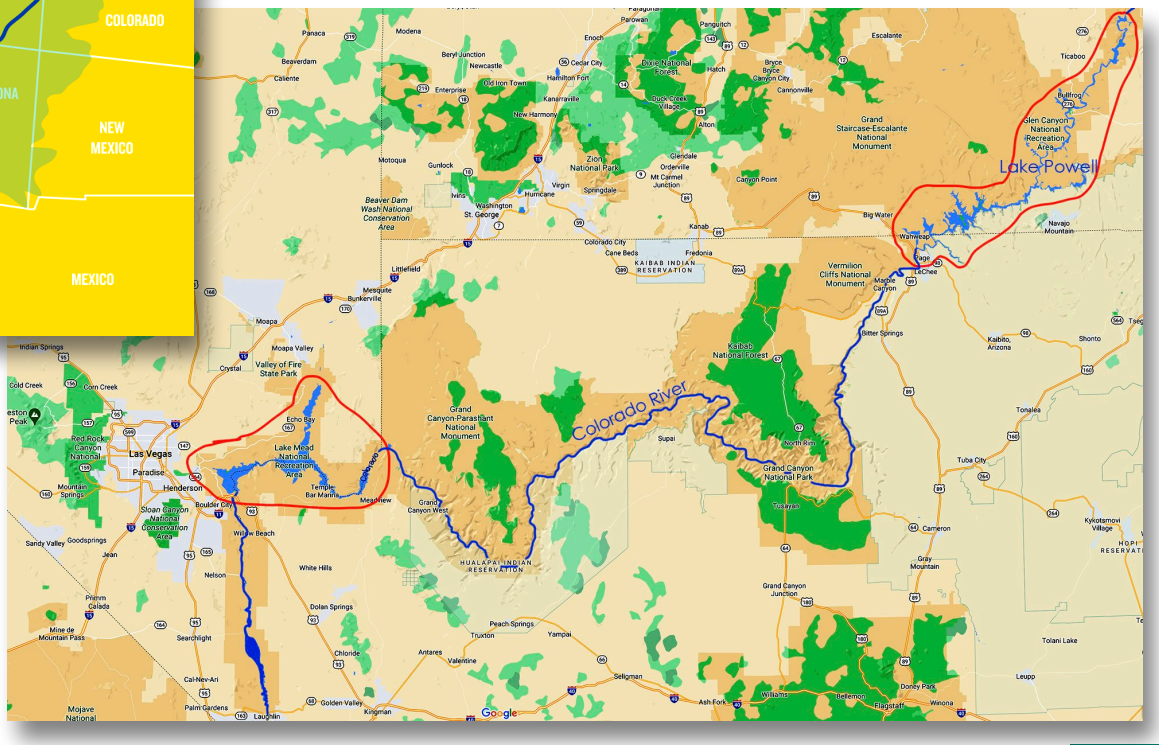
Global Warming
Pro Publica, via AlterNet
August 28, 2021

40 million people rely on the Colorado River -- and it's drying up fast

Lake Powell, near Page and Glen Canyon dam - Photo by Silvia Fang on Unsplash

On a 110-degree day (# 43°C+) several years ago, surrounded by piles of sand and rock in the desert outside of Las Vegas, I stepped into a yellow cage large enough to fit three standing adults and was lowered 600 feet through a black hole into the ground. There, at the bottom, amid pooling water and dripping rock, was an enormous machine driving a cone-shaped drill bit into the earth. The machine was carving a cavernous, 3-mile tunnel beneath the bottom of the nation's largest freshwater reservoir, Lake Mead.

Lake Mead, a reservoir formed by the construction of the Hoover Dam in the 1930s, is one of the most important pieces of infrastructure on the Colorado River, supplying fresh water to Nevada, California, Arizona and Mexico. The reservoir hasn't been full since 1983. In 2000, it began a steady decline caused by epochal drought. On my visit in 2015, the lake was just about 40% full. A chalky ring on the surrounding cliffs marked where the waterline once reached, like the residue on an empty bathtub. The tunnel far below represented Nevada's latest salvo in a simmering water war: the construction of a $1.4 billion drainage hole to ensure that if the lake ever ran dry, Las Vegas could get the very last drop.



For years, experts in the American West have predicted that, unless the steady overuse of water was brought under control, the Colorado River would no longer be able to support all of the 40 million people who depend on it.

Over the past two decades, Western states took incremental steps to save water, signed agreements to share what was left and then, like Las Vegas, did what they could to protect themselves. But they believed the tipping point was still a long way off.

Like the record-breaking heat waves and the ceaseless mega-fires, the decline of the Colorado River has been faster than expected. This year, even though rainfall and snowpack high up in the Rocky Mountains were at near-normal levels, the parched soils and plants stricken by intense heat absorbed much of the water, and inflows to Lake Powell were around one-fourth of their usual amount. The Colorado's flow has already declined by nearly 20%, on average, from its flow throughout the 1900s, and if the current rate of warming continues, the loss could well be 50% by the end of this century.

Earlier this month, federal officials declared an emergency water shortage on the Colorado River for the first time. The shortage declaration forces reductions in water deliveries to specific states, beginning with the abrupt cutoff of nearly one-fifth of Arizona's supply from the river, and modest cuts for Nevada and Mexico, with more negotiations and cuts to follow.

But it also sounded an alarm: one of the country's most important sources of fresh water is in peril, another victim of the accelerating climate crisis.

Americans are about to face all sorts of difficult choices about how and where to live as the climate continues to heat up. States will be forced to choose which coastlines to abandon as sea levels rise, which wildfire-prone suburbs to retreat from and which small towns cannot afford new infrastructure to protect against floods or heat. What to do in the parts of the country that are losing their essential supply of water may turn out to be the first among those choices.

The Colorado River's enormous significance extends well beyond the American West. In addition to providing water for the people of seven states, 29 federally recognized tribes and northern Mexico, its water is used to grow everything from the carrots stacked on supermarket shelves in New Jersey to the beef in a hamburger served at a Massachusetts diner. The power generated by its two biggest dams — the Hoover and Glen Canyon — is marketed across an electricity grid that reaches from Arizona to Wyoming.

The formal declaration of the water crisis arrived days after the Census Bureau released numbers showing that, even as the drought worsened over recent decades, hundreds of thousands more people have moved to the regions that depend on the Colorado.

Phoenix expanded more over the past 10 years than any other large American city, while smaller urban areas across Arizona, Nevada, Utah and California each ranked among the fastest-growing places in the country. The river's water supports roughly 15 million more people today than it did when Bill Clinton was elected president in 1992.

These statistics suggest that the climate crisis and explosive development in the West are on a collision course. And it raises the question: What happens next?

Since about 70% of water delivered from the Colorado River goes to growing crops, not to people in cities, the next step will likely be to demand large-scale reductions for farmers and ranchers across millions of acres of land, forcing wrenching choices about which crops to grow and for whom — an

omen that many of America's food-generating regions might ultimately have to shift someplace else as the climate warms.

California, so far shielded from major cuts, has already agreed to reductions that will take effect if the drought worsens. But it may be asked to do more. Its enormous share of the river, which it uses to irrigate crops across the Imperial Valley and for Los Angeles and other cities, will be in the crosshairs when negotiations over a diminished Colorado begin again.

The Imperial Irrigation District there is the largest single water rights holder from the entire basin and has been especially resistant to compromise over the river. It did not sign the drought contingency plan laying out cuts that other big players on the Colorado system agreed to in 2019.

New Mexico, Colorado, Utah and Wyoming — states in the river's Upper Basin — will most likely also face pressure to use less water. Should that happen, places like Utah that hoped to one day support faster development and economic growth with their share of the river may have to surrender their ambition.

The negotiations that led to the region being even minimally prepared for this latest shortage were agonizing, but they were merely a warm-up for the pain-inflicting cuts and sacrifices that almost certainly will be required if the water shortages persist over the coming decades. The region's leaders, for all their efforts to compromise, have long avoided these more difficult conversations. One way or another, farms will have to surrender their water, and cities will have to live with less of it.

Time has run out for other options.

Western states arrived at this crucible in large part because of their own doing. The original multistate compact that governs the use of the Colorado, which was signed in 1922, was exuberantly optimistic: The states agreed to divide up an estimated total amount of water that turned out to be much more than what would actually flow. Nevertheless, with the building of the Hoover Dam to collect and store river water, and the development of the Colorado's plumbing system of canals and pipelines to deliver it, the West was able to open a savings account to fund its extraordinary economic growth.

Over the years since, those states have overdrawn the river's average deposits. It should be no surprise that even without the pressures of climate change, such a plan would lead to bankruptcy.

Making a bad situation worse, leaders in Western states have allowed wasteful practices to continue that add to the material threat facing the region. A majority of the water used by farms — and thus much of the river — goes to growing nonessential crops like alfalfa and other grasses that feed cattle for meat production. Much of those grasses are also exported to feed animals in the Middle East and Asia.

Short of regulating which types of crops are allowed, which state authorities may not even have the authority to do, it may fall to consumers to drive change.

Water usage data suggests that if Americans avoid meat one day each week they could save an amount of water equivalent to the entire flow of the Colorado each year, more than enough water to alleviate the region's shortages.

Water is also being wasted because of flaws in the laws. The rights to take water from the river are generally distributed — like deeds to property — based on seniority. It is very difficult to take rights away from existing stakeholders, whether cities or individual ranchers, so long as they use the water allocated to them. That system creates a perverse incentive: Across the basin, ranchers often take their maximum allocation each year, even if just to spill it on the ground, for fear that, if they don't,

they could lose the right to take that water in the future. Changes in the laws that remove the threat of penalties for not exercising water rights, or that expand rewards for ranchers who conserve water, could be an easy remedy.

A breathtaking amount of the water from the Colorado — about 10% of the river's recent total flow — simply evaporates off the sprawling surfaces of large reservoirs as they bake in the sun. Last year, evaporative losses from Lake Mead and Lake Powell alone added up to almost a million acre feet of water — or nearly twice what Arizona will be forced to give up now as a result of this month's shortage declaration. These losses are increasing as the climate warms. Yet federal officials have so far discounted technological fixes — like covering the water surface to reduce the losses — and they continue to maintain both reservoirs, even though both of them are only around a third full. If the two were combined, some experts argue, much of those losses could be avoided.

For all the hard-won progress made at the negotiating table, it remains to be seen whether the stakeholders can tackle the looming challenges that come next. Over the years, Western states and tribes have agreed on voluntary cuts, which defused much of the political chaos that would otherwise have resulted from this month's shortage declaration, but they remain disparate and self-interested parties hoping they can miraculously agree on a way to manage the river without truly changing their ways.

For all their wishful thinking, climate science suggests there is no future in the region that does not include serious disruptions to its economy, growth trajectory and perhaps even quality of life.

The uncomfortable truth is that difficult and unpopular decisions are now unavoidable.

Prohibiting some water uses as unacceptable — long eschewed as antithetical to personal freedoms and the rules of capitalism — is now what's needed most.

The laws that determine who gets water in the West, and how much of it, are based on the principle of "beneficial use" — generally the idea that resources should further economic advancement. But whose economic advancement? Do we support the farmers in Arizona who grow alfalfa to feed cows in the United Arab Emirates? Or do we ensure the survival of the Colorado River, which supports some 8% of the nation's GDP?

Earlier this month, the Bureau of Reclamation released lesser-noticed projections for water levels, and they are sobering. The figures include an estimate for what the bureau calls "minimum probable in flow" — or the low end of expectations.

Water levels in Lake Mead could drop by another 40 vertical feet (# 12 m) by the middle 2023, ultimately reaching just 1,026 feet (# 316 m) above sea level — an elevation that further threatens Lake Mead's hydroelectric power generation for about 1.3 million people in Arizona, California and Nevada.

At 895 feet (# 273 m), the reservoir would become what's called a "dead pool"; water would no longer be able to flow downstream.

The bureau's projections mean we are close to uncharted territory. The current shortage agreement, negotiated between the states in 2007, only addresses shortages down to a lake elevation of 1,025 feet (# 312,5 m).

After that, the rules become murky, and there is greater potential for fraught legal conflicts.

Northern states in the region, for example, are likely to ask why the vast evaporation losses from Lake Mead, which stores water for the southern states, have never been counted as a part of the water those southern states use.

Fantastical and expensive solutions that have previously been dismissed by the federal government — like the desalinization of seawater, towing icebergs from the Arctic or pumping water from the Mississippi River through a pipeline — are likely to be seriously considered. None of this, however, will be enough to solve the problem unless it's accompanied by serious efforts to lower carbon dioxide emissions, which are ultimately responsible for driving changes to the climate.

Meanwhile, population growth in Arizona and elsewhere in the basin is likely to continue, at least for now, because short-term fixes so far have obscured the seriousness of the risks to the region.

Water is still cheap, thanks to the federal subsidies for all those dams and canals that make it seem plentiful. The myth persists that technology can always outrun nature, that the American West holds endless possibility. It may be the region's undoing.

As the author Wallace Stegner once wrote:

> "One cannot be pessimistic about the West. This is the native home of hope."

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