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Pricing Water's True Cost

Recently, a California panel rejected a proposal for a USD 1.4 billion desalination plant to convert ocean water into drinking water. The developer had hoped the plant would address the state's megadrought by creating 50 million gallons of drinking water a day.[1] Yet, in this age of climate change leading to multiyear droughts, frequent floods, and wildfires, we can no longer rely simply on building new plants and water storage that negatively impact the environment to climb our way out of the increasing water crises. Clean water is imperative to all life and is essential to the economy. Yet, in the United States, clean water is a resource long taken for granted. Part of the reason that people do not value water is because water is priced so cheaply due to the government subsidizing it.[2] Unfortunately, many places still price municipal water much lower than the true cost to provide it. Not surprisingly, freshwater resources are depleting more rapidly due to increased demand, exacerbated by the environmental stress of climate change.[3] The nation's water and sewer infrastructures are also rapidly aging and deteriorating, while most water providers have insufficient funds to modernize them. The system by which water is priced in the US should be raised to the full-cost pricing because it would generate essential revenue to adequately maintain or replace critical water and sewer infrastructure, and it would markedly encourage the public to

1 Stephanie Elam, "As water runs short in California, commission rejects $1.4 billion desalination plant," *CNN*, May 12, 2022, https://www.cnn.com/2022/05/12/us/california-water-desalinization-vote-drought-climate/index.html.
2 Holly Stallworth, "Water and Wastewater Pricing An Informational Overview," *US Environmental Protection Agency (EPA)*, (2003): 2-3, https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=901U1200.txt.
3 Thomas Brown, "Adaptation to Future Water Shortages in the United States Caused by Population Growth and Climate Change," *Earth's Future* 7, no. 3 (March 2019), https://doi.org/10.1029/2018EF001091.

conserve water. By implementing one or more of the rate pricing structures to transition to a full-cost pricing system that better reflects the true cost of water, water providers can better protect and ensure a continuous clean water supply for communities in the face of growing water scarcity.

Background

Water rates are usually managed by local or regional governing boards, which can be composed of elected public officials or appointed officials. The decisions of elected public officials can be heavily influenced by public sentiment and by water-dependent industries, whereas governing boards with appointed officials, often appointed by local politicians, are less politically constrained.[4] Water pricing can also be constrained by the state's water laws that dictate the responsibilities of the water provider.[5]

The nation's water rates have been historically underpriced. From the mid-1940s to the 1980s, the government subsidized a great deal of the municipal water infrastructure, leading to the water rates in many municipalities to be based on the cost to deliver water to customers.[6] Since the delivery fee becomes cheaper as higher volumes of water are delivered, many water providers implemented a declining block rate pricing structure which gives increasing rate discounts to high volume water users. A block rate system sets a determined price for a "specified consumption range," referred to as a "block."[7] In a declining block rate structure, water customers pay a decreasing rate per unit of water in each subsequent block of water used. The declining block rate structure usually keeps water artificially priced low, as it does not adequately reflect the full cost of

4 James Goldstein, "Full-Cost Water Pricing," *Journal (American Water Works Association)* 78, no. 2 (1986): 57-60, http://www.jstor.org/stable/41272599.
5 Stallworth, "Water and Wastewater Pricing An Informational Overview," 3.
6 "The Economic Benefits of Investing in Water Infrastructure: How a Failure to Act Would Affect the US Economic Recovery," *American Society of Civil Engineers (ASCE)* (2020): 14, http://www.uswateralliance.org/sites/uswateralliance.org/files/publications/VOW%20Economic%20Paper_0.pdf.
7 Barbara Lippiatt, "Water Rates and Residential Water Conservation," *Journal (American Water Works Association)* 74, no. 6 (1982): 278–81, http://www.jstor.org/stable/41271022.

water service, such as the operation, maintenance, and replacement of the water and sewer infrastructure.[8] In addition, the declining block rate rewards high volume users with discounts, which does not encourage water conservation. Thus, consumers are accustomed to the artificially low water rates and have generally opposed rate increases.[9]

At the same time, the United States' water infrastructure is aging and deteriorating. Much of the municipal water infrastructure was built after World War II and in the period following the Clean Water Act of 1972. Most water infrastructure, such as pipes, systems, and meters last between 15-100 years. Thus, considerable portions of the water infrastructure are nearing their useful lifespan and will need to be repaired or replaced before they fail or by 2040.[10]

Full-Cost Pricing

A better water rate structure would be to implement pricing rates that would account for all costs of supplying the water, known as full-cost pricing. The full-cost pricing of water factors in most of the costs of water service in the price of the water, including billing and administration, building, operations, maintenance, depreciation, and replacement of water and wastewater infrastructure, providing wastewater treatment and drinking water treatment service, in addition to the delivery of water.[11]

Types of Full-Cost Pricing Rate Structures

There are a few different methods that can be used to structure water rates to reflect full-cost pricing, such as a uniform rate, a seasonal rate, and an increasing block rate. First, a uniform

8 Bourree Lam, "Finding the Right Price for Water," *The Atlantic*, March 24, 2015, https://www.theatlantic.com/business/archive/2015/03/finding-the-right-price-for-water/388246/.
9 Goldstein, "Full-Cost Water Pricing," 57.
10 *ASCE*, "The Economic Benefits of Investing in Water Infrastructure: How a Failure to Act Would Affect the US Economic Recovery," 14.
11 Goldstein, "Full-Cost Water Pricing," 55–56.

or flat rate charges a single fixed rate for all unit volume of water for all water customers. A uniform rate would be better in capturing the true cost of water than a declining block rate because large volume users would not receive a volume discount, hence paying a fairer share for the large amount of water they use.[12]

Next, a seasonal or peak rate structure charges higher prices during peak demand, such as during the summer months when outdoor irrigation peaks. The seasonal rate helps to fund the additional capacity needed to meet peak water demands and provides a signal for the public to conserve water. A seasonal rate can be applied on top of any rate structure. It is most commonly combined with a uniform rate structure in which the seasonal rate can be applied to all water used or just the water used that exceeds a predetermined amount, allowing for basic water needs to still be affordable.[13]

Finally, an increasing block rate structure works the reverse of a decreasing block rate. For each subsequent block of water used, the rate increases. This would encourage customers to conserve water in order to pay a lower-priced bill. An increasing block rate also helps keep water affordable since the volume size of a household's basic indoor water needs can be met at lower rates in block 1. Block 2 volume and rate would increase to meet the water needs of a moderately landscaped property. Inefficient or wasteful water use would be captured in the rates of additional blocks.[14] Increasing block rate helps put the burden of paying for most of the water expenses on customers who can afford to use large amounts of water.[15]

The type of full-cost pricing method implemented depends on the goals of each water

12 Goldstein, "Full-Cost Water Pricing," 55-56.
13 Goldstein, "Full-Cost Water Pricing," 56.
14 "Arizona Water Meter: A Comparison of Water Conservation Programs in 15 Arizona Communities," *Western Resource Advocates* (October 2010): 7, https://westernresourceadvocates.org/wp-content/uploads/dlm_uploads/2015/07/Arizona-Water-Meter.pdf.
15 Ziv Bar-Shira, "Block-Rate versus Uniform Water Pricing in Agriculture: An Empirical Analysis," *American Journal of Agricultural Economics* 88, no. 4 (2006): 986–99, http://www.jstor.org/stable/4123541.

district and the composition of its customers. Increasing block rates are most effective in municipalities that want to convey the value of water to customers, such as in arid regions. It also works better in municipalities with a high number of residential households. In water districts with a high number of industrial companies or agriculture that use high volumes of water, a flat rate would work better as the water rates are priced the same no matter who the customer is or the volume used.[16]

Declining and Unreliable Government Funding and Subsidies

Over the decades, government funding for water infrastructure has drastically decreased, leaving a large gap in funding. Government funding is unreliable in that water providers have to compete with other entities for scarce tax resources and usually do not receive full funding to properly operate, maintain and improve water and sewer infrastructure.[17]

There was a spike in federal funding and subsidies in the 1940s and the 1970s, which prompted most of the municipal water and sewer infrastructure to be built. The Department of Interior's Bureau of Reclamation and the US Army Corps of Engineers financed water infrastructure projects. Federal subsidy also came from the EPA's Construction Grants Program (1972-1992), which provided grants for wastewater treatment plant construction, the Clean Water Act (1972), and the State Revolving Fund program (1990s), which provided federal seed money for low-interest loans for wastewater treatment.[18]

However, federal government funding and subsidies have decreased drastically over the decades. During the 1970s, the federal government allocated 63 percent of all federal capital spending towards water infrastructure, such as the construction of treatment plants, water storage,

16 Goldstein, "Full-Cost Water Pricing," 56.
17 Stallworth, "Water and Wastewater Pricing An Informational Overview," 3-4.
18 Stallworth, "Water and Wastewater Pricing An Informational Overview," 2-3.

distribution lines, and conveyance systems. Now, less than 10 percent of the federal capital spending is invested in water infrastructure. Thus, this leaves much of the funding for water infrastructure on water providers and local and state governments, which usually do not have sufficient funds to fully invest in the maintenance and replacement of deteriorating infrastructure.[19]

In 2019, the combined local, state, and federal governments only funded 37 percent of total water infrastructure capital needs. The result is a cumulative gap in infrastructure funding that is estimated to grow to USD 2.2 trillion by 2039. As for the operating and maintenance of water infrastructure, which includes the system components necessary for the day-to-day activities, these expenses were met at 90 percent in 2019. Yet that still leaves a cumulative gap in operating and maintenance costs estimated to grow to USD 287 billion by 2039.[20]

The previous decades' large funding from the federal government and dependence on state and local government for funding water services, which include costs for infrastructure, operation, and maintenance, has created an unintended effect of the disconnect of rate price as a tool to regulate the supply and demand of water. This has contributed to water being priced artificially low even when water becomes scarce and to the public's disconnect in the value of water.[21] Thus, with drastically reduced government subsidies and artificially low water rates, water providers have not been able to generate adequate revenue to cover the full service and cost of providing water.

A Risk to Public Health

The funding gap and revenue deficiency of water providers has delayed the fixing or replacing of aging and deteriorating water and sewer infrastructure. Indeed, this poses serious

19 *ASCE* "The Economic Benefits of Investing in Water Infrastructure: How a Failure to Act Would Affect the US Economic Recovery," 14.
20 *ASCE* "The Economic Benefits of Investing in Water Infrastructure: How a Failure to Act Would Affect the US Economic Recovery," 12.
21 "Failure to Act: Economic Impacts of Status Quo Investment Across Infrastructure Systems," *ASCE* (2020): 4, https://infrastructurereportcard.org/wp-content/uploads/2021/03/FTA_Econ_Impacts_Status_Quo.pdf.

public health risks and potential disruption to the clean water supply. The American Society of Civil Engineers estimated that six to ten million lead service pipes across the nation need to be removed and replaced.[22] In fact, the public health crisis in Flint, Michigan from corroded lead pipes has highlighted how the clean water supply was disrupted, and it caused residents and a generation of children to be harmed by lead-contaminated drinking water.[23] Additionally, emerging chemical threats and climate change will continue to pose new challenges. Per- and polyfluoroalkyl substances (PFAS), aka 'forever chemicals', could impose new, costly water treatment regulations.[24] Certainly, climate change threatens the nation's water system with "declining surface water flows and aquifer recharge, sea-level rise, salt-water intrusion, flooding, drought, and wildfire."[25] The consequence of the inability of water providers to fully fund capital spending projects and operation and maintenance is a growing public health threat to water customers.

Reduce Reliance on Government Funding and Subsidies

Full-cost pricing would allow water providers to reduce or eliminate reliance on government funding and subsidies for operation, maintenance, and improvement costs of water infrastructure. Full-cost pricing would shift reliance from government subsidies by generating enough revenue so that the infrastructure maintenance, operations, and maintenance costs are mostly funded from the revenue of the water providers.[26]

22 *ASCE* "The Economic Benefits of Investing in Water Infrastructure: How a Failure to Act Would Affect the US Economic Recovery," 16.

23 James Dean, "Water crisis increased Flint children's lead exposure," *Cornell University*, January 25, 2022, https://news.cornell.edu/stories/2022/01/water-crisis-increased-flint-childrens-lead-exposure.

24 *ASCE* "The Economic Benefits of Investing in Water Infrastructure: How a Failure to Act Would Affect the US Economic Recovery," 18.

25 *ASCE* "The Economic Benefits of Investing in Water Infrastructure: How a Failure to Act Would Affect the US Economic Recovery," 18.

26 Goldstein, "Full-Cost Water Pricing," 56.

A successful example of full-cost pricing is Boston's switch in 1978 from a declining block rate to a uniform rate structure, which helped them reach self-sufficiency and improved the water service management. Within 7 years of switching, the Boston Water and Sewage Commission (BWSC) went from being heavily subsidized by the local government to being financially self-sustaining. In the first year of the switch, BWSC increased the water rates by 75 cents from USD 7.65 per 1,000 cubic feet, which helped to cover the full costs of water service. As a result of the increased revenue generated from a change in both the rate structure and rate price, the BWSC was able to actively detect and repair over 100 supply-side water leaks. Due to the significant financial savings from fixing leaky pipes, the following year, water rates were decreased to USD 7.55, and again lowered in 1983 to USD 7.48 per 1,000 cubic feet. Thus, by implementing a full-cost water rate system, the BWSC no longer needed to rely heavily on government funding and was able to reach self-sufficiency in their water service operation. With this self-sufficiency, BWSC was able to maintain the water infrastructure more regularly, fixed costly leaks in the system, and prevented failures in the system.[27]

Furthermore, with a full-cost pricing structure, water providers would generate sufficient revenue to fund the capital projects, such as replacing or building new water infrastructure. For large capital projects, BWSC sold bonds and recouped the principal and interest costs by increasing the water and sewage rates.[28] Thus, full-cost pricing can create for water providers a more self-sustaining, revenue-generating, water service operation that also increases system efficiency without heavy reliance on government subsidies, and it allows the flexibility to price water rates to cover larger capital projects.

27 Goldstein, "Full-Cost Water Pricing," 60-61.
28 Goldstein, "Full-Cost Water Pricing," 60-61.

Water Conservation

Water conservation will need to play a more critical role in the solution of the growing water crisis if projected water demand continues to exceed future freshwater supply. This is especially applicable in arid regions that expect development and population growth, which will put a greater demand on existing or diminishing water supply. Large population growth is expected in arid regions such as Phoenix and Las Vegas.[29,30] In the coming years, climate change will also stress water supplies as prolonged drought, higher temperatures, and increasing forest fires impact the volume and flow of rivers and streams.[31,32] Indeed, the Government Accountability Office expects "sustained droughts" in at least 36 states in the next decade.[33] Thus, one way to meet water needs is by decreasing the demand for water by encouraging water customers to conserve water. After all, when water conservation decreases the usage demand, the need to build additional expensive water storage and other infrastructure also decreases or can be delayed.

Unfortunately, the commonly used declining block rate structure does not encourage conservation. After all, the declining block rate model depends on a continuous delivery of large volumes of water to generate revenue and to minimize additional revenue loss for water providers. Though there is a certain amount of water that people need to use for subsistence, 15 gallons per day per person, there is a fair amount of water use that is non-essential, such as watering lawns and landscaping, filling pools, and washing automobiles.[34] Thus, when water prices are artificially low

29 Jack Healy, "No large city grew faster than Phoenix," *The New York Times*, August 12, 2021, https://www.nytimes.com/2021/08/12/us/phoenix-census-fastest-growing-city.html.

30 "2021-2060 Population Forecasts: Long-Term Projections for Clark County, Nevada," *University of Nevada Los Vegas Center for Business and Economic Research* (2021): 3-4, https://files.clarkcountynv.gov/clarknv/2021%20CBER%20Population%20Forecasts.pdf.

31 Brown, "Adaptation to Future Water Shortages in the United States Caused by Population Growth and Climate Change."

32 "Forest Fires Increasingly Affecting Western Rivers and Streams, for Better and Worse," *Columbia Climate School*, February 22, 2022, https://news.climate.columbia.edu/2022/02/22/forest-fires-increasingly-affecting-western-rivers-and-streams-for-better-and-worse/.

33 "EPA Guide Pushes Water Reuse Methods for Full-Cost Pricing Scenario," *Inside EPA's Water Policy Report* 18, no. 1 (2009): 21, https://www.jstor.org/stable/26830651.

34 Lam, "Finding the Right Price for Water."

or when the water usage does not notably affect customers' water bills, customers are generally not inclined to reduce their water usage.

Full-Cost Pricing Influences Demand-Side Water Conservation

Although most studies show water demand is generally inelastic, customer water uses are responsive to price increases. Price elasticity of water demand refers to "the consumer's response (demand) to change in water price."[35] Water use is generally inelastic because there is no replacement for water for most purposes. However, that does not mean it is not responsive. A study by Olmstead and Stavins found that in the US, a 10 percent increase in the price of water usually resulted in a 3 to 4 percent decrease in water usage in urban residential areas.[36] Also, long-run elasticity is larger than short-run elasticity.[37] Long-run elasticity includes implementing strategies such as water-saving retrofits for faucets, low flow toilets, switching to water-saving appliances or manufacturing methods, or drought-tolerant landscaping. Thus, for the purposes of water conservation, water use is responsive to price increases.

A full-cost pricing structure of water that considers household income levels can encourage water conservation. For example, a study on Phoenix, Arizona, found that price has an effect on water conservation depending on income levels. Phoenix used a simple two-block rate pricing structure that included a fixed monthly account charge: no cost for the first 7,480 gallons and USD 3.51 per 1000 gallons over 7,480 gallons. The researchers' evidence suggested that the majority of residential water use was for outdoor irrigation. In addition, the researchers found that low-income households were more responsive to the increased rate by decreasing their water use. Also, high-

35 James Yoo, "Estimating the Price Elasticity of Residential Water Demand: The Case of Phoenix, Arizona," *Applied Economic Perspectives and Policy* 36, no. 2 (2014): 333, http://www.jstor.org/stable/43695827.
36 G. Tracy Mehan III, "Pricing as a Demandside Management Tool: Implications for Water Policy and Governance," *Journal (American Water Works Association)* 104, no. 2 (2012): 63, http://www.jstor.org/stable/jamewatworass.104.2.61.
37 Yoo, "Estimating the Price Elasticity of Residential Water Demand: The Case of Phoenix, Arizona," 334-335.

income households used more water, possibly due to their larger outdoor demands, and were less responsive to the increased rate than low-income households. The researchers concluded that the water usage demands of high-income households could be targeted by charging a steeper rate for higher water usage.[38] Thus, increasing the water rate raises customers' perception of water value.

Full-Cost Pricing Helps to Conserve Water in Agriculture

Full-cost pricing using an increasing block rate structure can help conserve water usage in agriculture without being an economic burden to small farms.[39] According to the US Geological Survey, agriculture accounts for 42 percent of the nation's total freshwater use.[40] Indeed, water conservation on farms would be significant savings of water resources. A 2006 study of Israeli agriculture water use, led by researcher Ziv Bar-Shira, found that implementing full-cost pricing with an increasing block rate lowered the overall water use by 7 percent without increasing the average cost of water. A common concern of full-cost pricing is the economic burden on small farms. The study found that small farms paid a lower average price under the increasing block structure and used more water, however, the larger farmers paid a higher average price and used less water. The overall effect was that the water conservation in the aggregate of farms was a net positive.[41] Thus, an increasing block rate structure encouraged overall agriculture water conservation without increasing the average water costs for small farms.

Since full-cost pricing better reflects the value of water in the consumer's water bill, consumers are more conscious of the water they use, which leads to increased water conservation. Water providers can implement various rate structures to encourage demand-side conservation.

38 Yoo, "Estimating the Price Elasticity of Residential Water Demand: The Case of Phoenix, Arizona," 346-48.
39 Irrigation water rates used by agriculture have more complexities, such as aquifer access, water rights, water trading, and water market pricing, and will not be addressed in this paper.
40 Cheryl A. Dieter et al, "Estimated use of water in the United States in 2015," *US Geological Survey Circular* 1441, no. 65 (2018): 7, https://doi.org/10.3133/cir1441.
41 Bar-Shira, "Block-Rate versus Uniform Water Pricing in Agriculture: An Empirical Analysis," 986–99.

And despite concerns about effects on small farms, full-cost pricing did not significantly increase their water average costs and saved water in the aggregate of farms. Therefore, full-cost pricing contributes to demand-side water conservation.

Implementation and Overcoming Obstacles to Full-Cost Pricing

One main argument against full-cost pricing is that it will increase the water bill for low-income households. However, water providers can implement the full-cost pricing structures while keeping water affordable for low-income households in a number of ways: not charging for water used for basic needs, providing initial block rates at modest cost, focusing water conservation efforts and rebates, and providing billing discounts.[42] Buckeye, Arizona, which has an increasing block rate structure, allows water use in block 1, between 0 to 3,000 gallons, at an affordable rate of USD 2.20 per 1,000 gallons.[43] On the other hand, Portland, Oregon uses a uniform rate structure and helps low-income households by directing conservation efforts that help reduce customers' water bills. These efforts include conservation education, home conservation kits, water audits, and fixture repairs.[44] Portland's water utility company also provides discounts on the water bills of renters living in subsidized housing.[45]

Another argument against full-cost pricing is that the higher water prices will deter new economic development or that it will harm existing companies and institutions, but reliable water services have been found to be more of a concern to businesses than the cost. For most sectors of businesses, industries, and institutions, the Portland Water Bureau (PWB) in Oregon found that

42 "Arizona Water Meter: A Comparison of Water Conservation Programs in 15 Arizona Communities," *Western Resource Advocates* (October 2010): 7-8, https://westernresourceadvocates.org/wp-content/uploads/dlm_uploads/2015/07/Arizona-Water-Meter.pdf.
43 *Western Resource Advocates*, "Arizona Water Meter: A Comparison of Water Conservation Programs in 15 Arizona Communities," 18.
44 "Water Affordability Programs & Policies: A National Review," *Illinois-Indiana Sea Grant* (2019): 37, https://iiseagrant.org/wp-content/uploads/2019/08/WAPP_FINAL.pdf.
45 *Illinois-Indiana Sea Grant*, "Water Affordability Programs & Policies: A National Review," 32.

water usage costs are not a major commodity expense in a report reviewing water rate structure in 2013. PWB found that "With the exception of the hotel sector, expenditures on water and sewer services constitute well under one-half percent of total expenditures on purchased commodities."[46] These included manufacturers in semiconductor, aircraft parts, ship building, soft drink and beverages, breweries, hospitals, and others. For the hotel sector, water expenditure was 1.05 percent of their total commodity expenditure. PWB concluded that "Costs for water and sewer services are unlikely to be major determinants of overall production cost or profitability for the sectors examined." Thus, companies are unlikely to make "strategic decisions" such as investment, expansion, and relocation based on water costs, and water costs are often not a major target for companies' cost control. Instead, PWB found that companies are more concerned about the water service reliability and water quality because unreliable or poor water quality disrupts production and business, which then "may necessitate added investment to build in service redundancy or even be a cause for relocation."[47]

Certainly, public education and outreach is imperative on the necessity of the water rate increase. Businesses, industries, and institutions that are high-volume water users could be consulted on how the new full-cost rate structure should be introduced. As well, water providers can support businesses by supplying information about available technology or innovative methods that high-volume water users can use to conserve water. Furthermore, water customers can be accommodated with a gentle phased-in period allowing for a gradual rate increase over a period of time, which would give customers ample time to adjust their water usage.[48]

46 "Portland Water Bureau Conservation Rate Structure Review," *Portland Water Bureau* (June 2013): 26, https://www.portland.gov/sites/default/files/2020/conservation-rate-structure-review.pdf.
47 *Portland Water Bureau*, "Portland Water Bureau Conservation Rate Structure Review," 26.
48 Goldstein, "Full-Cost Water Pricing," 60.

Conclusion

We have to rethink and reimagine existing tools to provide water solutions, such as using the economics of water. Full-cost pricing of water most effectively captures the true cost of water for a sustainable water service and to impart increased value to water for conservation. This can be implemented using a uniform, seasonal, or increasing block rate structure. The benefits of full-cost water pricing include making water providers financially self-sufficient, which then funds the costs of operation, maintenance, and replacement of water and sewage infrastructure. Timely fixing of aging and deteriorating water and sewer infrastructure that poses a risk to public health is possible with a full-cost water pricing scheme. This type of pricing also covers the costs of much-needed capital projects. Moreover, full-cost pricing helps to place a higher value on water and encourages the critical conservation of ever-dwindling freshwater supplies. Full-cost pricing through a uniform rate structure can also encourage water conservation in agriculture without harming small farms. To address common concerns, there are various methods and solutions to accommodate low-income households and businesses.

We are at a critical point in our lifetime as we witness the devastating impacts of climate change across the globe on the world’s water resources. Climate change has challenged society to rethink how our current and future water solutions and projects impact people and the environment. Future research that thoroughly compares the data of successes and failures of different water solutions is needed. With this, society can make better economic decisions on lending and sustainable investments that will guarantee a future with freshwater supply for all communities.

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