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2020 ASPEN-NICHOLAS WATER FORUM

Water Affordability and Equity Briefing Document

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CONTENTS

1. INTRODUCTION

> *Water is essential to life—the life of a city as well as the life of a human being. Without water, a man dies. Without water, a community faces the same fate.*
> *–Leonard A. Scheele, Surgeon General (1952)*

Without water, we cannot fight a global pandemic. COVID-19 is reorganizing life as we know it, revealing deep, systemic fault lines in our society, and further exacerbating health and financial disparities across racial, gender, and geographic lines. Water utilities are not immune to these significant impacts from COVID-19, and this moment of disruption offers an opportunity to look with an even closer eye at the inequalities in the sector and to envision what a better future might look like.

Widespread impacts from COVID-19 began in the United States in March of 2020 with stay-at-home orders kick starting a deep economic recession. The pandemic has worsened already existing financial challenges as utilities, large and small, have responded with shutoff moratoria, experienced changes in residential water use, and lost commercial customers, all while working to ensure the operational resilience of the utility and trying to keep their workforces healthy. Meanwhile, consumers are overwhelmingly experiencing greater strain to pay their bills as unemployment has dramatically increased. The pandemic amplifies the significance of conversations around the financial resiliency of water and wastewater services and household affordability.

The importance of water and sanitation for public health is once again visible and may change the trajectory of the water sector moving forward. Given that water is essential for public health, **what must be done to ensure that these life-sustaining services are affordable and accessible to all and the utilities providing services are financially resilient?** How do we reconcile the different values as individuals and society negotiate who decides, who gets what, and who pays. In a just society this process is inclusive, meaning all have a seat at the table.

To unpack these questions, we will explore the evolution of water services in the United States. The construction of water and wastewater systems during the 19th and early 20th century were significant feats. Now, most people have access to water, most tap water is drinkable, most dams are secure, most farms can grow more with less water, and most rivers are cleaner than they were 50 years ago. Most does not mean all. There is growing evidence that an increasing number of Americans are losing access to safe drinking water and sanitation—and others never had it at all.

Nearly two million Americans lack access to complete plumbing facilities, particularly in tribal communities, border colonias, and rural areas.[1] Within cities, those who can access water may not be able to afford rising water service rates, resulting in water shutoffs. Shutoffs then create a cascade of additional challenges and hardships for individuals, including possible evictions or even removal of children from the household. While the Detroit bankruptcy and ensuing water shutoff crisis received significant attention, loss of water services are becoming a more common reality in many cities with declining populations including Chicago, Cleveland, Milwaukee,

1. DigDeep & U.S. Water Alliance. 2019. Closing the water access gap in the United States.

and Philadelphia.[2] In these cities and beyond, affordability and accessibility challenges are concentrated in underserved communities, which are often also exposed to chronic pollution (e.g., Lowndes County, AL) or dependent on unsafe tap water (e.g., Flint, MI and Camden, NJ).

These challenges extend beyond water utilities. There is growing disparity in the ability of different communities and sectors (agricultural, municipalities, and industries) to secure and/or afford water rights (i.e., the right to divert, store, and make use of water resources). For example, as groundwater levels in aquifers have declined, the costs to pump groundwater have increased, resulting in some farms and communities being unable to afford to drill the now necessarily deeper wells during recent western droughts (2011–2017 drought in CA[3]). In the Chesapeake Bay, increased nutrient runoff and pollution is driving utilities such as D.C. Water and Hampton Roads Sanitation District to invest billions in capital infrastructure to address consent decrees from the Clean Water Act.[4]

Awareness of these inequalities coupled with aging infrastructure and the disproportionate impacts of climate change on communities and sectors have brought water equity and affordability to the forefront of many conversations about the future of water sustainability. COVID-19, along with heightened awareness of racial disparities following the murder of George Floyd, have further brought a magnifying lens to these issues. The 2020 virtual seminars and 2021 Aspen-Nicholas Water Forum will explore what underlying principles are essential to address equity and affordability.

2. WATER EQUITY

> *What are our priorities as a nation? What good are other rights to someone dying of cholera or thirst? –Rhett B. Larson (2017)*

Water as a Public Good, a Commodity, and a Right

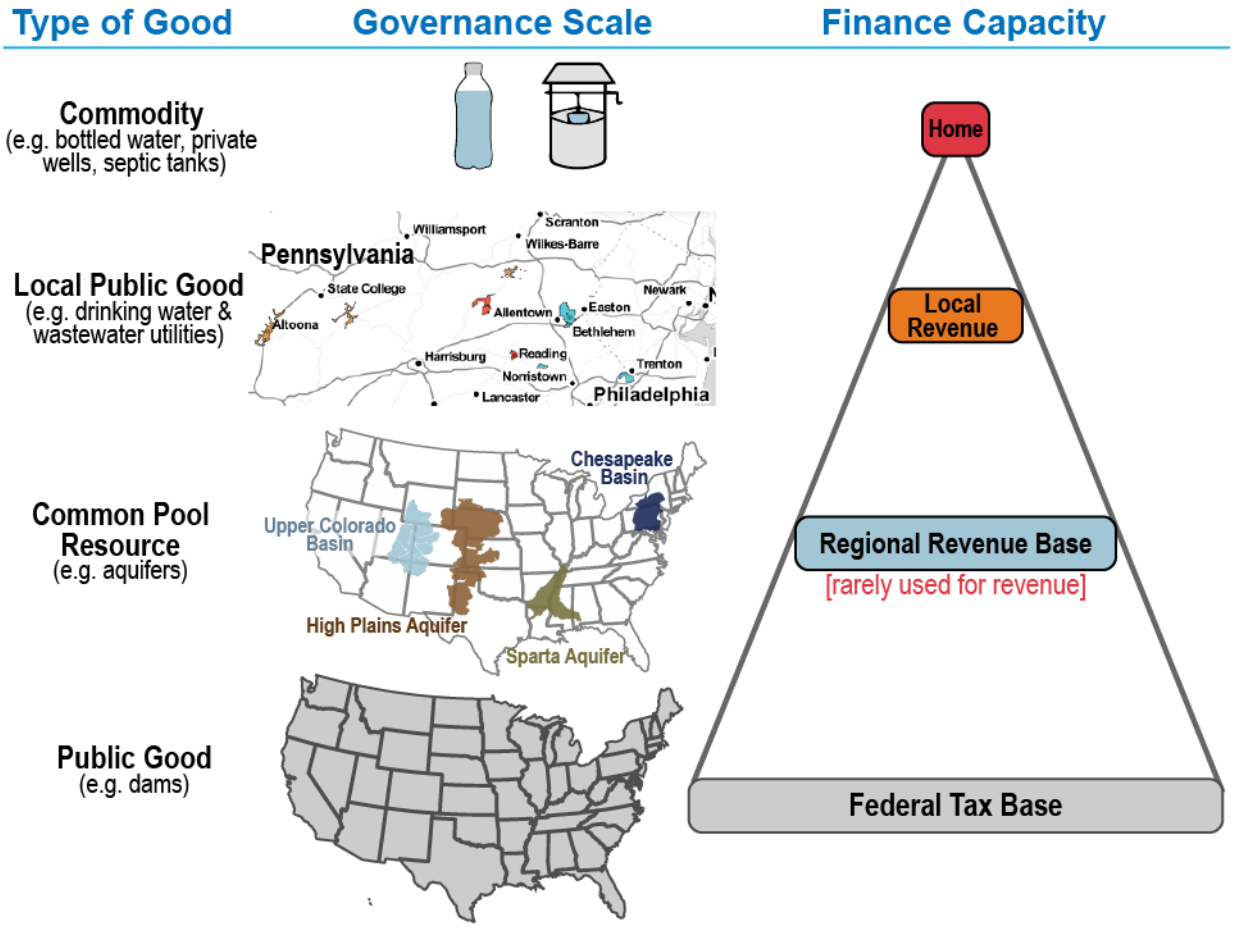
There is a long-standing debate around whether water is a public good or a commodity, and consequently whether all people in a community should be guaranteed access to water or if they must buy access. In reality, it is both. Water is a public good because it is essential for life and economic prosperity. Water is also a commodity because it can be finite, excludable, and dispersed geographically. We do not need infrastructure to access air, but most of us need infrastructure to access water, and this infrastructure is expensive. Large-scale water infrastructure (e.g., dams and levees) provide public goods such as navigation, flood protection, water supply, and recreation. The benefits from large-scale infrastructure are non-excludable, meaning the population writ large benefits (e.g., everyone downstream of a dam benefits from flood protection). Because of these broadly distributed benefits, the federal government often funds much of our water resources infrastructure.

In contrast, the beneficiaries of local water services infrastructure, such as drinking water and wastewater, are more constrained, typically at the scale of a city, county, or community. These

2. Montag. 2019. Water/Color: A study of race & the water affordability crisis in America's cities.
3. Perrone & Jasechko. 2017. Dry groundwater wells in the western United States.
4. Aspen Instute. 2019. Ensuring Water Quality.

beneficiaries fund drinking water and wastewater infrastructure through water and wastewater rates tied directly to the services provided. Since benefits and funding are localized, the geographic, demographic, and economic differences create disparities in the cost and affordability of water services infrastructure. Here, water services are a "local public good" because they are provided to the community (public good), but are funded through direct payment from customers based on usage (commodity). Households or individuals without access to public water and sewer systems rely on bottled water (solely a commodity), private wells, and septic systems (Fig. 1). Water as a commodity is incredibly expensive. As such, water in the U.S. can be simultaneously a public good and a commodity.

Figure 1. Scale of Governance and Financial Capacity Influence Where Water Falls on the Spectrum between Public Goods and Commodities



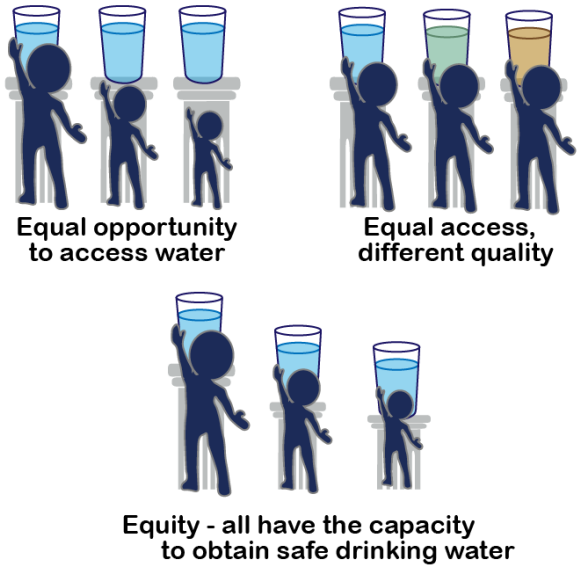
The "right" to access water also varies across the U.S. In the western U.S., water is often treated like a property right through the doctrine of prior appropriation, while the eastern U.S. treats water more like a common pool resource available to all parties for beneficial use. Water as a human right is becoming an increasingly popular perspective, particularly amidst the COVID pandemic. In 2010, the United Nations formally recognized that access to safe and clean drinking water and sanitation is a human right that is essential for the full enjoyment of life and all human rights.[5] In the U.S., water has evolved into a "constitutive commitment," which describes statutory rights that are held by many Americans as constitutional rights.[6] To date, California is the only state that has passed legislation formalizing the human right to water (AB 685).[7]

Water is also increasingly recognized as essential for our security. In 2013, the United Nations introduced the concept of water security as "the capacity of a population to safeguard sustainable access to adequate quantities of and acceptable quality water for sustaining livelihoods, human well-being, and socioeconomic development, for ensuring protection against water-borne pollution and water-related disasters, and for preserving ecosystems in a climate of peace and political stability."[8] Water security mirrors the human right to water, but the reason for ensuring access to safe water and sanitation is not about an inherent right, but about safeguarding the socio-economic health of communities and nations. The response of water systems to initiate shutoff moratoria emphasizes the critical nature of water for public health.

In the U.S., a patchwork of policies, investments, and governance structures shapes the capacity of an individual, utility, farm, city, district, and even state to provide (or obtain) access to adequate quantities of acceptable, quality water. While we all may have equal "rights" to water, we do not all start on an equal playing field nor have an equal capacity to access water because of differences in our natural, built, and sociopolitical environments (Fig. 2). This is partly why equity awareness is rising.

5. UN. 2010. The human right to water and sanitation. https://undocs.org/A/RES/64/292
6. Murthy, S. 2016. A new constitutive commitment to water. *Boston College Journal of Law and Social Justice* 36(2): 159–233.
7. AB 685. 2012. The Human Right to Water.
8. UN. 2010. The human right to water and sanitation. https://undocs.org/A/RES/64/292

Figure 2. Water Examples of Equality and Equity



Note. (Top Left) Equality refers to equal opportunity to access to water. However, we do not all have equal capacity. (Top Right) Similarly, we might have equal capacity to access water, but the quality of the water we can access is very different, making water much more expensive in some communities. (Bottom) Equity means ensuring all have the capacity to access safe water.

What Is Equity?

Equity can be defined as "fairness" marked by impartiality and honesty that is free from self-interest, prejudice, or favoritism. Equity is achieved when life outcomes are not predetermined by racial, economic or social identities. The U.S. Water Alliance, a forerunner on conversations around water equity, defines equity as just and fair inclusion such that everyone has an opportunity to participate and prosper,[9] but what constitutes "fair"?[10] Since we do not all have an equal capacity to access water and some water is more expensive to both access and treat, some resources must be redistributed. There are two broad theories around resource distribution: (1) equality of resources and (2) equality of welfare.

Equality of resources holds that all stakeholders should be treated equally with resources distributed evenly among them regardless of their starting point. In contrast, Equality of welfare, which is about equity, holds that resources should be distributed so that all stakeholders end at the same level of welfare (Fig. 2).

One of the frequent sticking points around fairness in equity revolves around whether someone is at a different starting point because of bad luck or choice, and distinguishing between the two creates heated debates. "Luck egalitarianism" is common allows resources to be given to those who have had "bad luck";[11] i.e., resources are distributed based on needs created through

9. US Water Alliance. 2017. An Equitable Water Future: A national briefing paper.
10. Rothman. 2020. The Equality Conundrum. We all agree that inequality is bad. But what kind of equality is good?
11. Ibid.

external circumstances beyond the control of the individual. However, what constitutes a "worthy" external circumstance is open for debate. A home flooded by a record setting hurricane deserves help, while a 100-year home flooded by a heavy downpour due to climate change and a combined sewer system may be labeled as a poor decision. The challenge with this approach is that the distinction between choice (human agency) and luck (systemic structures in policy and governance as well as disasters) is value-based and rarely recognizes the intergenerational legacy that has led to current decisions, the majority of which are likely beyond the individual's control. Luck is tied to immediate circumstances while choice embeds institutionalized structures. Our water systems are a mixture of "luck" and "choice." So what is water equity?

What Is Water Equity and Why Is It Imperative?

The U.S. Water Alliance defines water equity as occurring when all communities:

(1) have access to safe, clean, affordable drinking water and wastewater services;

(2) are resilient in the face of floods, drought, and other climate risks;

(3) have a role in decision-making processes related to water management in their communities;

(4) share in the economic, social, and environmental benefits of water systems.[12]

We have a long way to go to achieve water equity throughout the U.S. Many water systems are deeply entangled with social and environmental injustices that have accumulated over decades of purposeful decisions that have deprioritized or willfully ignored the needs of certain communities along racial lines (section 3). Systemic racism has created a myriad of generational and disparate health outcomes present today (section 4) that the COVID-19 pandemic has garnered greater public attention. Water equity was an imperative long before the pandemic, however, the current disruption and attention may create opportunities for significant movement towards a more equitable water future (sections 5 and 6).

3. TRACING WATER INEQUITY THROUGH TIME

> *No amount of compensation money can replace a culture that has lost its roots. And while politicians and corporate leaders have yet to come to terms with these humbling truths, the people whose air, water, and livelihoods have been contaminated are losing their illusions fast.*
> *–Naomi Klein (2019)*

Industrial Era (1800s)

The industrial era was characterized by a predominance of market incentives and local entrepreneurs, maximizing economic development, but largely at the expense of entire social and ethnic groups and environmental health.[13] Industrialization and cities went hand-in-hand as industries needed infrastructure to house laborers, create energy, and supply water and

12. US Water Alliance. 2017. An Equitable Water Future: A national briefing paper.
13. Collin & Collin. 1994. Where did all the blue skies go? Sustainability and Equity: The New Paradigm. *J. Env. Law and Litigation*. 9: 399–460.

sanitation. While private companies were initially a source of water infrastructure in cities, an 1849 Committee on Public Health noted that "water is so intimately connected to the health of a city, that the municipal authorities should rank this among the most important of their public duties…."[14] Once local governments were able to take on funded debt through municipal bonds, there was a trend towards public ownership of waterworks with most systems becoming publicly owned by 1910.

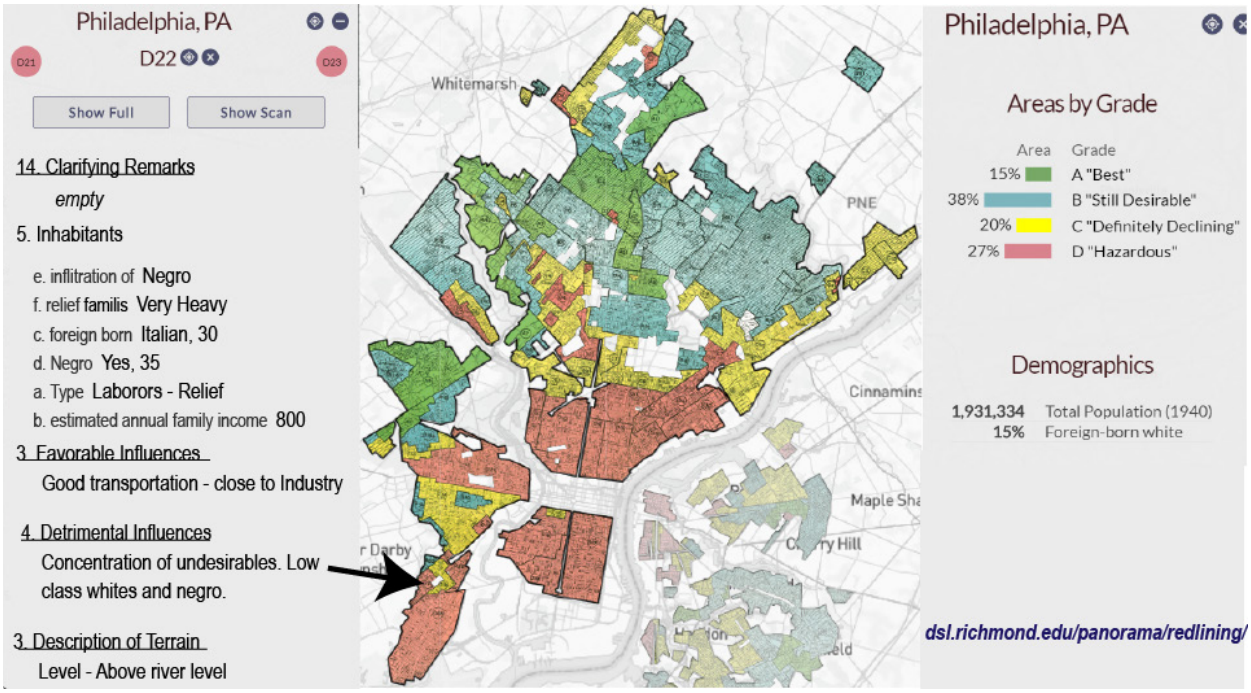
Most major cities had established water and sewer systems by 1910, prior to the growing number of segregation ordinances. Water services were provided throughout a city because the risk of epidemics spread by water-borne diseases, such as cholera, was so great that a city could not afford to not provide services to all customers, regardless of race.[15] The ensuing water and sanitation systems nearly eradicated these diseases, improving the public health and economic outcomes of cities.

The primary impact of federal policies on the trajectory of water and sanitation systems in cities is tied to housing policies. The U.S. population increased dramatically in the 1920s, causing a rapid expansion of the housing market and the National Mortgage Crisis of the 1930s. This contributed to the Great Depression and the subsequent creation of the Federal Housing Administration (FHA) in 1934. The way the FHA was administered furthered segregation from 1934 to 1968 by guaranteeing the loans of white Americans, making homeownership possible, while explicitly refusing to guarantee loans to African Americans or areas with high African American populations.[16] The systematic denial (directly or indirectly) of various services to residents of specific, often racially determined, communities is known as "redlining" (Fig. 3).

In the 1940s, the GI Bill that provided mortgages to veterans with no down payments was not explicitly discriminatory, but did nothing to stop discriminatory local policies and practices that continued to guarantee bank loans to developers who wouldn't sell to African Americans.[17] Many state and local governments promoted the use of racially restrictive covenants in deeds to prevent the sale of homes to African American families, while private real estate agents used "blockbusting" to convince white families to flee communities with growing African American populations at a premium and then resold those homes to African American families at inflated prices.[18]

14. Montag. 2019. Water/Color: A Study of Race and the Water Affordability Crisis in America's Cities.
15. Troesken, W. 2004. *Water, Race, and Disease*. MIT Press. 288 pp.
16. Madrigal, A.C. 2014. The racist housing policy that made your neighborhood. *The Atlantic*.
17. Lee, T. 2019. A vast wealth gap, driven by segregation, redlining, evictions, and exclusion, separates black and white America. *New York Times*.
18. Montag. 2019. Water/Color: A Study of Race and the Water Affordability Crisis in America's Cities.

Figure 3. Redlining Example for a Philadelphia Community



Note. Home Owner's Loan Corporation maps assigned grades to communities that reflected their mortgage security. Red (redlining) zones were ineligible from government insured loans. Comments often reflect racial reasons as shown for D22 above. Interactive maps are available here: http://dsl.richmond.edu/panorama/#maps.

These government policies encouraged "white flight" to suburbs and concentrations of African American populations in cities became poorer due to redlining policies that kept wealth outside their boundaries.[19] The ensuing disparity continues to play out today. African American incomes are on average 61% of white incomes and African American wealth is only 5% of white wealth.[20] Most middle-class families gained their wealth from home equity, homes that many were able to purchase through FHA policies decades earlier. Since African American families were prohibited from buying homes, buying homes with good interest rates, or buying homes in desirable locations, they had no way to accrue this same wealth. While the 1968 FHA technically allowed African Americans to buy homes anywhere, many homes remained unaffordable to those who lacked the baseline wealth (even if they had a comparable income) to their white peers.

Racial segregation at the scale of neighborhoods and census tracts had implications for the development of water and wastewater utilities after WWII. As residential segregation increased, municipalities could more easily exclude communities of color from water and sewer services through a practice known as "under-bounding," whereby municipalities selectively annexed white neighborhoods into the town's official boundaries while ignoring African American neighborhoods.[21] For instance, Zanesville, OH did not construct municipal water lines in African

19. Ibid.
20. Economic Policy Institute. 2010. State of Working American: African Americans.
21. Montag. 2019. Water/Color: A Study of Race & the Water Affordability Crisis in America's Cities.

American neighbors in the 1950s; Roanoke, VA did not extend water and sanitation lines to the nearby predominantly African American town of Hollins; and in Central Valley, CA rural Latinx communities were discouraged from incorporating and did not receive the infrastructure funds available to neighboring towns.[22] A 2018 study examined the relationships between race and access to water and sewer services in areas bordering 75 municipalities in North Carolina. They found the two most unserved groups were: (1) low-income African American populations excluded from municipal services on the basis of race during the era of legal racial segregation and (2) higher income white populations who could afford well and septic systems.[23]

Environmental Paradigm (1970s)

In the early 1970s, Congress passed the canon of federal water legislation to protect the quality of our streams and lakes (Clean Water Act in 1972; CWA) and the public health of drinking water (Safe Drinking Water Act in 1974; SDWA). These laws were passed in response to public outcry that local and state governments were insufficiently protecting environmental welfare. In the 1960s, studies found 41% of public water systems were not meeting public health guidelines and jeopardized the health of millions[24] and major rivers were repeatedly catching fire. In response to these events and with public support, Congress passed the CWA to protect the quality of surface waters by regulating the discharges of pollutants and the SDWA to protect public health by establishing and enforcing standards for drinking water quality.

Both the CWA and the SDWA included significant federal funding through grants to finance the infrastructure needed for local governments to meet these new regulations. In 1987, the CWA and in 1996, the SDWA, transitioned from providing grants to loans that must be repaid, consequently placing greater financial responsibility and burden on local and state governments and individual households. Studies have found inequities in the administration of these regulations due to an absence of political power to access safe water supply, selective enforcement of drinking water regulations, and the continued allowance of known non-compliance with federal standards.[25] There remain barriers for small water systems and those serving majority low-income communities to access state and federal dollars.[26] Funds are often contingent on meeting extensive engineering and reporting requirements, and some states have additional requirements—such as technical-managerial-financial (TMF) capacity, which creates an impossible bind. Communities that lack resources often lack TMF, but without TMF they cannot obtain funds. Yet, without funding TMF cannot be developed, and because there is no TMF there are no eligible funds. The American Recovery and Reinvestment Act of 2009 set aside money earmarked for "high priority" projects that were "shovel ready," qualities that underserved communities do not have the capacity to develop.[27] While the federal government allows states

22. DigDeep & U.S. Water Alliance. 2019. Closing the water access gap in the United States.
23. Leker, H. & J. Gibson. 2018. Relationship between race and community water and sewer service in North Carolina.
24. Pontius. 1993. SDWA: A Look Back. *Journal of the American Water Works Association* 85(2).
25. Balazs, C., and I. Ray. 2014. The Drinking Water Disparities Framework: On the Origins and Persistence of Inequities in Exposure. *American Journal of Public Health* 2014: 603–611.
26. Vanderwarker, A. 2012. Chapter 3: Water and Environmental Justice in *A Twenty-First Century Water Policy.*
27. Balazs, C. and I. Ray. 2014. The Drinking Water Disparities Framework: On the Origins and Persistence of Inequities in Exposure. *American Journal of Public Health* 2014: 603–611.

to use up to 30% of capitalization grants to provide loan subsidies for low-income communities, only a fraction of states do so.[28]

The allocation of CWA and SDWA funds are based on formulas that attempt to balance the tension between distributing resources and distributing welfare. But what is "fair"? Tribal systems are estimated to need $2.7 billion to provide water and sanitation to all homes on reservations but are prohibited from receiving more than 1.5% of all available CWA and SDWA funding.[29] This is particularly problematic when there are legal barriers inhibiting tribal capacity to generate local revenues to finance infrastructure. All water and sanitation systems are experiencing an increased burden to finance infrastructure. Yet tribal communities, rural regions, and low-income areas—especially if they are communities of color—have the added burden of not having the benefits of their initial infrastructure being financed through grants, have more difficultly accessing low-interest capital, and have a reduced capacity to recover costs.

Environmental Justice Paradigm (1980s)

The Civil Rights movement in the 1960s created a unified voice for social justice. Social injustices are prevalent in housing, employment, municipal services, education, and not surprisingly—environmental protection.[30] In the 1980s, the Environmental Justice movement sought to address environmental inequities with the growing body of evidence that those suffering these injustices were disproportionately low-income and racial minority groups. These communities are often more likely to live near hazardous sites, where they are exposed to greater contaminants and suffer the health and economic impacts).[31] Resulting medical bills are expensive, generating further economic disparities. Well known examples include (a) "Cancer Alley" impacts on African American communities by petrochemical manufacturers, (b) uranium mining on Navajo lands, (c) and pesticide exposure on predominantly Latinx farmworkers. Some environmental inequity is intentional, some began intentionally and is now perpetuated by the inertia of the status quo, and some began unintentionally and continues to be perpetuated.[32] Yet, while minority communities are suffering from environmental contamination, the very laws meant to protect all Americans from environmental pollution have been used against them. Even the National Environmental Policy Act has been invoked against minorities migrating into white neighborhoods as a form of pollution.[33]

Environmental injustices start with industry being given the right to pollute before proving harm, rather than having to prove no harm before being given the right to pollute. The negative externalities from industrial pollution are born by the public, particularly low-income and minority communities. Land use controls are often used to put locally unwanted land uses in minority communities that lack the voice or political capital to advocate for "Not-In-My-

28. Vanderwarker, A. 2012. Chapter 3: Water and Environmental Justice in *A Twenty-First Century Water Policy*.
29. Ibid.
30. Collin, R.M. & R.W. Collin. 1993. Where did all the blue skies go? Sustainability and Equity: The New Paradigm. *J. Envt. Law and Litigation* 9: 399–460.
31. Montag. 2019. Water/Color: A study of race & the water affordability crisis in America's cities.
32. Collin, R.M. & R.W. Collin. 1993. Where did all the blue skies go? Sustainability and Equity: The New Paradigm. *J. Envt. Law and Litigation* 9: 399–460.
33. Ibid.

Back-Yard." There is also a history of putting unwanted lands uses in minority communities to drive residents out, effectively serving as a "taking" of property.[34] If all communities were given an equal voice and political power, the rate of environmental degradation would likely slow. However, private industries are often the needed employers for many low-income communities, which inhibits many communities from raising concerns as they must choose between employment and health.

Agricultural Communities

The federal government created the Bureau of Reclamation (BoR) in 1902, which subsidized the development of irrigation projects and community water supply as populations were encouraged to settle westward through Homestead Acts, often at the expense of tribes.[35] In the 1930s, the federal government supported the development of rural water systems through New Deal programs for communities of less than 1,000 people. Federal support for rural water systems has continued; however, funds have changed from grants to loans, and amounts have decreased as the federal funding has declined in recent decades. Many of these rural systems provide services to those who manage agricultural production.

The big dam building era from the 1930s to the 1960s treated dams as immense public goods, but often had detrimental impacts on tribes as communities were displaced from their traditional lands and on ecosystems that were dramatically altered. The Dalles Dam on the Columbia River, the Elwha River Dams on the Elwha River, and the Pick-Sloan Missouri River Basin Program are all examples of dam projects with significant impacts to tribal communities.[36]

Today, the BoR maintains and operates much of the publicly funded water infrastructure in the western U.S. by directly providing irrigation water for ~25% of irrigated areas and subsidizing irrigated water to local irrigation districts. These subsidies enabled the development of large-scale corporate agriculture. The BoR is able to conduct interest-free projects and schedule payments based on the ability of the farmer to repay, consequently prioritizing large farms and certain crop types. Over time, federal subsidies have been declining, requiring farmers to pay larger portions of the full cost of developing irrigation supplies.[37] Higher prices for water are driving investments in technical solutions to increase water efficiency, but this requires farmers to have the capacity to afford new technology and irrigation infrastructure.

The federal subsidies of large-scale agriculture can then be juxtaposed with the low-wage labor associated with those working on corporate farms. These communities of low-wage laborers often have high nitrate and bacteria concentrations in their water, if they even have access to water.[38] This holds true from North Carolina to California. One study found the top 20 farm subsidies received on average over $1 million per farm, while rural development funding averaged $53 per person. Some ask why the federal government continues to subsidize companies that, in violation

34. Ibid.
35. DigDeep & U.S. Water Alliance. 2019. Closing the water access gap in the United States.
36. Church et al. 2015. Tribal Water Rights: Exploring Dam Construction in Indian Country.
37. OECD. 2010. Agricultural Water Pricing in the U.S.
38. Vanderwarker, A. 2012. Chapter 3: Water and Environmental Justice in *A Twenty-First Century Water Policy.*

of federal labor laws, cannot or will not provide basic water and wastewater services for their employees.[39]

In the environmental paradigm of the 1970s, the CWA applied to rural water systems to regulate point source pollution but did not apply to agricultural communities and nonpoint source pollution. Later amendments to the CWA included stormwater (urban nonpoint source pollution) but only encouraged voluntary best management practices for agriculture. However, we know that agricultural runoff is a significant contributor of nutrients and pollutants into surface and groundwater bodies. Currently, urban communities are paying the costs of treating increasingly polluted water. The 2017 Des Moines Water Works lawsuit was to recover treatment costs from high levels of nitrate pollutants running off farms in upstream drainage districts. While the lawsuit was dismissed, the question about who should pay to clean up nonpoint source waters remains.

4. WATER INEQUITY TODAY

> *Children walk through [sewage] unaware of the health issues they could be tracking into their homes. This situation is not in some Third World country, it exists in the USA … This is America's Dirty Secret. –Catherine Flowers (2014)*

The past trajectory of historic water inequity is evident today. In California, drought led to rapidly dropping groundwater levels that left several agricultural and rural communities without access to water and some remain without access today. Multi-year droughts in the western U.S. creating drastically fluctuating water prices, the negotiation of drought contingency plans, and the proliferation of water efficient technologies (affordable to some growers) are reshaping water markets and water rights. The lead crisis in Flint, MI raised public awareness as a city-sized utility knowingly provided visibly contaminated water to its citizens, predominantly underserved communities of color. Lead crises in Pittsburgh, PA, Camden, NJ, and Newark, NJ continually highlight links between water contamination, poverty, and race. The prevalence of perchlorate health impacts for the past 20 years has been overshadowed by growing concerns of PFOA and PFAS in drinking water supplies that wealthy industries have left for communities to pay to clean up. The discovery of tropical parasites in Lowndes County, AL due to inadequate sanitation and the widespread presence of raw sewage is unfathomable to many. The occurrence of massive water shutoffs in major cities have led to repeated outcries for the human right to water. Racism continues to manifest as white communities get green infrastructure projects while communities of color receive grey infrastructure, and those communities of color that do receive green infrastructure often contribute to gentrification. A warming climate with more frequent and intense flood events disproportionately impacts poor, minority communities and agricultural lands. Communities facing the greatest water stress and threat to water security include disinvested urban areas, rural areas, unincorporated areas, and Native American lands.[40]

39. Ibid.
40. US Water Alliance. 2017. An Equitable Water Future: A national briefing paper.

Current Challenges

Access to Water and Sewer Infrastructure

Today, more than two million Americans live without basic indoor plumbing, and many more without sanitation.[41] The majority are low-income people in rural areas, people of color, tribal communities, and immigrants. These communities face both historic and contemporary barriers to economic and social opportunities. Lack of access to water means already limited resources must be spent to truck water in, buy bottled water, and treat water-borne diseases and parasites. These household level solutions are far more costly in time and money than the resources spent by most Americans with access to public water and wastewater services (Fig. 1).

There are small pockets of communities without complete plumbing in every state. Lack of access can occur in high poverty census tracts within or adjacent to cities. For instance, a colonia in Cochran, TX is a 10-minute walk from existing water mains. Many colonias were sold property, often in floodplains or low-value land, with the promise of connection to public services by developers who have failed to deliver. These colonias are often unincorporated areas outside the jurisdiction of nearby utilities, but the high cost to expand lines to a few households makes it unlikely they will be connected. In terms of sanitation, one of the most widely known examples is in Lowndes County, AL where fewer than 20% of homes are connected to a sewer system. State law requires those not connected to a sewer system to install septic systems that are unaffordable for many, leading to fines, jail time, or evictions when individuals cannot afford to comply. Water-borne illnesses, once believed to be eradicated in the United States, are reappearing in the midst of this public health crisis.[42]

Disconnections and shutoffs within cities also have disproportionate effects on communities of color, particularly Black households. It becomes increasingly expensive and complicated to reconnect disconnected buildings as time goes by. Shutoffs also bring with them the risk of foreclosure, family separation, and compounding issues such as depression and health impacts.

Access to Drinking Water You Trust Is Safe

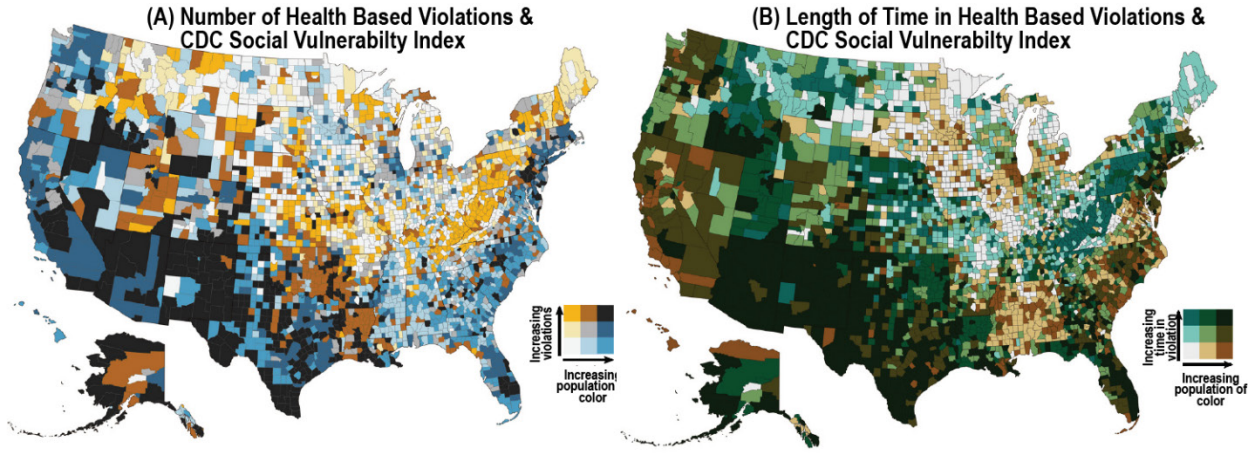
Today, nearly a third of Americans drink bottled water regularly. A 2015 consumer research report found that 60% of bottled water is consumed at home (where tap water is available) and a 2017 Harris Poll found that 99% of people listed quality and 92% listed safety as reasons for drinking bottled water. Voting by their wallet, many do not trust the safety and quality of water from their tap.

African American communities are disproportionately impacted by lead contamination due to a combination of exposure factors including living in older buildings with lead paint serviced by older, lead pipes.[43] St. Joseph, LA, a majority African American community, complained about high lead and copper in their water for more than a decade before a state of emergency was declared in 2016. The water system was replaced in 2017, triggering a 45% increase in water rates for a community where 40% of individuals fall under the federal poverty line, raising questions

41. DigDeep & US Water Alliance. 2019. Closing the water access gap in the United States.
42. Ibid.
43. Packtor. 2018. Racial Gaps in Children's Lead Levels.

about whether they could afford to continue to operate their system.[44] Another study found low-income African American and Latinx communities were more likely to have drinking water violations and they are more likely to stay in violation longer (Fig. 4).[45] These examples, and others, lead many to ask is public water safe to drink?

Figure 4. Correlation between Social Vulnerability and Safe Drinking Water Act Compliance



Note. (A) The rate of health-based Safe Drinking Water Act violations overlaid with CDC's racial, ethnic, and language vulnerability index. (B) The length of time a water system stayed in violation overlaid with CDC's racial, ethnic, and language vulnerability index. Figures are from Watered Down Justice.

While most of the time community water systems (CWS) provide reliable and high quality drinking water, 7–8% report at least one health-based violation annually.[46] The highest prevalence of violations were in rural and concentrated areas of the Southwest in regions with high racial, ethnic, and language vulnerabilities (Fig. 4).[47] Many have repeated violations, indicating these systems struggle with recurring issues. The number of water quality violations may be underreported, as smaller systems are exempt from some types of monitoring and can receive hardship waivers to defer responding to violations due to affordability challenges. With uncertainty around the number of violations, the question remains, is the water in rural communities safe to drink?

Growing awareness of emerging contaminants raises questions about their prevalence in our water and the impacts of long-term exposure to the 70,000 chemicals in commerce (and potentially in our water). The EPA only regulates 91 contaminants, and has not added a new contaminant in over 20 years, even when a chemical has known public health impacts and high prevalence in water systems, such as Perchlorate.[48] Similarly, PFOA and PFAS in drinking water were brought to the attention of the federal government decades ago, but only in recent years

44. Montag. 2019. Water/Color: A Study of Race and the Water Affordability Crisis in America's Cities.
45. Ibid.
46. Allaire et al. 2018. National trends in drinking water quality violations. *PNAS* 115(9): 2078–2083.
47. Fedinick, Taylor, and Roberts. 2019. Watered Down Justice.
48. Siegel, S. 2019. *Troubled Water: What's Wrong with What We Drink*. Thomas Dunne Books. 352 pp.

have they made headlines as they are being found in the water supplies across the country and in the blood of nearly all Americans.[49] The presence of pharmaceuticals, from hormones to anti-depressants to pain killers, in water supplies is another area of growing concern with unknown public health impacts.[50]

Americans are choosing to pay more for bottled water, even when they have access to tap water. Yet ironically, bottled water is less regulated than public water and often contains the same chemicals and contaminants, but the perception is that this water is safer. As a result, millions of Americans—often in underserved communities where there is less trust in the quality of their water and government—are paying for both tap and bottled water. Those who least can afford water are often paying the most for water (See Box: The Story of Toolville).

THE STORY OF TOOLEVILLE

Tooleville, CA is one of 15 unincorporated communities largely consisting of migrant laborers in Tulare County. Tulare County governs unincorporated areas. The 1973 Tulare County General Plan states, "These non-viable communities would, as a consequence of withholding major public facilities such as sewer and water systems, enter a process of long term, natural decline as residents depart for improved opportunities in nearby communities."[51] The County Plan designated these communities as nonviable, many of which began as labor camps for agricultural work and lack any kind of tax base or representation in the decision-making process, and withheld resources.

As a result, Tooleville residents rely on groundwater, which has received nitrate and total coliform violations from 2005 to 2010 due to large agricultural practices, likely from the farms that employ them. Boil water advisories were given to address bacteria contamination, but boiling water concentrates nitrates. There is no guidance on what a community should do when multiple contaminants are present. Tooleville has sought to be consolidated by Exeter City, which is located less than a half mile away, but Exeter has refused because Tooleville is too poor to cover the costs of connection. Regulatory failures and inadequate water system responses increase the vulnerability of already underserved communities, leaving the burden of mitigation to individual households. Tooleville residents, whose median annual household income is $16,000 are paying for contaminated tap water and bottled water. The legacy of social and environmental injustices in underserved communities continues to affect their capacity to access safe water at affordable costs.[52]

Exposure to, and Capacity to, Adapt to Changing Conditions

Most U.S. physical infrastructure was designed prior to widespread acceptance of climate change. A warming climate changes the type, location, and timing of precipitation. In some places, water variability may exceed infrastructure design (including pipes and culverts).[53] Extreme rainfall events can result in urban flooding, which disproportionately impacts underserved communities and communities of color.[54] Urban flooding that is coupled with combined sewer

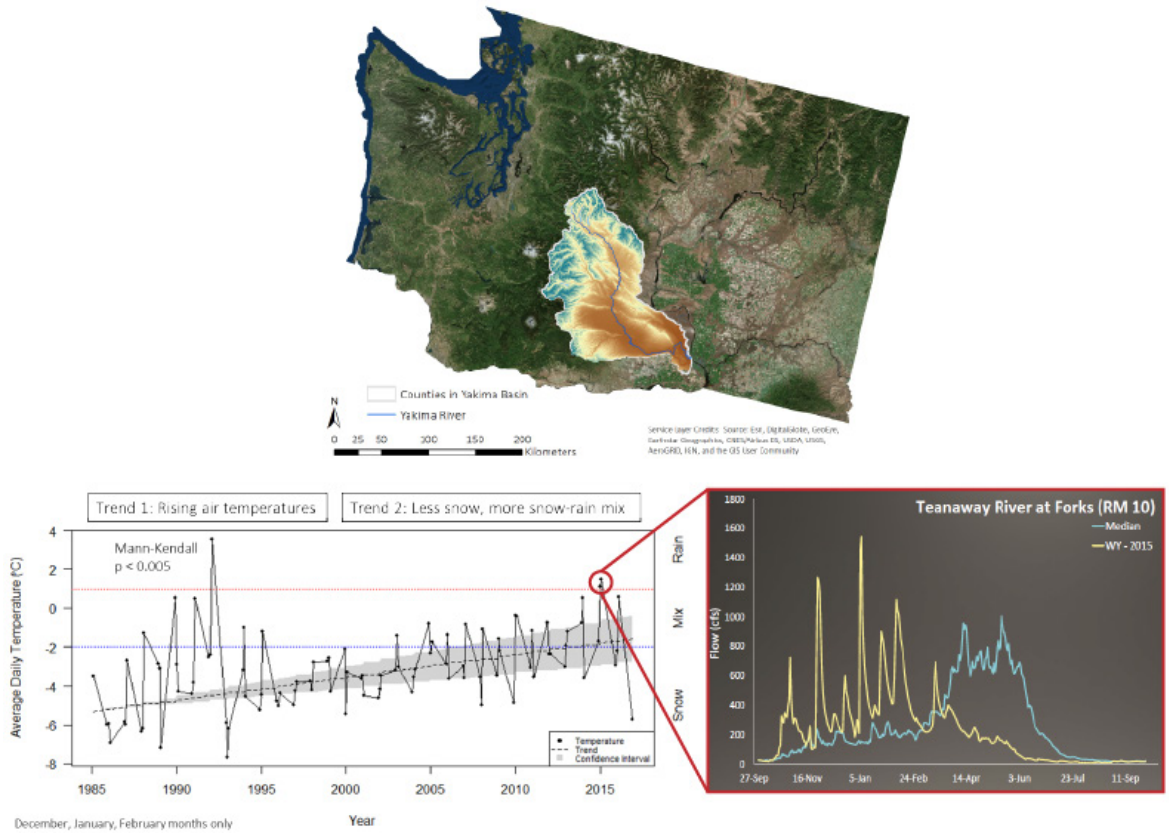
49. CDC. 2020. Per-and Polyfluorinated Substances Factsheet.
50. Siegel, S. 2019. *Troubled Water: What's Wrong with What We Drink*. Thomas Dunne Books. 352 pp.
51. Balazs, C. and I. Ray. 2014. The Drinking Water Disparities Framework: On the Origins and Persistence of Inequities in Exposure. *American Journal of Public Health* 2014: 603–611.
52. Ibid.
53. Wright et al. 2019. U.S. Hydrologic Design Standards Insufficient Due to Large Increases in Frequency of Rainfall Extremes. *Geophysical Research Letters* 46: 8144–8153.
54. Meridian Institute & American Rivers. 2018. Building a Community of Practice at the intersection of water, climate resilience, and equity.

overflows creates public health hazards as raw sewage enters streams and floods homes. The proximity of underserved communities to hazardous areas is the legacy of institutionalized racism, discriminatory housing policies, and underinvestment in water infrastructure over many decades.[55] Their exposure to contaminants and public health risks from these hazardous facilities and land uses are further exacerbated during flood events. The challenges presented by climate change and their disproportionate impact on economically and politically marginalized community's highlight the importance of environmental justice.[56] Intense precipitation may also inundate water and wastewater utilities. A warmer climate also means warmer water and the increased proliferation of biological contaminants that lead to increased treatment costs and potentially the need for investment in new treatment technologies and capital infrastructure. Higher costs may exceed the capacity of many smaller, lower-resourced communities.

Increased water variability in a warmer climate has significant implications for agricultural water management as shifts in the timing and volume of snow may lower water availability in summer months. In some areas, this is resulting in more frequent shortages and water insecurities for junior water right holders. For instance, in the Yakima Basin, warmer winter temperatures cause precipitation to fall as rain that flows downstream when the ground is fallowed, rather than snow that melts and releases water during the growing season (Fig. 5). Consequently, downstream senior water users receive their full allocation before upstream junior water users. As a result, junior water users bear significant risks of financial losses with limited capacity to be resilient in a warming climate under current legislation.

55. Ibid.
56. Larson, R. 2017. Water Security. *Northwestern University Law Review* 112(2): 139–200.

Figure 5. Effect of a Warming Climate on Precipitation and Streamflow



Note. (Top) Several irrigation districts are located in the Yakima River Basin. (Bottom Left) Warmer temperatures in winter months means more precipitation falls as a wintery mix or rain. (Bottom Right) In the 2015WY, precipitation fell as rain rather than snow, resulting in peaks in streamflow from October to February, rather than the more steady release of snowmelt from April through July in colder years.

A warming climate challenges the long-term viability of some river basin compacts. For instance, the Colorado River Basin is in a multi-decade drought, creating difficulties in delivering full allocations. Interim Guidelines were developed in 2007 that further reduced allocations to Arizona and Nevada (junior rights) and Drought Contingency Plans were authorized by Congress in 2019 to collectively address chronic water shortages. There is also uncertainty in how much water is available because of unused or unclaimed water rights. Twenty-two tribes were awarded 2.9 MAF as part of Indian water right settlements, but only use half of their rights while 13 other tribes have water right claims that have yet to be resolved. Increased use by tribes with existing rights and future settlement claims by other tribes will likely be more controversial in times of shortage. For instance, will Congress choose to fund the Congressionally authorized development of the Navajo-Gallup Water Supply Project to serve Jicarilla Apache Nation, the Navajo Nation, and the City of Gallup?[57]

57. Stern, C. and P. Sheikh. 2019. Management of the Colorado River: Water Allocation, Drought, and the Federal Role. CRS Report R45546.

Have a Role in the Decision-Making Process

The immense fragmentation of governance in the U.S. at the federal, state, and local level makes it difficult for the public to participate in water decisions. The federal government has at least 13 departments with a water-related mission. States often have separate departments managing water quantity and quality, with further subdivisions between surface water and groundwater. Local governments often manage water, sewer, and stormwater separately. Fragmentation and variation in governance makes it difficult for there to be meaningful public participation, particularly when water agencies have a culture of operating in the background. Some utilities are moving towards better communication and public engagement. Public engagement should be as inclusive as possible and strive to overcome barriers such as language (when meetings are only conducted in English), property ownership (sometimes required), timing of meetings (when only conducted during 8–5 hours), and location of meetings (when conducted in areas where public transportation is not available). A legacy of systematically excluding and disregarding disadvantaged communities creates significant distrust, and it can take decades for government to regain public trust once it has been lost.[58]

5. PAYING FOR INFRASTRUCTURE: QUESTIONS OF AFFORDABILITY

> *Nothing is more useful than water: but it will purchase scarce anything; scarce anything can be had in exchange for it. –Adam Smith (1776)*

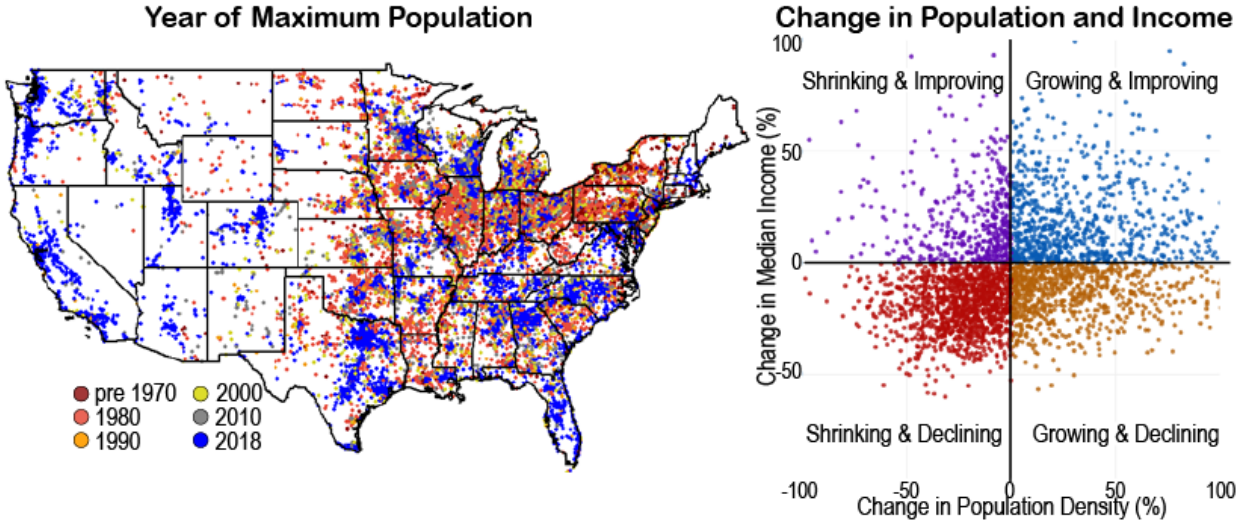
You need water to live, but you need money to live on. There are costs to pump water from its natural environment, treat to standards, and deliver it to its final destination. There are costs to move wastewater, treat to standards, and deliver it back into the natural environment. The main driver of affordability challenges is the capital needed to maintain and upgrade this infrastructure. Much of the water services infrastructure initially subsidized by the federal government is at the end of its useful life and in need of replacement. Estimates range from $655 billion in the next 20 years to $1 trillion in the next 25 years are needed to simply restore existing water systems, potentially tripling household bills in some communities.[59] Water and sewer services are expensive and historically underpriced. Even with rising rates, a 2018 AWWA survey found only 21% of utilities believed they could cover the full cost of services from their customers. Yet, the proportion of federal funding for capital infrastructure has declined from contributing 63% in 1977 to 9% in 2014.[60]

While there is bipartisan support in the federal government to invest in infrastructure, little has changed. Infrastructure design and spending are tied to archaic legislation that was passed to address different challenges, such as creating roads to connect cities, delivering telecoms, and ending the dumping of raw sewage directly into streams.[61] We also have archaic funding models focused on funding new infrastructure and growth while many areas in the US have shrinking populations and a declining median income (Fig. 7). Indeed, 47% of census designated places (i.e.,

58. US Water Alliance. 2017. An Equitable Water Future: A national briefing paper.
59. Montag. 2019. Water/Color: A study of race & the water affordability crisis in America's cities.
60. US Water Alliance. 2017. An Equitable Water Future: A national briefing paper.
61. Tomer et al. 2019. To fix our infrastructure, Washington needs to start from scratch.

communities) in the U.S. have a smaller population now than in 1980, while 60% have a lower median income after adjusting for inflation.

Figure 6. Community Population and Income Change over Time



Note. (Left) Map showing the decade of maximum population for CDPs located within a metropolitan statistical area. (Right) Chart of changes in population and income for 3,600 CDPs from 1980 to present.

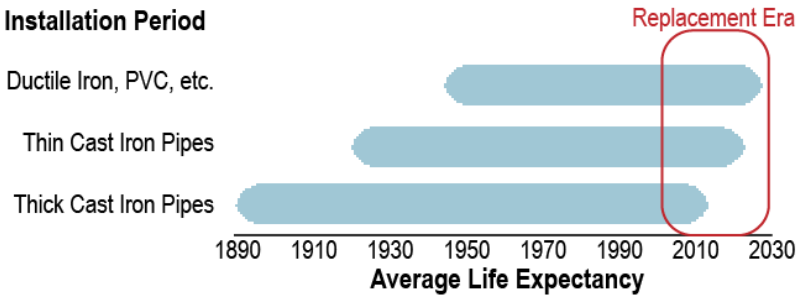
Utility Affordability

Water infrastructure reflects the history of a city. Water infrastructure in Rust Belt cities built in the late 1800s were thick, cast iron pipes (life expectancy of 120 years). As cities grew, cast iron pipes in the 1920s became thinner along with their life expectancy (100 years). Methods and materials continued to change, such that pipes laid post World War II had a life expectancy of 75 years.[62] The timing to replace pipes in older cities all fall between 2000 and 2030, creating significant cost burdens (Fig. 7). Often the cost burdens are so high that cities defer replacement. As infrastructure fails, there are service disruptions, impediments to emergency response, unsanitary health conditions, and environmental contamination.

After WWII, there was an explosion of small water systems in suburban areas to accommodate the swelling Baby Boomer generation and "white flight." These systems were often not built to enduring standards and have to be rebuilt when consolidated.[63] Rust Belt cities are plagued by shrinking populations and declining incomes as industry and people moved elsewhere, stranding infrastructure assets. Shrinking populations and/or declining incomes result in a smaller revenue base for utilities to maintain the fixed costs of day-to-day operations, let alone finance replacing infrastructure.

62. AWWA. 2001. Dawn of the Replacement Era: Reinvesting in Drinking Water Infrastructure.
63. Ibid.

Figure 7. Average Life Expectancy of Water Pipes and the Timing of Replacement[64]



In contrast, Sun Belt cities have experienced much of their growth in the last few decades. Rather than replacing already built infrastructure, they are paying for new infrastructure, much of which is sprawling and more expensive to build, maintain, and operate. The risk is two-fold with this approach. First, capital facilities must be laid in advance of the population, creating risk for stranded capacity should the expected population growth fail to materialize. Second, economies and jobs may change and populations may leave. **The inescapable fact is that water infrastructure is fixed while populations are mobile.**[65]

Built infrastructure creates the skeletal framework of American society and the age and health of the skeleton vary geographically. As the financial burden shifts from federal to local, the capacity to afford infrastructure varies considerably. Local systems require local wealth, but there is large income and wealth inequality across communities. While the incomes for high-earning workers has increased over time, the average American household is barely keeping up with inflation. Disparities in income and wealth create an inequitable infrastructure reality, making it difficult for many households, and therefore local utilities, to afford to replace aging infrastructure, let alone modernize their systems to be resilient to changing conditions.

Opportunities and Challenges

The arrival of digital infrastructure creates a vast array of opportunity to manage old infrastructure more efficiently. However, if not implemented with an equity lens, it may create additional inequities due to varied community capacity to obtain wireless capabilities or attract the skilled workforce needed to benefit from digital infrastructure. Challenges, like these, appeared as schools transitioned to online in the pandemic, but many families did not have broadband. Millions of Americans do not have access to broadband or high-speed connections (putting businesses to a disadvantage), or they do not have the skills to leverage digital solutions to better manage existing municipal services. In an effort to keep up, municipalities across the country are spending faster than their revenue growth.[66]

64. GAO. 2002. Water Infrastructure: Information on Financing, Capital Planning, and Privatization.
65. Ibid.
66. Tomer et al. 2019. To fix our infrastructure, Washington needs to start from scratch.

Older legislation is ill suited to manage modern challenges. The federal government needed to invest in new infrastructure as the country was growing and expanding. The country has grown and is now shifting between already established communities. Yet, federal dollars continue to prioritize the construction of new highways to connect cities, while providing little support to communities whose local roads are failing. Similarly, federal dollars from the CWA and SDWA largely support a limited subset of capital infrastructure investments, limiting funding for new technology and novel approaches that might decrease long-term costs, as well as increase the availability of water in poorer communities.[67] For instance, enabling funds for digital infrastructure to manage systems more efficiently may allow systems to defer or lower capital costs.

Our water system is highly fragmented with ~51,535 drinking water utilities (more than 16 utilities per county), an estimated 14,748 wastewater treatment plants, and many cities have separate stormwater departments. Fragmentation within and across water systems makes it difficult for local governments to reach economies of scale and generate sufficient revenue to afford infrastructure, meet regulatory changes, and invest in projects with multiple co-benefits from a "One Water" approach. Consolidating resources or physical systems can create economies of scale that lower utility costs. Some rural areas rely on cooperatives (such as EJ Water Cooperative) to consolidate technical, managerial, and financial functions. A "One Utility" approach may consolidate utility services to include water, sewer, stormwater, telecoms, electricity, and so on.

Household Affordability

The primary funding source for drinking and wastewater utilities is their residential and non-residential customers. Household affordability refers to the capacity of a household to pay for drinking water, wastewater, and/or stormwater services without undue hardship. A threat to affordability occurs when the demographic and economic conditions that shaped initial investments in water infrastructure change. What was once affordable given a large and prosperous revenue base can become unaffordable in the future. For instance, the per-capita replacement cost of mains in some cities is more than three times higher than average due to population declines.[68] Aside from replacing infrastructure, systems that need to upgrade treatment technologies to meet new regulations require long-term additional costs for basic operations and maintenance, as well as increased staffing costs to support more qualified managers and operators.[69]

One study found that rates increased by 4.71% per year from 1996 to 2016 while inflation increased by 2.15% (BLS CPI-U).[70] This creates deep concern regarding the ability of low income, fixed income, or other economically disadvantaged groups to afford basic services going forward. When customers are unable to pay their bills, utilities can disconnect services, leaving low-income households without access to basic services. The inability to pay bills negatively impacts

67. Ibid.
68. AWWA. 2001. Dawn of the Replacement Era: Reinvesting in Drinking Water Infrastructure.
69. Warmath. 2015. Chapter 10: Water and Wastewater Pricing Process in Water and Wastewater Finance and Pricing. Raftelis Financial Consultants, Inc.
70. Bunch et al. 2017. Water and Wastewater Annual Price Escalation Rates for Selected Cities across the U.S.

utilities as they take in less revenue and pay more to disconnect services or attempt to collect revenues. For instance, Detroit, MI lost $40 to $50 million in recent years due to low collection rates[71] and disconnected 44,000 households in 2014, 28,000 households in 2016, and 23,000 households in 2019.

Shutoffs have detrimental impacts on households extending beyond lack of access to water and sanitation. Local governments can place liens on properties when homeowners fail to pay for water and sewer systems that can lead to loss of the home through tax foreclosure of a few hundred dollars. These liens disproportionately affect communities of color.[72] In 2017, around 8,000 Flint homeowners were warned they could lose their homes through tax foreclosure for failure to pay their bills for (contaminated—perceived or real) water. The slow and antagonistic response of state and federal officials to Flint have brought claims of environmental racism at all levels of governance.[73]

Similarly, state laws may disproportionately place burdens on low-income households. In Alabama, it is a misdemeanor to build, maintain, or use an unsanitary sewage system. However, in Lowndes County more than 80% of the predominantly African American community do not have access to a municipal sewer system, and private septic systems cost more than the median household income. The State has fined and arrested residents for failing to install a proper sanitation system they cannot realistically afford. Additionally, these communities suffer from adverse health impacts created by efforts to use PVC pipes to carry sewage from homes into open pits and trenches that overflow during intense rain events. Yet, locations that are predominantly white have centralized wastewater services.[74]

Decentralized water and sanitation systems are prevalent across the U.S. Fifteen percent of the population supplies their own water from wells and 20% rely on septic systems. There is little regulation or funding available for household level infrastructure. In areas where public systems are not viable, funding for household infrastructure should be made available.

Assistance Programs

Federal programs exist to ensure low-income households have access to food (Supplemental Nutrition Assistance Program) and energy (Low Income Home Energy Assistance Program); however, no such federal program exists to ensure access to water and sanitation. In the 1990s, about 14% of water-related utilities provided some assistance for lower-income customers.[75] Today, an estimated 30% offer assistance to low-income households.[76]

Utilities have created many different types of programs to promote affordability (Table 1). Some programs are widely used (such as discounts) while others are rare (such as forgiving arrears). A single utility may implement multiple programs. The use of increasing block rates structures has been proposed as a way to develop "water stamps" to ensure basic water provision to underserved

71. Montag. 2019. Water/Color: A study of race & the water affordability crisis in America's cities.
72. Ibid.
73. Larson, R. 2017. Water Security. *Northwestern University Law Review* 112(2): 139–200.
74. Montag. 2019. Water/Color: A study of race & the water affordability crisis in America's cities.
75. GAO. 2002. Water Infrastructure: Information on Financing, Capital Planning, and Privatization.
76. Siegel, S. 2019. *Troubled Water: What's Wrong with What We Drink*. Thomas Dunne Books. 352 pp.

homes. Block rates allow a basic amount of water for domestic use to be priced well below cost. Once a household exceeds that basic allowance, the price for water becomes increasingly expensive until the largest water users pay higher than the full cost to subsidize water stamps.[77] This type of rate structure is illegal in some states, such as CA where Proposition 218 prohibits subsidizing low-income assistance programs.

If there is a human right to water, and if there is no funding from government that supports that aspiration, then higher-income customers will likely need to subsidize lower-income customers.[78] Yet, in nearly every state, legal requirements designed to ensure rates that are "reasonable" and "non-discriminatory" have ironically created roadblocks to establish affordability programs. In Maryland, private companies are prohibited from implementing affordability programs subsidized by other customers while public utilities may implement such programs. In California, the opposite is true. In Michigan, water rates must be set at the reasonable cost of delivering service without consideration or a constitutional right to afford water services. Utilities may have bond covenants that make it illegal to provide free service or service below actual costs to any customer or customer group.[79]

Table 1. Description of Some Current Innovations Used by Utilities to Promote Affordability

Innovation	Description	Example
Fixed discounts	Provide discounts on bills for certain populations, such as senior citizens and low-income households	NJ American Water, NJ
Conservation measures	Provide or incentivize low-flush toilets, plumbing repairs, water efficient fixtures, etc.	San Antonio, TX
Forgiveness of arrears	Forgive or reduce penalties, late fees, and/or missed payments. While rare, more utilities are considering during the COVID-19 pandemic.	York City, PA
Income qualified rates	Adjust payments based on a percent of income.	Philadelphia, PA
Payment plans	Establish payment plans to repay debt without incurring additional late penalties or fees.	Seattle, WA
Rate structures favoring affordability	Lower fixed charges and/or increasing block rates are more affordable for basic water needs.	Durham, NC

Despite legislative hurdles, utilities have created different types of affordability programs. For example, Buffalo recently introduced a new, tiered rate structure that has commercial and industrial customers subsidizing costs to achieve greater equity. They also launched a new Residential Affordability Water Program tiered based on income.[80] Philadelphia issued the Tiered Assistance Program (TAP) in 2017 to ensure water and sewer bills account for less than 3% of

77. Larson, R. 2017. Water Security. *Northwestern University Law Review* 112(2): 139–200.
78. Montag. 2019. Water/Color: A study of race & the water affordability crisis in America's cities.
79. Warmath. 2015. Chapter 10: Water and Wastewater Pricing Process in Water and Wastewater Finance and Pricing. Raftelis Financial Consultants, Inc.
80. Williams, D. 2018. Water rates to increase in Buffalo for first time in seven years.

a household's income for the nearly 60,000 residents with an income below the 150% federal poverty level. The minimum bill is $12 and participating households pay 2–3% of their income toward water bills. TAP replaced their previous program which had a cumbersome application process that limited the number of participating households to 5,500 participants. One in five customers had water services disconnected for failure to pay bills in the five years preceding TAP.

6. GETTING TO WATER EQUITY

> *Can you imagine, if we made our societal decisions as if the safety of drinking water mattered most of all? ... This would lead to better drinking water, fewer climate impacts, cleaner air, and a healthier nation. –Lynn Thorp*

Water is essential to prosperity and progress. As a blended private/public good, transitioning towards equitable water can foster greater opportunity for all people and communities. Public and private utilities are implementing low-income assistance programs and workforce development strategies, as well as utilizing capital projects to foster neighborhood revitalization. Community-based organizations are building local capacity to engage in water planning and policy-making, nurturing a new generation of leaders. Environmental organizations are incorporating community considerations into their ecological work. A growing number of philanthropic organizations are bringing equitable water strategies into their investment portfolios. Industries could contribute by investing in local utilities and minimizing the volume of both regulated and non-regulated pollutants discharged into water bodies. This will protect public and environmental health, as well as reducing treatment costs for utilities. Sustaining and scaling these efforts are essential to a One Water future.[81] As a starter for further conversation, below are a few broad ways that have been proposed to address the drivers of inequity.

Declare a Human Right to Water

The human right to water must achieve an acceptable quantity and quality of water with acceptable costs and risks.[82] It must be federally funded/subsidized and enforceable to provide legal leverage and opportunity for disadvantaged or marginalized groups to secure environmental justice and obtain a higher standard of living. The human right to water typically consists of four components.[83]

- **Quantity**. Everyone is entitled to sufficient and reliable sources of water for domestic uses to meet an acceptable standard of living, taking into account individual circumstances and needs, such as health issues or work conditions.
- **Quality**. Water must be safe and not pose a threat to human health in the immediate (such as bacteria) or long-term (such as accumulation of chemicals), and must be considerate of different health sensitivities (e.g., children, elderly). International standards require governments to limit contamination by third parties.

81. Anderson, M. 2017. Losing the War of Attrition: Mobility, Chronic Decline, and Infrastructure. *Yale Law Journal Forum* 127: 522–542.
82. Larson, R. 2017. Water Security. *Northwestern University Law Review* 112(2): 139–200.
83. International Human Rights Law Clinic. 2013. The Human Right to Water Bill in California.

- **Accessibility**. Everyone should be able to physically access water in households and workplaces.
- **Affordability**. The direct and indirect costs of water should not pose a barrier to access or compromise the ability to afford food, housing, and health care. Those who cannot pay should not be deprived of water, even if some require free or subsidized water.

The human right to water can be a "provision" and/or "participation" right. Provision rights impose an obligation on governments to provide water to its citizens, something that often proves to be economically and ecologically unsustainable. A participation right does not guarantee water provision but is designed to (1) prevent discrimination and neglect, (2) expand opportunities for meaningful public participation, and (3) ensure accountability through enforceable regulations and policies. For instance, they might guarantee a citizen's right to be free from discrimination or cruel treatment in water provision, to receive adequate notice of water cutoffs or rate increases, and to participate in the transparent development of water policy through stakeholder meetings. Participation rights do not require water provision at low or no cost and therefore do not have the same sustainability challenges as provisional rights. Participation rights are more easily enforced in courts[84] and can address the root causes underlying the lack of access, such as red-lining and under-bounding practices.

Emphasize Public Health

The demand for water to be a human right is often conflated with free or cheap services. However, water is an expensive, and genuinely valuable public good. The value of water may be enhanced as the quantity and quality of water are tied more closely with public health outcomes because poor public health is expensive. Levees and dams support public health by protecting lives and property during extreme rain events. Water is needed to create energy and grow food, both essential for public health. **Yet, public utilities usually do not see, or communicate themselves as part of the community's public health infrastructure.** This may be changing during the COVID-19 pandemic. Many utilities are in survival mode, seeking to deliver "good enough" water at the lowest cost possible—meaning what is minimally defined by EPA and state counterparts.[85] In some instances "good enough" does not meet even those minimum drinking water standard regulations with regulations not being enforced consistently or in a timely fashion. Lack of enforcement can encourage utilities to ignore the costly requirements of legislation, perhaps to the detriment of public health.[86]

Water service providers are caught between conflicting political interests as the number of regulated contaminants increase, the costs to both monitor and treat water increases. Furthermore, political agendas and legislation often prevent utilities from trying more innovative and cost effective solutions (including financing mechanisms) while limiting their capacity to raise rates. For example, Native American tribes have limited capacity to levy taxes, making it difficult to fund new infrastructure and keeping them dependent on the occasional grant. At the

84. Larson, R. 2017. Water Security. *Northwestern University Law Review* 112(2): 139–200.
85. Siegel, S. 2019. *Troubled Water: What's Wrong with What We Drink*. Thomas Dunne Books. 352 pp.
86. Balazs, C. & I. Ray. 2014. The Drinking Water Disparities Framework: On the Origins and Persistence of Inequities in Exposure. *American Journal of Public Health* 2014: 603–611.

same time, however, the drinking water is of such poor quality that many now buy bottled water, despite many living below the federal poverty line. Rather than being able to raise rates or taxes to invest in public infrastructure, they are forced to pay for private bottled water.

Increasing rates brings an affordability concern, yet many consumers yearn for safer, purer water and are prepared to pay a premium for bottled water in places were tap water is available yet not safe to drink. Perhaps public utilities could charge a little more and deliver far better quality water, saving their consumers money in the long-term when they no longer feel the need to pay more than a hundred times for a bottle of water than using their tap water.[87]

Protecting public health would also change the relationship between government and the sources of contamination. Historically, the economic agenda of the country has led to the creation of products first, and considerations for environmental and public health impacts have come later. A public health agenda may require industries to demonstrate the safety of new chemicals to public health or develop robust risk mitigation strategies.[88] There are monumental disincentives for both utilities and industries because they have to clean water and sites once a chemical is regulated, and to the level of regulation. Furthermore, it is not legal for consumers to bring a lawsuit against a water utility for an unregulated contaminant, such as perchlorate and PFAS. This creates another disincentive to add new contaminants for regulation and hinders the capacity for local communities to proactively ensure safe drinking water. A public health agenda may also encourage large-scale farms to support local communities whose wells have been contaminated by nitrogen or have run dry due to over-pumping. Promoting water as a public health service will likely only be achieved if congress passes legislation conveying this intent to utilities in tandem with industry standards being updated to reflect an expanded public health mandate beyond basic service provisions.

Develop and Fully Fund a National Infrastructure Agenda

A national infrastructure agenda is an urgent public health imperative and a down payment on future mobility. Climate change will likely alter the underlying environmental conditions upon which cities depend for water, land, and public safety. In the future, mobile populations may flock back to the Rust Belt's industrial cities that were built alongside major domestic sources of freshwater.[89] The deterioration of aging waterworks systems threatens to further contaminate freshwater sources, creating a local problem with national significance. The nation will need that water, and climate change promises to intensify that dependence.

When state and federal governments treat infrastructure as a local expense, they effectively leave low-resourced cities with no alternative but to decay. The usual model for funding infrastructure is premised on growth—a solid and growing base of ratepayers to pay fees for service, along with good credit to issue low-risk municipal bonds. Low-resourced cities and counties are often too small, have poor credit, or are maxed out on debt. By the federal government withdrawing funds

87. Siegel, S. 2019. *Troubled Water: What's Wrong with What We Drink*. Thomas Dunne Books. 352 pp.
88. Ibid.
89. Anderson, M. 2017. Losing the War of Attrition: Mobility, Chronic Decline, and Infrastructure. *Yale Law Journal Forum* 127: 522–542.

for infrastructure, Congress leaves the EPA to enforce laws that are too important to ignore, but that some systems are too poor to obey.[90]

Financial self-sufficiency is enshrined in nearly every law, policy, and funding program for water and wastewater systems, yet remains out of reach for many systems because of economic, environmental, and technical challenges.[91] It may be that not all water and wastewater systems can be financially self-sufficient. It is hard to imagine a path forward without federal support (or substantial technological changes) that lower costs. America's water and wastewater treatment systems need reinvestment. To fail at this core generational duty will only drive up the costs of the imminent migration predicted with climate change. A waterway treated as a sewer today may be needed as a water supply tomorrow (such as in Flint, MI). Climate change promises to shift the national map of environmental comfort and safety back to the Northeast and Midwest's surface waters and interior locations.[92]

Water Democracy: Build Trust and Empower Communities

Water inequity starts with social inequity. To reach equitable solutions we must address the historical injustices that have led to the unequal distribution of opportunities, wealth, and resources along the lines of race, gender, and other axes of difference for generations. Restorative justice and reconciliation are needed to address a legacy of harmful interactions between government and minority communities. Restorative justice posits that when harm has been done, all stakeholders must come together, identify the harm and its impacts, and take steps to repair trust. The parties at fault acknowledge their role, recognize the scope of harm and commit to restitution.[93] Greater public participation that includes all stakeholders must mean addressing language barriers, time and location of meetings, transparency, and access to information. This in essence is water democracy: the development of decision-making structures that reflect and respond to those served and impacted by decisions, whether utility boards or EPA rulemaking. The voices of the people, as much or more so than companies, must be heard and meaningfully incorporated.

In situations where deception took place, radical transparency—including data and the use of third parties (such as NGOs) to collect data—may be necessary to restore trust. Failures of the regulatory system to provide timely information and adequate funding mechanisms at the state level all undermine the success of the community addressing issues. At this point, households assume the burden of mitigation, often by purchasing bottled water. The combination of disenfranchised residents, inadequate water system responses, and regulatory failures create vulnerabilities and distrust.[94] Indeed, some areas do not have enough regulators to ensure water

90. Ibid.
91. DigDeep & U.S. Water Alliance. 2019. Closing the Water Access Gap in the United States.
92. Anderson, M. 2017. Losing the War of Attrition: Mobility, Chronic Decline, and Infrastructure. *Yale Law Journal Forum* 127: 522–542.
93. US Water Alliance. 2017. An Equitable Water Future: A National Briefing Paper.
94. Balazs, C. & I. Ray. 2014. The Drinking Water Disparities Framework: On the Origins and Persistence of Inequities in Exposure. *American Journal of Public Health* 2014: 603–611.

quality, putting the burden on NGOs and citizen science data to ensure residents are not exposed to contaminants.[95]

Design Multi-Benefit Solutions

Water touches on everything and solutions with co-benefits can be developed when engaging in workforce development, public health, food security, climate resilience, and renewable energy. For instance, the water industry can work with schools and labor unions to develop careers and job opportunities within their local communities. The water sector is local and provides living-wage jobs. Furthermore, in the replacement era of water infrastructure, there is the potential to generate economic benefits within local communities, and if done equitably (such as breaking large contracts into smaller contracts that do not require huge upfront capital costs), could provide financial resources for small minority-owned businesses.[96] Rebuilding water infrastructure could coincide with and complement redesigning neighborhood revitalization projects and the creation of green spaces (such as for green infrastructure projects) to amplify community benefits. Overall infrastructure costs may be reduced if water, transportation, energy, telecoms, and so on are coordinated.

There are also opportunities to leverage credits and recover costs. For example, planting trees along a stream corridor can create carbon credits, stream temperature credits, nitrogen credits, reduce flooding, and so on. Water is the most tangible representation of climate change impacts in many communities. Building water security should go hand-in-hand with developing climate mitigation strategies and planning for climate resilience within communities.

95. Ibid.
96. US Water Alliance. 2017. An Equitable Water Future: A National Briefing Paper.

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