Lake Mead's 'bathtub ring' (p169)
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THE COLORADO RIVER CRISIS

In the arid Southwest, water is everything. How are environmental challenges impacting the region's long-term prospects?

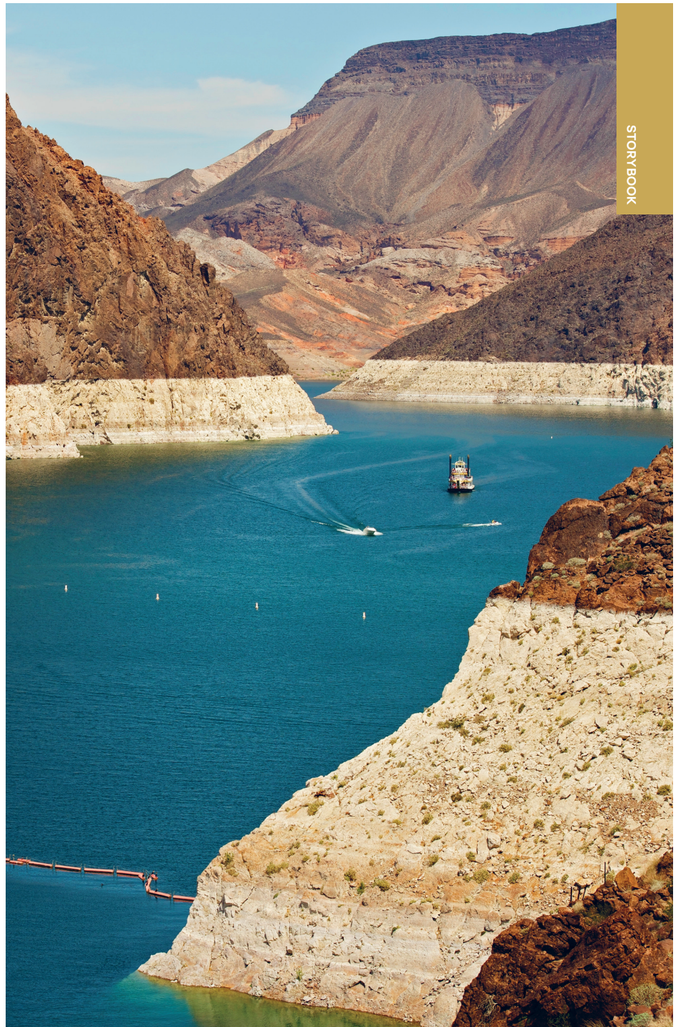
IN 2022, 100 years after the historic Colorado River compact – an agreement that divvied up the water-use rights between the seven states that depend on it – the water levels at the Lake Mead and Lake Powell reservoirs fell to record lows. Things looked so ominous that some experts were predicting that the river would cease to flow entirely in the coming decade. A historically wet winter in 2023 provided some relief, but the underlying problems of water availability in an arid climate, coupled with a growing population, remain.

The Original River Compact

For as long as there have been people living in the Southwest, the Colorado River has provided a lifeline. But the waterway is not without its challenges: it's unnavigable and inaccessible in many stretches, and it was as much a natural barrier that impeded travel as it was a source of irrigation for crops. Annual floods were violent and unpredictable, and downstream, the silt-laden waters changed course repeatedly and unpredictably over the centuries.

The Spanish laid claim to the watershed in the 1500s, but up through the mid-1800s, the Colorado remained largely uncharted. As Manifest Destiny spurred the United States westward and the population in the Gulf of California and the Rocky Mountain states began to swell, however, the management of the single largest water source in the West had to change. In 1922, the government drew up a compact that allocated water rights to the seven states that depend on it: Colorado, Wyoming, Utah, New Mexico, Arizona, Nevada and California. The first four are known as the Upper Basin states, the last three are known as the Lower Basin states. Each basin was granted the rights to 7.5 million acre feet of water per year, equaling a total of 15 million acre feet. In 1944, a treaty with Mexico allocated the country 1.5 million acre feet of water, bringing the total amount of water drawn annually to 16.5 million acre feet. According to a 1908 Supreme Court decision, Native American tribes were supposed to be allocated water rights as well, but historically, these have been completely disregarded.

Unfortunately, because of unusually wet conditions in the years preceding the compact, the original figure of 15 million acre



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Formed by the Hoover Dam, Lake Mead in Nevada, U.S.A. Lake Mead is the Largest Reservoir in the United States.
Lake Mead Bathtub Ring
Virrage Images

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feet was based on the calculation that the Colorado averaged around 18 million acre feet of water per year. In reality, scientists have since determined that the average annual flow of the river is closer to 13 million acre feet. This means that every year, more water is being taken out of the system than put back in.

This simple arithmetic, combined with a historic 20-year megadrought that is gripping the region, has led to what is being described as an environmental crisis in slow motion: unless drastic cuts are made to water usage, eventually, the river will stop flowing before it reaches the Lower Basin.

The Dams

Over the past 75 years, the Southwest has been one of the fastest-growing regions in the United States. City and state planners have thus long been faced with a core problem: how do you provide water and power for 40 million people living in a desert?

Early on, damming the river seemed like the obvious solution. Dams control flooding, they create reservoirs that can be drawn on in periods of drought, and they can be used to generate hydroelectric power. Hoover Dam, outside Las Vegas, was the first big dam to be built along the Colorado in 1935, and formed Lake Mead, the river's first massive reservoir. As the regional population continued to increase, however, dams continued to be built; the controversial Glen Canyon Dam, and its corresponding Lake Powell reservoir, was completed upriver near the Arizona–Utah state line in 1966.

While these dams continue to serve the region, they are far from perfect. For instance, the impacts on the Grand Canyon following the construction of the Glen Canyon Dam were both immediate and severe. Before the dam was built, the river would warm up to 80°F (27°C) in the summer and be thick with sediment. Flows annually fluctuated between a few hundred to 100,000cfs (cubic feet per second). These high volumes would move boulders downriver, scour out vegetation, and rebuild sandbars and beaches.

Now, the dam releases a predictable flow between 8000cfs and 25,000cfs at a near constant temperature of 59°F (15°C). Since Lake Powell acts as a settling pond, the Colorado below it is clear after dumping 380,000 tons of sediment per year into Glen Canyon.

These even, sediment-free flows ate away at the beaches and sandbars along the river corridor, damaging archaeological sites and destroying the backwaters and eddies that many fish call home. Without the massive floods to scour the remaining sandbanks, highly invasive plant species like tamarisk established strongholds along the Colorado from where they can send billions of wind-born seeds up fragile side canyons in search of sensitive riparian areas. Algal growth skyrocketed due to sunlight penetrating the now-clear water; the algae soak up phosphorus, a critical nutrient that otherwise fuels aquatic diversity.

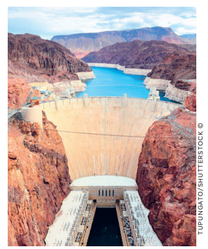
In 2012 and again in 2018, the Bureau of Reclamation adopted guidelines requiring annual 'high-flow releases' to simulate spring runoff patterns, when the river swells because of snowmelt. Previous experimental floods showed that pushing 200,000 metric tons of Paria River silt downriver dramatically rebuilds beaches during multiday flows above 35,000cfs.

Environmentalists have long opposed dams like the Glen Canyon, arguing that rivers serve their ecosystems best when allowed to flow free. But some of their more radical proposals – Edward Abby's novel The Monkey Wrench Gang, in which four environmentalists conspire to blow up the Glen Canyon Dam, is the most famous – are no longer considered to be so outrageous. Taken together, Lake Mead and Lake Powell were supposed to store 50.4 million acre feet of water when full. However, at the end of 2022, they held less than 13 million acre feet combined – about 25% of capacity. As the water levels in both reservoirs continue to decline, serious consideration has been given as to whether or not it would be better to decommission the Glen Canyon Dam entirely, and drain Lake Powell in order to keep the river flowing.

The Law of the River

As the climate in the Southwest continues to warm, and the amount of snowpack in the Rockies trends downwards, there remains only one real solution to the current crisis: reduce consumption. Considering that roughly one-half of all the water that flows out of the spigots in Phoenix, Los Angeles, San Diego and Denver comes directly from the Colorado River watershed (in Vegas it's upwards of 90%), and that the population in these areas is continuing to grow rapidly, this may seem like a tall order.

And sure enough, for years, agreement between the seven states on how to make cuts failed to come to fruition. One of the biggest stumbling blocks is known as the Law of the River – basically, who has the most senior water rights. Consider this: 80% of the Colorado's water is used by agriculture, and of that, most goes to California's Imperial Valley by way of the 82-mile-long All American Canal. Because southern California uses the most water, people naturally believed that the Imperial Valley, which uses 80% of California's water, should have to make the most drastic cuts. After all, what sort of argument can be made for growing water-intensive crops like cotton and alfalfa in a desert? And why should 180,000 farmers get more water than all of Arizona and Nevada combined?



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Hoover Dam (p168)

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However, the question of who has to cut what is considerably more complicated. Because the Imperial Valley was settled long before other areas along the river, legally, it gets first dibs on the river water. Furthermore, the Imperial Valley is an agricultural powerhouse: when farmland in the rest of the nation is on winter vacation, 66% of all the carrots, lettuce and other greens you find at the supermarket are being grown here in the always sunny desert. Cut too much water here, and the entire US could face consequences.

Nevertheless, if the Imperial Valley is the first in line according to the law, it is among the last in line on the river's flow to the sea. If Lake Mead does go dry, it will be the hardest hit by the crisis.

The Future

In June of 2022, the federal government upped the pressure on the seven Colorado River states to cut at least 2 to 4 million acre feet of water use (13.3% to 26.6%) per year in order to raise the water levels in the Lake Mead and Lake Powell reservoirs. When the states failed to come up with a plan, the US Interior Department declared they would unilaterally impose restrictions on everyone. California, Arizona and Nevada pushed back, and eventually, in May of 2023, a temporary agreement was finally reached: the three Lower Basin states would cut 3 million acre feet through 2026, or 1 million acre feet per year, in return for $1.2 billion in payments from the federal government.

In the long term, the cuts are far below the Fed's initial demands, and still not enough to rectify the imbalance in the original compact. Importantly, however, they are voluntary: a critical first step in establishing the framework for a permanent agreement when the deal expires in 2026.

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Hoover Dam in United States. Hydroelectric power station on the border of Arizona and Nevada.
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