Environmental Justice and Sustainable Urban Water Systems

COMMUNITY VOICES FROM SELECTED CITIES IN THE UNITED STATES

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About the Project

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The UWIN Social Equity and Environmental Justice Lab at Northeastern University and Florida International University conducted this research. The team includes faculty, graduate students, and undergraduate research assistants at the Social Science Environmental Health Research Institute, an interdisciplinary research center at Northeastern that focuses on social science research, teaching, community engagement, and policy work in the field of environmental health. https://www.northeastern.edu/environmentalhealth/

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Preface

". . . the engineering solution has been so strong, the technical solutions have been so strong, that they've almost hidden the issue of water from the public. And so there's been very little community engagement, literacy, or I would say, consideration or engagement." - Los Angeles 1

WATER connects us to our natural and built environments, and to each other. Free flowing water is a life-sustaining force on our planet. It does not conform to political boundaries, obey regulatory authority, respect property rights, or notice the skin color of people who depend upon it. Human stewards, on the other hand, create institutions to control and manage water, which have improved the efficiency of water services for many, but have also altered who has access to clean water and at what price. Centuries of human modifications to natural systems have led to water problems, and even crises, in communities around the world. The United States is water-rich in most regions of the country, and skillfully manages scarce resources in others, but water problems are multiplying, especially in low-income communities and communities of color.[1]

This report summarizes community perspectives on water resources in nine cities across the U.S. Our research team interviewed 45 leaders of community organizations in 2017-2018. Thematic content analyses of interview transcripts highlight their views of social inequities and environmental injustices related to local water, origins of inequities, perceived barriers to sustainability, and visions of sustainable urban water systems that benefit and serve *all* communities equitably. These leaders have a wealth of information about water in their communities, and one of the reasons for writing this report is to share their insights so everyone can appreciate how their water concerns relate to other cities. We believe that sustainability rests upon a foundation of inclusion, communication, and social equity.

What follows is a preview of our research findings. We are writing longer articles for publication in academic journals, a process which can take several months. Intended audiences for this report are the people we interviewed, our fellow scientists in the Urban Water Innovation Network (UWIN), the UWIN stakeholder groups of water professionals, and our funder, NSF.

At the end of this report we invite you to use an online, open-access platform to begin an important conversation between readers and authors. Everyone is welcome to participate. We hope our work will contribute to better communication among different water interest groups and collaboration in designing solutions for sustainable water resources. We encourage readers to circulate the report to others in your networks and invite their comments as well.

Sharon L. Harlan

Sharon L. Harlan, Study Director

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Executive Summary

The scope and nature of the United States' growing urban water crisis is enormously complex, and developing solutions requires collaboration among many kinds of stakeholders. While scientists, engineers, and water professionals have expertise regarding technological interventions to guarantee a sufficient and safe water supply, communities also have valuable knowledge to share in charting a pathway toward urban water sustainability.

Our UWIN Social Equity and Environmental Justice research team interviewed 45 leaders of community organizations across nine U.S. cities to amplify and foreground community perspectives on social inequities and environmental injustices related to local water resources, the origins of inequities and perceived barriers to sustainability, and their vision for a sustainable urban water system. We found that leaders have intimate knowledge of the social distribution of water problems and benefits in their communities, are very familiar with the histories of water inequities, understand the barriers to sustainability, and offer visionary solutions for sustainable and equitable water systems.

The Unequal Distribution of Water Resources

Community leaders emphasize that environmental justice (EJ) communities, predominantly low-income and people of color, are disproportionately burdened with water-related problems and have less access to water amenities in their cities. Disparities exist in: contamination risk and proximity to polluting sources; vulnerability to flood and/or climate change risks; unaffordability of household water; and access to waterfront recreation.

Who Is Burdened?

There are disparities among individuals and households *within* EJ communities. Community leaders specifically have concerns for people who are non-English-speaking immigrants, children, women, immune-compromised, elderly, and disabled. Our findings highlight the importance of understanding the intersecting layers of social vulnerability that community members can experience, and how a person's age, health, or immigration status can further exacerbate the experience of water-related hardships.

Origins of Water Inequities and Barriers to Sustainability

Conversations with community leaders made clear that water-related problems do not exist independently from broader issues of social, racial, and environmental justice. This demonstrates the importance of addressing water inequities at a broad, structural level during the rebuilding of new, sustainable urban water systems. Community leaders identify three root causes of inequities and barriers to sustainability:

Racial Discrimination. Decades of racialized urban planning shaped the inequitable distribution of basic water services and amenities that exist across white communities and communities of color today. Currently, wealthier, white neighborhoods continue to attract greater public and private investment, compounding historical inequities.

Economics of Free Market Logic. A "profits over people" mentality is a primary cause of water inequities and a barrier to sustainability. Governing water resources with logic of the free market allows for too much corporate influence over municipal planning, preferential treatment for industry in crafting and enforcing water laws and regulations, and often leads to the commodification and privatization of water.

Exclusive Institutions and Regulatory Failure. The institutions that govern water resources have a bureaucratic and technical culture, leading decision-making processes to be obscured from the public. In effect, communities with greater social capital and political power, as well as private companies, have more influence over decision-making.

Community Visions for Just and Sustainable Urban Water Systems

Recognizing that inequities in urban water systems intersect with other racial and economic injustices, community leaders envision *equity* and *civic involvement* as the building blocks of a better science and management approach to sustainability, emphasizing that environmental solutions are not truly sustainable unless they are just and equitable for all. Three main tenets of sustainability were repeatedly underscored:

Equitable Access and Benefit. Water managers must understand and confront inequities stemming from historical and ongoing institutional racism and make clean water accessible and affordable to all. Community leaders emphasize that unless low-income and communities of color are prioritized to address decades of disenfranchisement, the existing inequities of the current water system will be carried into planning and implementing future systems.

Civic Involvement. As a field dominated by scientists and engineers, democratic water sustainability planning necessitates inclusion of community voices from the initial stages of problem definition to the end result, particularly communities who are disproportionately burdened by water problems. Inclusive and transparent governance processes allow for more public accountability in the crafting and enforcement of regulations.

Better Science and Management. Techno-scientific problem-solving is essential to crafting solutions for challenges posed by storm and wastewater management, as well as aging infrastructure and the rising burden of pollution control. But rather than envisioning a strictly top-down managed water system, community leaders emphasize the value of civic science projects, community water monitoring, and other activities to involve residents in the management and protection of their local water resources.

Next Steps

This report is intended to be the *beginning* of an ongoing conversation among communities, researchers, and water managers for developing technical and managerial solutions for urban water problems that are both environmentally sustainable and socially just. At the end of this report, we invite readers to join an online discussion platform to provide feedback, network, and brainstorm directions for future collaborative work.

Introduction

Urban water systems across the U.S. are under pressure from increasing demand due to shifting and growing populations, rising costs of delivery and infrastructure maintenance, polluted waterways from decades of industrial activities, unequal service areas due to legacies of residential segregation, and increasing frequency and severity of extreme weather events such as storms, floods, and heat waves due to climate change. The specific nature of these challenges are regionally variable, depending upon local geography, neighboring industries, and local governance and funding structures. Other challenges, such as shrinking water supply and affordability of water services, are immediate concerns for only certain cities, although projections suggest that these problems are becoming more widespread.

Pressures on local water systems, combined with the technical and financial implications of insufficient public funding to fix aging infrastructure and clean up pollution, are well-known to scientists and water professionals, who are responsible for finding behavioral, policy, and technological solutions to guarantee sufficient and safe water for our future.

Leaders of community organizations also have valuable perspectives to share on water, although they are often overlooked as legitimate water stakeholders. They have first-hand, local knowledge of water-related burdens and benefits through their work with residents and through everyday lived experiences in their own homes and neighborhoods. These individuals, who are organizers, advocates, and often residents of environmental justice (EJ) communities, have insights as to *why* inequities exist, and *how* they can be dismantled in the process of building sustainable water systems.

> **Environmental justice (EJ)** communities are commonly defined as low-income or communities of color that face a high burden of environmental hazards, have been historically excluded from environmental policy decision-making processes, and experience inadequate implementation and enforcement of environmental regulations.

Through our interviews, we found that community leaders' definitions of water problems and their visions for a sustainable system sometimes converge with those of water professionals. But the leaders also raise different concerns about water problems and benefits in their communities, have different understandings of the barriers to sustainability, and prioritize some different solutions. It is important for community voices to be heard by scientists and water decision-makers.

The Urban Water Innovation Network (UWIN)

UWIN is a coalition of academic institutions and key partners across the U.S. that collaborate on research, engagement, and educational programs to address challenges that threaten urban water systems.

The mission of the network is to create technological, institutional, and management solutions to help communities increase the resilience of their water systems and enhance preparedness for responding to water crises. UWIN scientists and stakeholders seek solutions that are consistent with *inclusive, equitable* and *sustainable* urban development. For more information, see https://erams.com/UWIN/.

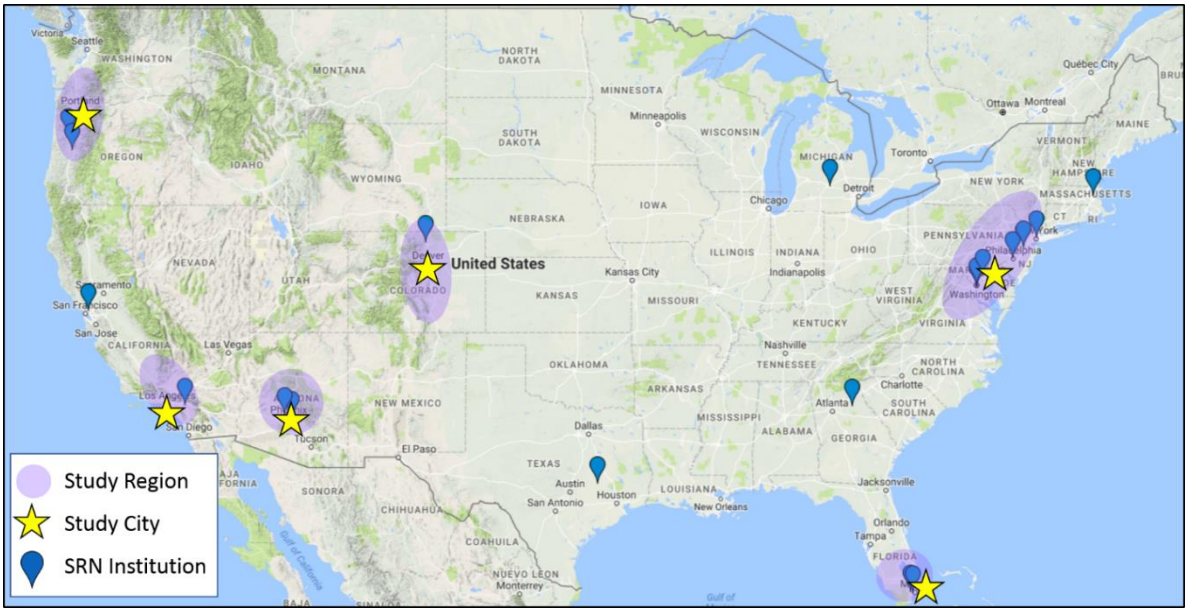

Image 1: Urban Water Innovation Network (UWIN) study regions and institutions

UWIN's Social Equity and Environmental Justice (SEEJ) team at Northeastern University designed this interview study of community organizations to amplify underrepresented voices and foreground community members' firsthand experience with water problems, as well as their visions for a sustainable urban water system. SEEJ researchers at Northeastern and Michigan State University have also recently completed a survey of over 9,000 households in nine metropolitan areas to examine the public's beliefs and their experiences with water in their communities. Some results from the survey will be available later in 2018. Michigan State SEEJ researchers published an article in 2017 on the geography of water unaffordability in the U.S.[2]

Methods

Interviews with Leaders of Community Organizations

We interviewed 45 leaders in 44 organizations in and near Baltimore, Boston, Denver, Detroit, Los Angeles, Miami, Phoenix, Portland (OR), and Tucson. We located them through referrals from members of UWIN stakeholder groups, web searches, and referrals from people we interviewed.

The mission statements of organizations in our sample vary greatly. For example, some were formed with the explicit purpose of protecting larger watersheds or reducing the cost of water, while for other groups, water is just one part of their larger scope of work on social or environmental concerns in their community.

39 organizations in our sample are community-based organizations, defined according to 20 U.S.C.A § 7801(6) as "a public or private nonprofit organization of demonstrated effectiveness that is representative of a community or significant segments of a community, and provides educational or related services to individuals in the community."

Also in our sample are two public university centers that bridge academic expertise on water with local water interest groups, one state and one municipal government agency focused on water equity and sustainability, and a private consultant who works closely with resident groups. Participating organizations are listed in the Appendix.

The work they do includes educating residents about water, organizing residents to work on solving water problems, or advocating on behalf of communities to local and state governments and water utilities. These organizations are diverse in how much they rely on paid staff or volunteers to accomplish their work, how they are supported, connections outside the community of interest, and whether they are affiliated with larger, national NGOs or primarily driven by involvement of local residents.

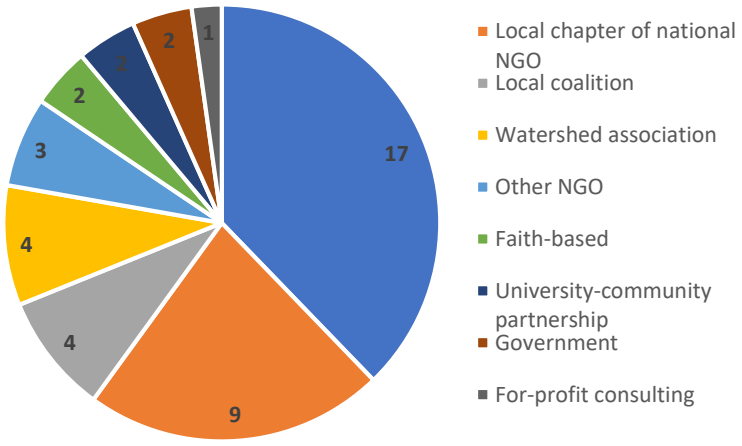

Figure 1: Types of Community Organizations in the Study

We encouraged interviewees to give in-depth answers to a series of open-ended questions. This report discusses responses about types of water problems, which groups are burdened by inequities, and characteristics of sustainable water systems. Most interviews took 45-60 minutes and each one was transcribed verbatim. Each transcription was read and coded by at least two members of the research team using computer software for textual data analysis. Thematic analyses were conducted in small group meetings where we discussed and distilled coded interviews to elicit the variety, categorization, and comparison of responses.

The Inequitable Distribution of Water Resources

Community leaders everywhere speak of local water amenities as important assets for residents' quality of life. Abundant water supply is the most frequently mentioned water-related benefit, with the exception of four cities in the drought-prone West. Urban regions share a number of water-related challenges, but they also face unique problems stemming from local geography, industry, governance, and funding structures.

Despite the existence of plentiful natural water resources, benefits are not necessarily universally accessible and burdens are distributed unequally across different racial, ethnic, and income groups. Furthermore, EJ communities do not have the same degree of political influence as their counterparts in wealthier communities to advocate for clean, affordable, and accessible water. Community leaders told us repeatedly and emphatically that urban water resources are distributed inequitably across different social groups, between EJ and privileged communities, as well as *within* EJ communities.

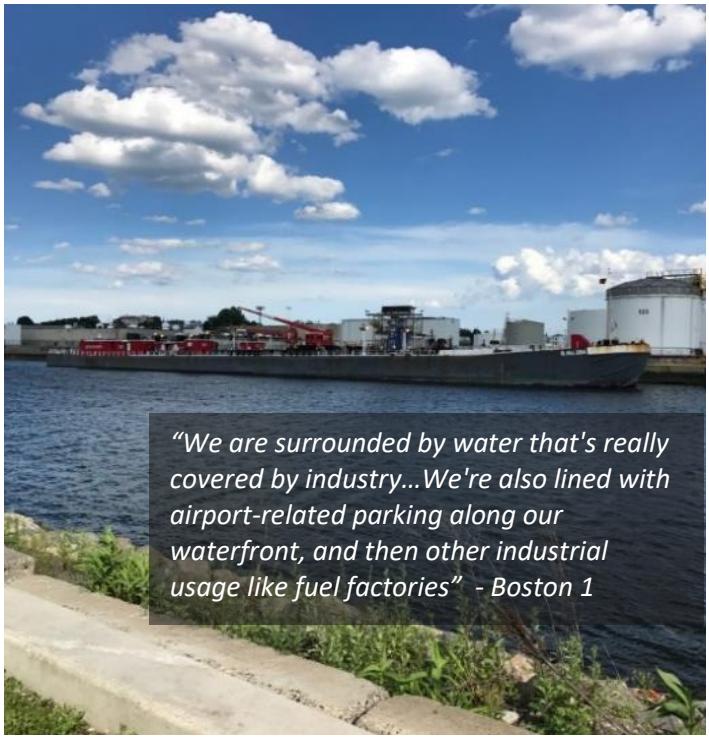

Image 2: Waterfront in Chelsea, MA (David Ortiz)

Contamination Risk/ Proximity to Polluting Sources

Contaminated local water bodies is one of the primary concerns of community organizations across all study cities. The type of contamination and its source varies based upon dominant local industries in each region, or the level of deterioration of local water infrastructure. For example, community organizations in Colorado are primarily concerned about groundwater contamination from the recent boom in natural gas drilling (fracking) in the Front Range urban corridor, while those in Boston are especially concerned with legacy pollution from abandoned factories as well as ongoing transportation-related and other industrial enterprises in a busy port.

Aging infrastructure and its associated implications, such as lead contamination in drinking water, diminished capacity for stormwater runoff, and insufficient wastewater management are also universal concerns. Contamination was consistently reported as more burdensome for EJ communities that are less resourced and therefore less likely to receive infrastructure upgrades, and whose neighborhoods have historically been targeted by industry as favorable sites for environmentally destructive activities such as hazardous waste disposal, manufacturing, or gas drilling.

"We consider it [fracking] to be one of, if not the top threat, to not only Colorado water security—because you know oil and gas water usage is significant and rising—but also water quality. We have something like 53,000 oil and gas wells in Colorado that are active. And each one of those uses an average of 5 million gallons of fresh water, which is irreversibly contaminated with a mix of chemicals, salts, sands, hydrocarbons, and pumped underground." - Denver 2

Vulnerability to Flood and Climate Change Risks

Community leaders are also wary of the threat of climate change and its associated extreme weather events. Because of their semi-arid climates, drought and diminishing water supplies are problems unique to the Sun Corridor (Phoenix-Tucson), Los Angeles, and Denver, while the threat of sea level rise and flooding (as well as wastewater management) is a concern in coastal cities such as Miami, Portland, and Boston.

Across all these regions, leaders acknowledge that EJ communities are more vulnerable to extreme weather events; for example, under-resourced communities lack the pumping systems that wealthier communities can afford. Historically marginalized populations, including African-Americans, Latinos, and other communities of color, often have more dilapidated water infrastructure and live closer to polluting facilities. Some Indigenous communities lack access to basic water and sanitation infrastructure and services altogether. Degraded, failing infrastructure that cannot handle wastewater management and proximity to polluters increase the risk of exposure to daily contamination, but especially during extreme weather events that cause flooding and sewer overflow.

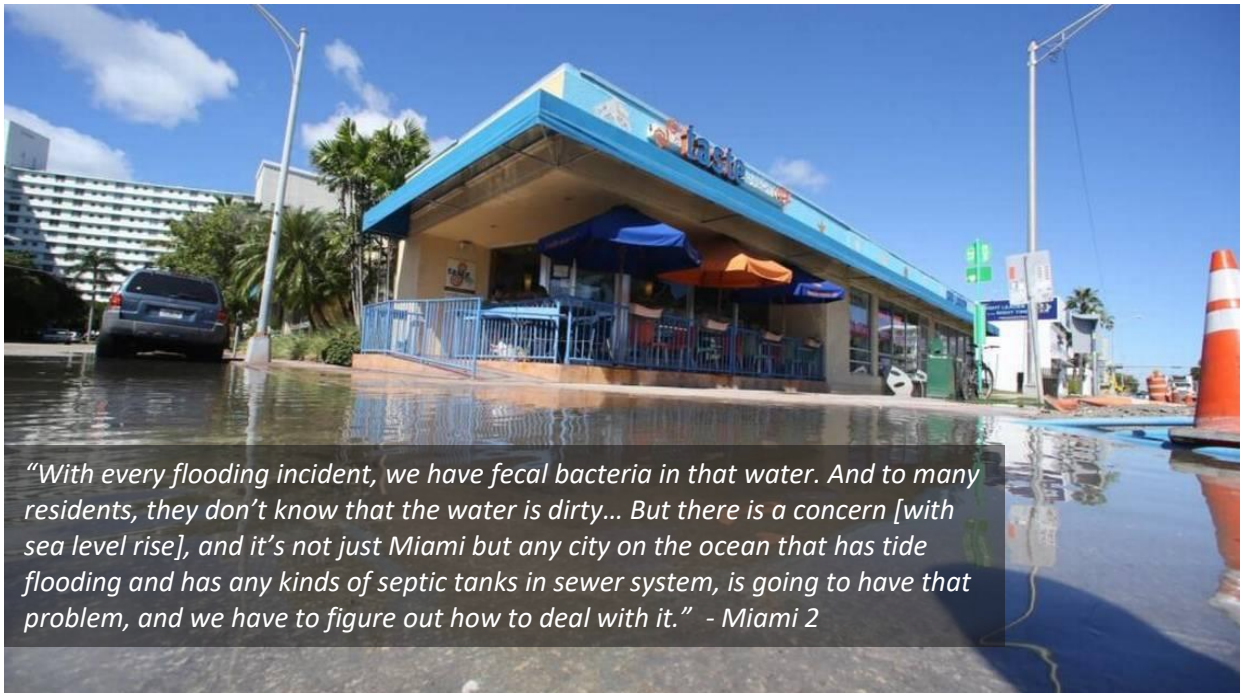

Image 3: "Miami Beach officials installed massive pumps to address flooding, pictured here at Flooded Alton Road Ninth Street. But scientists now say pumping stormwater is dumping water laced with high amounts of human waste into the bay." Hector Gabino, *El Nuevo Herald* https://www.miamiherald.com/news/local/environment/article77978817.html

Unaffordable Household Water

Water unaffordability and the threat of water shutoffs for non-payment is primarily a concern in Detroit, though it was also mentioned as an emerging concern in some other urban areas including Boston, the Sun Corridor, and Los Angeles. In water-rich areas such as Detroit and Boston, the issue of water unaffordability is attributed to 1) aging water infrastructure resulting in less efficient technologies available to consumers, as well as higher cost of water services due to needed investments in infrastructure repairs, and/or 2) management and governance of water services. In Los Angeles and the Front Range, the increasingly prohibitive cost of water is often driven by limited supplies of water in the region and a growing reliance on external water sources. The problem of unaffordability is consistently reported to disproportionately affect low-income communities and communities of color.

"The present rate structure is not sustainable…the present infrastructure is not sustainable…That system is unaffordable. And until you start thinking about how are you going to have adequate investment and modernization of infrastructure, you're not going to have any form of basic sustainability." - Detroit 4

"The fact that people are being asked to pay something they can't afford is a problem…The water system would be better maintained financially if there was an income-rated pay structure." - Detroit 7

Access to Waterfront Recreation

Rivers, lakes, or oceans are plentiful in most regions, but lack of access to water recreation is a problem across all cities, almost exclusively experienced by traditional EJ communities. Barriers to access include the physical location of water amenities and transportation limitations, decision-making and investments relating to where new amenities are developed, feeling unwelcome or unsafe, historical legacies of exclusion resulting in unfamiliarity or discomfort with using such amenities, and contamination of water bodies that are otherwise accessible.

". . . for generations, black Marylanders were denied access to a major recreational point [ocean beaches]. We build this narrative around water as a recreational source and a point of relaxation and pride and there's all these great rivers in Maryland, and western Maryland is beautiful. But for a long part of our history, we denied access to a large proportion of our state, and that carries over in ways that keep institutional racism in place so that modern-day families, while they might not recognize it as such, don't have that same access to water for recreational purposes as wealthier and whiter Americans and Marylanders." - Baltimore 3

At times, there is also active community resistance to development of amenities in EJ neighborhoods for fear of "green gentrification." Community leaders in Los Angeles and Boston discussed the challenges their communities have experienced in balancing the need to improve access to both blue and green spaces while also preserving community demographics and preventing displacement of current residents by new development and higher-priced real estate.

"We have been sort of strong advocates for the completion of the Mattapan section of the Neponset River Greenway, which was just completed a few weeks ago. That was a significant equity issue for us because that 5-mile long walking/biking path had all of the sections completed except the one section that [was] a community of color, and that was something that we felt was a severe injustice to our community." - Boston 16

Who is Burdened?

There are layers of hidden social vulnerabilities for individuals and households *within* EJ communities. A household's income or a person's age, health, ethnicity, or immigration status can intensify experiences of water-related hardships. For example, because water is currently

treated as a fee-for-service commodity, where access to safe drinking water is dependent upon a person's ability to pay for it, low-income households are disproportionately vulnerable to rising prices of water. In many instances, this means they are having to choose between paying their water bills and buying medicine or groceries for their families.

> *"In Detroit, 67% of the households live below the ALICE [financial hardship] line. And so 67% of the households do not have incomes sufficient to meet their basic needs including paying their water bill. And as many people have pointed out to you, if you have a choice between paying your rent and paying your water bill, you're going to pay your rent. And buy food. And the water bill kind of gets – in the priorities it gets pushed down. It's poor, minority households. They're hanging on by a string anyway and they can't afford to pay their water bill." - Detroit 6*

Community leaders have specific concerns for non-English speaking immigrants, women and children, those who are immune-compromised, the elderly, and disabled. Immigrant families, as well as African Americans, are more likely to depend on fishing from local water bodies for subsistence. In this case, contaminated water affects their ability to feed themselves or eat in accordance with cultural traditions. Community leaders also note that water-related information and publicly-posted warning signs are often only available in English, limiting risk communication to those who may be most vulnerable.

> *"The carp and similar species are very heavily contaminated from the pollution in the river. I was speaking to a group with the PHCC, and when I mentioned about the carp are the most heavily contaminated fish in the river, the individuals that were there from the Eastern European community, their eyes got wide and it just opened their eyes because they were among the population of people who were used to catching carp at home where they originally came from. And they come to Portland and realized there's carp in the river, and so they were fishing for and eating carp here." - Portland 4*

Living on a fixed-income, health problems, and limited mobility can drastically increase a person's susceptibility to water-related health emergencies, especially if their household drinking water is contaminated or shut off completely. Pregnant and nursing women, children, the elderly, and other immune-compromised individuals are particularly vulnerable to water-borne and infectious disease outbreaks that can result from having household water shut off. Given that access to affordable healthcare is also often limited due to financial or immigration status constraints, the risk of infection or exacerbation of pre-existing conditions is even higher. Additionally, children are at risk of being removed from their homes by local agencies and separated from their families when household water is shut off.

"When we were canvasing, going house to house, we were talking with people who've been released from the hospital. I mean people with wounds. I was delivering water to a woman who had a kidney disorder. I mean she was a working woman who was ill, and lost her job, and had gotten out of the hospital with a kidney disorder, and had no water." - Detroit 5

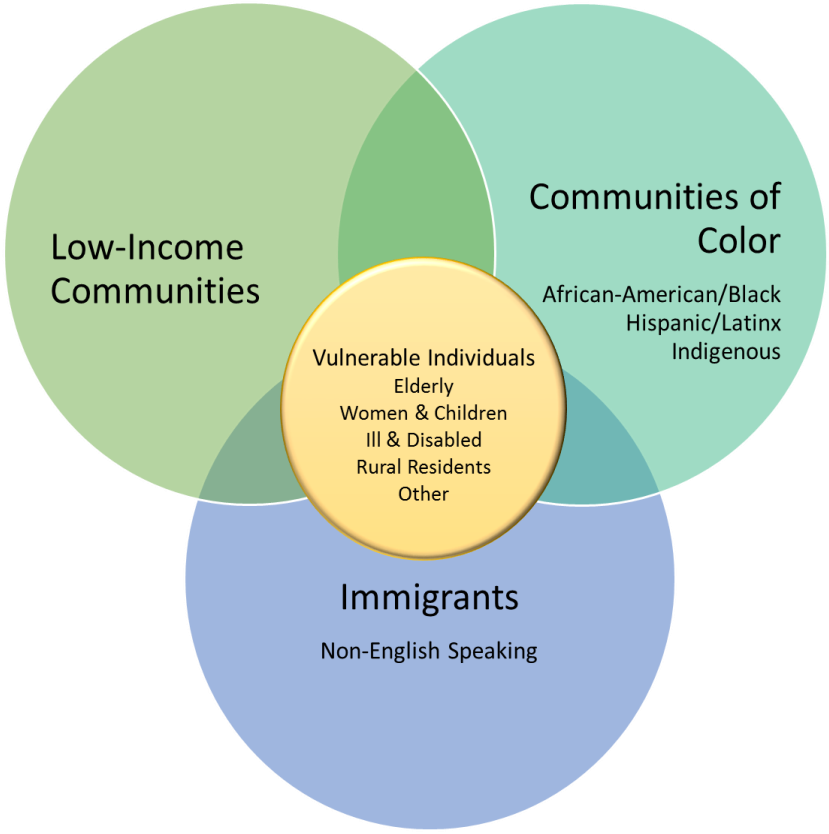

Figure 2: Communities and Individuals Disproportionally Burdened by Water Hardships

Water problems not only exist within cities, but also between cities and suburbs, and between rural and urban areas. Though we asked specifically about *urban* water inequities, community leaders volunteered important differences in water services for residents of unincorporated fringe urban areas, rural communities, and Native American tribal lands. Individuals living in rural communities often depend upon on small, underfunded public water systems, or on-site well water systems that are ill-equipped to deal with pollution from industrial sources like oil and gas drilling, or agricultural run-off.

"So overall, while we have very good water quality, there are some pockets. In particular, small communities, low income communities of color, experience problems with their drinking water. And the causes of those problems are varied…It could be premise plumbing or the distribution system leaching in the areas where there's a history, a legacy of industrial pollution combined with other ongoing pollution, air pollution in particular…And you have a lot of people who rent apartments that have not been kept up and the water comes out brown. And then there's other small systems, small water systems that serve low-income communities, and they just don't have the resources or capacity to maintain their systems and treat the water in a way that the Los Angeles Department of Water and Power is able to do." - Los Angeles 5

"Mexicans face greater vulnerability specifically associated with the cost of water, but also with the effects of low water use for outdoor urban irrigation, which creates greater vulnerability associated with urban heat. The other big inequity is related to Native American tribal communities on the reservations in the state…but also the urban tribes like the Gila River, the Salt River Pima-Maricopa, and their social, economic, and political power vis-à-vis the federal government or the state of Arizona in procuring the legal rights to their historical and culturally determined water rights. Those would be the big ones." - Sun Corridor 4

In sum, communities that are already socially vulnerable, politically disempowered, and relatively underserviced are hit hardest by the water problems facing urban areas today. And within these communities, varying levels and kinds of vulnerability exists for individuals and households with added layers of social, health, literacy, and mobility hardships. Our findings highlight the importance of understanding the potentially intersecting layers of social vulnerability that community members can experience, and what this means for water-related hardships.

Origins of Water Inequities and Barriers to Sustainability

Water-related problems do not exist independently from broader issues of social, racial, and environmental justice. Inequities in urban water service provision often stem from and are worsened by social and political systems, including local housing policy, environmental laws, educational systems, investment/divestment flows, zoning, community development, and urban planning. Our conversations with community leaders highlight the importance of addressing water inequities at a broad, structural level. Without such intervention, inequities are likely to carry over into the rebuilding of new, sustainable urban water systems.

"It's not just the water infrastructure that's failing, it's also our social infrastructure." - Detroit 3

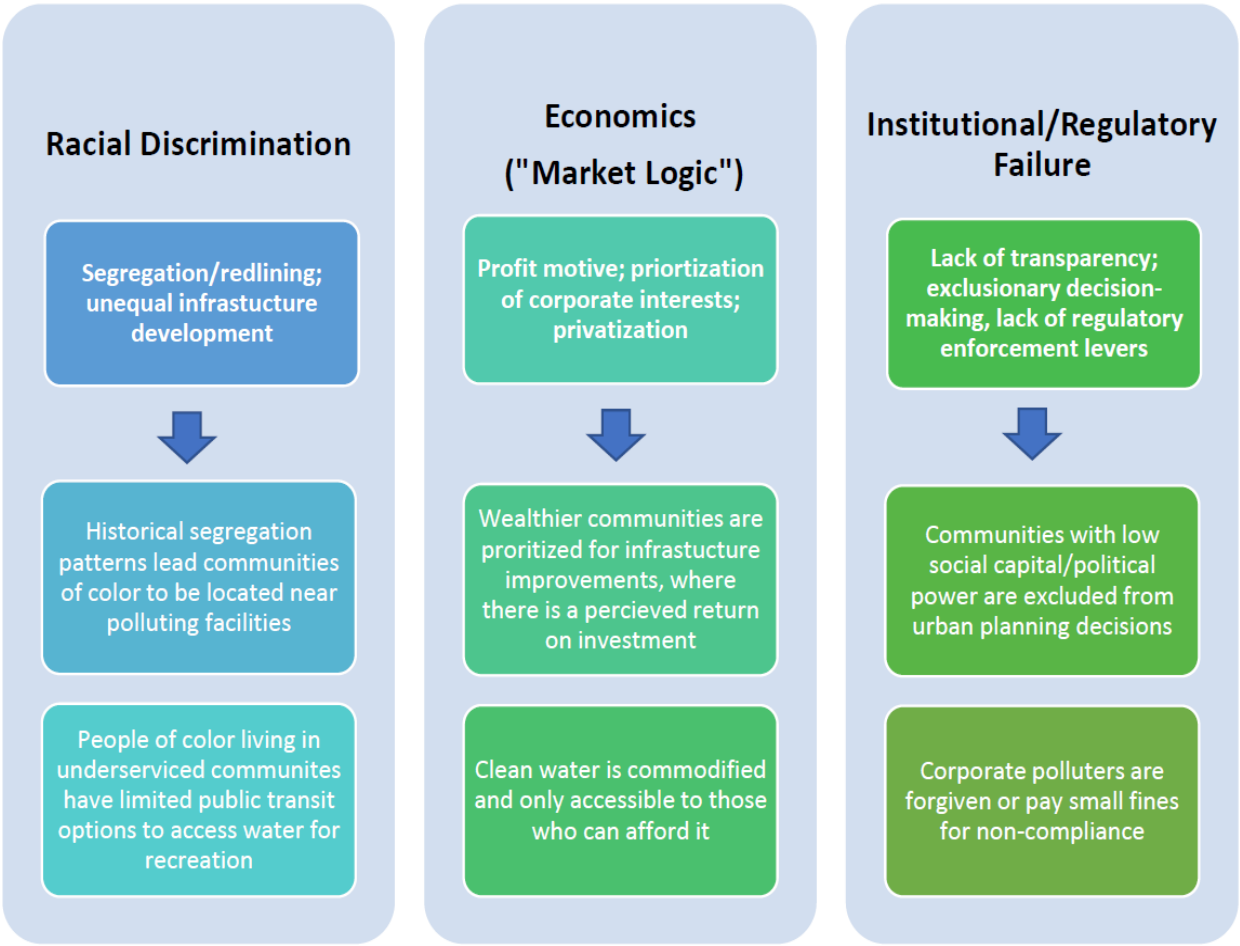

Figure 3: Barriers to Water Sustainability and Equity

Race, Economics, and Regulatory Failure

Community leaders emphasize that in order to understand why water inequities exist, one has to look at historical political-economic forces that have produced the current condition of urban water infrastructure and management silos in the water industry. The water inequities described in the previous section are the result of decades of racialized urban planning, power dynamics between city governments and private business interests, and the failure of government institutions to include communities in decision-making and hold polluters accountable to regulatory standards that protect public health.

Racial Discrimination. One of the most frequently mentioned underlying causes of water inequities is the legacy of neighborhood segregation created by racist practices like blockbusting, redlining, and restrictive covenants, which constrained minorities to living in certain areas of cities. Decades of this racialized urban planning shaped the inequitable distribution of public services and infrastructure that exist across white communities and communities of color today. Marginalized neighborhoods, particularly low-income, black, and Latino communities, have historically lacked adequate investment from both the public and private sector.

Absence of a strong tax base and decades of divestment ultimately contributed to high levels of poverty, inferior water infrastructure, and the inability to keep up with needed system upgrades. These politically marginalized and underserved communities are also often victims of environmental racism, disproportionately chosen for the siting of hazardous polluting facilities. Industrial waste intensifies the pressures on local water infrastructure.

Community leaders emphasized that unless low-income and communities of color are prioritized to address decades of disenfranchisement, the existing inequities of the current water system would simply be carried over into planning future systems.

"Those from communities where segregation was enforced, certain people from different backgrounds were forced to live in specific areas. Usually where environments were unkempt or where there's heavily industrial facilities. Even if you weren't a part of those communities that had been historically separated from those of privilege, those from lower income backgrounds had to choose places that were within their means of living. So what we see is that there's an influx of people who live in communities that are heavily polluted by industrial facilities that are lacking water-efficient infrastructure, that have failing sewer systems that can't handle stormwater mitigation, and much more." - Detroit 3

"Baltimore city public schools had to close all their water fountains because there was lead in the pipes. If you're a less resourced school system—because public schools are funded by property taxes and there's a vacant housing problem in Baltimore, an absentee landlord problem—you have a system where your sources of funding for your schools is cut out, and you have a school system that's majority black and you don't have healthy drinking water there. And so you end up having to spend all your money on water bottles instead of new textbooks. It adds to the inequity." -Baltimore 3

Economics of Free Market Logic. A "profits over people" mentality is another primary cause of water inequities, as well as a barrier to water sustainability. Community leaders' comments converge on three big problems caused by using a business model to manage a public resource like water.

- ✓ ***Corporate influence over municipal planning*.** Municipal decisions regarding water infrastructure are often driven by the profit interests of corporations and private developers, rather than in the interest of providing equitable distribution of water-related services. Cities' water priorities are set by big industry and real estate developers because they have the power and money to lobby politicians.

- ✓ ***Preferential treatment in crafting and enforcing water laws and regulations*.** Corporations receive preferential treatment when it comes to enforcing regulations, accountability to water payments, and subsidies for water services. Problems include water debt forgiveness for corporate entities, but not residents; establishing contaminant risk standards that sacrifice public health to protect corporations from the financial "burden" of pollution control; subsidies for water and sanitation services for industry, but not low-income residents; and small "slap on the wrist" fines for environmental violations.

- ✓ ***Commodification and privatization of water*.** There are dangers of treating water as a commodity (that is, a good you must pay for instead of a public service with universal right to access). Already, cities have begun to privatize green space, recreational water areas, and more recently, provision of drinking water. In effect, only those who can afford water, or as one person put it, those who are deemed "deserving," have access to it. Populations who are already socio-politically vulnerable, including the elderly, young children, the disabled, and communities of color, will be most hurt by privatization and rising water prices.

"We've encountered a lot of desire to privatize, privatize, privatize everything. Whether its water, schools, prisons, whatever. We've been served this false narrative from a lot of directions that if we just inject profit motive, or we inject market into this problem, then magically everything is gonna get fixed. And I think we haven't seen that. We've actually seen really intense failures when we apply that to water." - Denver 2

Exclusive Institutions and Regulatory Failure. Community leaders identify problems with the way institutions of environmental governance and management currently function, noting that in some instances, water/environmental agencies are actually heightening water inequities. Although they acknowledge that the individuals working in water management and regulation may have good intentions, the rigidity and bureaucratic culture of their agencies lead to a lack of *just* and *inclusive* governance. There are two primary recurring problems: lack of transparency and inclusiveness in decision making processes, and lack of adequate enforcement mechanisms for existing regulations.

Many leaders feel their organizations have amicable relations with local water management agencies, but many also feel these agencies have failed to include marginalized populations in important decision-making processes, and have demonstrated a lack of commitment to address community concerns around equity and environmental justice. Whether this exclusion is intentional or not, the effect is the same: wealthier communities with greater social capital and political power, as well as private companies, have more influence over decision-making.

> *"It boils down to environmental justice, and I think it boils down to really people of color and low-income folks having less of a voice when it comes to policy and planning processes…And part of that is outreach, interpreting devices, making sure every meeting is interpreted; making sure there are flyers in Spanish and English; making sure you provide daycare for people who have kids, young kids; making sure that you have your meetings after work so that people can come. We've seen a lot of state agencies and planning agencies who, they'll have a planning meeting at 2pm in downtown Boston, and they expect people to come, and that's just never going to work— because low-income people of color are already overburdened by their economic status, and they need to keep their jobs, they need to bring food to the table, and if you want to engage them you need to meet them where they're at. And part of that is making adjustments on how these processes happen." - Boston 1*

Another institutional barrier to equity and sustainability is a lack of effective mechanisms to enforce existing environmental regulations. All too often, regulations are crafted with corporate profit margins in mind, rather than in the interest of maximizing protection of public health. Moreover, the sanctions for enforcing regulations often do not deter companies from polluting or hold them accountable. Some community leaders express anger and frustration over companies "getting off the hook" for egregious violations of water laws, while urban residents' health and safety are sacrificed. In sum, community organizations advocate for regulations to be set with public health as the utmost priority, not corporate profits.

> *"Here recently, in talks about allowing the oil production near schools, you end up with this chance of methane exposure. The health department…said well, there really isn't a risk. Now what they were saying by "there isn't a risk," they were saying that it's within the acceptable risk numbers that if you have people exposed to this degasification off of the rigs, that you would only have 10 out of 100 people or kids that would actually develop cancer. So they said that was within the acceptable risk limit… So risk isn't just that exposure, it's the cost of doing business. And of course the biggest lobbyist, and the most powerful, has been industry. And the industry has always wanted to keep the numbers as high*

as possible because it keeps their cost down, which increases profitability." - Denver 6

"There's a long history of a lot of companies here breaking a lot of environmental laws, not keeping up with the standards. Our regulatory agencies like the Air Quality Management District or the Department of Toxic Substances Control, instead of them actually taking action to shut them down, they fine them. So for a lot of these companies, it's easier for them to pay off the fines than necessarily upgrade their systems."- Los Angeles 3

Community Visions for Sustainable and Just Urban Water Systems

Water *sustainability* means having sufficient, clean water to meet human and ecosystem needs now without compromising water quality and quantity for future generations. This requires that water systems are designed to handle the shocks of severe weather events (like flooding and droughts), have sufficient pollution control and remediation mechanisms, and be resilient to effects of global climate change. This standard definition of sustainability entails that water managers and city planners focus on the technical and scientific aspects of system design, as well as policy solutions for better management and regulation. Although public engagement may be a small component of urban sustainability planning, overwhelming evidence from this and other research suggests that the economic and technical logistics of planning are prioritized over issues of social equity and environmental justice.

Inequities in urban water systems intersect with multiple other racial and economic justice issues, compounding the burden felt in low-income and minority neighborhoods and the diverse individuals and households that live in them. The legacy of racial segregation has left communities of color underserviced and without strong tax bases. As public and private investment patterns continue to prioritize wealthier communities for infrastructure development, these marginalized communities are left further behind and ill-equipped to manage environmental pressures on water systems. While residents of wealthier communities are not immune to these environmental pressures, they also have the means to reduce their water vulnerability through individual actions, such as buying home water filters, or avoiding recreation in contaminated water bodies. They can afford to pay the rising costs of water services. But for those low-income families who may depend on fishing in local streams for subsistence, or who cannot afford to pay their water bills, taking personal steps to avert water risk is less of an option.

Recognizing these complex social dynamics, community leaders' envision *equity* and *civic involvement* as the building blocks of a better science and management approach to

sustainability, emphasizing that environmental solutions are not *truly* sustainable unless they are just and equitable for all.

Equitable Access and Benefit

First and foremost, community leaders emphasize that all urban water sustainability planning must consider equity and environmental justice from the beginning stages. The baseline is that drinking water must be accessible, safe, and affordable for all residents. While some organizations frame access to water as a human right that should be available regardless of ability to pay, others advocate for solutions like income-based water payment systems. Leaders also emphasize the importance of intentionally prioritizing new development projects that benefit low-income, minority, and tribal populations that have historically had lower levels of public and private investment.

A commitment to social equity and environmental justice requires mayors and city councils to anticipate the unintended equity consequences of newly built water infrastructure. Private developers need to be held accountable for the public good, and adequate rent-control protections are necessary to prevent gentrification of low-income areas that are recipients of desirable new water amenities that increase property values.

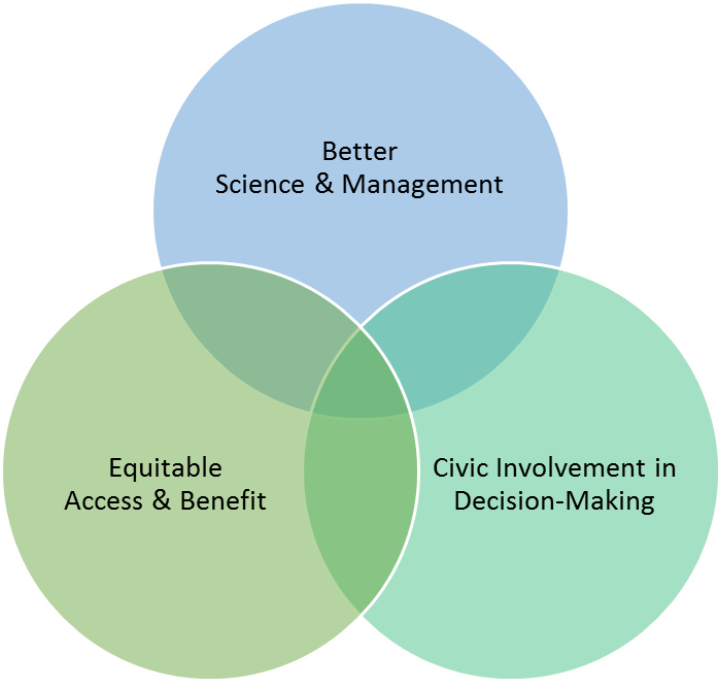

Figure 4: Community Vision for Sustainable and Just Urban Water Systems

"For me, the equity piece is a core part of the sustainability because if you don't include a broad swath of voices, that means you're leaving someone out, and there's a better chance that the final policy or solution is not going to bring in their perspective, which means the end result could threaten the livelihood of that community in some way. And in the end, it's not sustainable for that community, right? It may be sustainable for some communities but not for others." - Portland 1

Civic Involvement

Community leaders believe that a truly sustainable urban water system is one in which there is strong civic involvement. They stress the importance of educating residents and engaging them in water monitoring and restoration projects for the purposes of helping residents feel more connected to their water sources, but also for the purpose of empowering them to participate in the political system. Many of the organizations we spoke with have an advocacy component to their work. Key to their mission is empowering residents with knowledge of their local water system so they can call their representatives or participate directly in local decision making. While working to build bottom-up, grassroots political power, leaders also call on water managers and government agencies to incorporate more inclusive decision-making processes into their planning culture. As a field dominated by scientists and engineers, democratic water sustainability planning necessitates inclusion of community voices from the initial stages of problem definition to the end result, particularly inclusion of communities that have been disproportionately disadvantaged by water-related problems.

"…getting people engaged in some small, tangible projects that they can relate to and then bringing them to meetings where the Boston Planning and Development Agency can present what they're talking about for a neighborhood, and these folks can say, "Well, what are you doing about stormwater?" … Having people educated to a point where they can begin to advocate for better planning… and in particular I think it would be on that issue of stormwater management and then the other one would be just access for recreational purposes…that there should be equitable access of that within communities of color, low-income communities, as well as those communities that are more well-off." - Boston 12

"So, typically, there's a box that you can check, have you had this many meetings. . . The community can come put a sticker on a board and say they like this or don't like this. But how much of the community's actual needs have actually driven the formation of the project, [rather] than have just sort of presented a menu at the end, 'which park bench do you like?'" - Los Angeles 1

Better Science and Management

Like most scientists, engineers, and water managers, community leaders believe that better science and management is imperative to achieve water sustainability. They recognize the technical infrastructure challenges posed by storm and wastewater management, the rising costs of pollution control and remediation, and replacing aging infrastructure, as well as the need for additional green space as a natural way to mitigate climatic shocks. But rather than envisioning a strictly a top-down managed water system, community leaders emphasize the value of civic science projects, community water monitoring, and other activities to involve residents in the

management and protection of their local water resources. What communities want from all levels of government and the water industry are the following improvements in urban water systems:

- ✓ Ensure the safety of infrastructure that delivers potable water and manages wastewater treatment and storm runoff;
- ✓ More strongly adhere to existing environmental regulations and enforcement mechanisms that effectively hold corporate polluters accountable for externalities of industries like natural gas drilling, chemical spills, and shipping;
- ✓ Restore urban waterways to ecological health fit for fishing and swimming and provide coastal access for EJ communities;
- ✓ Increase green space and green infrastructure with small-scale, innovative projects targeted to EJ communities;
- ✓ Educate the public about their waterways and water sources.
- ✓ Keep water and sewer rates affordable for everyone.

Conclusions

The problems and pressures facing urban water systems in the age of climate change pose complex technical and management questions for engineers, water managers, and governments. With these challenges also comes the opportunity to rebuild our aging water infrastructure into systems that are sustainable and resilient to future environmental shocks. However, discussions on water sustainability must also contemplate issues of *equity* and *environmental justice*, not simply as added elements to aspire to, but as indispensable components of a truly sustainable system.

Invitation to Respond
This report is intended to be a living document, serving as the beginning of an ongoing conversation among communities, researchers, and water managers about developing technical and managerial solutions that are informed by local knowledge, and in service of providing clean and accessible water to all.

- ➢ Join the **UWIN Community Voices Forum** to provide feedback on this report, network, and brainstorm directions for future collaborative work via **Slack** (instructions below!).

Conversations with community leaders illuminated which social groups are disproportionately affected by water-related threats, and explained why these inequities can only be addressed through intentional recognition of broader structural inequalities in our social system. Leaders

emphasized that in order for a water system to be sustainable and just, water managers must understand and confront inequities stemming from historical and ongoing institutional racism, prioritize public health over corporate profits and private developers, and implement inclusive governance processes and effective regulations to hold polluters accountable.

With this approach, the community vision of a sustainable water system that has equitable access and benefit, better science and management, and democratic accountability can be realized.

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[1] Christian-Smith, Juliet and Peter Gleik (eds.) (2012) *A Twenty-First Century Water Policy*. New York: Oxford University Press. Piper, Karen. (2014) *The Price of Thirst: Global Water Inequality and the Coming Crisis.* Minneapolis: University of Minnesota Press. The Executive Office of the President (2016) *Commitments to Action on Building a Sustainable Water Future* (March 22). Washington, DC: The White House.

[1] Mack, Elizabeth A. and Sarah Wrase. A Burgeoning Crisis? A Nationwide Assessment of the Geography of Water Affordability in the United States. *PLOS ONE* DOI:10.1371/journal.pone.0169488 January 11, 2017

Directions for Joining Slack

To join our Slack forum, **UWIN Community Voices Forum**, click and follow this link: **https://tinyurl.com/uwincommunity,** or type it into your web browser. You will be asked to provide an email address, and will receive a message with directions on how to join. To access the forum in the future, *after* creating an account, the workspace URL is: **uwin-community.slack.com.**

Once you have successfully logged into the **UWIN Community Voices Forum**, you will see a list of pre-created channels we've started to organize discussion. While anyone is welcome to raise any related issues or topic for discussion, we used 5 questions to get conversation started:

1. What are your thoughts about the report? Is there any information missing? **(#report-feedback)**
2. What should our next steps be? **(#next-steps)**
3. How can we facilitate more communication among communities, researchers, and water utilities? What are the obstacles? **(#communication?)**
4. Do you see opportunities for future collaboration with other communities, UWIN researchers, or water utilities? **(#collaboration)**

Anyone is welcome to post in any channel, or create a new channel, if necessary. The purpose of the #general channel is to capture any discussion that does not fit under the topics listed above, while the #random channel is for sharing news stories, videos, memes, or other water conversation.

Any user can invite new users by clicking on "Invite Users" on the left side bar.

About: Slack is user-friendly, cloud-based platform that allows users to engage in group discussion in chat-room style, share documents, or send messages to individual members. Messages are saved and can be referred back to, allowing for ongoing discussion threads that anyone can view and respond to. When you first join Slack, the application will offer to guide you through the interface with a tutorial, if needed. If you have trouble joining the forum, or need to troubleshoot issues, please email Lauren Contorno at Contorno.L@husky.neu.edu.

Appendix

Participating Organizations

Alternatives for Community and Environment (ACE), Boston

Anonymous by Request (2)

Arizona State University, Decision Center for a Desert City

Barr Lake and Milton Reservoir Watershed Association, Denver

Bear Creek Watershed Association, Denver

Catalyst Miami

Charles River Watershed Association, Boston

Choose Clean Water Coalition, Baltimore

Colorado Watershed Assembly

Communities for a Better Environment, Los Angeles

Detroit Equity Action Lab, Wayne State University Law School

Detroit Jews for Justice

Earth Force, Denver

Food & Water Watch Colorado

Food & Water Watch, Detroit

Friends of the Los Angeles River

Greenroots Chelsea, Boston

Groundwork Denver

Hamtramck Community Initiative, Detroit

Los Angeles Water Keeper

Lowell Parks & Conservation Trust Fund, Boston

Mattapan Food and Fitness Coalition, Boston

Meyer Memorial Trust, Portland

Michigan Coalition for Human Rights

Moms Clean Air Force, Miami

Neponset River Greenway Council, Boston

Oregon Water Resources Department

Pacoima Beautiful, Los Angeles

Portland Bureau of Environmental Services

Portland Harbor Community Advisory Group

Prevention Institute, Los Angeles

Sierra Club Michigan Chapter

Sierra Club Rincon Group, Tucson

Sisters of Mercy, Detroit

Southwest Boston Community Development Corporation

The CLEO Institute, Miami

The Greenway Foundation, Denver

The Nature Conservancy, Phoenix

Third Horizon Consulting, Detroit

Tualatin Riverkeepers, Portland

Tucson Audubon Society

We the People of Detroit

Westwood Unidos, Denver