

Small Community Water Systems

June 2026



Background

Arizona's small community water systems (SCWS) are the backbone of rural water delivery, and voluntary conservation by these systems is critical to regional groundwater sustainability.

This factsheet is intended for operators, managers, and governing boards of small potable water providers, small municipal utilities, water districts, small water companies, and Tribally operated systems.^{1,2} It focuses on providers outside of Active Management Areas (AMAs) and small providers inside AMAs, where conservation programs are voluntary.³ Low-cost water conservation strategies with documented water savings are highlighted.

The U.S. Environmental Protection Agency (EPA) defines a small public water system under the Safe Drinking Water Act as a system serving 10,000 or fewer customers. This factsheet adopts this definition; however, the Arizona Department of Water Resources (ADWR) defines small community water systems (SCWS) as serving fewer than 1,851 residents. EPA, ADWR, and the Arizona Department of Environmental Quality (ADEQ) all define community water systems for regulatory purposes as those systems serving at least 15 service connections or at least 25 year-round residents in the system's service area. Some strategies and resources in this factsheet may apply to smaller systems (fewer than 1,851 residents).

Why Conservation Matters

- Arizona has been in a prolonged drought since the mid-1990s, with below-average precipitation.³ Average temperatures are projected to continue rising, accelerating groundwater depletion across the state.³ In addition, Arizona's population is expected to grow by more than two million residents by 2060, much of that growth in areas dependent on groundwater.⁵
- Programs to conserve water can be more affordable than acquiring additional water rights or upgrading infrastructure to tap limited or declining groundwater resources.
- Tribal water systems face interconnected challenges—including limited indoor plumbing, histories of hauled water, high energy costs, and water quality issues—that directly shape conservation feasibility and community priorities.⁴

Where Are Arizona's Small Community Water Systems?

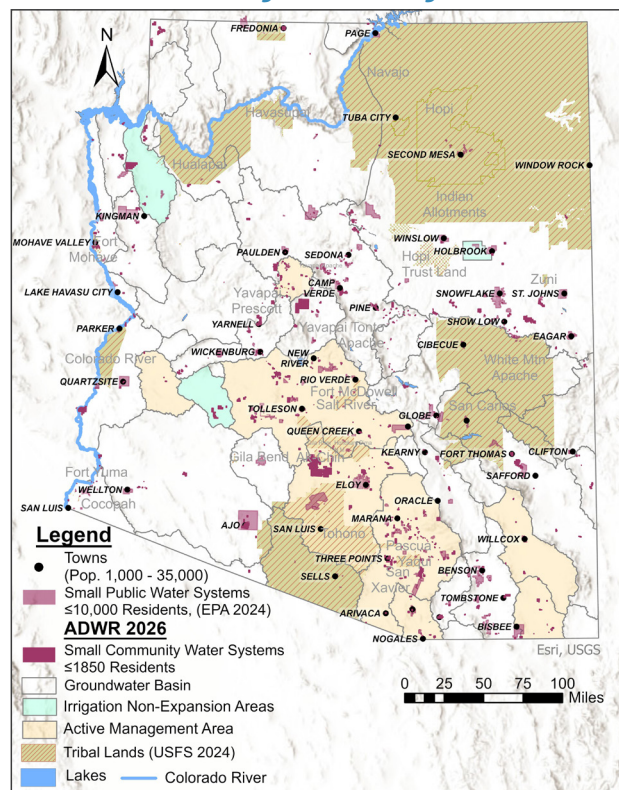


Figure 1. ADWR Small Community Water Systems,¹ AMAs and INAs,⁶ and EPA Small Public Water Systems⁷ in Arizona.

Where to Look for Water Savings

Water loss occurs at two levels for SCWS: within the distribution system before it ever reaches a customer, and at the point of use by customers. At the system level, non-revenue water (NRW), water produced but never billed, is often the single largest source of water loss. It is water that has already been pumped, treated, and pressurized but generates no revenue for the system.⁸ Small rural systems with aging infrastructure commonly lose 15–30% of their water supply through leaks, meter inaccuracies, and unbilled use.^{8,10} At the customer level, landscape irrigation typically accounts for the majority of residential demand, making outdoor efficiency programs a high-impact complement to system-level loss reduction.⁹ Understanding where water is lost — at the pipe, at the meter, or at the tap — points directly to effective conservation strategies.

Four Water Conservation Strategies

1. Leak Detection and Water Loss Audits

In Arizona's AMAs, small providers are required to keep NRW losses below 10% of total supply; ADWR works with out-of-compliance providers to achieve compliance by the following year.¹¹ Leak detection and regular water audits are among the lowest-cost, highest-return interventions available to small utilities.

Like financial audits, a regular water loss audit is considered a good business practice to save both money and water. A water loss audit compares total water produced (metered at the source) to total water billed to customers. The difference represents real losses (e.g., physical leaks in pipes, storage tanks, or service connections) and apparent losses (e.g., meter inaccuracies and unauthorized or unbilled use). Audits following the American Water Works Association (AWWA) Free Water Audit Software methodology are standard practice.⁸

Why It Works for Small Community Water Systems

- Low-cost startup: basic leak detection equipment costs under \$1,000; complete locator and sensor systems cost under \$5,000.
- Immediate return on investment: reducing NRW directly lowers pumping energy costs, chemical treatment costs, and infrastructure wear.
- Technical and financial assistance is available (see Resources link on page 4).

Estimated Water Savings

Systems with NRW rates above 20% that implement targeted leak repair programs commonly reduce water loss by 10–30%.⁷ The EPA estimates that small system leak repair can save tens of thousands of gallons per service connection per year depending on system age and condition.⁹

Programs Spotlight:

Rural Community Assistance Partnership (RCAP) Technical Assistance Program

The Rural Community Assistance Partnership (RCAP) partners with rural and Tribal water system operators across Arizona and the Southwest to provide free water audits and leak detection surveys under EPA's capacity development framework. Systems receiving RCAP technical assistance have documented NRW reductions of 15–25% following audit completion and targeted pipe repair. For a small system serving 500 connections at 100 gallons per connection per day, a 20% NRW reduction saves approximately 3.65 million

Water Loss Audit Implementation Steps

1. Establish baseline by comparing data from meters on all production wells with billing records for 12 months.
2. Calculate Real Losses and Apparent Losses using AWWA Water Audit Software (Basic free-version).⁷
3. Determine the location of leaks. Various methods for leak detection may be used, including ground penetrating radar (GPR), acoustic leak detection, or pressure zone analysis, to locate leak areas. GPR is recommended if system maps are incomplete or outdated.
4. Prioritize repairs by volume of loss and repair cost, focusing on high-loss segments first.
5. Re-audit annually to track progress and document savings for reporting to funders of repairs or upgrades.

gallons annually. This is equivalent to removing 11 homes from the distribution system.¹⁰

Indian Health Service (IHS) Sanitation Facilities Construction Program

The Indian Health Service (IHS) Sanitation Facilities Construction Program funds leak surveys and infrastructure rehabilitation in Tribally operated community water systems across reservations with deteriorating distribution lines. Tribal systems assisted through IHS programs have reduced non-revenue water substantially. On some Navajo Nation Chapter water systems, repairs of aging infrastructure have restored service continuity and reduced hauling costs for communities that previously lost significant pressure through undetected leaks.⁶

2. Universal Metering

Many small rural systems without individual meters bill customers on a flat-rate, regardless of water use. Without metering, there is no incentive for customers to conserve water, no data to detect leaks, and no relationship with water use and the water bill. Universal metering combined with pressure zone management (see next strategy) produces measurable demand reductions. With universal metering, an individual water meter is installed at every service connection.

Why It Works for Small Community Water Systems

- Customers who pay for what they use conserve 10–15% more than unmetered flat-rate customers.¹²
- Meter data identifies abnormal usage patterns that may indicate leaks at the service connection level.⁷

- Metered billing ensures that high-use customers pay their fair share, rather than having costs spread equally across all households regardless of how much water they use.¹²

Universal Metering Implementation Steps

1. Inventory all service connections, identifying unmetered connections.
2. Select AWWA standards compliant meters and procure with WIFA DWSRF funding, if available.
3. Install meters at all service connections.
4. Record meter data and integrate it into your AWWA water audit.
5. Establish a billing structure based on metered use.

Estimated Water Savings

According to industry standards, installing meters on a previously unmetered 500-connection rural system reduces demand by an estimated 10–15%.¹²

3. Pressure Management

Pressure management sets system operating pressure to the minimum level required for adequate service and reduces the physical force driving water through undetected leaks and customer fixtures.

Why It Works for Small Community Water Systems

- Leakage rate is directly proportional to operating pressure; for example, reducing pressure by 10% can reduce leak volume by 5–10%.¹²
- Lower pressure reduces pipe stress and burst frequency, extending infrastructure life.¹²
- Pressure-reducing valves (PRVs) cost \$500–\$3,000 installed and require minimal maintenance.¹²
- Pressure management is particularly effective in older distribution systems with aging pipes.¹²

Pressure Management Implementation Steps:

1. Map the distribution system identifying pressure zones.
2. Measure key node operating pressure (60–80 Pounds per Square Inch).
3. Install pressure-reducing valves (PRVs) at high-pressure entry points.
4. Re-measure pressure to ensure targets are met.
5. Be sure to document savings due to addition of PRVs.

Estimated Water Savings

By combining universal metering with pressure management targeting 60–80 PSI operating pressure, total system water savings of 15–25% are achievable.¹² For a system producing 250,000 gallons per day, this represents 37,500–62,500 gallons saved daily.

4. Conservation Education and Assistance

Customer conservation education and assistance encourages customers to reduce their water use. Within AMAs, small municipal providers are required to implement programs to:

- Minimize waste of all water supplies.
- Maximize efficiency in outdoor watering.
- Encourage reuse of water supplies.
- Increase overall water use efficiency as feasible.

Large municipal providers have a choice of regulatory program by which they reduce per capita water use. One program allows them to choose from a list of conservation practices; the number of listed practices they must implement depends on their size. The list of practices contains many that may be useful for small water providers both inside and outside AMAs.

List of Conservation Practices

- Public awareness, education, and outreach strategies include the following:
 - Conservation campaigns and special events
 - Workshops for homeowners and training programs for landscape professionals
 - Youth education programs
 - Residential audits, high water use notifications, and resolution of high water use issues
- Rebates and incentive strategies for residential and/or non-residential customers include the following:
 - Rebates to replace low water use models of residential fixtures (e.g., toilets) and appliances (e.g., washing machines)
 - Incentives for gray water systems and/or rainwater harvesting
 - Rebates or incentives for installing **xeriscape*** and/or smart irrigation controllers

Why It Works for Small Community Water Systems

- Conservation by customers leads directly to water savings.
- Readily available information, education materials, and outreach can influence customer behavior at relatively low cost.
- Rebates and incentive programs can produce measurable reductions in demand, especially valuable where supplies are under stress.

Water Savings

- Some utilities have reported more than a 20% reduction in customer water usage in response to awareness campaigns. These results over time can make the difference during drought or supply shortages.
- Rebates and incentives for equipment upgrades or other structural changes achieve more lasting reductions.

Case Study: Sierra Vista, Arizona, System Efficiency and Conservation Program

Sierra Vista implemented a multi-year conservation program including advanced metering and xeriscape rebates to substantially reduce per capita water use. The city's 2022–2030 Conservation and Drought Management Plan set measurable efficiency goals for both residential and commercial users, and xeriscape demonstration gardens promoted drought-tolerant landscaping.¹³ Combined with groundwater protection measures, these strategies protect the Upper San Pedro aquifer and the San Pedro River.

Water Rates

Water system revenues typically cover costs. There are multiple rate structures that can yield the same revenue, with some rate structures designed to encourage water conservation. Information about conservation-based rate structures can be accessed through water industry associations such as the American Water Works Association, government agencies, or other water utilities (see Resources link below).

Tribal Communities

Arizona's 22 federally recognized Tribal Nations have long managed water resources with deep stewardship traditions. Water efficiency in Tribal contexts must be understood within the frameworks of Tribal sovereignty, water rights, infrastructure access disparities, and community-defined priorities.

Tribal Water Efficiency Context

- We use the term water efficiency rather than water conservation in Tribal contexts because conservation can imply giving up or reducing a resource. Many Arizona Tribal Nations hold legally quantified water rights through adjudication or settlements. These rights are not subject to forfeiture or abandonment. For Tribal Nations whose water rights were hard-won through decades of legal battles, reducing water use does not entail any reduction in a Tribe's legal entitlement.¹⁴ **The term water efficiency better reflects the goal of expanding existing supply to fulfill purposes the Tribe deems important.**¹⁴
- The Indian Health Service (IHS) Sanitation Facilities Construction Program is the primary federal infrastructure funding mechanism for Tribal systems; The U.S. Department of Agriculture Natural Resources Conservation Service (USDA NRCS) and Bureau of Reclamation each offer Tribal-specific technical and financial assistance programs.⁴ WIFA programs, <https://wifa.az.gov/programs> may also support eligible Tribal community water systems.

Non-Tribal Water Providers Working with Tribal Communities

- Engage Tribal water administrators early in any shared basin water efficiency planning. The Indian Water Rights 101 guide from the Native American Rights Fund (NARF) provides an accessible background on water rights frameworks relevant to small system operators in shared basins.¹⁴
- Tribal and non-Tribal water efficiency strategies are not interchangeable. Hauled water histories, variable plumbing access, and energy cost disparities shape feasibility differently. Any outreach or planning that assumes piped water access may miss a significant portion of the Tribal population.
- Costs for construction of infrastructure can be three times higher on Tribal land; where Tribal companies exist, they can lower costs and realize infrastructure expansion faster.
- Technical and financial assistance is available⁴ (see Resources link below).

Getting Started

Many resources are available to operators of small community water systems for adopting water conservation strategies. Ultimately, the community you serve and the environment will both benefit. **Please use the QR code link below or visit wrrc.arizona.edu/conserve to find additional resources and references (linked by numbers in the text) used for the creation of this factsheet.**

Additional Definitions, Resources, and References

wrrc.arizona.edu/conserve



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