The Water Report

Water Rights, Water Quality & Water Solutions in the West

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AN ANTIFRAGILE APPROACH TO WATER SCARCITY

by Gary M. Gold, Best, Best & Krieger (Washington D.C.)

This article is dedicated to the mission-driven and critically important federal workforce at the Bureau of Reclamation.

Introduction

Nassim Nicholas Taleb writes about the concept of antifragility, which is defined in simple terms as a system that increases capabilities and thrives as a result of stressors or sources of harm. Antifragility is distinct from resilience: whereas a resilient system resists stressors and stays the same, an antifragile system gets better through being stressed.

Communities throughout the western United States face increasing water demands and a new hydrologic reality that impacts all sectors. As a result, conflict over water scarcity will undoubtedly increase in frequency and intensity. The public would benefit if more leaders in the water industry aimed to address water scarcity challenges with an approach based on the concept of antifragility.

All too often, a community facing water scarcity will take a narrow approach centered on individual resilience. The individualistic approach—which stifles innovation and merely postpones inevitable conflict—is short-sighted because it misses opportunities to build enduring partnerships that allow an entire water basin to grow stronger. To address the new hydrologic reality, it is imperative that there be a shift from a focus on building short-term resilience to one of long-term antifragility.

WATER RESILIENCE VS. ANTIFRAGILITY

In many instances, communities aim to address water scarcity challenges by building their own "water resilience." They pursue projects to tap into new supplies, improve the efficiency of existing resources, and protect their water rights in legal proceedings. While all of these actions are important, the practical realities of water—particularly the interconnectedness of water resources—will always render these efforts ineffective in the long term if they are not coupled with a focus on regional partnerships. Put simply, building water resilience individually is short-sighted. Such an approach ignores opportunities to develop and strengthen the basin-wide partnerships necessary to address the inevitable water scarcity disputes that will arise.

In contrast, a deliberate and systematic focus on partnerships with other water users in a basin not only yields better project outcomes (as described in Part III of this article) but also builds antifragility so that future disputes become opportunities for growth. This approach is nothing new. It has been applied for decades in negotiated water rights settlements with Tribal Nations. As an alternative to zero-sum water rights litigation, these settlements achieve win-win results and build the relationships necessary to turn conflict into opportunity.

Tribal settlements achieve successful outcomes by building coalitions based on common goals that align and unite the otherwise competing interests of water users in a basin. An Arizona example provides a brief illustration. In 2004, a diverse coalition of water interests came together based on a common goal of resolving some of Arizona's most pressing water challenges and reached a historic settlement, the Arizona Water Settlements Act (Pub. L. No. 108-451, 118 Stat. 3478). Since the enactment of this settlement, the Gila River Indian

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Antifragility

Practicably Irrigable Acreage

Winters Doctrine

Community's leadership in the Colorado River Basin has been invaluable. In particular, the Community has leveraged the settlement to conserve hundreds of thousands of acre-feet of water—conservation that has benefits for the entire Colorado River Basin—while fostering enduring partnerships to advance innovative initiatives such as incorporating municipal water recycling projects into its irrigation delivery system. The Arizona Water Settlements Act embodies the integrative approach that is necessary to build antifragility.

This article presents the antifragility approach to addressing water scarcity. Rather than seeing water scarcity challenges as impediments, they can be viewed as opportunities for basin-wide growth by motivating water users to develop a shared vision and work towards mutually beneficial solutions. The way to do this is by using the practical conflict resolution framework and tools that have been applied successfully for decades in negotiated water rights settlements with Tribal Nations. Tribal water rights settlements, which are simply agreements based on common goals, are centered on the basin-wide partnerships necessary to address complex water disputes.

The antifragile approach exemplified in Tribal water rights settlements should be broadly adopted to address water scarcity challenges throughout the western United States.

Part I of this article provides background on the legal context of Tribal water rights. Part II describes the benefits that are achieved by resolving water rights disputes through negotiated settlements. Part III offers an example of how the integrative approach of negotiated settlements can lead to successful outcomes on a basin-wide scale. Part IV provides a brief discussion of water management strategies that should be prioritized to anchor future negotiated agreements that will be critical to addressing water scarcity.

Part I: Tribal Water Rights

A brief background on Tribal water rights is necessary to understand the legal context for negotiated settlements with Tribal Nations. For a full overview of Tribal water rights, *see* Robert T. Anderson, *Indian Water Rights, Practical Reasoning, and Negotiated Settlements,* 98 Calif. L. Rev. 1133-63 (2010).

Tribal water rights have a strong legal foundation rooted in the 1908 Supreme Court decision *Winters v. United States* (207 U.S. 564). Under the Winters Doctrine, when the federal government sets aside land for a reservation, it implicitly reserves sufficient water rights to fulfill the purposes of the reservation. These federal reserved water rights are typically senior in priority to rights perfected under state law in accordance with the prior appropriation system adopted in all western states.

Since the 1908 *Winters* decision, the Supreme Court has issued few substantive decisions regarding the nature and scope of federal reserved water rights of Tribal Nations. However, the decisions issued by the Court to define the contours of these rights have firmly upheld the Winters Doctrine, including a 1963 decision in *Arizona v. California* (373 U.S. 546). This case dealt primarily with the Colorado River apportionments of California, Arizona, and Nevada—the three states within the Lower Colorado River Basin (Lower Basin). In this decision, the Court established the **p**racticably **i**rrigable **a**creage (PIA) doctrine as the methodology for quantifying federal reserved water rights of Tribal Nations and in 1964 issued a decree (376 U.S. 340) using PIA to quantify the water rights of five sovereign Tribes within the geographic boundaries of the Lower Basin States. Quantification is defined by the PIA doctrine as "the water intended to satisfy the future as well as the present needs" based on the water that would be needed "to irrigate all the practicably irrigable acreage on the reservation…" (373 U.S. at 600-01).

The most recent Supreme Court decision regarding federal reserved water rights of Tribal Nations was issued in 2023 in a case concerning the Navajo Nation (*Arizona et. al. v. Navajo Nation et. al.,* 599 U.S. 555) (*see TWR*#235). While the Court held that the United States did not have an obligation to take affirmative steps to secure water for the Navajo Nation, its decision was steadfast and unwavering in upholding the Winters Doctrine. The Court described the federal reserved water rights of Tribal Nations in the following statement: "Under this Court's longstanding reserved water rights doctrine, sometimes referred to as the Winters Doctrine, the Federal Government's reservation of land for an Indian tribe also implicitly reserves the right to use needed water from various sources—such as groundwater, rivers, streams, lakes, and springs—that arise on, border, cross, underlie, or are encompassed within the reservation" (*Id*. at 561).

Part II: Benefits of Settlements

The strong legal foundation of Tribal water rights has facilitated 39 federally approved settlements (35 have been approved through Congressional action; four have been approved administratively)(*see* TWR#230). These settlements have evolved since the first modern-day settlement in 1978 up to the most recent ones currently pending before Congress. Each of these settlements is unique, reflecting the inherent principles of Tribal sovereignty and self-determination. While some settlements have been implemented more successfully than others, they have all provided opportunities that did not exist prior to reaching a negotiated agreement. Key benefits that have been achieved through Tribal water rights settlements are described below.

Antifragility

Settlement vs. Litigation

Transactions

Collaboration & Partnerships

Flexible Arrangements

Basin-Wide Perspective

PAPER RIGHTS VS. WET WATER

First, a core principle to understanding the advantage of settlements in contrast to litigation comes down to the simple difference between "paper rights" and "wet water." Water infrastructure is expensive. While a Tribal Nation may win a decreed water right through litigation, that water right will do nothing to address water needs if the Tribe lacks the financial ability to develop infrastructure to put water to use. It becomes a "paper right" in that situation. In contrast, negotiated settlements typically include funding to support water infrastructure for Tribal communities; thus, they create a meaningful, on-the-ground impact by providing "wet water" to Tribal Nations that often lack access to safe and reliable sources of water for basic needs. While paper rights postpone future conflict, negotiated settlements provide the foundation for enduring partnerships in a basin.

OPERATIONAL FLEXIBILITY IN MANAGING WATER RESOURCES

Second, settlements provide operational flexibility by establishing mechanisms for transactions that improve how water resources are managed within a basin. There are many instances where water leases or exchanges that make practical sense for a basin get tied up in legal issues, with no way to resolve the dispute outside the massive litigation associated with general stream adjudications. Through mechanisms established in settlements, water providers gain the tools needed to develop agreements to lease and exchange water in a way that is in touch with the hydrologic and practical realities of a basin. These lease and exchange agreements can align and unite interests to facilitate the relationships necessary for enduring partnerships.

The Gila River Water Storage, LLC (GRWS) illustrates how negotiated settlements build antifragility by fostering collaborative agreements that enhance water resources management. GWRS is a partnership between Gila River Indian Community and Salt River Project—two of central Arizona's primary water management entities—and plays a vital role for water security in Arizona. To appreciate the significance of this partnership, it is important to understand that Arizona has strict groundwater laws and regulations in its most densely populated regions—designated as Active Management Areas (AMAs). Within an AMA, new developments must demonstrate access to a 100-year assured water supply. This requirement is very difficult to meet due to Arizona's limited water resources (for a full overview of Arizona groundwater law, *see* Kenneth A. Hodson, Esq. & Maxine Becker, Esq., *The Constitutionality of Intrastate Groundwater Management: Arizona – A Case Study,* 49 Ariz. L. Rev. 385 (2007)).

GRWS helps address this challenge by facilitating water storage and exchange agreements that comply with Arizona's strict legal requirements. Through water rights quantified and secured under the Arizona Water Settlements Act, the Gila River Indian Community has made five million acre-feet of water available to meet future water demand in central Arizona. The Community works closely with Salt River Project to plan water banking and underground storage within AMAs, identify prospective water users in need of a renewable supply, and coordinate the marketing of long-term storage credits to meet 100-year water supply requirements under Arizona groundwater law.

The GRWS initiative enables flexible mechanisms for water resources management made possible through the framework of the Arizona Water Settlements Act. This partnership has been a key tool for addressing water scarcity in central Arizona. And there are major benefits on a larger, basin-wide scale; the flexibility to move water through these lease and exchange mechanisms has been critical for intrastate and interstate agreements to address shortage conditions in the Lower Colorado River Basin. This type of flexibility will be essential for all water users who depend on the Colorado River system.

COLLECTIVE PROBLEM SOLVING

Third, and finally, settlements strengthen long-term relationships within a basin by establishing forums in which to address challenges collectively. Rather than focusing on individual water resilience, parties to a settlement maintain a basin-wide perspective. This perspective promotes a shared sense that durable and mutually beneficial solutions for a basin are not only possible but are also essential. Applying an antifragile approach to future disputes provides a chance to find new win-win solutions rather than engaging in zero-sum games.

Part III: Common Goals

How do settlements build antifragility? The answer is simple: Settlements establish common goals, which drive the basin-wide partnerships that enable impactful solutions. Reaching a settlement is no small task. It requires years of negotiation, compromise across the board, and careful navigation of shifting political landscapes. Yet, when water users in a basin reach agreement on how to directly

Antifragility

confront water scarcity with mutual buy-in and accountability, they are better positioned to collectively implement projects that support a long-term vision. In this way, settlements foster antifragility through common goals that align and unite the interests of water users in a basin.

NAVAJO-GALLUP WATER SUPPLY PROJECT

Navajo Nation Leadership

The Navajo Nation's leadership in negotiated settlements illustrates the power of partnerships grounded in common goals. In the San Juan River Basin, the Navajo Nation and its partners have successfully advanced a major infrastructure project—the Navajo-Gallup Water Supply Project (NGWSP), authorized as part of a 2009 settlement in northwestern New Mexico (Omnibus Land Management Act, Pub. L. No. 111-11, 123 Stat. 991). NGWSP includes over 300 miles of pipeline, 19 pumping plants, and two water treatment facilities—one of which recently broke ground on construction, while the other is complete and has received multiple national and international awards for engineering excellence. This project reflects a shared vision for a regional storage and conveyance system to deliver reliable water to communities across the San Juan River Basin.

NGWSP would not have been possible without a water rights settlement to resolve claims and align interests in the basin. The settlement laid the foundation for durable partnerships and established important governance mechanisms, including a Project Construction Committee (PCC) comprising local, state, federal, and Tribal representatives to oversee construction of the project. NGWSP will ultimately deliver drinking water to more than 250,000 people across the San Juan River Basin, including 43 chapters of the Navajo Nation, the City of Gallup, and the Teepee Junction area of the Jicarilla Apache Nation. A project of this magnitude could not have been achieved without a firm commitment to building basin-wide partnerships.

Accomplishments

This approach has yielded impactful outcomes. The partnership driving NGWSP has enabled impressive progress on construction. The Cutter Lateral—the delivery system serving the eastern portion of the project—is substantially complete, and construction of the San Juan Lateral to service the western portion is advancing efficiently. The benefits of this regional partnership are also evident in the project's adaptive capacity. Through close coordination among PCC members, the project successfully acquired and incorporated an additional reservoir mid-construction—a major achievement requiring close collaboration among local, state, federal, and Tribal entities. This off-stream reservoir will provide operational flexibility and bolster the region's ability to mitigate the impacts of drought in the San Juan River Basin.

The example of NGWSP in western New Mexico illustrates the on-the-ground impact that settlements can have in addressing regional water challenges. It demonstrates that durable partnerships built through years of negotiation, firm commitment, and mutual compromise have the ability to align and unite otherwise competing interests to build antifragility and achieve successful results on a basin-wide scale.

NORTHEASTERN ARIZONA INDIAN WATER RIGHTS SETTLEMENT

NAIWRS

Similar to the water rights settlement in the San Juan River Basin, the Northeastern Arizona Indian Water Rights Settlement (NAIWRS) presents an opportunity to strengthen partnerships along the mainstem of the Colorado River Basin. This settlement—pending before Congress at the time of this publication—would resolve the water rights claims of the San Juan Southern Paiute Tribe, Hopi Tribe, and Navajo Nation to the mainstem Colorado River and other water sources in Arizona (*see* next article). Notably, Navajo Nation holds a unique position as the only Tribal Nation with reservation land in both the Upper and Lower Basins of the Colorado River.

Benefits & Importance

NAIWRS offers advantages achievable only through a negotiated settlement: "wet water" to three Tribal Nations; lease and exchange mechanisms that provide operational flexibility in a dynamic river system; and legal certainty regarding the extent of water rights held by three Colorado River Basin Tribes with unquestionable yet unquantified rights under the Winters Doctrine. These are basin-wide benefits in terms of water security, water resources management, and legal certainty for all water users who depend on the Colorado River system. And the settlement comes at a pivotal moment in the basin's history, as decisional documents and agreements that govern the river are set to expire at the end of 2026. As the post-2026 trajectory is developed, NAIWRS presents a critically important opportunity to strengthen key partnerships among the Upper Basin States, Lower Basin States, and Basin Tribes.

Part IV: Water Management Strategies

Fostering basin-wide relationships to build antifragility is undoubtedly challenging. And the challenge will only become more difficult with the escalating stress of water scarcity. To meet this moment, broader adoption of solutions that enhance water-use efficiency will be essential. Key examples include **a**quifer **s**torage and **r**ecovery (ASR) and on-farm technologies such as drip irrigation, which are an

Antifragility

Efficiency Strategies

embodiment of antifragility themselves. While ASR and drip irrigation have been implemented in some local contexts, they have yet to be fully integrated into basin-wide negotiated agreements. Expanding their inclusion in this context could enhance regional antifragility in meaningful ways.

In parallel, it will be increasingly important to rethink how water service providers manage non-traditional water sources such as wastewater effluent and brackish groundwater. Both water reuse and brackish groundwater desalination—discussed in more detail below—represent promising strategies that could deliver long-term benefits as part of negotiated agreements.

UNTAPPED POTENTIAL FOR WATER REUSE

Tapping into the potential for water reuse—particularly in the Colorado River Basin—should be a priority as the western United States adapts to the stress of water scarcity coupled with growing demand. A recent study has estimated that only 26% of municipal wastewater in the Colorado River Basin is currently recycled to offset water demand (for more information, see Noah Garrison, Lauren Stack, Jessica McKay, & Mark Gold, *Can Water Reuse Save the Colorado? An Analysis of Wastewater Recycling in Colorado River Basin States*, UCLA Institute of the Environment (2025)).

While the implications for return flows and seepage into the Colorado River Aquifer must be considered, there is no question that water recycling—and opportunities for direct potable reuse—will be essential in the Colorado River Basin. This is particularly true in California, where only 22% of effluent is currently recycled to offset demand. Negotiating agreements grounded in durable partnerships could help cities throughout the western United States rethink how they manage wastewater. Such agreements could serve as springboards for water reuse projects that turn water scarcity into an opportunity for growth.

BRACKISH GROUNDWATER DESALINATION

Brackish groundwater desalination is another strategy that should be prioritized in the broader context of negotiated agreements to address water scarcity. Brackish groundwater is underutilized due to its higher salinity compared to "sweet" groundwater; however, it can be treated through reverse osmosis desalination. This process uses less energy and offers significant cost savings compared to desalination of seawater. Several municipal brackish groundwater desalination plants are already operating and supply water to communities in Texas. For a comprehensive overview of brackish groundwater desalination and examples of projects in Texas, *see* Gary M. Gold & Michael E. Webber, *The Energy-Water Nexus: An Analysis and Comparison of Various Configurations Integrating Desalination with Renewable Power,* Resources Journal (2015).

Examples

Opportunities

In Arizona, a recent study identified more than 600 million acre-feet of brackish groundwater stored in areas deemed feasible for large-scale withdrawals (*see* Montgomery and Associates, *Updated Inventory of Brackish Groundwater in Arizona,* prepared for the Arizona Department of Water Resources, 2024). While a brackish groundwater desalination project requires careful consideration of tradeoffs—including energy use, disposal of brine concentrate, and infrastructure costs—the process is underutilized but would be practicable in many western states.

The Kay Bailey Hutchison Desalination Plant in El Paso, Texas, illustrates how brackish groundwater desalination can foster partnerships that help communities adapt and thrive amid growing water scarcity. This project was made possible by a shared vision between the City of El Paso and Fort Bliss, one of the largest military installations in the United States. As prolonged drought threatened military operations and municipal water supplies, the City and Fort Bliss came together to develop an award-winning brackish groundwater desalination plant that now provides water to hundreds of thousands of residents and serves as the backbone for water security in the region. The plant has proven to be a win-win for both parties, exemplifying how brackish groundwater desalination can facilitate partnerships that enable communities to grow stronger in response to the stress of water scarcity.

Conclusion

Every basin is unique. Solutions to address water scarcity within basins will vary depending on the hydrology and water resources, the perspectives of the local communities, and the level of funding available for water infrastructure projects. However, leaders in the water community throughout the western United States share the common challenge of determining how to address water scarcity and the inevitable conflict that it brings.

Common Challenges

Meeting this challenge requires a paradigm shift from a narrow focus on individual water resilience to a long-term vision rooted in antifragility. Tribal water rights settlements exemplify this approach. They demonstrate how negotiated agreements built on shared goals and mutual accountability can transform conflict into collaboration and uncertainty into opportunity. These settlements are more than legal

NAIWRSA

instruments; they are also models for integrative thinking and durable partnerships.

Using this framework as a guide, increased pressure on water supplies in the western United States can shift from being seen as a destabilizing threat to an opportunity for growth.

For Additional Information:

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Gary M. Gold is an attorney and engineer who recently served as a senior executive on the leadership team at the US Department of the Interior. In this role, Gary led the Bureau of Reclamation in Tribal water rights settlement negotiations—in the Colorado River Basin and other basins throughout the western United States—and in advancing water infrastructure and conservation projects through administrative and regulatory processes. Prior to his time at Interior, Gary served as a Natural Resources Attorney for a water and power provider in Arizona. Gary has also served as professional staff for US senators on both sides of the aisle in roles as a Natural Resources Policy Advisor and Water Law Fellow. Before practicing law, Gary worked as a Water Resources Engineer at a public utility in central Texas and conducted research funded by the National Science Foundation on the water-energy nexus. Gary lives in Washington, D.C. with his wife—who is a source of strength and inspiration through her antifragile approach to parenting, work, and everything in between—and their two daughters.

THE NORTHEASTERN ARIZONA INDIAN WATER RIGHTS SETTLEMENT ACT OF 2025

THE MOST COMPLICATED TRIBAL WATER RIGHTS SETTLEMENT IN UNITED STATES HISTORY

by Dwight Witherspoon, MacArthur Stant, Crystal L. Tulley-Cordova and Erika R. Pirotte, Navajo Nation

Introduction

The Navajo Nation is the largest tribe in the United States in terms of both population and land, with territory spanning across Arizona, Utah, and New Mexico. The Northeastern Arizona Indian Water Rights Settlement Act of 2025 (NAIWRSA), reintroduced in the 119th Congress as S.953 and H.R.2025, resolves the most significant outstanding water claims of the Navajo Nation in the State of Arizona. NAIWRSA is life-changing for the Navajo Nation, authorizing safe, reliable drinking water projects, improving water supply quality, and securing a vision for a thriving homeland. NAIWRSA also benefits the entire State of Arizona by addressing a dwindling ground water supply. Importantly, NAIWRSA provides certainty for the greater Colorado River Basin by quantifying rights to the largest outstanding claim to the Colorado River. This article addresses the Navajo Nation's water access gap and chronicles the Navajo Nation's pursuit of its water rights in Arizona, including its claims to the Colorado River, the Little Colorado River, the Navajo Aquifer, and the Coconino Aquifer.

The Navajo Nation Water Access Gap

Hauling Water

One in three households in the Navajo Nation do not have running water and sanitation facilities in their homes. The Indian Health Service mapped the Navajo homes without piped water access (Figure 1). These households have to meet their water needs by hauling water from elsewhere. According to a 2011 Navajo Nation Department of Water Resources report, "Families, which haul water for domestic purposes, spend the equivalent of $43,000 per acre-foot of water compared with $600 per acre-foot for typical suburban water users in the region. This Navajo water hauling cost is $133 per thousand gallons. This water is among the most expensive in the United States for a sector of the population that is among the poorest."

Deteriorating Infrastructure

Households with access to running water face substantial challenges, as well. A large proportion of those who do have running water depend on rapidly deteriorating public water supply systems that do not generate sufficient revenues to fund maintenance. Many of these water systems have exceeded the maximum sustainable withdrawal capacities of their source aquifers, have poor water quality, and are susceptible to drought.

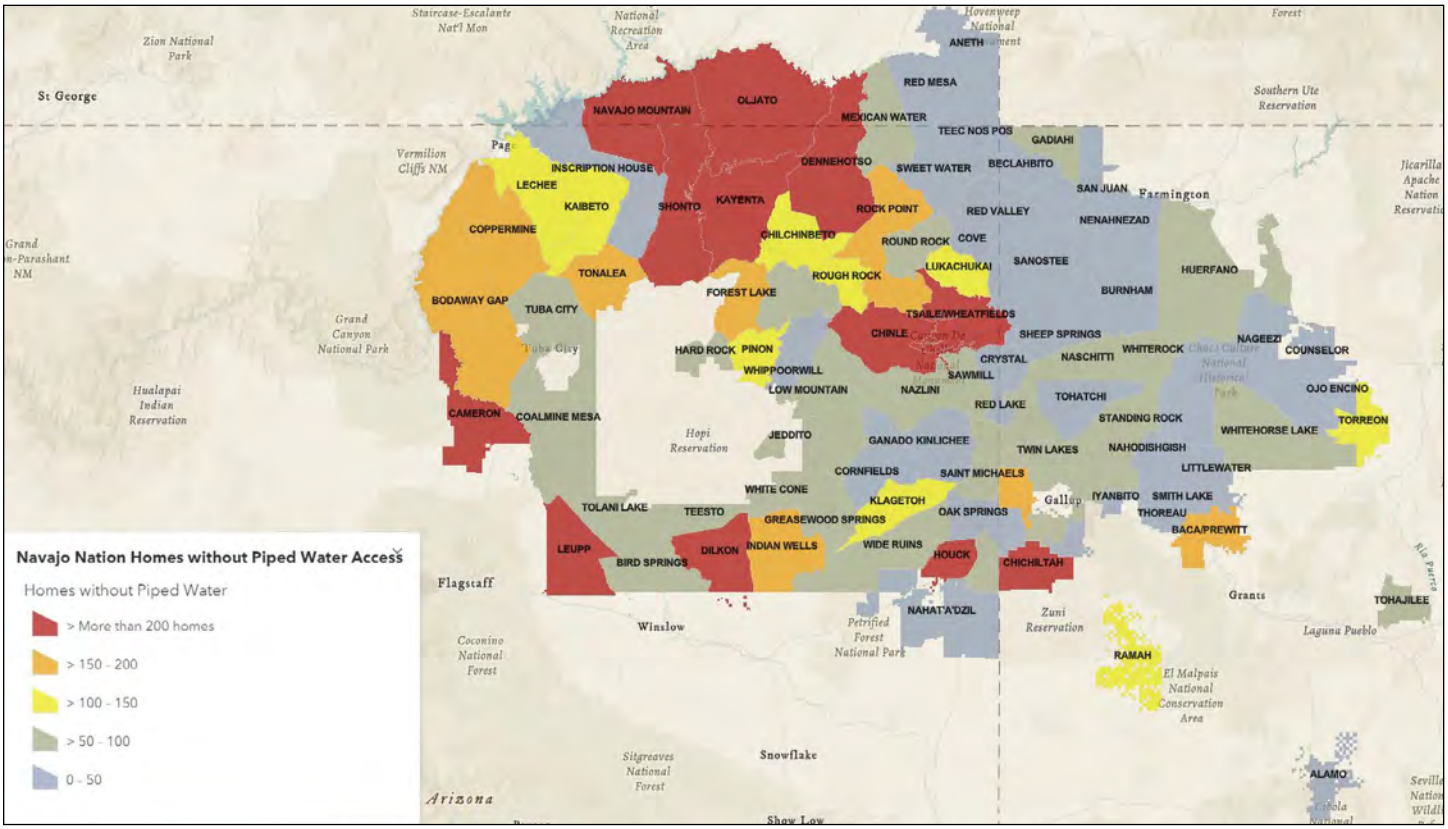


Figure 1. Navajo Nation homes without piped water access.

NAIWRSA

A lack of safe, reliable, and affordable water contributes to a high incidence of diseases and infections attributable to waterborne contaminants and places a tremendous economic burden on the Navajo people. Although NAIWRSA will not immediately eliminate water hauling or instantly deliver piped drinking water to homes on the Navajo Reservation, it will provide more reliable and higher-quality sources of potable water to many Navajo communities. Thus, it will improve the health and economy of the Navajo Nation.

Key Facts and Provisions for the Northeastern Arizona Indian Water Rights Settlement Act

Upper & Lower Basin Split

- The portion of the Navajo Reservation within the State of Arizona is divided between the Upper and Lower Colorado River Basins.
- Congressional approval is needed for the Navajo Nation and Hopi Tribe to move all of their allocations of Arizona Colorado River water between the Upper and Lower Basins to deliver water to Navajo and Hopi communities.

Impacts

- NAIWRSA will be the largest Indian water rights settlement, and when enacted, will provide the settling Tribes—the Navajo Nation, the Hopi Tribe, and the San Juan Southern Paiute Tribe—with desperately needed water and infrastructure funding necessary to put their water to use. Without this settlement, other water users in the Colorado River Basin would face uncertainty regarding the Tribes' Colorado River water rights, which is of particular importance because the Navajo Nation has one of the largest outstanding claims in the Colorado River Basin, and tribal water rights constitute 25 percent of Colorado River water use.
- The Navajo Nation and the Hopi Tribe offered a compromise for the seven Colorado River Basin states, dividing the 34,100 acre-feet per year (AFY) of Colorado River Water previously used by the Navajo Generating Station for storage in the Upper Basin (Lake Powell) and leasing in the Lower Basin (off-reservation in Arizona):
  - For 20 years, the Navajo Nation and the Hopi Tribe will collectively deliver 17,050 AFY of Navajo and Hopi Upper Basin Colorado River Water to a "NAIWRSA Pool" in Lake Powell. In return, the legislation will include $129,716,400 for Navajo and $6,683,600 for Hopi for their contributions to the NAIWRSA Pool.
  - For the same 20-year period, the Navajo Nation and the Hopi Tribe will limit the leasing of Navajo and Hopi Upper Basin Colorado River Water in the Lower Basin to a collective maximum

NAIWRSA

CO River Pipeline

of 17,050 AFY and for the explicit purpose of generating revenue to build, operate, and maintain critical water infrastructure on their Reservations.

- The iiná bá – paa tuwaqat'si pipeline will divert Colorado River water from Lake Powell and deliver:
  - Up to 6,750 AFY to serve Navajo communities from the Colorado River Upper Basin and Lower Basin Colorado River Water to LeChee, Coppermine, Bitter Springs, Cedar Ridge, Bodaway/Gap, Tuba City, Coal Mine Mesa, Cameron, and Grey Mountain;
  - Up to 350 AFY of Colorado River Water to the San Juan Southern Paiute Tribe Southern Area; and
  - Up to 3,076 AFY of Colorado River Water to the Hopi Reservation at the combined preliminary estimated cost of $1.715 billion.
- The 6,411 AFY reserved in the Arizona Water Settlement Act (AWSA) for the Navajo Nation and authorized for delivery through the Navajo Gallup Water Supply Project (NGWSP) infrastructure will be delivered to Navajo communities in Arizona.

The Navajo Nation's Pursuit of its Water Rights in Arizona

"Under the [Navajo Treaty of] 1868, the Navajo Reservation includes (among other things) the land, the minerals below the land's surface, and the timber on the land, *as well as the right to use needed water on the reservation"* (emphasis added) (*Arizona v. Navajo Nation,* 599 U.S. 555, 1 (2023)).

Prior to NAIWRSA, the Navajo Nation had attempted to settle its water rights in Arizona in 1999, 2010, and 2012. Each attempt sought a comprehensive settlement to account for the exceptional nature of the Navajo Nation's position within the Colorado River Basin and specifically within the State of Arizona. The Navajo Nation's water rights claims in Arizona included Upper Colorado River water, Lower Colorado River water, the Little Colorado River mainstem, and groundwater supplies, all of which were important water supplies for water infrastructure projects necessary for a thriving, permanent homeland. Each attempt reflected the legal complexities of settling Indian water rights claims in the Colorado River Basin and revealed a foundation of laws laid without the Navajo Nation's direct representation and participation. The following is a brief summary of the legal complexities faced by the Navajo Nation during the pursuit of its water rights in Arizona.

Legal Complexities

THE COLORADO RIVER COMPACT OF 1922

Representation

The Colorado River Compact of 1922 divided the Navajo Nation's Colorado River water claims in the State of Arizona without the Nation's representation or participation. The Navajo Nation straddles both the Upper and Lower Colorado River Basins (Figure 2).

UPPER COLORADO RIVER BASIN COMPACT OF 1948

Again, without representation or participation, the Upper Division States (Colorado, New Mexico, Utah, and Wyoming) compromised with Arizona for a 50,000 AFY apportionment of Upper Basin Colorado River water. Most of Arizona's Upper Basin portion is Navajo Nation land (Figure 2).

ARIZONA V. CALIFORNIA AND THE COLORADO RIVER BASIN PROJECT ACT OF 1968

CAP Canal

The US Supreme Court decision in *Arizona v. California* (376 U.S. 340 (1964)) allowed the completion of the Central Arizona Project (CAP) and delivery of Arizona's Colorado River water apportionment to Phoenix, Tucson, and other communities in southern Arizona. The water deliveries bypass the Navajo Nation, as the Colorado River water enters the CAP canal via the Mark Wilmer Pumping Plant at Lake Havasu on Arizona's western border.

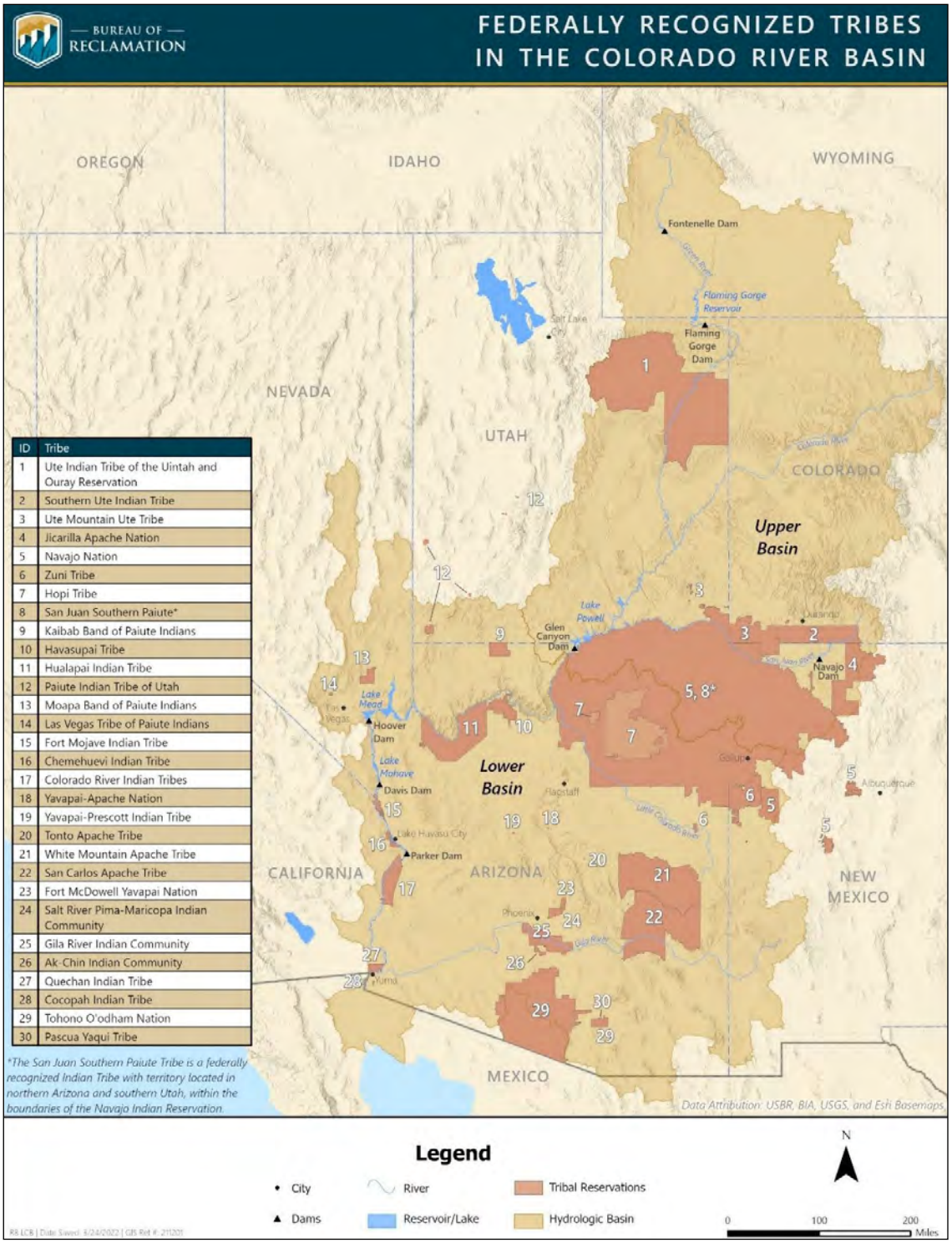
The Colorado River Basin Project Act of 1968 (Pub. l. 90-537) authorized that most of the power needed to move Arizona's Colorado River water through the CAP canal would come from the Navajo Generating Station located on the Navajo Nation.

FIFTY-YEAR NON-ASSERTION TO ARIZONA'S 50,000 AFY UPPER COLORADO RIVER WATER

Navajo Generating Station

In 1969, the Bureau of Reclamation asked the Navajo Nation Council not to assert claims to Arizona's 50,000 AFY Upper Colorado River water for fifty years in support of the 34,100 AFY needed to operate the Navajo Generating Station. The non-assertion agreement ended in 2019 along with the closure of the Navajo Generating Station.

NAIWRSA



ID	Tribe
1	Ute Indian Tribe of the Uintah and Ouray Reservation
2	Southern Ute Indian Tribe
3	Ute Mountain Ute Tribe
4	Jicarilla Apache Nation
5	Navajo Nation
6	Zuni Tribe
7	Hopi Tribe
8	San Juan Southern Paiute*
9	Kaibab Band of Paiute Indians
10	Havasupai Tribe
11	Hualapai Indian Tribe
12	Paiute Indian Tribe of Utah
13	Moapa Band of Paiute Indians
14	Las Vegas Tribe of Paiute Indians
15	Fort Mojave Indian Tribe
16	Chemehuevi Indian Tribe
17	Colorado River Indian Tribes
18	Yavapai-Apache Nation
19	Yavapai-Prescott Indian Tribe
20	Tonto Apache Tribe
21	White Mountain Apache Tribe
22	San Carlos Apache Tribe
23	Fort McDowell Yavapai Nation
24	Salt River Pima-Maricopa Indian Community
25	Gila River Indian Community
26	Ak-Chin Indian Community
27	Quechan Indian Tribe
28	Cocopah Indian Tribe
29	Tohono O'odham Nation
30	Pascua Yaqui Tribe

*The San Juan Southern Paiute Tribe is a federally recognized Indian Tribe with territory located in northern Arizona and southern Utah, within the boundaries of the Navajo Indian Reservation.

Figure 2. Map of Colorado River Basin with state and tribal boundaries delineated.

Stream Adjudications

THE MCCARREN AMENDMENT AND *ARIZONA V. SAN CARLOS APACHE TRIBE*

The McCarren Amendment waived the United States' sovereign immunity to adjudicate Indian water rights held in trust by the US in state courts. In *Arizona v. San Carlos Apache Tribe* (463 U.S. 545 (1983)), the US Supreme Court held that the McCarren Amendment removed limitations placed on state court jurisdiction over Indian water rights. The Navajo Nation must therefore rely on the prior appropriation doctrine and state statutes that determine rights in a particular basin—known as general stream adjudications. The adjudication process, from the initiation of a general stream adjudication to the final decree, can take decades to complete. This means the Navajo Nation has interests in multiple general stream adjudications, as it lies within several basins, including but not limited to the Colorado River Basin.

NAIWRSA

LITTLE COLORADO RIVER ADJUDICATION

The Little Colorado River (LCR) Adjudication was initiated in 1978, and the Navajo Nation submitted its first water claims in 1985. In 1995, the Adjudication Special Master determined federal reserved rights claims would proceed ahead of other state law claims. The Hopi Tribe hearings were held first, between 2019 and 2021. The Navajo Nation Phase 1 hearings of the LCR Adjudication were held between April and August 2023, decades after the initial filing. The Phase II hearings are scheduled for 2027. The resolution of these claims is ongoing, but it is presently stayed in light of NAIWRSA.

ARIZONA WATER SETTLEMENT ACT OF 2004

Section 104 of AWSA reallocated 67,300 AFY of CAP (non-Indian agricultural) water for future Arizona Indian water rights settlement agreements (Pub. L. 108-451). The AWSA also included a provision that the Secretary shall retain 6,411 AFY for use in a future Navajo Nation water rights settlement agreement approved by an Act of Congress before December 31, 2030.

NORTHWESTERN NEW MEXICO RURAL WATER PROJECTS ACT (PUB. L. 111-11 (2009))

In addition to settling the Navajo Nation's water rights claims to the San Juan River in New Mexico, Public Law 111-11 included a provision that Arizona's Upper Colorado River water allocated to the Navajo Nation may be diverted from the Upper Basin and delivered to Navajo communities in the Upper and Lower Basins (meaning in the State of Arizona), including delivering 6,411 AFY for Window Rock and surrounding communities through the NGWSP infrastructure.

The Navajo Nation Persists

Despite the challenges and the legal complexities of water rights in the Colorado River Basin, the Navajo Nation continues its pursuit to settle. NAIWRSA is a permanent resolution to all of the Navajo Nation's water rights claims in Arizona in exchange for the water security needed to provide a future for the Navajo Nation and its people.

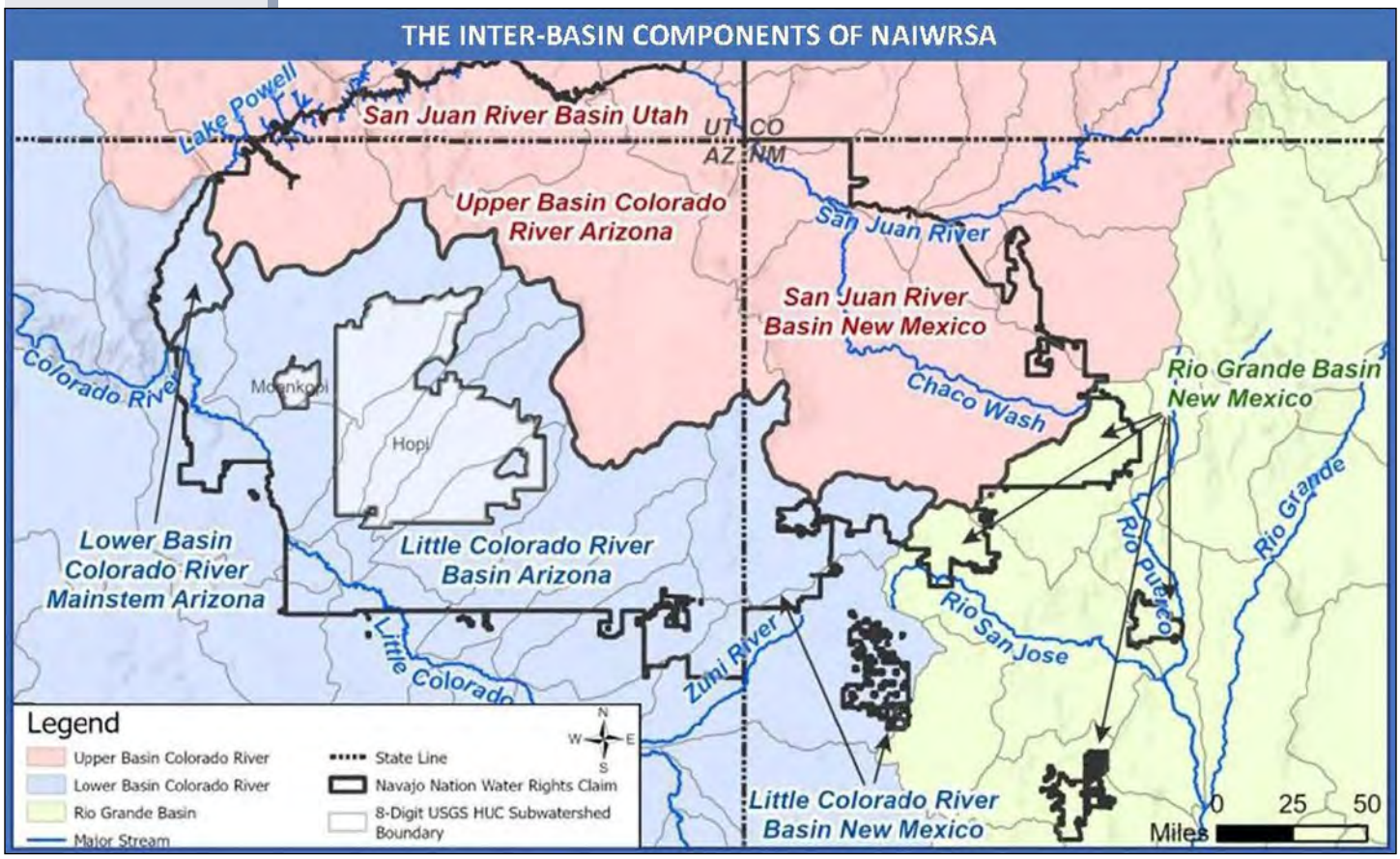


Figure 3. Map of Navajo Nation and river basins for water rights claims.

NAIWRSA

CO Basin Consensus

Leasing & Compromise

NAIWRSA requires congressional approval. To facilitate this approval, the tribal parties are working to obtain consensus from the seven Colorado River Basin states (Arizona, California, Colorado, Nevada, New Mexico, Utah, and Wyoming). The Nation is familiar with the challenges presented, as it faced similar circumstances with its San Juan River settlement. At issue is the use of Upper Basin Colorado River water in the Lower Basin, a practical necessity for the Navajo Nation given its location within both the Upper and Lower Basins (Figure 3).

Additionally, the Navajo Nation needs the option to lease its water off-Reservation in order to generate revenue for the long-term operation, maintenance, and repair of on-Reservation water infrastructure. As a compromise to allay concerns raised by the Basin states, the Nation identified the Upper Colorado River water formerly used by the Navajo Generating Station to be divided for storage and leasing: the Navajo Nation and the Hopi Tribe will deliver half of the water to Lake Powell for 20 years, and the other half will be available for leasing, subject to certain terms and conditions. The compromise reduces immediate impacts to the Upper and Lower Basins while fulfilling the goals of an Indian water rights settlement.

The Navajo Nation continues to work to achieve consensus with the seven Colorado River Basin states; NAIWRSA's lead sponsors Senator Mark Kelly (D-AZ) and Representative Juan Ciscomani (R-AZ); and co-sponsors Senator Ruben Gallego (D-AZ) and Representatives Yassamin Ansari (D-AZ), David Schweikert (R-AZ), Greg Stanton (D-AZ), and Eli Crane (R-AZ) to advance the Act through Congress. The Navajo Nation will not stop its pursuit.

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Affordability

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TAP WATER AFFORDABILITY IN ARIZONA

by Grant Heminger, Kathryn Sorensen, Sarah Porter, and Manny Teodoro
with contributions from Jennifer Davidson and Behshad Mohajer
The Kyl Center for Water Policy at ASU's Morrison Institute

Editor's note: In February 2025, the Kyl Center for Water Policy under Arizona State University's (ASU) Morrison Institute released the Tap Water Affordability in Arizona Report. This report assesses the affordability of tap water rates of over 600 water providers—including publicly-owned systems, Tribal systems, and privately-owned systems—to help Arizona communities assess how to balance considerations of affordability with their revenue needs. What follows is an abridged version of that report, which has been edited and condensed to better match The Water Report format. The full report is available here: https://azwaterblueprint.asu.edu/news/tap-water-affordability-arizona.

Introduction

Access to safe, reliable water is the foundation of public health, economic opportunity and quality of life in any community. There is abundant research and vital, ongoing action to address challenges associated with the physical accessibility of safe, reliable tap water,[1] but understanding the financial accessibility of water—the affordability of tap water—is also important.

In this report, the Kyl Center for Water Policy presents a comprehensive set of tap water affordability data for community water systems in Arizona. Communities can use this study to better assess how their current and future charges for water impact low- and median-income households. Water access can be improved when water charges are designed with affordability in mind so that fewer families face the risk of disconnection due to non-payment. On the other hand, most water providers rely on fees to pay for replacing aging infrastructure and water system improvements to ensure reliability.

HOW THIS STUDY CAN HELP LOCAL DECISION MAKERS

Assess Risk

By identifying the risk of water insecurity in a community. Water insecurity occurs when households do not have sufficient access to affordable and safe tap water and can result in service disconnection due to inability to pay water bills. Measuring tap water affordability allows decisionmakers to identify households and communities that are experiencing water insecurity or are at risk of falling into it. Awareness of the risk of water insecurity in a community can inform critical policies and programs to increase affordability and access to tap water.

Funding

By providing measurements of affordability that can help utilities that are seeking grants and aid. Many grant and loan programs prioritize projects that benefit low-income communities and address water access concerns. Utilities that can clearly demonstrate the tap water affordability challenges their customers face may have a better chance of securing this funding.

Affordability

Design

By informing the process of designing water rates. Rate setters design tap water rates with multiple goals in mind, including revenue sufficiency, transparency, conservation and affordability. Measures of affordability help decision makers design tap water rates to achieve the balance between these goals that best suits their communities. Measures of affordability can also help utility managers design effective customer assistance programs.

Rates

By gauging the ability to raise rates while maintaining affordability. Measures of affordability can help rate setters assess the affordability impacts of increased tap water charges to support needed investment in the rehabilitation and replacement of aging water infrastructure and other system improvements.

Definitions and Basic Methodology

Goal

The goal of this study is to measure tap water affordability in community water systems in Arizona by calculating the percentage of monthly household income that is required to pay for monthly tap water costs at a base monthly volume.

A public water system provides water for human consumption through pipes or other constructed conveyances to at least 15 service connections or serves an average of at least 25 people for at least 60 days a year.[2] A community water system is any public water system that serves the same 25 people on a year-round basis.[3] The Arizona Department of Environmental Quality maintains a database of all 1,671 water systems in the state,[4] 747 of which are community water systems, and the US EPA maintains a database of tribal community water systems in Arizona.[5]

Tap water affordability has no standard, universal definition, but commonly involves the cost to the user of accessing piped tap water relative to measures of the user's financial capacity to cover that cost. Thresholds of this ratio are often deployed to determine whether water service is affordable; however, these thresholds are always subjective in that what one community determines to be affordable water service may be considered unaffordable in another.

Residential Indicator

The Residential Indicator is a common measurement of affordability in the US, which defines water as "affordable" when total costs for water and sewer are less than 4.5% *of median household income*.[6] The Residential Indicator measures affordability at the *median* household income; it does not address water affordability for the lowest income earners in a community, who are often at the highest risk of water system disconnection due to non-payment.[7]

This study relies upon the Household Burden as the primary metric of affordability. The Household Burden is determined by calculating the percentage of monthly income spent on tap water costs by households earning the lowest 20th percentile income.[8] An alternative metric, measuring the cost of tap water in terms of the number of hours at the respective minimum wage, is provided to contextualize the Household Burden results.

Household Burden

The study measures monthly household water costs at 4,000 gallons of consumption, an amount generally adequate for indoor cooking and cleaning, and not usually adequate for outdoor irrigation. In doing so the study does not attempt to measure or identify current water usage levels, nor advise any specific amount of monthly usage for households in Arizona. The decision to use 4,000 gallons was informed by the range of existing estimates for indoor household water use, which generally fall between 3,000 and 6,000 gallons per month:

- Flume indoor water use data suggests between 3645 and 4347 gallons for a 3-person household in Phoenix.[9]
- The Arizona Department of Water Resources' Generic Demand Calculator estimates 4,050 gallons for a 3-person household.[10,11]
- The US EPA cites over 6300 gallons a month for the average American family.[12]

The lowest estimates of monthly use were not used to avoid measuring affordability only for those with small household sizes or particularly low water use, and the highest estimates were not used so as not to create an unrealistic or overstated representation of average water costs.[13]

Volume & Cost

The monthly cost of water was measured assuming a standard 5⁄8-inch meter connection (or smallest meter size for which a charge was listed) and included any fixed charge, usage charges, and applicable taxes and fees. Tap water charges were gathered from publicly posted tariff schedules, the Arizona Corporation Commission, and through direct outreach to individual systems.

Where tap water rates vary by month or season, an annual average was calculated.[14] Municipally owned community water systems often charge a higher tap water rate to customers that receive service from the system but live outside of municipal corporation boundaries. Results presented here are for customers who pay "inside-city" rates.

Affordability

Many community water systems offer customer assistance programs through which qualifying customers pay different rates than others, are offered payment programs that differ from others or even receive bill forgiveness. Such programs may dramatically change the cost for tap water that economically disadvantaged customers pay, but collection of the data associated with these programs is beyond the scope of this study. The results presented here should be viewed in this context.

Data

Water charges were found for 659 Community Water Systems that collectively report serving 6,992,390 customers, or about 98% of the population of Arizona.[15] There are hundreds of community water systems in Arizona, each of which follows a unique schedule for updates to their water charges. Information on water charges for some systems may have changed between the date of collection and the date of publication of this study.

The costs of water hauling, informal well-sharing agreements, and other non-conventional or distributed water systems, although important, are beyond the scope of this research and are not included. The cost families incur in purchasing bottled drinking water was also not included.

Water Systems in Arizona

In Arizona, there are over 1,600 public water systems which together serve more than 7 million people[16] and range in size and purpose from the City of Phoenix's municipal water utility which serves approximately 1,700,000 people to systems that serve individual neighborhoods, businesses, parks, schools, farms, campgrounds, fire stations, hospitals, and a myriad of other essential uses across the state. About half of these are community water systems.

COMMUNITY WATER SYSTEMS

Ownership

Community water systems make up only half of the total number of systems in Arizona but serve roughly 97% of the state's people. The size, structure, design, ownership, management, goals, and resources of community water systems vary widely from system to system even within the same region or municipality. In Arizona there are four typical ownership characteristics: municipal, private, district and Tribal.

Community water systems range in size from those that serve major cities to individual homeowners associations, mobile home parks, and cooperatives serving fewer than 30 people. Just over 75% of community water systems are categorized as "small" because they serve fewer than 1,850 people.[17] Small water systems are the rule in rural Arizona. Less than 4% of systems in Gila and La Paz Counties and less than 10% of systems in Apache, Coconino, Greenlee, and Yavapai Counties are considered large.

Public v. Private

In Arizona, people living in small, rural towns are typically served by small, private water systems and those living in urban areas are typically served by large, municipally-owned water systems. The nine largest water systems in Arizona are all municipally owned and together they serve approximately 4.2 million people. In comparison, all private community water systems in the state combined serve fewer than 1.5 million people.

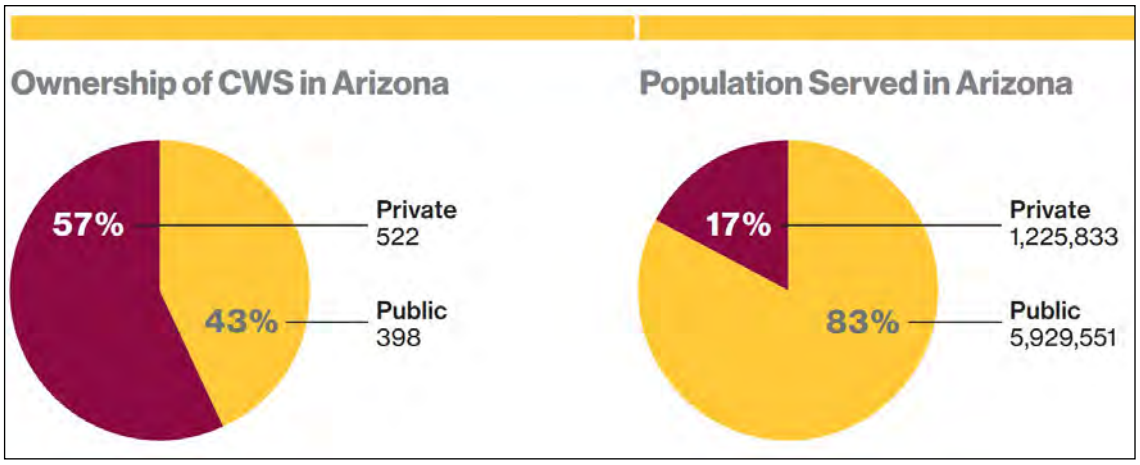

Figure 1. Water System Ownership

Water Charges in Arizona

Affordability

Utility Costs

The provision of safe, reliable, piped water involves high capital costs for wells, reservoirs, treatment plants, pipes, pumps, and other infrastructure alongside large expenses for operations and maintenance, such as for chemicals, electricity, skilled labor, and components. These costs must be covered over both the short and long term or else the community water system will fail to deliver safe water either through acute operational crisis or long-term deterioration.

Occasionally some community water systems secure federal, state, or non-profit funding to cover these costs via grants and subsidized loans, but such funding is generally far from adequate to fully cover costs, particularly over the long term, and its availability is normally uncertain and unreliable from year-to-year. In Tribal areas, the US government has trust responsibilities that may entail the provision of free tap water service for certain end uses (such as hospitals and schools), and some Tribal nations choose to fund community water systems out of Tribal revenues rather than from customer charges. However, as a general rule, community water systems rely on customer charges to cover the large costs of infrastructure, maintenance and operations.

Fixed Charges

Water systems commonly employ a fixed monthly charge that is usually intended to recover the cost of meter reading, billing, and other activities for which cost does not vary with water consumption[18] and a variable charge per unit of water consumed (typically per thousand gallons to achieve payment proportional to the benefit of the water received). Some water systems charge different rates to different customer types, such as single-family, multi-family, commercial and industrial. However, because there is no standard rate structure, rates can vary widely depending on the goals each community intends to achieve through its tap water charges, as well as the business model of the entity providing water service.[19] These goals often conflict and most commonly involve balancing the competing needs of revenue adequacy and predictability, conservation, affordability, economic development, transparency, and simplicity.

Rate Structure

Of the community water systems in the state for which rate information was available, nearly all charge a fixed monthly fee. Approximately 85% use a tiered rate structure in which the cost of water per unit increases with consumption. Around 5% employ a rate structure in which the cost per unit remains flat as consumption rises, and 6.5% charge a flat monthly fee regardless of the volume of water delivered. Flat structures are more common among small and informal systems as well as some Tribal systems. Around 12% of the water systems for which rate information could be found employ a fixed monthly fee that includes an allowance of water. A very small number of systems (0.6%) employ a rate structure in which the cost per unit decreases as more water is consumed.

Cost Per Customer

Small systems face unique difficulties covering the costs associated with operations, maintenance, and upgrading the aging infrastructure required for a functional system that is compliant with Safe Drinking Water Act regulations, because the pool of ratepayers shouldering these costs is much smaller relative to the fixed costs of running a water system than in larger systems. Generally, the more customers served by a community water system, the lower charges need to be per customer to achieve revenue adequacy.[20]

WATER CHARGE OVERSIGHT

Whether publicly or privately owned, community water systems operate as monopolies; they are the sole providers of piped water service in a physical boundary and therefore oversight is necessary to prevent monopolistic (unreasonably high) water charges.

Elected Officials

In municipally owned community water systems, which serve the vast majority of Arizonans, elected officials deliberate water charges through a public process and ultimately determine water charges by voting on whether to adopt a proposed water-charge ordinance. State statutes include requirements for public notices and hearings related to the adoption of these ordinances to help ensure adequate public involvement.[21] Other than for these public notices and hearings, which at a minimum take 60 days to complete,[22] there are few rules that constrain municipal governments in the rate-setting process and city councils are generally free to adopt or change water charges in any amounts and in any manner they deem necessary. The same is largely true for publicly owned domestic water improvement districts, which are common in residential developments in rural areas. In publicly owned systems, monopolistic pricing can be mitigated or avoided through the public process and voter recourse. For this reason, it can be difficult for elected officials to advocate for an increase in water rates, and they instead often defer cost recovery to future generations.

AZ Corporation Commission

The story is very different for privately owned utilities because voters cannot recall a private board. Instead, the state of Arizona regulates these monopolies through the Arizona Corporation Commission, which has created impactful and detailed rules for the development and alteration of water charges. Commission approval for new rates requires the submission of several substantive documents[23] and the

Affordability

Formula Rate Plans

SDWA & Rates

process can take well over a year. These rules prevent monopolistic pricing and ensure public input but can also be daunting for small, privately-owned community water systems which may lack the resources to navigate the process. The ACC has developed the Small Water Ombudsman Program to reduce this burden by assisting small systems in "interpreting and navigating the Corporation Commission rate case, financing, and compliance processes, and to provide evaluations of the long-term infrastructure and acquisition planning needs".[24] Additionally, in December 2024 the ACC announced its plan to allow utilities to adopt Formula Rate Plans that allow utilities to adjust their rates autonomously on an annual basis according to a "pre-established formula, which accounts for specific cost inputs".[25] This change is expected to reduce the regulatory burden for utilities while promoting gradualism in increases to water rates to facilitate utility operations and infrastructure updates.[26]

The results of this study show that the average "age" of tap water charges, measured as the date of the last posted rate schedule, is more than four times older in private water systems than in public water systems. On average, in small systems the age of tap water charges is more than double that in large systems; 7.4 and 3.1 years, respectively. Outdated tap water charges can exacerbate the financial difficulties and related infrastructure deficiencies small systems often face particularly in the context of new regulations and high inflation. While the impacts of outdated rates may not be immediately apparent in a short-term view, the erosion of buying power over 6 years (the state average rate age) is immense.

Cheap water is not cheap if the ultimate result is system failure. Analysis of nationally representative data shows that SDWA compliance correlates positively with water price, controlling for size, ownership, region, and water source:[27]

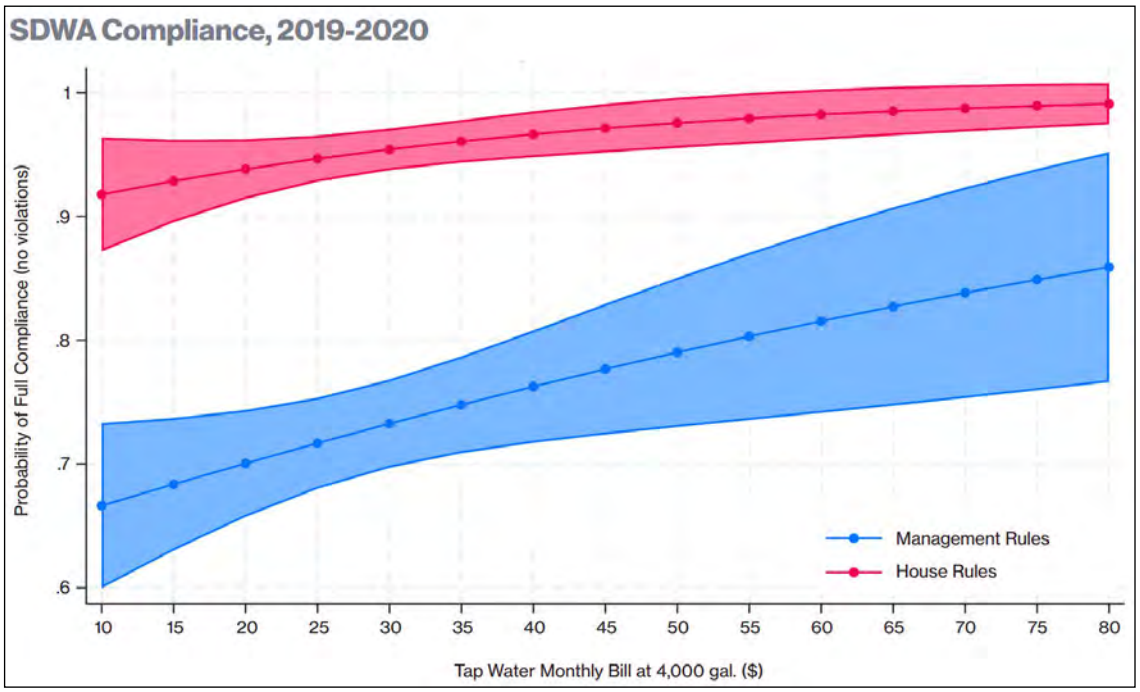

Figure 2. Safe Drinking Water Act Compliance versus Monthly Bill. Note: Estimates produced by a logistic regression predicting full SDWA compliance in 2019 and 2020. Shaded areas represent confidence intervals. N=413.

In substantive terms, these results indicate that a utility charging $15 per month for 4,000 gallons in 2019 had a 93.9% probability of complying with SDWA's health regulations and a 68.4% probability of complying with SDWA management regulations. For a utility that charged $75 per month, those probabilities rise to 98.9% and 85.9%, respectively. Put simply, higher average prices correlate with stronger regulatory compliance for community water systems.

HOW WATER CHARGES RELATE TO AFFORDABILITY

Though there is no standard water rate structure, rates most commonly consist of a fixed and variable usage charge. Monthly fixed charges are just that—fixed. Ratepayers cannot avoid or reduce these charges by minimizing water use. Therefore, smaller monthly fixed costs enhance affordability; the charge that cannot be avoided is smaller and creates less of a burden on lower-income households that pay proportionately more of their income on fixed fees relative to higher-income households.

Affordability

Tiered Rates

Variable charges depend on the amount of water used. Variable charges may be set such that the customer pays an increasing rate per unit of water or structured in a flat rate such that the customer is charged the same price per unit consumed whether they consume one or one hundred units. In Arizona, most utilities employ increasing variable charges ("tiered rates") because they contain a price signal encouraging water conservation.[28] A tiered consumption-based water charge structure helps to ensure that water users bear a share of the cost of the water system proportionate to their use but can make high water use—such as for outdoor landscape irrigation—costly.

HOW WATER CHARGES RELATE TO THE FINANCIAL VIABILITY OF THE SYSTEM

Delivering safe, reliable water through a community water system entails many costs (for tanks, pipelines, machinery, chemicals, labor, and power, among other things) and utilities have a different mix of water supplies and infrastructure which both influence the cost of providing tap water. Rate-setters must consider the revenue adequacy and stability associated with water charges, particularly as infrastructure approaches the end of its useful life[29] and new regulatory standards increase costs.[30]

Risks

While low fixed charges are more affordable for customers, the smaller the fixed charge the more a utility's revenues become dependent on variable charges and are therefore increasingly volatile. Reliance on variable charges combined with low fixed-charges exposes the community water system to revenue risk in the event customers use less water for any reason (e.g. heavy rainfall, economic downturn, drought, conservation). The same is true the more these variable revenues are tied to consumption volumes: The water system risks becoming dependent on high water use for a portion of overall revenues disproportionate to the actual cost.

Water systems can prioritize both affordability and revenue stability by including an allowance of a certain amount of water consumption in the fixed monthly fee. This ensures a predictable revenue stream through monthly fixed charges but enables low-income households to limit overall costs by potentially avoiding variable charges all together.

Balance

When determining water charges rate-setters must balance the need to ensure revenue sufficient to invest in the rehabilitation and replacement of aging infrastructure, maintain reliable operations, meet Safe Drinking Water Act standards, maintain an emergency fund, and achieve water conservation goals against the community's ability to pay at all income levels. This is no easy task.

Study Results

The average monthly cost for 4,000 gallons of tap water in Arizona is $41.[31] Monthly costs in Arizona range from a high of over $180 in a small water company in Gila County to zero in some Tribal nations that do not charge for water at the household level. Monthly charges for 4,000 gallons in most systems fall somewhere between $4 and $78.

Nearly 70% of systems charge between roughly $19 and $63 for 4,000 gallons of monthly water service. For context, the average American phone bill is $141 per month.[32]

The size of a water system is a highly influential factor in water charges and measures of affordability.[33] Small water systems charge on average roughly 20% more than large systems, likely because small systems have a comparatively smaller base of ratepayers over which to spread costs. As a case in point, the largest community water system in Arizona, the City of Phoenix's Water Services Department which serves approximately 1.7 million people, charges among the lowest rates for 4,000 gallons of monthly tap water consumption. The community water system that charges the highest serves 66 people in Gila County.

COMPARING WATER AND ENERGY COSTS

While there are broad differences between energy and water both as resources and utilities, it can be enlightening to compare their costs to consumers. In 2024, Arizona residents' average monthly energy bill was $134.38 in non-summer months and $234.53 in the summer.[34] (Note: As discussed above, 4,000 gallons is not an average tap water consumption rate.)

Those energy costs represent between 6% and 10% of monthly income for earners at the lowest quintile depending on the time of year. Average water costs for 4,000 gallons of tap water for comparison represent just over 2% of monthly income for households at the 20th percentile. Adjusting rates to meet a Household Burden of 6% nearly all systems (97%) could increase tap water costs for 4,000 gallons of monthly consumption by an average of about $100 and remain within this threshold.

Affordability

Utility Size

STATEWIDE WATER AFFORDABILITY

Water affordability as measured by the Household Burden is calculated in this study as the percentage of household income at the lowest quintile required to meet the monthly costs of 4,000 gallons of tap water.

In Arizona, the average Household Burden for 4,000 gallons of tap water monthly is 2.22%, meaning that on average just over two percent of monthly household income at the lowest quintile is necessary to pay monthly tap water costs. For comparison at the median household income level, Arizona households spend on average less than one percent (0.92%) of monthly income on 4,000 gallons tap water.

The statewide average cost of 4,000 gallons of tap water amounts to 3.36 hours of labor at minimum wage.[35]

COMPARING STATE AND NATIONAL AFFORDABILITY RESULTS

The most comparable national study of tap water charges and affordability does not include systems serving fewer than 3,300 people.[36] Because tap water charges are on average higher in small systems, the omission of systems serving fewer than 3,300 people in the national study resulted in a lower average Household Burden than found in this study, which includes systems serving fewer than 3,300 people. Adjusting Arizona results to exclude systems serving fewer than 3,300 people results in a statewide average Household Burden of 1.43%, almost exactly on par with the national average.

Household Burden

	% of monthly income at TPI
Arizona Average – Includes 513 systems of <3,300 people served	2.22%
National Average – Does not include systems of <3,300 people served	1.44%
Arizona Average – Systems of >3,300 people served	1.42%

Figure 3. Household Burden

Approximately three quarters of Arizonans, 5.3 million people, are served by a community water system with a lower Household Burden (more affordable) than the national average. The one quarter of Arizonans served by a community water system with a Household Burden score above the national average (less affordable) tend to be served by small systems.

COMPARING LARGE AND SMALL SYSTEMS

There are noticeable differences in nearly every measured rate and affordability statistic between large and small systems in Arizona, which include both Tribal and non-Tribal systems. In Arizona, the average large system serves about 31,000 residents and cumulatively large systems serve a total of around 6.9 million people. The average small system serves just over 300 residents and all small systems together serve a total of around 440,000 people.

Household Burden in Arizona — Large Systems

	Less Affordable than National Average	More Affordable than National Average
Systems	42%	57%
People	1.52 million (24%)	5.25 million (76%)

Household Burden in Arizona — Small Systems

	Less Affordable than National Average	More Affordable than National Average
Systems	70%	30%
People	157k (70%)	68k (30%)

Figure 4. Comparing Household Burden for Large and Small Systems

Affordability

Results

In Arizona, large community water systems average rate for 4,000 gallons of tap water is $36 and the average Household Burden is 1.5%—very close to the national average of 1.44%. Approximately 5.25 million Arizonans served by large systems are served by community water systems that score as more affordable than national average. 1.52 million Arizonans are served by large community water systems that score as less affordable.

For small community water systems in Arizona, the average rate for 4,000 gallons of tap water is $43 and the average Household Burden is 2.52%. Approximately 68,000 Arizonans served by small systems are served by community water systems that score as more affordable than national average. 157,000 Arizonans are served by systems that score as less affordable.

On average, monthly costs for 4,000 gallons of tap water from a small system amount to one additional hour of pay at the non-tribal minimum wage compared to monthly costs from a large system.

TRIBAL SYSTEMS

On Tribal lands, 164 community water systems serve approximately 280,000 people.[37] Water charge data was collected for 14 of the 22 federally recognized Tribes in Arizona. Affordability metrics were calculated for 95% of all Tribal community water systems, representing roughly 98% of people served by Tribal water systems in Arizona.[38]

Tribes hold authority to set rates for their community water systems. The Gila River Indian Community, Ak-Chin Indian Community, Fort McDowell Yavapai Nation, Tonto Apache Tribe, and Havasupai Tribe do not charge for household water service. The 19 water systems not charging for water service serve about 25% of all people served by Tribal community water systems in the state, about 69,000 people.

Tap Charges

The average tap water charge for the Arizona Tribal systems that charge for water is $36, 24 lower than the non-Tribal state average of $44 and quite close to the national average for community water systems of $35.[39] Because the lowest quintile household incomes tend to be lower on Tribal lands than on non-Tribal lands, the average Household Burden for Tribal water systems is 2.85%, higher than non-Tribal systems at 1.98%.

On average, 4,000 gallons of tap water from a Tribal community water system amounts to 4.31 hours at the applicable minimum wage compared to the 3.06 hours in a non-Tribal community water system. The disparity is largely due to differences in minimum wage rates between Tribal and non-Tribal communities as noted in footnote 32.

CONSIDERING AFFORDABILITY WHILE DETERMINING WATER CHARGES

Increasing Costs & Rates

Affordability is important, but so is revenue sufficient to pay for operations and the rehabilitation and replacement of aging water infrastructure. Almost all community water systems will need to increase water charges to cover rising costs for operations and maintenance costs as well as the replacement of aging infrastructure.

Using two percent of household income as a threshold for affordability,[40] at a base volume of 4,000 gallons a month,[41] as of the date of this publication about 57% of systems could raise water charges and remain affordable for people earning the lowest 20th percentile income in their communities. As many as 369 systems could increase base volume charges by about $25 per month while keeping costs below two percent of monthly income at the 20th percentile.

Using three percent of household income as a threshold, around 76% of systems could increase base volume charges and remain "affordable" for people earning the lowest 20th percentile income. As many as 498 systems could increase rates on average by about $43 while keeping costs below three percent of monthly income at the 20th percentile.

Rate Increases

2% Rate (TPI)	Number of Systems	% of Systems	How Much (Average)
Can Raise	369	56.60%	$25.51
Can't Raise	283	43.40%	$20.63
3% Rate (TPI)	**Number of Systems**	**% of Systems**	**How Much (Average)**
Can Raise	498	76.38%	$43.22
Can't Raise	154	23.62%	$17.90

Figure 5. Rate Increases

Conclusion

When determining tap water charges decision-makers must balance the need for revenue sufficient to maintain an adequately functioning community water system against affordability for all users. Most community water systems in Arizona have room to raise water rates and remain within affordability limits.

However, tap water costs in some water systems exceed affordability limits as measured by Household Burden. For these systems, increasing tap water charges will only exacerbate affordability challenges. In these cases, rate setters might consider implementing an assistance program or increasing awareness and usage of existing programs, making changes to water charges to include water allowances in fixed costs and increasing variable charges at higher consumption levels so that less revenue needs to be earned at low-usage levels. Systems facing these challenges should explore available federal, Tribal, state and non-profit financing opportunities to potentially lessen the cost on individual ratepayers.[42]

Please see the full report for all data figures, appendices, and author information: https://azwaterblueprint.asu.edu/news/tap-water-affordability-arizona

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WATER BRIEFS

WATER INFRASTRUCTURE US
COST ESTIMATE REPORT

US municipal capital expenditure (CAPEX) for water and wastewater treatment infrastructure is projected to total US$515.4 billion through 2035, according to a new report by Bluefield Research. With a compound annual growth rate of 4.4%, growing from US$37.2 billion to US$57.3 billion annually, the next decade signals a critical turning point for modernizing water systems in response to intensifying regulatory, climate, and demographic pressures.

Across the two primary forecasted segments—drinking water and wastewater—the latter represents 58% of the total forecast, totaling US$310.4 billion. Investment in wastewater treatment infrastructure is attributable to expansion of centralized sewer systems, adoption of advanced treatment technologies, and efforts to mitigate sewer overflows. On the drinking water side, which is growing at a slightly faster clip than wastewater (4.72% / 4.18%), utilities must navigate anticipated PFAS compliance costs, storage mandates, and shifting population patterns—all of which are driving a major wave of system upgrades. Drinking water CAPEX is expected to total US$214.0 billion over the next ten years.

Geography remains a key driver of investment patterns. The southern US is expected to account for 44% of total spend, led by Texas and Florida, where rapid suburban expansion is fueling demand for new wastewater treatment facilities and system buildouts. As the region grapples with increased water stress and heightened climate risks, urgency around long-term investment planning is growing. Meanwhile, the fastest growth is projected in smaller states like Connecticut, Washington, and Maine, where aging infrastructure, shifting demographics, and tightening regulations are converging to drive significant reinvestment.

Beyond geography, utility size also plays a critical role in shaping capital expenditure strategies. Mid-sized systems—those serving between 25,000 and 100,000 people—are in the strongest position to adopt modular and scalable treatment technologies. Larger utilities often have in-house treatment capabilities, while many smaller utilities lack the capital.

Delays in federal funding, policy uncertainty, and newly announced tariffs are creating headwinds across the industry, impacting technology vendors to utility procurement teams. As of April 2025, only 14.0% of the US$43.6 billion appropriated for State Revolving Fund programs through the Infrastructure Investment and Jobs Act had reached project deployment, with half of all project awards concentrated in just seven states.

FOR INFO: https://www.bluefieldresearch.com/research/u-s-water-wastewater-treatment-infrastructure-capex-forecasts-2025-2035/

WASTE PETITION CO BASIN
BENEFICIAL USES

National water groups filed a petition on May 6, asking the US Bureau of Reclamation (Bureau) to utilize its legal authority to stop waste of Colorado River water by users in California, Nevada, and Arizona.

The Natural Resources Defense Council (NRDC), represented by the UCLA Frank G. Wells Environmental Law Clinic, along with a coalition of Waterkeepers and other local advocacy groups, filed the petition.

The petition requests that the Bureau exercise its authority to ensure that all its water deliveries to Colorado River Lower Basin users are "reasonably required for beneficial uses" and are not delivered for uses that are "unreasonable." Under existing law, the Bureau has the authority and duty to limit its water deliveries to prevent unreasonable uses of water, as the petition lays out.

The petition also requests that the Bureau undertake a process with stakeholder input to define the phrase "reasonably required for beneficial use"; develop a robust, consistent, and transparent process for determining whether Lower Basin water users are adequately avoiding wasteful, unreasonable uses of water; and require and perform periodic reviews of Lower Basin water users to ensure that all water deliveries are, in fact, being used reasonably.

Currently, Arizona, Nevada, California and their water utilities with Colorado River water rights receive 100 percent of their allocations annually regardless of snowpack and river flow conditions.

The petition highlights examples of water waste, including excessive irrigation of purely ornamental turf in areas that routinely swelter in extreme heat, as well as inefficient industrial processes that use more water than needed due to outdated evaporative cooling systems.

FOR INFO: https://law.ucla.edu/sites/default/files/PDFs/Publications/Emmett%20Institute/NRDC%20Petition%20to%20the%20Bureau%20of%20Reclaimation.pdf?_gl=1*1mnwu16*_up*MQ..*_ga*MTkyOTU2MDc1MS4xNzQ3MzQyOTIy*_ga_LH03WX2T8B*czE3NDczNDI5MjAkbzEkZzAkdDE3NDczNDI5MjAkajAkbDAkaDA.

CONSERVATION CO BASIN
SHORT-TERM AGREEMENTS

On May 7, the Department of the Interior and the Bureau of Reclamation marked major progress for the continued short-term health of the Colorado River System. Eighteen short-term System Conservation Implementation agreements with water entitlement holders in Arizona and California have been negotiated to include additional conservation of Colorado River System water.

Interior and the Bureau are committed to working intensely with representatives of the governors of all seven Colorado River Basin states and tribal nations within the basin to forge a sound water management plan for the river that will promote the prosperity of all 40 million people living in the Basin for generations to come.

Extension of 18 short-term agreements with tribal, municipal, and agricultural water users in the Lower Colorado River Basin will result in additional water savings through 2026, totaling approximately 321,000 acre-feet in Lake Mead storage, the equivalent of approximately five feet in reservoir elevation. The extension of these agreements provides tribes, cities and farmers with funding for water savings during the development of Post-2026 Colorado River Operating Guidelines. This additional water helps to bolster Lake Mead's elevation for continued resilience to deliver water and produce hydropower on the Colorado River during this critical time to benefit the Colorado River System and its users.

The agreements are part of the more than three million acre-feet of system conservation commitments made by the Lower Basin states.

The Bureau is also working with water entitlement holders in the Lower Colorado River Basin to negotiate water conservation agreements for additional projects that will put the Colorado River Basin on a path to a more resilient water future.

These short- and long-term actions come as Interior and the Bureau continue to engage with our basin state and tribal partners on development of post-2026 operations, a critical effort that will shape the future of the Colorado River Basin. Throughout the coming weeks and months, Interior will provide updates on progress as it aims to complete a Post-2026 Draft Environmental Impact Statement by the end of the calendar year.

FOR INFO: https://www.usbr.gov/ColoradoRiverBasin/post2026/index.html

PFAS REGULATIONS US

UPDATES AND GUIDANCE

US Environmental Protection Agency (EPA) Administrator Lee Zeldin announced on May 14, that the agency will keep the current National Primary Drinking Water Regulations (NPDWR) for perfluorooctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS), which set nationwide limits for these "forever chemicals" in drinking water. The agency is committed to addressing Per- and Polyfluoroalkyl substances (PFAS) in drinking water while following the law and ensuring that regulatory compliance is achievable for drinking water systems.

As part of this action, EPA is announcing its intent to extend compliance deadlines for PFOA and PFOS, establish a federal exemption framework, and initiate enhanced outreach to water systems, especially in rural and small communities, through EPA's new PFAS OUTreach Initiative (PFAS OUT). This action would help address the most significant compliance challenges EPA has heard from public water systems, members of Congress, and other stakeholders, while supporting actions to protect the American people from certain PFAS in drinking water.

Paired with **e**ffluent **l**imitations **g**uidelines (ELGs) for PFAS and other tools to ensure that polluters are held responsible, EPA's actions are designed to reduce the burden on drinking water systems and the cost of water bills, all while continuing to protect public health and ensure that the agency is following the law in establishing impactful regulations such as these.

EPA is also announcing its intent to rescind the regulations and reconsider the regulatory determinations for PFHxS, PFNA, HFPO-DA (commonly known as GenX), and the Hazard Index mixture of these three plus PFBS to ensure that the determinations and any resulting drinking water regulation follow the legal process laid out in the Safe Drinking Water Act.

On Apr. 10, 2024, EPA announced the final National Primary Drinking Water Regulation, including standards for PFOA and PFOS. At that time, EPA established legally enforceable levels for these PFAS in drinking water and gave public water systems until 2029 to comply with the Maximum Contaminant Levels (MCLs).

To allow drinking water systems more time to develop plans for addressing PFOA and PFOS where they are found and implement solutions, EPA plans to develop a rulemaking to provide additional time for compliance, including a proposal to extend the compliance date to 2031. EPA plans to issue a proposed rule this fall and finalize this rule in the Spring of 2026. Aligned with the agency's intent to provide additional compliance time for water systems, EPA encourages states seeking primacy for implementing the PFAS drinking water regulation to request additional time from EPA to develop their applications. At the same time, EPA will support the US Department of Justice in defending ongoing legal challenges to the PFAS National Primary Drinking Water Regulation with respect to PFOA and PFOS.

To enhance engagement on addressing PFAS, EPA will launch PFAS OUT to connect with every public water utility known to need capital improvements to address PFAS in their systems, including those EPA has identified as having PFOA and PFOS levels above EPA's MCL. EPA will share resources, tools, funding, and technical assistance to help utilities meet the federal drinking water standards. PFAS OUT will ensure that no community is left behind as we work to protect public health and bring utilities into compliance with federal drinking water standards. PFAS OUT will engage utilities, technical assistance providers and local, State, Tribal, and Territorial leaders to develop effective, practical solutions where they are needed most.

EPA will continue to offer free water technical assistance (WaterTA) that provides services to water systems to improve their drinking water and help communities access available funding. EPA's WaterTA initiatives work with water systems nationwide to identify affordable solutions to assess and address PFAS, including PFOA and PFOS. Services offered to utilities include water quality testing, development of technical plans, operator training support, designing public engagement and outreach strategies, and support for accessing federal funding opportunities.

FOR INFO: https://www.epa.gov/sdwa/and-polyfluoroalkyl-substances-pfas

EPA RESTRUCTURE US

CHANGES TO AIR, LAND, WATER

The US Environmental Protection Agency (EPA) announced on May 2, the next phase of organizational improvements to the agency to better provide clean air, water, and land for all Americans. These workforce changes impact the Office of the Administrator, Office of Air and Radiation, Office of Chemical Safety and Pollution Prevention (OCSPP), and Office of Water.

With this action, EPA is delivering organizational improvements to the personnel structure that will directly benefit the American people and better advance the agency's core mission, while Powering the Great American Comeback.

EPA is creating the first-of-its-kind Office of State Air Partnerships within the Office of Air and Radiation. This office will be focused on working with, not against, state, local and tribal air permitting agencies to improve processing of State Implementation Plans and resolving air permitting concerns. This will help ensure national consistency so that a state, local or tribal air permitting agency receives the same answer regardless of where they are in the country. EPA is also creating the Office of Clean Air Programs that will align statutory obligations and mission essential functions based on centers of expertise to ensure more transparency and harmony in regulatory development.

Similarly, changes to the Office of Water will better align the development of regulations, guidance, and policy

with the science that underpins it. EPA is also elevating issues of cybersecurity, emergency response, and water reuse and conservation to ensure they are receiving appropriate resources to address today's pressing water issues.

In this reorganization, the agency is shifting its scientific expertise and research efforts to program offices to tackle statutory obligations and mission essential functions. This includes the creation of the Office of Applied Science and Environmental Solutions (OASES) in the Office of the Administrator to align research and put science at the forefront of the agency's rulemakings and technical assistance to states.

Specifically, OCSPP will gain more than 130 scientific, technical, bioinformatic, and information technology experts to work directly on the backlogs of over 504 new chemicals in review that are beyond the statutorily required timeframes and over 12,000 pesticide reviews that are well beyond their expected timelines. In this process, EPA is also gaining the tools needed to advance a PFAS testing strategy to ensure that we are furthering our understanding of PFAS and its impacts on human health and the environment. These organizational improvements provide better tools and capabilities to allow OCSPP to use computational and bioinformatic tools—and eventually artificial intelligence—to streamline and improve the review of chemicals and pesticides.

This phase of reorganization will save taxpayers more than $300 million annually by Fiscal Year 2026. It is all part of a larger, comprehensive effort to restructure the agency, and when finalized, EPA expects to have employment levels near those seen when President Ronald Reagan occupied the White House.

Earlier this year, EPA announced the termination of the Biden-Harris Administration's Environmental Justice (EJ) and Diversity, Equity, and Inclusion (DEI) arms of the agency. In doing so, EPA began a Reduction in Force for approximately 280 DEI and EJ employees and transferred 175 employees who perform statutory obligations and mission essential functions to other offices.

FOR INFO: https://www.epa.gov/newsreleases/epa-announces-next-phase-organizational-improvements-better-integrate-science-agency

WATER PROCTECTION FUND AZ

GRANT APPLICATIONS OPEN

The Arizona Water Protection Fund (AWPF) supports projects that develop or implement on-the-ground measures that directly maintain, enhance and restore Arizona's river and riparian resources.

The AWPF Commission will be accepting applications for the Fiscal Year 2026 grant cycle and will award grants under three categories: capital projects, research, and water conservation. The deadline to submit applications is Friday, August 15, 2025, at 11:59 p.m. Arizona time. Applications will only be accepted electronically via the eCivis Grants Management System.

AWPF staff will be hosting an online grant application workshop Wednesday, June 11, 2025 from 1:30 p.m.–2:30 p.m. Webinar link is https://azwater.webex.com/azwater/j.php?MTID=m24989c585e1c6304ec947d328a68bd00

FOR INFO: https://www.azwpf.gov/grant-information/fy-2026-grant-cycle

GRANT FUNDING US

TECHNICAL ASSISTANCE

On May 20, the US Environmental Protection Agency (EPA) announced $30.7 million in grant funding to provide training and technical assistance that will improve water quality in small and rural communities across the country. This support helps ensure that every American has access to clean and safe water and advances the goals of Administrator Lee Zeldin's "Powering the Great American Comeback" initiative.

Funding for the training and technical assistance grant will be used for meeting technical, financial, and managerial needs at small public drinking water and wastewater systems to achieve and maintain compliance with the Safe Drinking Water Act and Clean Water Act. It will also assist private well owners with improving water quality, including testing for PFAS contamination. Additionally, these investments can be used to address challenges with onsite wastewater management (e.g., septic systems).

EPA anticipates awarding federal grants to these recipients after legal and administrative requirements are satisfied:

- **National Rural Water Association**—$9 million to support small systems while enhancing operator licensing and conducting troubleshooting to determine factors affecting performance.
- **Rural Community Assistance Partnership (RCAP)**—$9.9 million to strengthen small systems, including by developing lead service line replacement plans and improving cybersecurity. In addition, $1.25 million will help small publicly owned wastewater and on-site/decentralized wastewater systems to improve water quality, and $3.45 million to work with private drinking water well owners to help improve water quality, including testing for PFAS contamination.
- **Southwest Environmental Finance Center at the University of New Mexico**—$7 million to build small system capabilities, improve operation efficiency and overall drinking water system performance.

Additionally, EPA is re-launching the Water Infrastructure and Capacity Assessment Tool (Water ICAT) following improvements to better serve users. Water ICAT is an interactive map that helps users—such as state, and federal partners, and technical assistance providers—identify drinking water and wastewater utilities that may benefit from water infrastructure technical assistance. Water ICAT combines water utility information with compliance, demographic/economic, and historical water infrastructure funding data enabling users to efficiently and effectively screen for, evaluate, and prioritize utilities that may benefit from additional federal, state, or local support.

FOR INFO: https://www.epa.gov/dwcapacity/training-and-technical-assistance-small-systems-funding

DESALINATION CA

NEW TECH TESTING

OceanWell, a water technology company, and Las Virgenes Municipal Water District (LVMWD) launched a first-of-its-kind pilot to showcase OceanWell's fresh water harvesting system. The pilot is the next step in OceanWell's and LVMWD's partnership, first announced in 2023, to prove the efficacy of OceanWell's proprietary submerged water filtration technology, and ultimately, provide a stable, scalable and climate-resilient source of water for a region that has been hard-hit by water shortages in recent years.

OceanWell is developing deep-sea water farms that harness natural hydrostatic pressure at depths in excess of 400 meters (1,300 feet) to drive a high-pressure water purification method called reverse osmosis. Each purification pod will harvest up to one million gallons of fresh water daily from the ocean, and the modular design allows for scalable projects based on demand. This technology produces ultra-clean water by filtering out salts, bacteria, viruses, pesticides, and PFAS, while its components are engineered for durability in harsh deep-sea environments. Unlike traditional industrial desalination which is energy-intensive and can harm marine life, OceanWell's technology reduces energy consumption by up to 40 percent while protecting marine life and eliminating toxic brine.

Testing the technology in a reservoir demonstrates the efficiency of the system's LifeSafe™ intake in highly bio-active conditions, which are more challenging than in the deep sea. This phased approach helps fine-tune each stage of the system, paving the way for reliable, scalable deployment in the ocean.

The pilot launch was held on March 21, 2025 at the Las Virgenes Reservoir in Westlake Village, California, where elected officials, water agencies, environmental organizations and more, were able to see an OceanWell pod submerged in the water, producing clean, drinkable water in real-time.

The next phase of testing, which has already received approval from the California Coastal Commission, is planned to take place in the ocean—marking a critical step from controlled reservoir conditions to real-world ocean deployment. This will further validate OceanWell's technology in its intended deep-sea environment and bring it closer to commercial readiness, signaling a major breakthrough for the water industry to bring new supplies to regions across the globe in a cost-effective and environmentally safe manner.

OceanWell is supported by a working group of 25 municipal water agencies in California and aims to build 15 water farms across the globe in the next decade.
FOR INFO: https://www.oceanwellwater.com/

DELTA CONVEYANCE CA

SUPPORT FROM GOVERNOR

The Inland Empire Utilities Agency (IEUA), Western Municipal Water District (Western Water), Eastern Municipal Water District (EMWD), and Three Valleys Municipal Water District (Three Valleys/TVMWD) is issuing strong support for Governor Gavin Newsom's recent proposal to streamline and expedite approvals for the long-awaited Delta Conveyance Project (DCP).

The DCP is a critical infrastructure project that aims to modernize the State Water Project's (SWP) delivery system by constructing a new, single-tunnel conveyance pipeline through the Sacramento-San Joaquin Delta. The SWP provides clean water to 27 million Californians and 750,000 acres of farmland.

While the SWP helps to manage California's water supply during floods and droughts, there have been significant challenges and deficiencies with the current infrastructure, leading to significant water supply loss. The DCP is critical to protecting the reliability of the SWP from threats by extreme weather fluctuations, seismic activity, and aging infrastructure. In 2024 alone, the DCP could have captured water for 9.8 million Californians' annual usage.

The proposal by Governor Newsom includes measures that will simplify permitting processes, confirm funding authorities, and streamline judicial reviews to reduce unnecessary delays and costs associated with the project. The Governor reported that these measures would save more than $365 million for every year of avoided delay.

The DCP has made tremendous progress in recent years with the certification of a final environmental impact report in December 2023 and securing financial support from water agencies throughout the State. However, the project is facing complicated regulatory frameworks and bureaucratic delays.

During the recent prolonged drought, Metropolitan Water District and its member agencies received for the first time a zero percent allocation from the State Water Project. To provide imported water to the State Water-dependent cities, Three Valleys had to pump water uphill.

If the Delta Conveyance Project had been in place, IEUA, Western Water, EMWD, and Three Valleys would have had access to more stored water on the State system and could have avoided using drought contingency plans and severe outdoor water restrictions.

IEUA, Western Water, EMWD, and Three Valleys applaud the Governor's proposal to protect the State's most critical water supply and urge the Legislature to enact these provisions.
FOR INFO: https://water.ca.gov/deltaconveyance

DISASTER TRACKING US

NOAA PRODUCT CANCELLED

The NOAA Billion Dollar Weather and Climate Disasters product will be retired, with no updates beyond calendar year 2024.

All past reports, spanning 1980-2024, and their underlying data remain authoritative, archived, and available below.

The NOAA National Centers for Environmental Information ceased providing support for this product in May 2025 in response to an initiative to implement reductions within the US federal government. This dataset contains US disaster cost assessments of the total, direct losses ($) inflicted by: tropical cyclones, inland floods, drought and heat waves, severe local storms (i.e., tornado, hail, straight-line wind damage), wildfires, crop freeze events and winter storms. These assessments require input from a variety of public and private data sources including: the Insurance Services Office (ISO) Property Claim Services (PCS), Federal Emergency Management Agency (FEMA) National Flood Insurance Program (NFIP) and Presidential Disaster Declaration (PDD) assistance, and the United States Department of Agriculture (USDA) National Agricultural Statistics Service (NASS) & Risk Management Agency (RMA), the National Interagency Fire Center (NIFC) and state agency reporting, among others. Each of these data sources provides unique information as part of the overall disaster loss assessment.
FOR INFO: https://www.ncei.noaa.gov/access/metadata/landing-page/bin/iso?id=gov.noaa.nodc:0209268

PFAS RESEARCH FUNDING US

NEW SUPERFUND CENTER

Experts in population health, engineering, and medicine will study and address harms related to the manmade pollutants at the new Southern California Superfund Research and Training Program for PFAS Assessment, Remediation and Prevention (ShARP) Center.

A team of scientists from Keck School of Medicine of the University of California (USC) and USC Viterbi School of Engineering has been awarded an $8 million, five-year grant from one of the National Institutes of Health to launch a Superfund Research Program Center where they will study environmental contamination from "forever chemicals," or PFAS, which are used to make multiple household items from cookware to furniture.

With the grant from the National Institute of Environmental Health Sciences, the USC scientists are establishing the Southern California Superfund Research and Training Program for PFAS Assessment, Remediation and Prevention, or ShARP Center. There, they will investigate how these chemicals impact liver health, and how to detect and remove them from public water sources.

Known as "forever chemicals" because they take so long to break down, PFAS are estimated to be present in the blood of more than 99% of US adults. Researchers from the Keck School of Medicine have found that these chemicals can affect nearly every organ in the body, including the kidneys and liver, and are linked to a range of rare cancers. Still, much work remains to better understand how PFAS affect health.

The new center builds on a strong foundation of PFAS research and remediation efforts by Chatzi and her team. In addition to studying how the pollutants affect health, the researchers have documented PFAS contamination of drinking water, as well as food and beverage products, and partnered with local communities to share information on how to stay safe.

The team's recent research efforts were supported by a 2023 USC President's Sustainability Initiative Award, which paved the way for the launch of the ShARP Center, Chatzi said. The pilot grant allowed researchers to gather and publish data on PFAS in Southern California and to show that a cross-disciplinary collaboration could lead to solutions.

Superfund Research Program Centers unite leaders from various fields to protect public health from hazardous substances, including those found at Superfund sites deemed as a threat to human health by the US Environmental Protection Agency. With the research grant and the establishment of the ShARP Center, USC is among nearly two dozen universities that lead Superfund research in the country, according to information maintained by the National Institute of Environmental Health Sciences.

Scientists at the ShARP Center will focus on understanding how PFAS affect liver health, building on early evidence from animal models. To explore how PFAS exposure affects human liver cells, Chatzi and her team will employ advanced techniques such as 3D spheroid modeling. These lab-grown clusters of cells help scientists more accurately simulate what happens in the human body, compared to traditional 2D cell cultures.

They will also conduct a population study that examines the link between PFAS exposure and liver disease in youth, a group that faces an outsized and growing risk of the condition. Currently, there are no effective intervention strategies to tackle the liver disease epidemic affecting children and adolescents across the country. The center researchers will investigate what factors and mechanisms may be driving the spike in liver disease and identify critical approaches to address this gap.

One major problem is PFAS contamination of public drinking water, which affects an estimated 200 million people nationwide. Researchers from the USC Viterbi School of Engineering will explore ways to remove PFAS from polluted water, including through the use of special microbes, chemicals, or heating methods that can break down the chemicals.

While research is ongoing, Chatzi and her team are already taking steps to protect public health. They have launched several efforts that aim to educate high-risk Southern California communities about the harms of PFAS exposure.

The ShARP Center will also share findings with industry partners, policymakers, and the broader scientific community, with the goal of using its remediation work as a model for similar initiatives nationwide.

FOR INFO: Laura LeBlanc, 646/ 825-0821 or Laura.LeBlanc@med.usc.edu

KLAMATH PLAN OR ANNUAL OPERATIONS

Anticipated water demands for Klamath Project water contractors are likely to be met as the Klamath Basin hydrology pivots from consecutive years of drought. Described in the 2025 Klamath Project Annual Operations Plan, initial water supply allocations from the Bureau of Reclamation are based on modeled estimates of water available for irrigation delivery and incorporate current reservoir storage, precipitation, and snowpack, as well as projected inflow forecasts.

The Klamath Project consists of approximately 240,000 irrigable acres, equivalent to 275 square miles, and is connected to two national wildlife refuges in Southern Oregon and Northern California. The 2025 Plan is used as a planning and information tool by water users and details the volume of water available for Project irrigated agriculture as well as water reserved to meet Endangered Species Act requirements in the Klamath River and Upper Klamath Basin. As of Apr. 1, snowpack was 182 percent of median with total precipitation at 140 percent of median.

Allocations are anticipated to fulfill typical demand in similar water year types for Project contractors. Reclamation will continue to monitor hydrology and may increase basin-specific allocations if conditions warrant with final adjustments made in June.

Reclamation will manage Project deliveries throughout the irrigation season to meet regulatory and all other legal and contractual obligations.

FOR INFO: https://www.usbr.gov/mp/kbao/docs/2025-klamath-project-annual-operation-plan.pdf

CALENDAR

June 17 IA

Water Treatment and Distribution Techniques, Calmar. South Winn Golf and Country Club. Presented by Iowa Rural Water Association. For info: https://storage.googleapis.com/production-sitebuilder-v1-0-3/313/1141313/MKrLjiQw/e0985d9f1c0c471e93a5ad4f2390eec5?fileName=061725-CalmarFlyer.pdff

June 17 WEB

Water Efficiency Research Committee, Virtual Event. Presented by Alliance for Water Efficiency. For info: https://allianceforwaterefficiency.org/events/water-efficiency-research-committee-5/

June 17 WEB

Living fossils - Ancient Groundwaters in the Anthropocene, Virtual Event. Presented by National Groundwater Association (NGWA). For info: https://www.ngwa.org/detail/event/2025/06/17/default-calendar/24june17web

June 17-18 TX

2025 Texas Groundwater Conference, Lubbock. Fibermax Center for Discovery. Presented by American Ground Water Trust. For info: https://agwt.org/event/2025-texas-groundwater-conference/

June 18 OR

Managing Stormwater in Oregon, Portland. Sheraton Portland Airport Hotel. Presented by Northwest Environmental Business Council & State of Oregon Department of Environmental Quality. For info: https://oregonstormwater.com/registration/

June 18 WEB

EPA Cybersecurity Guidance for Drinking Water and Wastewater Systems, Virtual Event. Presented by American Water Resources Association. For info: https://www.awra.org/Members/Events_and_Education/2025-Webinars/WEBINAR_EPA_Cybersecurity.aspx

June 18 WEB

State Climate Superfund Laws, Virtual Event. Presented by Farella Braun + Martel LLP. For info: https://lawseminars.com/seminars/2025/25SCSLWA.php

June 18 WEB

Well 2025 Webinar – Recycled Water: A Key to a Resilient Water Future, Virtual Event. Presented by Association of California Water Agencies. For info: https://www.acwa.com/events/well-2025-webinar-recycled-water-a-key-to-a-resilient-water-future/

June 18 AZ

Tapping into Change: Inspiring Action Through Marketing, Gilbert. Civic Center Drive Gilbert. Presented by AZ Water Association. For info: https://www.azwater.org/events/EventDetails.aspx?id=1963916&group=

June 20 CO

Watershed Summit, Denver. Denver Botanic Gardens' Freyer – Newman Center. Presented by Denver Botanic Garden. For info: https://www.botanicgardens.org/our-impact/water-stewardship/watershed-summit

June 20 WEB

Emerging Strategies to Build and Retain Your Water Workforce, Virtual Event. Presented by Association of California Water Agencies. For info: https://www.acwa.com/events/emerging-strategies-to-build-and-retain-your-water-workforce/

June 23-25 OH

Industrial Water Solutions 2025, Columbus. Presented by Water Environment Federation & WaterReuse Association. For info: https://www.wef.org/events--education/conferences/IWSconference/

June 25 WEB

Building Trust, Securing Water: Inclusive and Innovative Strategies for SGMA compliance, Virtual Event. Presented by Groundwater Resources Association of California. For info: https://www.grac.org/events/EventDetails.aspx?id=1954716&group=

June 26 OR

Oregon Summer Water Reuse Summit & Social, Newberg. Chehalem Glenn Golf Course. Presented by WaterReuse Association Pacific Northwest (PNW) section. For info: https://watereuse.org/event/oregon-summer-summit-social/

June 26 WEB

Conservation + AMI Committee, Virtual Event. Presented by Alliance for Water Efficiency. For info: https://allianceforwaterefficiency.org/events/conservation-ami-committee-2/

July 8-10 WEB

Water Tech Innovation: Discovering Your Path to Impact, Virtual Event. Presented by The Water Council. For info: https://thewatercouncil.regfox.com/customerdiscoveryworkshop

July 8-11 PA

One Water Summit 2025, Pittsburgh. David L. Lawrence Convention Center. Presented by the US Water Alliance. For info: https://uswateralliance.org/events/one-water-summit-2025/

July 9-10 ND

North Dakota Water Users and Water Resource Districts Associations Joint Summer Water Meeting, Devils Lake. Spirit Lake Casino. Presented by North Dakota Water. For info: https://ndwater.org/events/2025summermeeting/

July 10 WEB

NGWA's Problematic Contaminant Webinar Series: Microplastics in Groundwater, Virtual Event. Presented by the National Ground Water Association. For info: https://www.ngwa.org/detail/event/2025/07/10/default-calendar/25jul10web

July 10 CO

Headwaters River Journey Tour, Winter Park. Headwaters River Journey. Presented by Colorado Water Wise. For info: https://coloradowaterwise.org/event-6168580

July 15-16 NM

2025 New Mexico Groundwater Conference, Albuquerque. State Bar of New Mexico. Presented by American Ground Water Trust. For info: https://agwt.org/event/2025-new-mexico-groundwater-conference/

July 15-18 TX

Collection Systems and Stormwater Conference 2025, Houston. George R. Brown Convention Center. Presented by Water Environment Federation & Water Environment Association of Texas. For info: https://www.wef.org/events--education/conferences/collectionsstormwater2025/

July 17 NM

2025 New Mexico Water Well Workshop, Albuquerque. State Bar of New Mexico. Presented by American Ground Water Trust. For info: https://agwt.org/event/new-mexico-water-well-workshop-conference/

July 20-22 AZ

2025 Arizona Water Reuse Symposium, Flagstaff. High Country Conference Center. Presented by AZ Water Association. For info: https://www.azwater.org/events/EventDetails.aspx?id=1919545&group=

July 22 WEB

Education and Outreach Committee Meeting, Virtual Event. Presented by Alliance for Water Efficiency. For info: https://allianceforwaterefficiency.org/events/education-and-outreach-committee-meeting-6/

July 22 CO

Women's Water Network Forum, Colorado Springs. Cheyenne Mountain Resort. Presented by National Association of Clean

The Water Report
Water Rights, Water Quality & Water Solutions in the West
3615 W. Hills of Gold Dr. Tucson, AZ 85745

CALENDAR

Water Agencies. For info: https://www.nacwa.org/conferences-events/2025-women-s-water-network-forum

July 22-25 — **CO**

2025 Utility Leadership Conference & 55th Annual Meeting, Colorado Springs. Cheyenne Mountain Resort. Presented by National Association of Clean Water Agencies. For info: https://www.nacwa.org/conferences-events/event-at-a-glance/2025/07/22/nacwa-events/2025-utility-leadership-conference-55th-annual-meeting

July 23 — **WEB**

Community Engineering Corps Program: Real World Application, Virtual Event. Presented by American Water Works Association. For info: https://store.awwa.org/product/44380

July 24 — **TX**

Dam Safety Workshop for Owners and Operators, Austin. Commons Conference Center, The University of Texas at Austin. Presented by Texas Commission on Enviromental Quality. For info: https://www.tceq.texas.gov/p2/events/dam-safety.html

July 29-31 — **UT**

NWRA 2025 Western Water Seminar, Park City. Presented by National Water Resources Association. For info: https://www.nwra.org/event-6184316

August 4-7 — **NV**

40th Annual Tri-State Seminar, Las Vegas. South Point Hotel & Casino. Presented by AZ Water Association. For info: https://www.azwater.org/events/EventDetails.aspx?id=1903846&group=

August 5-6 — **TX**

TCEQ Public Drinking Water Conference, Austin. Presented by Texas Commission on Environmental Quality. For info: https://www.tceq.texas.gov/drinkingwater/conference.html

August 7 — **WEB**

Microgrids for Water Utilities, Virtual Event. Presented by Enchanted Rock. For info: https://store.awwa.org/product/44377

August 7-8 — **AZ**

Arizona Water Law SuperConference, Scottsdale. Hilton Scottsdale Resort & Villas. Presented by CLE international. For info: https://web.cvent.com/event/e547964e-3b6b-4d6f-b733-870fef496db8/regProcessStep1?RefId=cle.com%20more%20info

August 13 — **WEB**

Unique Challenges of Tackling PFAS in Surface Water, Virtual Event. Presented by American Water Works Association. For info: https://store.awwa.org/product/44222

August 13 — **WEB**

ACWA Quarterly Policy Committee Meetings (August), Virtual Event. Presented by Association of California Water Agencies. For info: https://www.acwa.com/events/acwa-quarterly-policy-committee-meetings-august/

August 19-21 — **TX**

2025 Texas Ground Water Summit, San Antonio. Hyatt Regency Hill County Resort. Presented by Texas Alliance of Ground Water Districts. For info: https://tagd.wildapricot.org/event-6093203

August 19-21 — **CO**

2025 CWC Summer Conference, Steamboat Springs. Steamboat Grand. Presented by Colorado Water Congress. For info: https://members.cowatercongress.org/ap/Events/Register/oXFVNwRf6C2CB

August 20 — **WEB**

Water 2050: Securing Our Future in a Circular Water Economy, Virtual Event. Presented by American Water Works Association. For info: https://store.awwa.org/product/44246