven western states, 30 Native American tribes and Mexico. The flow of the Colorado River has dropped 20% since the 1900s. About half of that decline is because of climate change, which has fueled a 20-year megadrought across Colorado and the West. That rapid decline could soon cause problems between the states that share this water, Udall said.
Almost 100 years ago, seven states signed the Colorado River Compact, which lays out how much river water each state gets. Udall said the deal contains a fatal flaw: fixed numbers, which were set when climate change wasn’t a concern.
“You can’t have fixed numbers in a declining system,” he said. “That’s going to unduly impose pain on (parties) that are completely undeserving and never signed up for that.” Part of that agreement requires states in the upper Colorado River basin – Colorado, Wyoming, Utah and New Mexico – to keep a certain amount of water in the river to ensure the flow reaches states in the lower basin, including Arizona, California and Nevada. That agreement was amended in the 1940s to ensure river water also reached Mexico.
If the river keeps drying up, that agreement could soon be broken. That could trigger a formal water delivery shortage and what’s known as a “compact call” for the first time. The result could mean upper-basin states, including Colorado, are forced to cut off some water users to make sure there is enough water in the river to flow downstream.
New Mexico’s lifeblood is water, and it’s in big trouble

In New Mexico, there is no more important resource than water. It replenishes the aquifers, lakes, rivers and streams that provide the source for drinking water and agriculture. Trout fishing, waterfowl hunting and cross-country and downhill skiing are some of my favorite outdoor activities. They represent a way of life for me and many others throughout New Mexico. All require a healthy water supply that is fed by mountain snowpack. As a longtime member of Trout Unlimited and Ducks Unlimited, I have come to respect the work they do both in the field and with policy. Both of these organizations have sounded the alarm about the potential devastating impacts of warming waters and the lack of a consistent water supply fed by mountain snowpack and the dried-up prairie pothole regions that serve as the breeding grounds for waterfowl.

I have seen entire cold-water fisheries just dry up. Last fall, my wife and I traveled to a remote area to a stellar brown trout fishery I had fished 10 years earlier, only to find the entire watershed completely dry. Other streams in New Mexico now have such low flows they no longer are able to support trout. In northeastern New Mexico, a small lake near Raton was a favorite place for my family to hunt waterfowl. However, that lake is now dry more often than not, eliminating that as a refuge for waterfowl and impacting local water supplies. It is not unique to waterfowl and trout, though, as even the local ski area is now closed more often than open and other ski areas in the state often suffer a similar fate. Livelihoods and lifestyles of entire communities depend on the ski areas’ existence.

Despite drought, New Mexico project to seed clouds scrapped

A plan to seed the clouds over the mountains of New Mexico to increase snowfall during a historic drought was pulled this week after accusations it could poison people and the environment. Western Weather Consultants (WWC) of Durango, Colorado proposed siting machines near five ski resorts in the Sangre de Cristo Mountains to pump silver iodide vapor into the atmosphere and increase ice crystals and snow. A state agency said WWC this week withdrew its application to deploy the 75-year-old technology that is being widely used to fight extreme drought affecting half the western United States. WWC did not respond to requests for comment.

Cloud seeding seeks to increase precipitation by adding small particles to the clouds that water droplets form around. These turn into snowflakes and raindrops. The WWC plan, which would have been paid for with state funds, got preliminary state approval, according to an October state filing.
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During a public webinar on Monday, officials for WWC, which provides cloud seeding for Vail and Beaver Creek ski resorts in Colorado among other clients, said the technology was an effective way to boost snowfall and studies showed no negative effects on flora and fauna.

The company said then that the five ski areas in the New Mexico target area were not participating in the project.

Original Article: Reuters by Andrew Hay

State program designed to buy private water rights

The state Department of Ecology is offering money for local governments to buy private water rights to make “water banks.”

The program allows counties, cities, towns, water districts, etc. to use Ecology funds to buy private water rights and place them in a government-controlled “bank” using the agency’s trust water right program.

“The goal is to preserve water supplies for local use,” Ecology spokesman Jimmy Norris said.

Not all water bought for the bank would be available for local use.

“To help protect aquatic resources, one-third of each water right bought with this funding must be dedicated (to) instream use,” Norris said.

Ecology officials claim the creation of the banks is to compete against “deep-pocketed water investors” buying water rights in headwater basins.

“As demand for water increases statewide, supplies available for new water uses are increasingly scarce,” Norris said. “As a result, market interest in existing water rights – buying, selling, and banking – has increased dramatically in recent years.”

Under state law, it is easier to transfer water rights downstream than upstream. For that reason, some communities in headwater basins are concerned about the sale of large water rights downstream, Norris said.

The state budgeted $14 million this year to buy private water rights for the program, as well as additional funding to support ongoing policy development to support the program.

The money is available for public entities that have “demonstrated interest in an existing water right, validity of that right for water banking purposes, and sufficient expertise to manage the water bank on an ongoing basis. Additionally, eligibility for grant funding is restricted to rural headwater counties.”

Original Article: The Ritzville Adams County Journal by Bill Stevenson

Arizona’s water supply: Don’t let misinformation affect investment

Back in August, the U.S. Secretary of the Interior declared a long-expected Tier 1 shortage for the Colorado River. This means that the Basin States, including Arizona, will begin to experience cutbacks in 2022.
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Out-of-state investors have begun to question the long-term viability of Arizona’s water supply and our ability to continuing growing. It’s important that anyone in the commercial real estate industry, especially those who speak to prospective investors or tenants from other parts of the country, be able to quickly articulate the facts.

First and foremost, agriculture, primarily in Pinal County, will be the only sector of the economy impacted by Tier 1 cuts under the Drought Contingency Plan (DCP). Farms will receive less Colorado River water from the Central Arizona Project (CAP) as stipulated in this agreement. Cities, homeowners, industrial users and other types of businesses will not be forced to curtail their water use.

The Tier 1 reductions amount to about 30% of CAP’s normal supply, 18% of Arizona’s total Colorado River supply and, importantly, less than 8% of Arizona’s total water use. Over many decades as Arizona has grown, land use has shifted from agriculture to municipal. Houses and businesses use far less water per acre than farming. As a result, Arizona is now using the same amount of water as it was in 1957 despite a more than sevenfold increase in population.

Nevertheless, agriculture remains the largest user of water statewide at 70% of all water but makes up less than 7% of the gross state product (sum of economic value added by all industries in the state). In Metro Phoenix, agriculture uses 30% of the water, while cities use 50%, industrial 9% and tribal 11%, according to Arizona Department of Water Resources 2018 data.

Metro Phoenix is not overly dependent on Colorado River water. The supply comes from four major sources: groundwater (34%), effluent (12%), Salt and Verde rivers (25%) and the CAP/Colorado River (29%), according to Arizona Department of Water Resources’ 2020 data.

Original Article: [AZ Big Media by Suzanne Kinney](https://www.azbigmedia.com/)

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**Lake Michigan’s November surface temperature — hovering around 50 degrees — ‘really warm for this time of year’**

Weeks before the official start of the winter season, Great Lakes surface temperatures are still trending above average, following summer and fall evenings that didn’t cool down — a feature of climate change in Illinois.

“What was kind of jarring was the consistency of the warmer-than-normal conditions,” said state climatologist Trent Ford. “And the lack of cool nights.”

Above-average temperatures warmed the Great Lakes basin through summer. Minnesota and Wisconsin recorded their third-hottest June on record; parts of New York, including Syracuse, experienced one of their hottest summers on record. Lake Huron warmed to nearly 74 degrees in late August — another record-breaker.

Illinois saw an extended period of high minimum temperatures across the state in summer and fall. The average minimum temperature for July through October was the second highest on record statewide, below only 2016, according to National Oceanic and Atmospheric Administration records going back to 1895. The October average minimum
GLOBAL WATER NEWS

Why Water Funds are getting popular globally

Only 1% of all water is actually drinkable, according to the FAO. And yet, we tend to treat water as though it were an infinite resource, with massive quantities literally being flushed down the pipes every day. According to some research, a typical shower lasting around 10 minutes requires around 100 litres of water and about 5 kilowatts of energy to heat the water to body temperature. If we assume we spend one or two of those 10 minutes using body washing products and shampoo, that leaves eight minutes — or 80 litres — of reusable water wasted. This wastefulness gets even worst when considering that vast swathes of the world population are still in need of water. According to 2020 research by UNESCO, worldwide 3.6 billion people — nearly half the global population — live in areas that experience water scarcity at least one month each year. That figure could reach 5.7 billion by 2050.

The hunt for fresh water

The management of water services represents a major challenge for future generations, but it is also an opportunity for investors. “The main thesis underlying an investment in global water equities revolves around the scarcity of fresh water as a commodity. Over recent years, demand for fresh water has increased at more than twice the rate of global population growth, leading to dramatic predictions of future shortfalls between supply and demand,” says Kenneth Lamont, analyst at Morningstar. Additionally, fresh water resources are not evenly distributed across the globe. Even highly developed regions such as California, are not immune to crippling shortages. This is likely to provide an increasing number of opportunities for companies involved in the treatment and distribution of water globally.

The coronavirus pandemic has led to greater attention on environmental issues and water is something investors are increasingly concerned about.

Don't forget about food

The issue of water is closely linked with agriculture too, if you consider its intensive use in food production. According to the Water Footprint Network, producing 1kg of apples requires 822 litres of water. A kilogram of coffee requires 18,900 litres. And, according to this 2018 report, the water footprint of California almonds averaged 10,240 liters per kilogram kernels (or, 12 liters per almond kernel).
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The food issue becomes more complex if we consider the increase in food prices. According to a February report by the FAO, prices had increased for nine consecutive months. The FAO’s Price Index (which tracks monthly changes in the international prices of commonly traded food commodities) recorded an average of 116.0 points in February, 2.4% more than the previous month.

Of course, the environmental pollution factor should not be underestimated when thinking about food. According to the United Nations, livestock accounts for about 14% of global greenhouse gas emissions. Reducing the consumption of meat - with a simultaneous decrease in intensive farming - could therefore make a difference in the slowdown of climate change.

New eating habits such as Veganism or "Flexitarianism" that are taking root seem to go in the right direction. Consumers' preference for healthier and more sustainable sources of nutrition is growing. According to a study by the research firm MarketsandMarkets, the global plant-based meat market, which was worth $4.3 billion in 2020, will grow nearly 15% annually through 2025. “The uptick in demand for vegan and vegetarian products is yet more evidence of the generation wealth flip as millennial consumers shift demand paradigms.” says Elizabeth Stuart, ESG analyst at Morningstar.

The spot price of water.

In December 2020, CME Group started trading futures contracts on the Nasdaq Veles Water Index, which tracks the spot price of water in California. That may be just one local market in one country and one economy, but it's the first instrument to offer a water price proxy, and given its size, exposure to urban and agricultural use cases, and the growing effect of droughts on water availability, California's water market provides a solid illustration of what scarcity and competing demand drivers do to the price of water.

Original Article: Morning Star by Larissa Fernand

Flood warning in Tamil Nadu: Rising water level in Mullaperiyar Dam prompts authorities to release 1682.46 Cusecs of water

The Tamil Nadu State Disaster Management Authority (SDMA) has issued a flood warning after releasing water from the Mullai Periyar dam (Mullaperiyar Dam). A 'third and final warning' was issued by the SDMA after the water level in Mullai Periyar dam reached 142 feet at about 3.55 am on Tuesday. According to the TN SDMA flood alert for Tamil Nadu, 1682.46 Cusecs of water is being released from the Mullai Periyar dam.

Original Article: The Economic Times India

Surplus water released from Uppar dam after 15 years

Farmers and public celebrate with fireworks the release of water

Farmers in Dharapuram and Kundadam areas of Tiruppur district are hoping for a year free of water woes after witnessing the release of surplus water from Uppar dam after a gap of over 15 years.
Officials from the Water Resources Department of the Public Works Department said that the surplus water was released into River Uppar at the rate of around 500 cusecs at around 9.10 p.m. on Saturday. Due to increased inflow of water into Thirumoorthy Dam following heavy rain, water was released via the Parambikulam Main Canal to Uppar dam from November 8. Amid heavy rain in Dharapuram and Kundadam areas along with the inflow from Thirumoorthy dam, the water level rose steadily and it almost touched the full reservoir level of 24 feet on Saturday evening, the officials said. Following this, the officials opened the shutters of the Uppar dam to release the surplus water into the river and issued a flood alert to those living near the river. Prior to this, the surplus water was released from Uppar dam only in December 2005, according to the officials.

Farmers and the public celebrated with fireworks and cheer at the Uppar dam on Saturday evening as the past decade was marked with several protests demanding release of adequate water to the dam.

R. Muruganantham, executive committee member of Tiruppur District Uppar Farmers’ Protection Association, said that the farmers expect the water to be released for irrigating over 6,000 acres of agricultural lands in January next year. “We hope that the water stored in the dam will be sufficient till next year. Due to heavy rain, the groundwater table in these areas have also increased,” he said. Mr. Muruganantham said that farmers could cultivate crops such as cotton, groundnut, maize and paddy and vegetables such as tomatoes and drumsticks on a larger scale with the increased water supply.

The officials said that surplus water through the Parambikulam Main Canal was diverted to Vattamalaikarai Odai reservoir near Vellakoil on Sunday afternoon and the inflow was around 200 cusecs. President of Vattamalaikarai Odai Farmers’ Welfare Association K. Palanisamy on Monday welcomed the move as the reservoir had not received adequate water for nearly two decades. The release of water would benefit around 6,043 acres in Kangeyam Block, he added.

Original Article: The Hindu

Turkey’s groundwater sources shrinking, report says

Groundwater sources in Turkey are burdened and critically decreasing due to faulty agricultural practices, unplanned cities and uncontrolled population, according to a water report.

The report was prepared by the Water Policies Association, using the data of the Environment, Urbanization and Climate Change Ministry.

Evaluating the report for daily Milliyet, Dursun Yildiz, the chairperson of the association, stated that the underground waters that meet the water needs of natural resources and cities are now at their limit.
He noted that the increase in the use of groundwater, which is unconsciously drawn to meet the needs of the human population in cities, as well as the wells drilled for agricultural purposes, was frightening. “Drinking and utility water drawn in the last 27 years is twice as much as our population growth. In other words, while our population has increased by 45 percent in the last 27 years, drinking and utility water withdrawals have increased by 100 percent,” Yıldız noted.

Recently, Turkey has been experiencing the deep effects of drought due to misuse of existing water sources. “In four of the 30 metropolitan cities, drinking and utility water is met entirely from groundwater. Around 75 percent of the drinking and utility water of Antalya and Konya and 60 percent of Izmir is drawn from wells,” he added.

Stressing that the quality of water resources in the country is deteriorating rapidly and widely, Yıldız noted that urgent measures should be taken regarding water management.

Reminding that water resources in Turkey are under the pressure of climate change, rapid population growth, pollution and migration, Yıldız said a water law could be passed in a few months by the Turkish parliament.

Original Article: [The Hurriyet Daily News](http://example.com)

### Around 33% of wells registered groundwater decline of up to 2 metres, says MoS

About 33 per cent of wells registered a decline in groundwater levels in the range of 0 to 2 metres, the Ministry of Jal Shakti said on Monday, noting that a decline of more than four metres has also been observed in a few cities, including Delhi, Chennai, Allahabad, Kanpur and Lucknow.

Responding to a question in Rajya Sabha, Minister of State for Jal Shakti Bishweshwar Tudu said the Central Ground Water Board (CGWB) is periodically monitoring the groundwater levels throughout the country, including Metro cities, on a regional scale, through a network of monitoring wells.

"In order to assess the decline in water level on a long-term basis, the water level data collected by CGWB during November 2020 has been compared with the decadal average (2010-2019)," he said in a written response. The minister further said the analysis of water level data indicated that about 33 per cent of the wells monitored have registered decline in groundwater levels in the range of 0–2 metres. "Decline of more than 4 metres has also been observed in a few pockets of Delhi, Chennai, Indore, Coimbatore, Madurai, Vijayawada, Dehradun, Jaipur, Allahabad, Ghaziabad, Kanpur and Lucknow," he added.

Original Article: [Deccan Herald](http://example.com)
Water And Freedom Uprising

Iran is located at the same historical and geographical place for thousands of years. Its ingenious people have lived in this majority arid and semiarid land for generations. They have established an amazing civilization with a sustainable management of their natural ecosystems exemplary for the world and massively contributed to humanities, arts, architecture, culture and science.

Now, the country is faced with massive water shortage due to the mismanagement, corruption, and water plundering of the ruling Clerical Regime. The Regime officials and some of its foreign and domestic experts trying hard to portray this severity to drought, climate change and global warming instead of notorious Iran’s water mafia, which protesting farmers are calling for its abolishment.

Iran’s water resources have been depleted due to massive over extraction of underground water resources and IRGC affiliated companies building of dams, regardless of their usefulness for the nation, without any environmental considerations, and farming of water intensive crops, which are again under the control of affluent IRGC members, elite clerics or foundations under the supervision of Iran’s Supreme Leader. Farmers hit by water shortages are fleeing their villages to live in shacks and sub-standard settlements on the outskirts of cities.

Iran is a victim of anthropogenic climate change, but also of water resources mismanagement, especially after the anti-monarchial uprising in 1979. Due to this disastrous mix of climate impacts and problematic water resources management decisions, water related challenges do not only threaten lives and livelihoods, but have also led to protests, violence and an increasing risk of destabilization. The recent farmers protests in the Iranian province of Khuzestan in July 2021, recently in Isfahan, and Shahrekord, capitals of Isfahan and Chaharmahal Bakhtiari provinces and other places are only the latest evidence of water related challenges leading to risks of instability, insecurity and conflict in Iran and beyond. Here, one has to mention that such conflict is not certainly between people of involved provinces, but between Iranians as a whole and the entirety of the Iran’s Clerical Regime.

Original Article: Eurasia Review by Khalil Khani

Water profits surge even as leaks and spills wash away public trust

The last of Britain’s three FTSE-listed water companies is due to report its financial results this week, but there’s little doubt any news on the performance of Pennon will be drowned out by a wider crisis in the industry.

Pennon, which owns South West Water and Bournemouth Water, is expected to set out an increase in revenues following a boom in holidaymakers to the West Country over the last year that bolstered water volumes. But beyond the regulated returns a set of troubling, but familiar, issues have welled up for the sector.
VELES WATER WEEKLY REPORT

Water companies have faced calls to be renationalised for years because of ongoing concerns over their financial engineering, tax avoidance, hefty investor payouts and a long list of crimes against the environment. In simple terms, they are regional monopolies whose prices are set by regulator, Ofwat, every five years to make sure water is readily available at an affordable price. This allows well-run water companies to achieve reasonable and fairly predictable financial returns, and has helped to make listed water companies a favourite of utility and infrastructure investors. In return, water companies are expected to be responsible custodians of the beaches, reservoirs and waterways they manage. But this fundamental element of the social contract between water companies and the communities in which they work has been repeatedly soiled by the pollution, leaks and spills that have marked their record in the UK.

Following each moment of reckoning the industry has promised a watershed moment of accountability that will result in a more sustainable future. But each time, as sure as the tides, water companies plunge back into scandal. A recent report, by Surfers Against Sewage, found earlier this month that water companies spilled raw sewage into the coastal bathing waters used by holidaymakers and families over 5,500 times in the last year, a surge of more than 87% from the year before.

Original Article: The Gaudian by Jillian Ambrose

Chennai Reels from Water Woes After Heavy Rains Overnight, Residents in Low-lying Areas Rescued by Boat

Heavy rains through Friday and overnight exposed the poor drainage in Chennai as residents of several low-lying areas had to be rescued on boats manoeuvred by NDRF personnel who had to wade through in chest-deep water. Some localities such as Guduvancherry and Mannivakkam were in knee-deep water overnight. The city had barely recovered from a low-pressure weather system that brought heavy rains between November 18 and 20. With many localities still reeling from disruption, the fresh spell brought a new set of problems for residents. Guduvancherry is a southern Chennai suburb that has witnessed immense residential and commercial development over the last decade. Similar to fast-paced construction witnessed by Velachery, a locality of Chennai, Guduvancherry appears to be following a similar trajectory. Varadarajapuram, another low-lying new settlement off Chennai’s southwest, witnessed NDRF boats plying along the roads to remove stuck residents. Overnight rains and heavy showers boxed people into their homes, cutting off access to and supply of essentials. The situation is similar across localities such as Mudichur, Madipakkam, pockets off Tambaram and Selaiyur, and areas in Chengalpattu and Kanchipuram districts. If the
waterlogging along the suburbs of Chennai is severe, the scenario in its central localities is not any dissimilar.

In T Nagar and KK Nagar, which are densely populated localities where middle-class families and those slightly well-off, jostle for space, flooded roads and parks have brought life to a screeching halt. Across many locations in Chennai, sewage water is flowing onto roads and homes. In some localities in KK Nagar, residents have complained of sewage water contaminating piped water resources, prompting residents to be more careful about water used for cooking.

Chennai and other north Tamil Nadu districts will continue to be on ‘red alert’ till November 29, after which the IMD has predicted normal weather for the city. On Saturday morning, Avadi in Chennai recorded over 20 cm rainfall through Friday, while localities such as Mahabalipuram off south Chennai received 18 cm, indicating a strong pounding for the south, southwestern regions off Chennai.

Original Article: News 18 by Poornima Murali

Chennai wastes nearly 2 years’ water supply in just 20 days

The amount of water let into the sea over the past three weeks could have catered to Chennai’s water needs for one-and-a-half years. According to official sources, over 20 thousand million cubic ft (TMC) of water was released from five major reservoirs in the city (which supply drinking water) since November 6. With Chennai’s water requirement being 1 TMC per month, about 20 months’ supply was wasted.

Even on Thursday, as much as 2,000 cusecs of water continued to be released from the Chembarambakkam and Red Hills reservoirs. Public Works Department officials said they would wait for the rains to subside before beginning desilting work. Currently, water is being released in phases to avoid inundation in the low-lying areas, officials said.

However, experts pointed out that no lessons were learnt after the 2015 deluge, when drinking water that would suffice for 25 years was wasted. “After facing the worst drought in 2019, the reservoirs were neither desilted nor deepened even when they were bone dry. Moreover, the run-off (the amount of rainwater wasted) is 80 per cent,” said S Janakarajan, water conservation expert. Chennai has nearly 4,200 small waterbodies and an average annual rainfall of 140 cm.

A retired professor from the State Water Resources department, P Ramachandran said, with such heavy rainfall, if water is stored, there would be no need for desalination plants to meet drinking water needs.

Original Article: The New Indian Express by KV Navya

New breakthrough in surface-based groundwater measurement

Based on recent breakthroughs in instruments and data modeling, researchers from the Department of Geoscience and the Department of Electrical and Computer Engineering
at Aarhus University have collaborated to develop an effective technology to measure groundwater accurately from the surface.

The new technology sends very much cleaner signals than have so far been possible using NMR-based (nuclear magnetic resonance) measurements, and this enables the researchers to make a detailed map of the hydrogeological and geological structure of the subsurface, even in inaccessible areas.

The research has just been published in Geophysical Research Letters.

"Using this new technology, NMR measurements are now a cheap, fast and, above all, very accurate tool for mapping and characterizing groundwater systems. There are problems with groundwater all over the world, and the really good news is that, using this tool, we can better map the groundwater and thereby take better care of it," says Assistant Professor Denys Grombacher from the Department of Geoscience.

Groundwater is a critical source of freshwater for many billions of people, but climate change, pollution and over-exploitation are making it more difficult to find suitable areas as a groundwater source.

NMR measurements are the only technique available today that enable direct non-invasive measurements of the water content and pore properties of the soil.

NMR is short for Nuclear Magnetic Resonance and in short it means that we influence the hydrogen atoms in water molecules in the subsurface using a man-made magnetic field on the surface.

Hydrogen atoms have a nuclear spin which, in principle, aligns with the magnetic field of the earth, either with or against the field—just like small magnets. A pulse from the artificially created magnetic field changes the spin direction of the hydrogen atoms, and when the pulse fades out, the atoms return to the direction they had before. This realignment emits an electromagnetic field that can be measured.

NMR measurements have a disadvantage, however, in that background noise from the electricity grid, for example, can interfere with the signals, and this can make it exceedingly difficult to measure the very weak electromagnetic field in the realignment. Roughly speaking, the researchers are looking for a whisper-like voice among the audience at a Motörhead rock concert, and this is where the new technologies in the field of data transmission and modeling come into play.

"We can sort of direct the microphone towards the specific sound source we want to hear, and through a number of identical pulses almost 'force' a clear signal from the hydrogen atoms in the soil. The computer can piece together the signal we receive to an accurate reproduction of the original signal using data modeling," says Associate Professor Jakob Juul Larsen from the Department of Electrical and Computer Engineering.

The research team sees the new technology as a breakthrough in groundwater modeling, and as a quick, stable, reliable and inexpensive alternative for mapping groundwater throughout the world.
As floods worsen, Uganda moves to protect its vanishing wetlands

Until recently, truck drivers who poured fill into wetlands near Uganda's capital, to illegally create new land for building or agricultural expansion, rarely met any resistance. But since Barirega Akankwasah became executive director of the National Environment Management Authority (NEMA) in September, some of those drivers have ended up in jail.

"We have a plea of guilty, hence we shall soon have a conviction. Another three are in coolers" awaiting trial, he said, using a slang word for police detention.

"This will deter others from destroying our valued environment," Akankwasah told the Thomson Reuters Foundation in an interview.

In September, the new NEMA head indefinitely suspended all consideration of new projects in wetlands, in a push to better protect areas seen as key to curbing worsening flooding in Uganda.

Over the last two decades, Uganda has lost about 40% of its wetlands, many of them filled in as the country's rising population looks for new farmland or to create space for industrial expansion, according to the environment ministry.

A report on the country's environment and natural resources, presented to Parliament in September, indicated that the area of Uganda covered in wetlands has fallen from 16% in 1994 to 9% in 2016, the last year losses were estimated.

The report, ordered by the country's cabinet in 2019, warned that at the current pace of losses the country would have no wetlands by 2040.

As floods worsen in Uganda, the country’s leaders are now pushing back, saying protecting such areas is crucial to controlling flooding, especially in urban areas like Kampala, the capital.

Better protecting disappearing natural areas is also key to meeting a global goal to safeguard 30% of the world's land and seas by 2030 to stem losses of biodiversity, curb climate change and protect natural systems that provide clean air and water.

Original Article: Reuters by Christopher Bendana

United States launches $45.5 million five-year project to improve Water, Sanitation, and Hygiene in Northern Ghana

The United States is committing $45.5 million over the next five years to improve water, sanitation, and hygiene (WASH) services in Ghana. U.S. Ambassador Stephanie S. Sullivan joined representatives of the Ministry of Sanitation and Water Resources to launch the project in Tamale today. The U.S. Government, through USAID, will work together with the Government of Ghana (GOG) to enhance governance and planning for
WASH projects, strengthen sustainable financing, improve private sector engagement, and accelerate the adoption of healthy hygiene practices. The project will focus on six regions in northern Ghana: Upper East, Upper West, North-East, Northern, Savannah, and Oti Regions.

Ambassador Sullivan reiterated the United States’ commitment to supporting Ghana to achieve UN Sustainable Development Goal Six to Ensure availability and sustainable management of water and sanitation for all by 2030. “Communities need clean water and healthy sanitation. Together we will continue to support individuals, communities, districts, and regions to achieve universal access to clean water and basic sanitation and hygiene services. This is an essential action during the COVID-19 pandemic, and beyond, to improve the health of Ghanaians and their economy.”

This new initiative aims to provide 300,000 people with access to basic sanitation services and provide 250,000 people with access to basic drinking water services. Over the next five years, USAID and partners will work with the Minister of Sanitation and Water Resources, District Assemblies, environmental health officers, community leaders, and the private sector to strengthen the governance financing of WASH services. This new effort will ultimately empower citizens to adopt sustainable, long-term WASH behavior change to improve their health and economic opportunities.

The project builds on over a decade of partnership between the U.S. Government and the Government of Ghana on water, sanitation, and hygiene and overall healthcare delivery systems. Over the past five years, through the WASH for Health project, 150,000 people gained access to basic drinking water services and 200,000 gained access to improved sanitation facilities. WASH for Health built and rehabilitated 200 water boreholes, providing an essential source of water to hospitals, clinics, and schools. In addition, five, small-town water systems are providing clean water to 50,000 people.

Also through WASH for Health, a ground-breaking partnership with the private sector led to the development of the Digni-loo, a more durable latrine which is 80% cheaper than similar latrines. The model is now being used in countries around the globe.

While in Tamale, in collaboration with Gushiegu District, Ambassador Stephanie S. Sullivan attended the launch of Ghana’s first ever decentralized ambulance dispatch center. Ambassador Sullivan was joined by the Chief Executive of the National Ambulance Service, Professor Ahmed Nuhu Zacharia; and Robert Waaja Dawuni, Municipal Chief Executive, Gushiegu, to commission Ghana’s first district Emergency Dispatch Center (EDC), in Gushiegu, Northern Region. The Emergency Dispatch Center is a key component of a $5.1 million U.S.-supported health system strengthening project-Developing Acute Care and Emergency Referral System (ACERS), which also raises awareness amongst community members to seek emergency services, and supports health workers to improve service delivery. The project has a specific focus on mothers and newborns, addressing bottlenecks in accessing safe and quality healthcare services at the time of most need.

Original Article: U.S Embassy in Ghana
Note the attachment is not an inducement to trade and Veles Water does not give advice on investments.