features

# We Will Miss the Water If the Wells Run Dry

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Water is essential to life. Early settlements were located close to an adequate water supply, and settlers carried water from hand-dug wells, streams, and lakes. As settlements grew into villages and then into towns and then into cities, water infrastructure also grew to import water from great distances. Although cities typically added and improved infrastructure as population and growth demands have required, in recent years a series of factors have drawn attention to the adequacy of water delivery systems. Aging components, use of early materials now believed to be harmful, population flux, and increased drought from climate change now require a focus on modification of these systems.

## Aging Infrastructure

In many cases, water is supplied to homes and businesses across the country through a vast network of pipes and supply infrastructure, and the age and condition of the system require attention. The American Water Works Association's *State of the Water Industry* report for 2021 lists renewal and replacement of water and wastewater infrastructure as the number one issue, followed by financing for capital improvements and long-term water supply availability. The annual number of water main breaks across the country is high; according to one estimate, there are between 250,000 and 300,000 breaks per year. Steven Folkman, Utah State Univ. Buried Structures Lab'y, *Water Main Breaks in the USA and Canada: A Comprehensive Study* (Mar. 2018). A large portion of the infrastructure is made up of cast iron pipes; 82% of cast iron pipes are over 50 years old and experiencing a 46% increase in break rates. *Id.* Further, at least one study found that breaks increased 27% from 2012–2018, and that 16% of installed water mains are beyond their useful life. *Id.* Moreover, while a massive break often makes the nightly news, a leaking pipe may go undetected for years. Breaks and leaks account for an estimated loss of 2.1 trillion gallons of water per year. *Id.*

The financial requirements to address the infrastructure need is not small. In the U.S. Environmental Protection Agency's (EPA's) 6th Drinking Water Infrastructure Needs Survey and Assessment (2018), the agency reported that the 20-year capital improvement need for drinking water infrastructure was $472.6 billion. The estimate was based on Drinking Water State Revolving Fund (DWSRF)–eligible infrastructure projects but does not include costs for projects generally considered ineligible for DWSRF funds such as raw water dams and reservoirs, projects related primarily to population growth, and water system operation and maintenance costs. Thus, the actual capital improvement needed is much larger; in fact, one estimate calculates that the funding gap could exceed $1 trillion. NRDC, *Going Back to the Well: States and the Federal Government Are Neglecting a Key Funding Source for Water Infrastructure* (May 2018).

By itself the issue of leaking infrastructure, pipe breaks, and the corresponding loss of drinking water is a significant concern, but when drought and the ever-increasing resource demand are added to the discussion, the situation becomes even more serious.

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## Climate Change and Droughts

Resource availability, or the rising lack thereof, makes infrastructure water loss a more significant issue. Trending drought conditions in the country, worsened by climate change, are suggesting a new pattern of water scarcity. Over time this can mean creeks, rivers, streams, and lakes experience reduced flow or even dry up. *See* Amy Joi O'Donoghue, *Is It Too Late to Save the Diminishing Great Salt Lake?*, Deseret News (Mar. 2, 2022). Climate change has further altered these conditions by making them more frequent, longer, and more intense. Andrea C. Ostroff et al., U.S. Geological Serv., *USGS Integrated Drought Science* (2017). Further, the U.S. seasonal drought outlook released April 30, 2022, by the National Weather Service Climate Prediction Center predicts drought persistence in nearly half the country's land mass. The current predictions map drought conditions as far south as the southern portion of Louisiana, west to the Pacific coast, and rising Northwest to the eastern area of Washington. The National Oceanic and Atmospheric Administration National Center for Environmental Information, U.S. Drought Monitor (May 18, 2022), states that while there may be geographic differences, "If you live in the United States, you've probably experienced some type of drought over the past two decades." Thus, while drought is generally thought to be an issue of the western United States, if you factor time into the analysis, it is an issue for the country as a whole.

Some journals suggest that within as little as 50 years many regions of the United States could see their fresh water supply reduced. For areas in the Rocky Mountains and Southwest, the reduction may have already begun in 2020–2021. John Heggie, *Why Is America Running Out of Water*, Nat'l Geographic (Aug. 12, 2020). This same study notes that the shortages will not only affect arid regions but predicts that 96 out of 204 water basins across America are at risk.

Despite the large-scale scope of drought in America, the concern is obviously heightened in the historically arid regions. Data indicate that by 2050 many states have an "extreme or high risk to water sustainability or are likely to see limitations on water availability as demand exceeds supply. These areas include parts of Arizona, Arkansas, California, Colorado, Utah, Florida, Idaho, Kansas, Mississippi, Montana, Nebraska, Nevada, New Mexico, Oklahoma, and Texas." NRDC, *Climate Change, Water, and Risk: Current Water Demands Are Not Sustainable* (July 2010). In 2010, the concept that the U.S. would see limitations on water availability as demand exceeds supply was prognosticative; 10 years later the data seem factual. Even recognizing cyclical water seasons—some years above-average rainfall, some years below-average—the likely conclusion is that climate change is a significant factor in changing drought patterns and increased water scarcity.

## Development and Population Demand

But aging infrastructure and changing climate and weather patterns are not all that must be contended with. As the population of the country not only grows but migrates to new regions, we are seeing how changes in human demand might become one of the most significant threats to water security in many communities. The need for real estate development is constant because population migration, new generations, lifestyle choices, and the evolution of technology drive economic changes in consumer tastes, attitudes, and individual preferences. This reconfiguration relies on either existing or expanded infrastructure to bring access, utilities, and other essential services to users. If existing infrastructure has the capacity to deliver the required services, no modifications are usually necessary. However, as we're seeing more frequently, especially in the south and west, a proposed use either outstrips existing capacity or creates the need for additional infrastructure not already in place. In these cases, new or modified utilities must be put in place to ensure the delivery of safe drinking water and management of wastewater.

As with many elements of the market, real estate development follows user demand. The more users, the greater the demand, and the current population demand is likely to strain drought-impacted regions. Following a preexisting pattern, the 2020 U.S. Census Report identified Nevada, Idaho, Utah, Texas, and North Dakota as states with the largest percentage growth over the prior census with "twice the U.S. percent change." Thus, four of five of the fastest-growing states are either in the Southwest or Mountain West, and those states are all currently classified as experiencing severe drought. Closely behind these five states were Colorado, Montana, Arizona, Washington, South Dakota, Minnesota, Florida, and several states in the Southeast. Colorado, Montana, Arizona, and eastern Washington also are classified with severe drought. Population growth and inward migration to all these drought-impacted states, along with continued effects of climate change, portend a perpetual increase in water demand coupled with a decline in available natural water sources. As an increasing number of communities that subsist off natural water supplies face water shortages (potentially with increasing severity), the need for water preservation and new water conflicts seem certain.

Disputes over water are as old as the law is young; as Mark Twain aptly put it, "Whisky is for drinking—water is for fighting." States battle over the right to water, landowners regularly dispute claims to water, and as water becomes scarcer, new disputes will arise. If drought continues to reduce supply and population movement increases demand without some action to address the issue, new development of real estate will be challenging and potentially even curtailed. Communities have already begun to withhold approval of development permits, requiring projects be put on hold or demonstrate that they have a private source of water. Alex Brown, Pew Charitable Trusts, *Drought Stricken Western Towns Say No to Developers* (Oct. 12, 2021). The pattern of population growth outstripping the capacity of local water supplies, followed by investments of thousands of dollars per person to import water from great distances, is not new, but aggravated through increased water drought, especially in the west.

The problem is plainly formulaic: Loss of trillions of gallons of water across the United States through aging infrastructure, alongside drought conditions and water shortages, plus population migration straining (and often outstripping) the capacity of local water supplies, equals a pressing need to evaluate and implement available options, including some measures that are outside of the normal toolbox.

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## Governmental Funding Assistance

Options for funding upgrades, replacement, and construction of new water systems would seem to be the logical place to begin. There have been several federal programs developed to assist in the construction and renewal of drinking water infrastructure projects, most notably the DWSRF, the Water Infrastructure Finance and Innovation Act of 2014 (WIFIA), and the U.S. Department of Agriculture (USDA) Rural Utilities Service Water and Environmental Program (WEP).

The DWSRF operates through funds appropriated by Congress that EPA then uses to award capitalization grants to each state based on the most recent Drinking Water Infrastructure Needs Survey and Assessment. States then place the funds into a revolving loan fund that provides loans and assistance for eligible projects within each state. As the loans are repaid, the funds are used to make additional loans.

The WIFIA created a federal credit program administered by EPA for eligible water infrastructure projects. Eligible borrowers include government entities, partnerships and joint ventures, corporations and trusts, and the Clean Water and DWSRF programs.

The WEP are a group of programs administered by USDA for rural communities with populations of less than 10,000 people. The programs are intended to provide rural communities with the technical assistance and financing necessary to develop drinking water and waste disposal systems.

Supporters and critics alike have long argued for increased appropriations to the federal revolving fund programs to address the estimated $1 trillion need. Congress recently acted on such recommendations and increased appropriations to, among other programs, the DWSRF and WIFIA. Through The Infrastructure Investment and Jobs Act of 2021 (IIJA), Congress dedicated $55 billion to aggregate water issues and water infrastructure improvements. The IIJA also amended the Safe Drinking Water Act (SDWA) section 1452(d) to expand forms of additional subsidization for projects serving disadvantaged communities. Moreover, in addition to current authority to forgive loan principal, states may provide additional subsidies using grants, negative interest loans, and other loan forgiveness and through buying, refinancing, or restructuring debt. IIJA also conditionally requires states to use at least 12% of their capitalization grant for these subsidies and excludes loans with zero or higher interest rates from the definition of "additional subsidization."

To ensure the effectiveness of these programs, states need to actually use the revolving funds. Critics of the state revolving fund programs often complain that many states simply have not taken steps to leverage the federal programs. For example, in addition to capitalization grants, there are avenues to provide debt guarantees or municipal bond insurance to enable a community to get private financing. The Act also provides a mechanism to issue state bonds that are deposited back into the fund to increase the long-term financial capacity. Even with full utilization of the significant IIJA appropriations and the amendment to the SDWA, which should improve the ability to use the programs, there remains a gap in necessary funding that is unlikely to be filled through governmental appropriation, so other options will need to be developed.

## Municipal Government Opportunities

Beyond financing the upgrade and replacement of aging infrastructure to address water loss across the United States, measures could also be taken to address population demand where drought conditions strain aging infrastructure.

One already-established tool is the municipal use of development exactions and conditional development approval. Exactions are a form of government-required contributions by a developer to provide for the provision of public facilities related to their developments. Often municipal development entitlements (development approvals) are conditioned on the provision of these contributions. The U.S. Supreme Court established the foundation for the current conditional exaction doctrine in *Nollan v. California Coastal Commission*, 483 U.S. 825 (1987), and *Dolan v. City of Tigard*, 512 U.S. 374 (1994), which, when read together, explain the constitutionality of conditional exactions.

According to these cases, a conditional exaction is constitutional if (1) there is an "'essential nexus' . . . between the 'legitimate state interest' and the permit condition exacted by the city" and (2) the permit condition is "roughly proportionate" to the "projected impact of the proposed development." *Dolan*, 512 U.S. at 386 (quoting *Nollan*, 438 U.S. at 837). Based on this legal concept, it may be appropriate to require a party seeking to develop to also participate in the financing, upgrade, improvement, or installation of infrastructure burdened by its new development—maybe even to itself provide water sufficient for the development. The question will be the extent to which the requirements imposed relate proportionally to the development burden, since the exaction limitation is "to bar Government from forcing some people alone to bear public burdens which, in all fairness and justice, should be borne by the public as a whole." *Nollan*, 483 U.S. at 836 n.4. There are similar cases that support this concept. In *West Linn Corporate Park L.L.C. v. City of West Linn*, 428 F. App'x 700 (9th Cit. 2011), the Ninth Circuit upheld the conditions of approval for the development that required the plaintiff (developer) to construct several offsite public improvements with its personal property (money, sand, piping, and gravel, etc.).

If the exaction theory is to be used, the question is whether the burdens created by climate change, loss of trillions of gallons of water across the United States through aging infrastructure, plus population migration overburdening the capacity of local water supplies, add to a set of facts to support the conclusion that a conditional exaction is a proportionate burden. The severity of the situation may indicate that it is, in fact, proportionate.

Aside from the concept of a formal exaction, voluntary public private partnerships (PPP) for small community water systems may be less acrimonious and more effective. PPPs have been utilized for decades to promote mutual governmental, citizen, and private party interests. For example, in 2016, San Antonio, Texas, and private investors teamed up in what some claim is the largest PPP in the water sector. The PPP worked to create a project designed to treat and deliver up to 50,000 acre-feet per year of water to the San Antonio Water System. The project is expected to increase access to drinking water by 20%. Allan T. Marks, Milbank Tweed Hadley & McCloy LLP, *Vista Ridge to Deliver 20% More Water* (2017). There are

other examples where private companies have partnered with municipalities to explore desalination, development of new water lines, underground piping, and management staffing—all efforts seeking to achieve revenue enhancements, produce system upgrades, and develop new water supplies.

Municipalities and developers should also work toward conservation subdivision design and water preservation elements for all residential and commercial construction. Subdivision design should evaluate and incorporate preservation measures such as use of permeable soils or pavements, rainwater tanks, rain gardens, green roofs, xeriscaping, gray water systems, and microclimate evaluation that reduce ambient air temperatures. Other elements such as rain barrels and cisterns can store runoff for nonpotable uses such as irrigation, which helps conserve drinking water. Conservation design is finding its way into municipal codes and is being implemented voluntarily through many development designs. For example, Saratoga Springs, New York, requires that all proposed subdivisions in certain residential zones be conservation subdivisions. Henderson County, North Carolina, requires conservation subdivision standards to apply to all subdivisions proposing 35 lots or more. Some municipalities like Cumberland, Maine, state simply that the conservation subdivision is preferred and require a conservation plan to be submitted.

## Trending Options

But even these readily available options are unlikely to be enough. We will need to look beyond the "norm" to find a solution to this trifecta of strains on our water systems.

Water banking is an interesting tool to add to the box. Water banking is usually seen in one of two forms: physical water banking and virtual water banking. Physical water banking involves the "transfer of water from one region to another or capture of excess surface runoff into storage in a groundwater aquifer or surface water reservoir." Sheryl Luzzadder-Beach & Jonathan Flood, *Water Banking*, Int'l Encyclopedia of Geography (2017). Basically, water banking seeks to divert floodwater or surface water into an aquifer where it can be stored and used later. Water banking seeks to protect an aquifer from being overdrawn and, with proper management, can create a water balance between wet and dry seasons. For example, Texas, California, Arizona, and Nevada have successfully implemented water banking programs for water conservation. *Id.* Virtual water banking programs, on the other hand, involve the trade of water use or water withdrawal rights within a market. Functionally, it is a market-based tool that is designed to facilitate transactions between willing buyers and sellers. Some of the goals include creating alternatives to traditional transfers, adding flexibility to water rights, and improving water quality and recreation through greater access to water. In Utah, for example, the Utah Water Banking Act was enacted as a 10-year pilot project that promotes the creation of local water banks to manage temporary leasing and optimization of local water rights. Utah Water Banking Act: Legislative Summary and Key Considerations, Utah Water Banking (2020).

Water metering is another tool that might help by seeking to monitor and reduce water consumption. Specifically, water metering is designed to account for water user consumption rates. It can also be used to establish a fee associated with water use and may assist with preventing water loss from aging infrastructure since metering helps detect leaks in the piping system. Water metering has been resisted in many states largely due to the capital investment necessary to install and monitor meters and citizen opposition. In addition, smart water technologies such as leak detection, seismic resilient pipes, and improved real-time data sensors are all measures that could improve the adequacy of water supply infrastructure.

Outside of water infrastructure measures, watershed protection is another important method for water conservation, including measures focused on preventing contaminants from entering the source, restricting overuse, requiring permits and licensing for water-use and water-affecting activities in the watershed, and hydrologic zoning to prevent nutrient loading and sediment runoff into watersheds.

Additionally, private companies, foundations, and academic institutions focused on improving drinking water quality should evaluate grant or other funding to support technological development and innovation. For example, the science behind geo-engineering techniques designed to modify weather to produce increased rain and enhanced snowpack is now more robust in terms of data collection and pilot tests, and it may have the potential to increase water supply.

Finally, consumers must also become part of the solution. Even with infrastructure upgrades, consumer habits must change, and this may be the most difficult issue. Conservation and smart use of drinking and irrigation water must be embraced. Smart landscaping consistent with the geographic region should become a norm. Agricultural and industrial processes also need to be more efficient and include development of better irrigation technologies evaluating wastewater supply, smart drip and pivot irrigation systems, and desalinization supply plants.

The combination of aging infrastructure, climate change and increased drought, and population increases and migration has created the perfect storm for water infrastructure concern in America. Resolution of the issue will require a combination of efforts and a willingness of stakeholders to work together. Yet modification of environmental policies cannot be the only solution; by its nature, environmental policy swings wildly depending on the party in power and, while it may provide for temporary improvements, it cannot be relied on to bring stability or resilience. Likewise, conservation measures are needed, but they alone will not ensure an adequate supply of water. And although some of the techniques discussed will be ineffective on their own, it is time for a comprehensive approach using a myriad of options to resolve a dire situation. We must be proactive if we want to ensure water resources can meet demand, especially in drought-stricken areas. We must address water infrastructure and aging water systems as soon as possible, or else the infrastructure will continue to decline, perhaps putting us in a place from which we cannot recover. Populations migrate, industry changes, and local/regional/national needs morph. It is time to take prompt steps to ensure an appropriate supply of wet gold.

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