US Water Alliance

AN EQUITABLE WATER FUTURE

Opportunities for the Great Lakes Region

PREFACE

In the summer of 2017, the US Water Alliance released *An Equitable Water Future: A National Briefing Paper*, the most comprehensive document to date on the interconnections between water management and equity in the United States. Since its release, we have been encouraged by the enthusiastic response from a range of stakeholders—water utilities, community-based organizations, journalists, elected officials, universities, and more. It's clear that communities across the nation recognize the importance of equitable water management, and they are taking bold strides to implement it.

The national briefing paper had a particular resonance in the Great Lakes region. As a place that is rich in water resources, and also the location of some of the most serious water crises in recent American history, the Great Lakes region exemplifies the challenges and opportunities inherent in our water systems. It is also home to inspiring leaders in the movement for social and economic equity. This report highlights the strategies being developed in the Great Lakes to ensure that our water systems provide services and opportunity to all people, and creates a shared vision for the region's future.

The Great Lakes' regional identity, history, and culture have been shaped by water. It is home to creative, diverse, and innovative leaders who are shifting the course of the region's future to be more equitable. The US Water Alliance has produced this report to support and scale up their promising work. By working in partnership, we can build an equitable water future for the Great Lakes.

One Water, One Future.

Kevin Shafer
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INTRODUCTION

The Great Lakes region is defined by water. The lakes are an important national resource, holding 90 percent of the country's fresh surface water and supplying drinking water to more than 48 million people in the US and Canada.[1] Water is the foundation of the region's identity, and is essential to its environmental, social, and cultural fabric. The region's leaders have long understood the value of water and have a proven track record of working together to protect and preserve water resources. To secure a sustainable and prosperous future, stakeholders in the Great Lakes region must build upon these shared values and deepen their focus on fostering equity and inclusion in water management.

Once the industrial and manufacturing center of America, the region has struggled to adapt to the post-industrial economy, leaving many cities with high poverty rates and declining populations.[2] Long after the rest of the country has begun to bounce back from the Great Recession, many Great Lakes cities still face widespread unemployment and distressed housing markets.[3] While the region is seeing employment growth in the education, healthcare, logistics, advanced manufacturing,[4] and service sectors, this growth has not been enough to alleviate economic inequalities, in part because these growing sectors do not provide the stability and prosperity that manufacturing jobs did in the past.[5]

As the economy changes, the region is also experiencing significant demographic shifts. Diversity is increasing as people of color and immigrants lead population growth.[6] These growing populations are held back from full participation in the economic and social fabric of the region: communities of color and lower-income people in the region tend to be concentrated in areas with lower-quality infrastructure and environmental challenges.

As the Great Lakes region undertakes planning, policy development, and investments to revitalize its economic base, water is a cornerstone for future growth and prosperity. Jobs in economic sectors that depend directly on water infrastructure generate $447 billion in wages annually. Almost a quarter of the jobs in the region are in water-dependent industries such as agriculture, recreation, and manufacturing.[7] Indeed, water is a fundamental strength upon which the region can build.

Map of the Great Lakes Basin

The Great Lakes region must also focus on equity and inclusion if economic growth is going to be sustainable in the long term. Making sure that disadvantaged communities have the opportunity to participate in the economic and social life of the Great Lakes strengthens the whole region. Studies have found that greater economic and racial inclusion stimulates more robust growth,[8] as well as the converse—racial and economic segregation holds back the whole economy in addition to individuals and communities.[9]

While equitable water management will not solve the Great Lakes' socioeconomic challenges on its own, it is an essential component of future prosperity. Water is closely tied to public health, the economy, and the environment. The historical patterns that have shaped a deeply divided region, such as segregation and disinvestment, have also shaped the disparities in water quality and service. Making water management more equitable can provide the Great Lakes region with economic, health, and social benefits to drive long-term progress.

If any region can chart an equitable water future, it is the Great Lakes. The region has a long history of actively working towards the common good through its community-based organizations, foundations, environmental advocates, research institutions, regional governing bodies, and utilities. Now is the time to harness this culture of collaboration to make progress on inclusive water management in the region. By creating a shared vision that highlights the interconnections between water and equity, we can advance policies and practices that will bend the region's future to be better for everyone.

This report is organized in the following manner:

- **The Pillars of Water Equity** offers a vision for creating more equitable water systems;
- **Priorities to Forge Progress** takes a closer look at nine big challenges facing vulnerable communities in the region and describes strategies to advance water equity, illustrated by case studies; and
- **Conclusion: Regional Assets to Secure an Equitable Water Future** describes the characteristics, institutions, and resources that the Great Lakes region can draw on in advancing equitable water management.

It is our hope that this report inspires action to build a more equitable future for the Great Lakes region.

This Great Lakes-focused paper is a companion document to two national resources developed by the US Water Alliance that explore the impacts of water management on vulnerable communities and the opportunities to create more equitable water systems. These include:

- **An Equitable Water Future: A National Briefing Paper.** This report aims to expand national understanding of the water-related challenges that vulnerable communities across the US face, and the opportunities to leverage water investment to build a society and economy that work for everyone.

- **Water Equity Clearinghouse.** This online database showcases the promising practices that are underway to advance water equity. The clearinghouse allows users to discover organizations working on all aspects of water equity, using a detailed search system.

To access these resources, visit: www.uswateralliance.org

Defining Terms

Great Lakes region: This report primarily focuses on the US portion of the Great Lakes region of North America, a bi-national Canadian-American region that includes portions of the eight US states of Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania and Wisconsin as well as the Canadian provinces of Ontario and Quebec. The eight US states that are part of this region all have shorelines on at least one of the Great Lakes.

Water equity: Equity refers to just and fair inclusion—a condition in which everyone has the opportunity to participate and prosper. Water equity occurs when all communities have access to safe, clean, affordable drinking water and wastewater services; share in the economic, social, and environmental benefits of water systems; are resilient in the face of floods, drought, and other climate risks; and have a role in decision-making processes related to water management in their communities.

Water stress: Water stress occurs when individuals and communities have difficulty accessing water services. It can include inadequate access to drinking water, wastewater, and stormwater services for everyday needs, whether due to lack of infrastructure, difficulty paying for services, or poor water quality. Water stress encompasses water-related climate impacts such as floods, droughts, and storms. Water service facilities like wastewater treatment plants can cause stress to residential communities in the surrounding areas. Water stress affects people who rely on water for their livelihood or subsistence, such as farming communities.

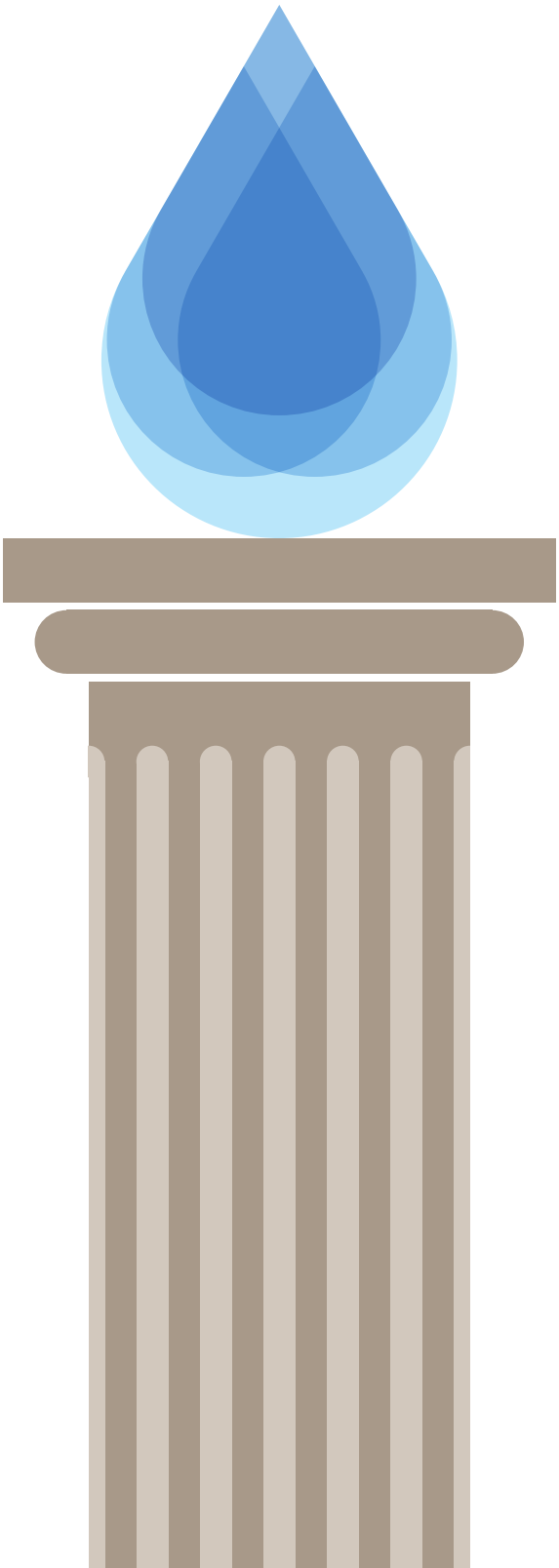
Vulnerable communities: Vulnerable communities have historic or contemporary barriers to economic and social opportunities and a healthy environment. The principal factors in community vulnerability are income, age, race or ethnicity, citizenship status, language ability, and geographic location. This may include low-income people, certain communities of color, immigrants, refugees, seniors, children, people on fixed incomes, people with disabilities, people with limited English-speaking ability, rural communities, tribal communities, people living in public housing, and currently or formerly incarcerated people.

Environmental justice communities: Environmental justice communities are low-income neighborhoods, often communities of color, that face disproportionate environmental risks and burdens, such as hazardous facilities and land uses that threaten public health and quality of life.

Resilience: Resilience refers to the ability of an individual, community, or system to respond and adapt to crises, and to treat them as opportunities for transformation and improvement. It encompasses the capacity of all people—including vulnerable communities—to respond to shock and trauma of all kinds. In the context of water, resilience is generally discussed in terms of vulnerability to climate impacts and natural disasters.

Water sector: In this paper, the water sector refers to organizations and agencies that are involved in providing, protecting, and managing water. This includes drinking water, wastewater, and stormwater utilities, both public and private; businesses across the water supply chain; government agencies and regulators; and nonprofits and foundations focused on water issues.

THE PILLARS OF WATER EQUITY



The US Water Alliance has developed a framework for understanding the challenges and opportunities for making our water systems more equitable, organized around three pillars. These focus areas have emerged through our research on water equity issues across the country, and they represent arenas in which progress is being forged. In this paper, the three pillars provide an overarching framework for the more specific strategies that follow.

PILLAR ONE:
Ensure all people have access to clean, safe, affordable water service

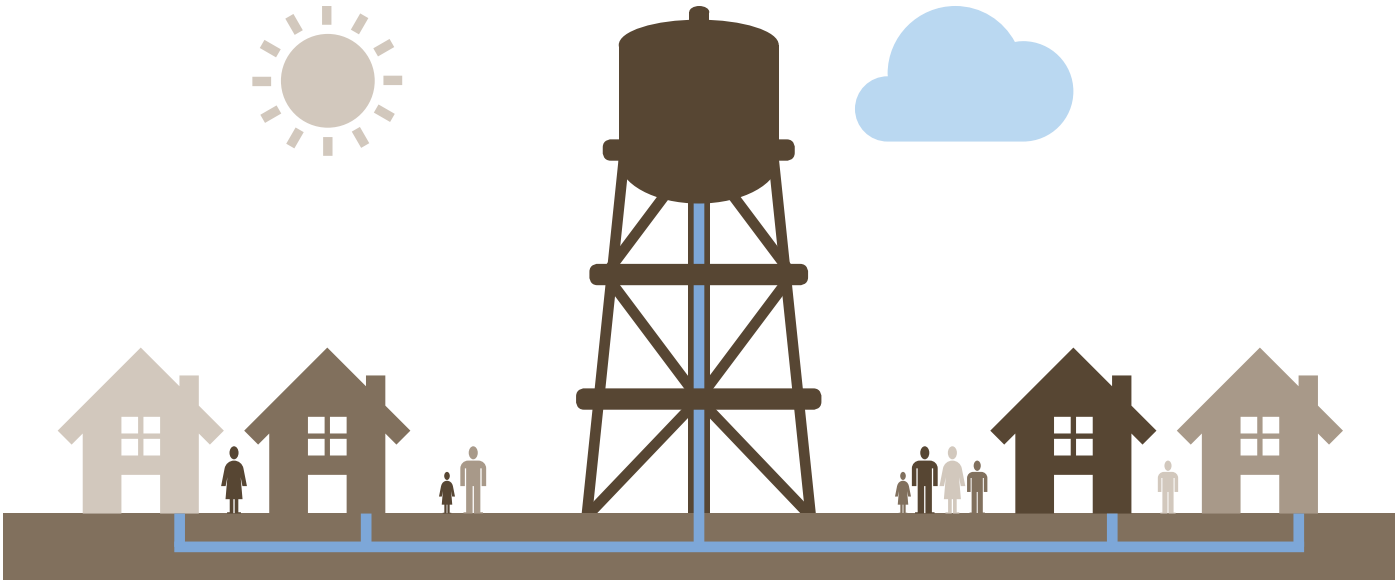
Creating an equitable water future means providing all people with clean, safe, affordable water and access to water bodies. For some people in the Great Lakes, unsafe or unaffordable water is an obstacle that can result in lost work time, lower productivity, poor health, and stress. Vulnerable communities that are already overstretched must spend time seeking out safe water, struggling with high bills, and dealing with health problems linked to water quality. Water bodies are also a focal point for subsistence, livelihood, cultural practices, and recreation. The region's lakes and waterways are actively utilized for subsistence fishing by Native American, immigrant, refugee, and low-income communities.[10] Access to water for recreation and fishing often falls along racial and economic lines, creating obstacles for low-income people and communities of color. Ensuring the health of water bodies and systems will increase overall prosperity, improve public health, and strengthen vulnerable communities.

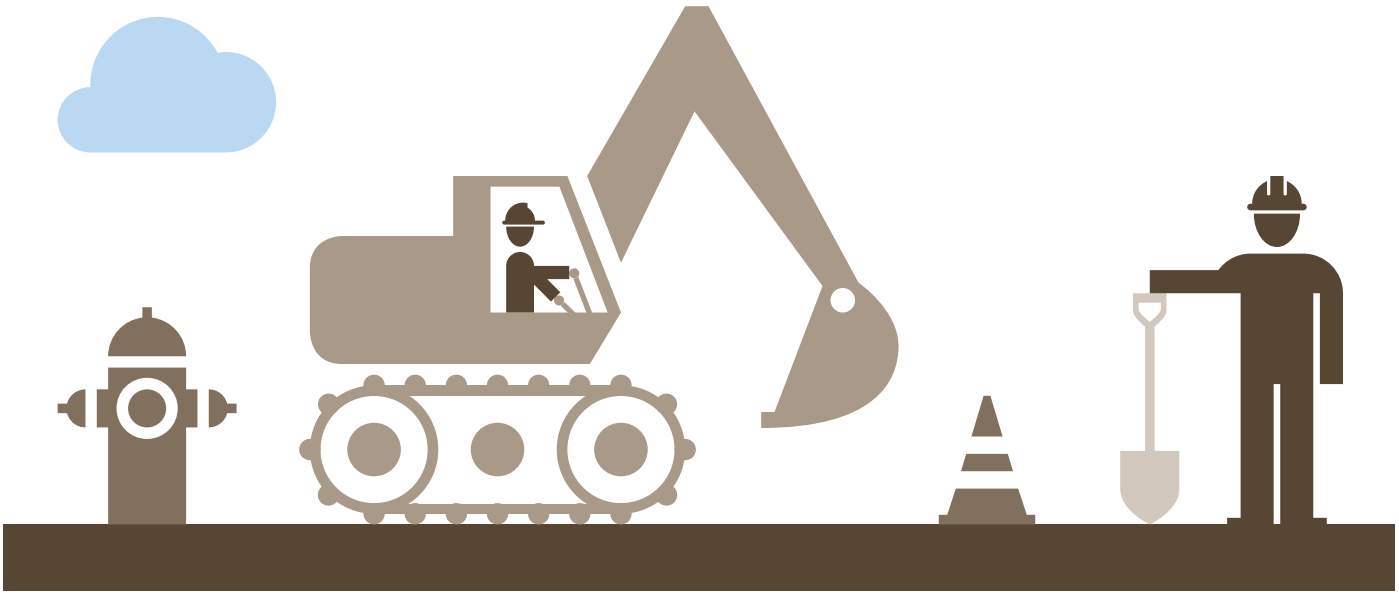
PILLAR TWO:
Maximize the community and economic benefits of water infrastructure investment

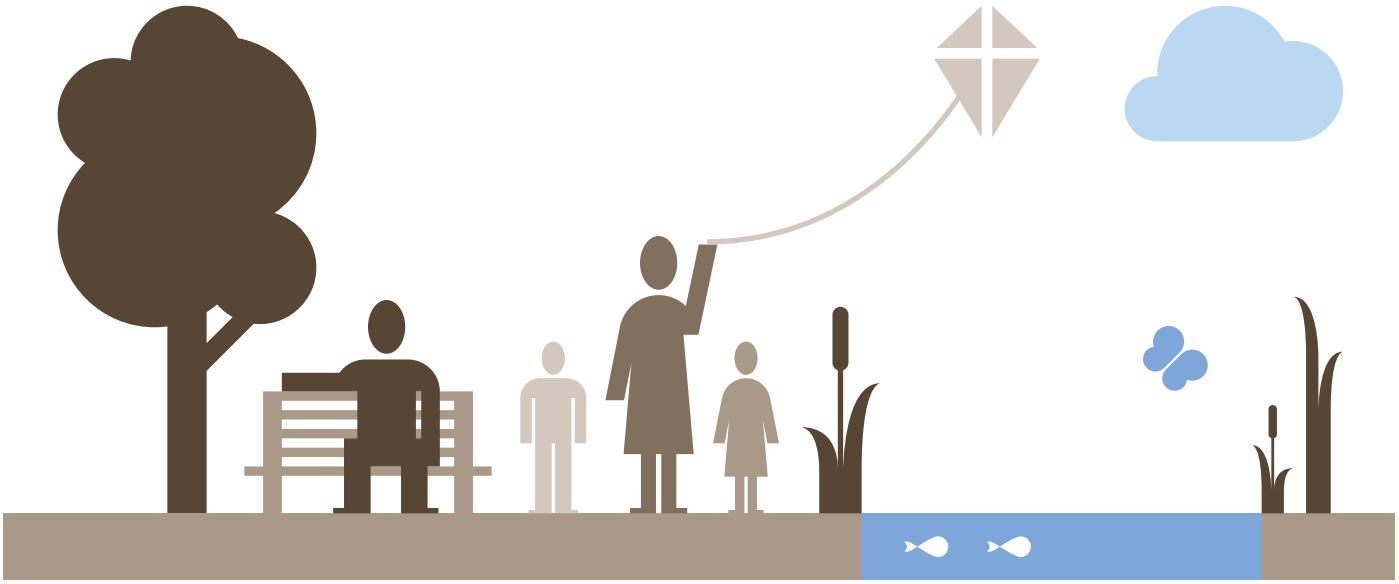
Nothing is more localized than our water and wastewater systems—utilities are place-based anchor institutions that safeguard public health, protect the environment, and foster economic vitality. Every business in the region, from local diners to Fortune 100 manufacturers, depends on the reliable delivery of clean water and the safe management of wastewater. Utilities and municipalities across the region will spend billions over the next few decades to bring water infrastructure to a state of good repair. These investments are levers to create employment opportunities, support economic development, and revitalize disinvested neighborhoods. Every step of the process has the potential to advance water equity. Partnering with community-based organizations, local educational institutions, nonprofits, labor unions, and philanthropic organizations can optimize these outcomes.

PILLAR THREE:
Foster community resilience in the face of a changing climate

The Great Lakes region is already feeling the impacts of a changing climate, through shifting precipitation patterns, heavy storms, and flooding—and lower-income communities are often the most vulnerable. Utilities, cities, and regional agencies are beginning the process of climate adaptation planning, which can include assessing vulnerabilities and risks, retrofitting infrastructure, preparing for disasters, implementing new practices, and making physical changes to the built environment. While there are few existing climate action plans that include equity metrics or recommendations, there are many opportunities to build community resilience alongside resilient infrastructure.[11] Climate adaptation will entail significant changes to policy and infrastructure, and it has the potential to advance equitable outcomes through planning, funding, and implementation.







PRIORITIES TO FORGE PROGRESS

The nation as a whole faces a range of water challenges—drought and flooding, poor water quality, deteriorating infrastructure, and more. These concerns manifest in different ways across the country, and some are especially acute in the Great Lakes.

Water issues in the region are closely tied to spatial inequalities: the region is home to many environmental justice communities, and its history as an industrial center has left its cities dotted with factories, power plants, and other facilities that have polluted the land, air, and water. Many of the region's cities have been shaped by discriminatory housing practices like redlining, the practice of denying home loans and other services to communities of color, particularly African Americans. As a result, portions of these cities are disinvested and highly segregated: 15 of the 25 cities in the US with the most extreme Black-white segregation are in the Great Lakes.[12] This means that communities of color are disproportionately exposed to hazards and experience health issues.[13,14] The region's history, environmental conditions, and economic context necessitate tailored regional strategies. Many promising strategies have emerged to address these challenges and make water management more equitable and inclusive.

The US Water Alliance's national briefing paper *An Equitable Water Future* outlined a multi-faceted menu of policies and programs to foster equitable water management in the United States. This companion report lifts up nine strategies that are particularly important for the Great Lakes region, given its history and current challenges. The good news is that progress is already happening in all of these areas—projects, campaigns, and initiatives that can be scaled up and spread across the region. This section is not meant to be exhaustive; there are a multitude of promising approaches. Rather, it highlights a set of specific actions that can create real change and achieve multiple positive outcomes for individuals and communities. These include:

1. **Improve levels of service among struggling utilities**
2. **Create comprehensive approaches to addressing affordability**
3. **Develop transparent, multi-faceted approaches to addressing lead in water**
4. **Prepare equitable emergency plans for water crises**
5. **Support capacity-building of tribal governments on water issues**
6. **Build an inclusive water workforce**

7. **Expand opportunities for small, minority-, and women-owned businesses in the water sector**
8. **Ensure that equity concerns are central to climate planning and investment**
9. **Leverage water improvements to bring multiple benefits to disinvested areas**

This section describes the challenges and key issues related to these actions, and the opportunities to implement more equitable approaches. Each action includes a case study, demonstrating the innovative and effective work already underway in the Great Lakes.

Improve levels of service among struggling utilities

Key Issues

Water and wastewater utilities across the Great Lakes are delivering uneven levels of service. While many utilities provide safe drinking water, wastewater treatment, and reliable stormwater management, others are struggling. Many smaller utilities and those that serve lower-income populations lack the financial base and technical capacity to provide high-quality services. The concentration of struggling utilities in the region is itself an equity issue, in addition to the disparities between neighborhoods and individuals within their service territories.

Most water and wastewater infrastructure in the Great Lakes was built between 50 and 150 years ago and is in need of repair and retrofits to handle climate and population shifts.[15] After decades of deferred maintenance, deteriorating systems are losing water—in northeastern Illinois, for example, some towns lose more than 30 percent of their water,[16] while others in Michigan lose up to 50 percent.[17]

$175 billion+

US EPA estimate of budget needed through 2030 to maintain and upgrade the water, wastewater, and stormwater infrastructure in the region's eight states.

Defining terms

Level of service is a term used in the water industry to refer to a utility's short- and long-term performance goals for its water system. Level of service can include quality, quantity, and reliability, as well as environmental and community standards. Utilities often use information about customer demand, data from utility commissions or boards, and information from other stakeholders to develop level of service requirements. Level of service requirements can be updated to account for changes due to growth, regulatory requirements, and technology improvements.

Despite the enormous need for investment, utilities have few funding options. When the Clean Water and Safe Drinking Water Acts were passed in the 1970s, the federal government provided significant capital to build and upgrade local water systems. Since the mid-1980s, federal funding has declined, and grants have been replaced with loans.[18] State Revolving Funds (SRFs) can be hard to access for economically struggling communities. State and federal funding covers less than 10 percent of estimated water infrastructure costs in New York, Ohio, and Minnesota.[19]

Utilities are heavily reliant on revenue generated from rates to pay for operations, maintenance, and new infrastructure investments. Thus, water utilities that serve rural, suburban, or tribal areas; communities of color; and disinvested urban centers have limited ability to maintain and upgrade infrastructure.[20] These utilities often operate in crisis mode, responding to issues as they arise rather than planning for the long term. In some cases, grant and award funding is available to defray some costs, but utility staff lack the training or capacity to prepare proposals.

Fragmentation in the water sector is another barrier to uniformly high-quality water service. The sector is far more fragmented than other services like energy, with thousands of water systems, many of them serving very small rural populations. Illinois, for example, has 1,749 drinking water systems.[21] Small systems often struggle to cover the cost of making repairs and meeting regulatory compliance mandates, and lack the staff or expertise needed for general operations.

Promising Approaches

Raising the bar so that all people in the Great Lakes consistently enjoy high levels of water service will not be easy or cheap. But strengthening utilities across the region is essential to both economic prosperity and equity, and a multi-faceted approach is needed.

All stakeholders should work together to promote effective utility management as the foundation for building and sustaining the technical, managerial, and financial capacity of water systems in the Great Lakes. National water associations and the Environmental Protection Agency (EPA) have developed utility management tools and resources. Federal agencies such as the United States Department of Agriculture (USDA) and organizations such as the National Rural Water Association support circuit rider programs to assist struggling utilities. State governments can support local utilities by providing guidance

Water system context in the Great Lakes states

State	Number of drinking water systems*[22]	Number of combined sewer overflow communities in the Great Lakes Basin[23]	Public water system infrastructure investment needs†[24]
Illinois	1,749	42	$24 billion
Indiana	783	24	$13 billion
Michigan	1,387	33	$14 billion
Minnesota	967	0	$9 billion
New York	2,314	17	$50 billion
Ohio	1,199	43	$25 billion
Pennsylvania	1,949	1	$20 billion
Wisconsin	1,054	2	$12 billion

* These numbers refer to active Community Water Systems, or water systems that serve the same people year-round (e.g. in homes or businesses).
† These numbers refer to the approximate combined estimates of the investment needed over a 20-year period for drinking water and wastewater systems to continue providing safe services.

on sound business practices and making them a criterion of SRF awards. Providing funding and venues for peer-to-peer support among utilities in the region is also critical.

Policy mechanisms like regional consolidation and resource sharing can alleviate some of the pressure on small utilities and help them build their capacity. For example, several utilities can pool funds to hire technicians, or consolidate specific functions like purchasing or workforce development, lowering their individual costs. When implemented effectively, consolidation can create economies of scale and improve the overall quality of service. It can also provide access to capital resources on favorable credit terms. These approaches may free up resources for asset management and maintenance. In addition to policy approaches, larger organizations, funders, and other utilities can help struggling utilities by identifying opportunities to share resources, providing staffing support, or combining operations. The resulting improvements in governance and management can give utilities more bandwidth to address equity issues.

Case Study

National Rural Water Association

The National Rural Water Association (NRWA), a nonprofit organization dedicated to training and supporting water and wastewater professionals, addresses the needs of struggling rural utilities through its Circuit Rider program. Circuit Riders are highly experienced water and wastewater technicians who provide onsite training and technical assistance to local utility staff. The services they provide cover all aspects of water and wastewater utility management, including evaluating technological alternatives, responding to natural disasters, detecting leaks, conducting rate analyses, and troubleshooting everyday operational problems. The program is funded by USDA Rural Development, through its Water and Waste Water Loan and Grant Program.

Through its affiliated State Rural Water Associations, NRWA trains over 100,000 professionals annually, from licensed system operators to administrative staff. Options include courses, conferences, and onsite training, as well as online instruction for geographically isolated utilities. Training Specialists cover utility operations, management, financing, governance, and sustainability. For small and rural utilities with limited capacity and small customer bases, NRWA's Circuit Riders provide an essential service. Their training and technical assistance allow these utilities to take on technical challenges and provide their customers with higher levels of service. This program demonstrates how larger organizations can support struggling utilities and alleviate disparities in water and wastewater service.

Create comprehensive approaches to addressing affordability

Key Issues

Utilities that provide service to lower-income parts of the region face a dilemma. To keep up with the costs of operations, maintenance, and financial obligations, such as making debt service payments on bond-financed capital improvements, utilities must raise rates. However, their customers are not always able to support rate increases. Utilities with limited financial capacity find it difficult to balance assisting low-income households and meeting their financial needs.

Water rates are affordable for the majority of people in the United States, but they can present a serious cost burden to those who are already in economically precarious situations. Water affordability is an especially serious challenge in the Great Lakes region both because of the age and condition of much of the infrastructure, and the many areas with low-income populations. A recent study of the Chicago region found that median water bills in predominantly African-American suburbs are 20 percent higher than in predominantly white towns. Moreover, very low-income towns pay 31 percent more for water than very high-income towns.[25] In many states, local governments can use water revenue to fund other departments—in Illinois, for example, a financially-strapped utility used water revenue to cover employee payroll.[26] In Milwaukee, about 10 percent of drinking water revenue goes to the city's general fund.[27]

Water shutoffs, one of the primary mechanisms for enforcing payment, can have detrimental effects on health and wellbeing. In some states, such as Michigan, water shutoffs can be a factor in children being separated from their families and placed in foster care.[28] Failure to pay water bills can also lead to eviction or foreclosure; in many jurisdictions, municipalities can place liens on houses with unpaid bills, which can potentially lead to the homes being sold at auction.[29]

Promising Approaches

Utilities, cities, and states in the Great Lakes region can proactively establish a comprehensive approach to affordability. Programs should consider drinking water, wastewater, and stormwater fees, and include a menu of options to cover different circumstances, from discounts and rebates to forgiveness of arrears. Affordability programs should consider renters as well as homeowners, as landlords may pass water costs on to tenants. Restructuring rates to make water affordable to low-income people and people on fixed incomes in the long term is especially effective. In states where it is legal, an income-based rate structure can help ensure that customers are not charged more than they can afford.

Alternative rate structures may be difficult for financially stressed utilities to establish, as they reduce revenue and require administrative resources; some jurisdictions also have legal barriers to income-based rates. In these cases, utilities can still address water cost burden by offering assistance options like fixed discounts, payment plans, and forgiveness of arrears. Conservation measures, such as installing more efficient plumbing fixtures or providing water efficiency audits, can lower household bills by reducing water usage. Linking eligibility for affordability programs to other programs that use household income data—such as the Supplemental Nutrition Assistance Program (SNAP)—can simplify implementation. Utilities can lower their rates overall by reducing water loss and optimizing utility efficiency.

Whatever form they take, affordability and assistance programs should include measures to protect vulnerable households from shutoffs, including households with disabled, pregnant, or elderly people, or small children. In areas where water shutoffs can have consequences like eviction, foreclosure, or separation of families, affordability policies should connect customers to social services that can help them remain in their homes. Utilities can partner with local agencies and organizations to connect households with unpaid water bills to a range of critical services.

Case Study

Northeast Ohio Regional Sewer District

Recognizing that necessary rate increases can negatively affect vulnerable populations, the Northeast Ohio Regional Sewer District (NEORSD) expanded and added several affordability and assistance programs alongside a rate increase in 2012. The Homestead Rate Program offers assistance to elderly customers, as well as customers with disabilities who are younger than 65. For this program, the rate reduction increased from 33 to 40 percent in 2012, providing qualifying customers with additional support. The Summer Sprinkling Program stipulates that during summer months sewer charges are based on either average winter usage or actual summer usage—whichever is lower in cost.

NEORSD also launched two new programs. The Wastewater Affordability Program, administered by the CHN Housing Partners, was launched in 2011 as part of NEORSD's 2012-2016 rates schedule. Both NEORSD and Cleveland Division of Water customers with an income at or below 200 percent of the poverty level are eligible to apply for a 40 percent rate reduction. In late 2012, NEORSD launched the Crisis Assistance Program, which offers financial assistance to qualifying customers affected by a disruptive event in their lives, such as major medical expenses, job loss, separation, or divorce. It also suspends water shut-offs. NEORSD's affordability and assistance programs demonstrate the range of options that utilities can offer to ensure that vulnerable customers are not burdened by water rates.

Develop transparent, multi-faceted approaches to addressing lead in water

Key Issues

When anyone turns on a tap in their home, school, or place of business, the water from the tap should be safe to drink. The Flint water crisis, in which the water supply for 90,000 people was contaminated with lead, has brought the risk of lead poisoning to the fore in the region, and its repercussions will be felt for decades to come. Exposure to lead in water is especially dangerous for children because it can affect their development. Since lead exposure causes serious long-term health problems and has high social costs, there is broad consensus that our drinking water systems and plumbing should be lead-free.

Lead in water is a legacy issue that reaches across private property lines and different agencies' areas of responsibility. Many of the region's systems use lead service lines (LSLs)—the pipes that connect water mains to homes—and many buildings use lead fixtures. Lead pipes and fixtures are more common in lower-income areas that have older housing stock and deteriorating infrastructure. While most water utilities use corrosion control to prevent lead leaching into water, that alone is insufficient to address the problem in some communities. Replacing lines is costly and complicated, as cities do not always have accurate maps of line locations; and the replacement process itself can release more lead into water.

Lead in water is a particularly acute problem because it raises the fundamental issue of trust in the authorities that manage and oversee our water systems. In the wake of Flint, many people suspect that their water is not safe to drink. Utilities across the region are encountering fear of drinking water, especially in vulnerable communities, even where there is no evidence of lead contamination. It can take decades to rebuild the public trust after it has been broken, especially when it relates to something as important as the water we drink.

Promising Approaches

In every community with lead service lines, water utilities should prioritize completing a lead service line inventory and planning for full removal. Steps should be taken to manage the risk of lead exposure in the interim by providing filters, alternative water sources, and water testing as necessary.

In developing lead service line removal programs, communities should develop partnerships among water utilities, city departments, community health and social service organizations, and housing agencies to ensure that those at highest risk from lead exposure are receiving priority attention. Strong partnerships among these organizations can speed up detection of problems and marshal resources from multiple sources to implement solutions more quickly. Lead service line removal can also be leveraged to provide economic benefits; utilities can partner with workforce development initiatives to hire workers from vulnerable communities and train them in transferrable skills. The Lead Service Line Replacement Collaborative is a cross-sector initiative that offers a toolkit to help communities develop and implement lead service line removal programs.[30]

Lead service line replacement plans should be evaluated not only for scientific soundness or cost effectiveness but also for their potential to improve access to safe water for vulnerable communities—or their risk of exacerbating existing inequities. Because many lead pipes and fixtures are on private property, policies should include funding options for lower-income homeowners. This could include offering grants, providing low-interest loans, or waiving construction permit fees.[31] Jurisdictions with the financial means can use rates to fund lead service line replacement on private property. Policies should also consider the needs of renters; for example, low-income renters are put at risk if landlords opt not to replace their lines. States can assist municipalities with lead service line replacement with funding or by facilitating access to federal funding sources like Community Development Block Grants.

Addressing lead risks in an equitable manner also entails providing information and resources to help communities access safe water. Communications about lead issues should be transparent and accessible to all people, including those with limited literacy, English proficiency, or access to technology. They should include special provisions to reach households with children or pregnant residents. Because this is a highly technical subject, communications should be accompanied by outreach and education. For example, a program distributing water filters should also teach people how to use and maintain them, and offer replacements as necessary. In jurisdictions that test drinking water or children's blood lead levels, the testing procedures and results should be transparent and clearly explained to avoid creating undue anxiety. It is helpful to partner with trusted community-based organizations to conduct outreach on lead issues, since residents may be wary of information coming from government agencies.

Case Study

Wisconsin Department of Natural Resources

Utilities in lower-income jurisdictions with lead service lines are in a double bind. They may recognize the importance of replacing the lines, but lack the financial capacity to undertake the complex and expensive process. Even if they can partially fund the removal of public pipes, utilities in areas with a larger population of low-income homeowners cannot always afford to offer assistance to these households.

In order to ensure that all water systems are able to provide safe drinking water regardless of their ratepayer base, the Wisconsin Department of Natural Resources offers funds to disadvantaged municipalities with lead service lines. In 2016, the state allocated $14.5 million in funding drawn from its 2017 Safe Drinking Water Loan Program Principal Forgiveness Funds for private lead service line removal. The funding allows these municipalities to pay for private LSL removal in homes, schools, and licensed/certified daycares without incurring debt, taking the pressure off of vulnerable households. The principal forgiven loans range from $300,000 to $1 million, and are awarded based on factors like population size, median household income, and the number of private LSLs within the municipality. Cities may add criteria, like age of children in the home. Funded projects must result in full lead service line replacement. Around $13 million has been allocated for the 2018 fiscal year, with allocations ranging from $150,000 to $3.8 million. This policy is an important tool in addressing disparities in access to clean, safe water.

Case Study

City of Grand Rapids

Grand Rapids, the second-largest city in Michigan, has an estimated 17,000 lead service lines, mostly located in the older part of the city. The city's water system has replaced thousands of publicly-owned lines in the past two decades, taking advantage of construction projects, leaks, and breaks to minimize disruption as they complete the operation.

In Grand Rapids, replacement costs average from $1,000 to $3,000 per line. Recognizing that homeowners may not have the means to replace their portion of the lines, the utility finances replacement by paying the cost upfront and then adding it to the home's utility bill over ten years.

While lines are being replaced, the utility uses corrosion control measures to ensure that drinking water is free of lead contamination. Grand Rapids' water has tested below the federal standard for lead in water since 2007; however, since any level of lead can be unsafe, the city's focus on replacing lead service lines is the most effective response.[32] In 2016, the city's water met or exceeded federal standards with only one exception.

After launching the program, the city lowered the finance rate for paying back the cost of replacement from 7 to 3.38 percent, making the service more accessible to lower-income households.[33] The program is accompanied by outreach to inform homeowners of their options, and to urge landlords to inform their tenants as well.

Prepare equitable emergency plans for water crises

Key Issues

The Great Lakes region experiences periodic water crises. In addition to the very visible example of the lead crisis in Flint, there have been examples of outbreaks of bacterial infections like Legionnaires' disease and shigellosis. More than 550 communities in the region have combined sewer systems, which collect wastewater and stormwater in the same pipes, and can flood streets and homes during heavy rains.[34] Billions of gallons of untreated sewage are regularly released into the Great Lakes, leading to elevated *E. coli* levels.[35]

Drinking water sources in some parts of the region are impacted by industrial, agricultural, and urban pollution. The best-known example of these challenges is the algal blooms in Lake Erie, which have caused drinking water crises in Toledo and Ontario. Phosphorus levels have doubled in western Lake Erie tributaries since the mid-1990s.[36]

Low-income communities are especially vulnerable during water crises. They may not be able to afford replacement water sources or filters during periods when tap water is unsafe. They may live in flood risk areas and lack insurance or the resources to rebuild after floods. In some cases, they do not receive adequate information or assistance during water crises. In Flint, residents began to worry about their water's color and taste in April 2014, and elevated lead levels were detected in February 2015. However, it was not until October that the city warned residents not to drink tap water, and it would take a few more months to declare a state of emergency. Public outreach was muddled by conflicting information coming from different government agencies.[37] Once the crisis was acknowledged, free bottled water was offered at distribution points; but for some senior citizens or people with disabilities carrying cases of water every day is not feasible.[38,39] People without cars also had a hard time—and even those with cars sometimes had to spend their lunch breaks picking up bottled water.[40]

Promising Approaches

Drinking water and wastewater utilities develop emergency response plans for situations that affect water quality or infrastructure. These plans should consider all the factors that shape people's access to water services and information during a crisis, including income, age, language ability, literacy, physical ability, access to technology, and access to transportation. For example, drinking water advisories may not reach people without regular access to television and internet, or people who speak languages other than English. Distributing information through multiple channels, including text messages, helps reach all residents. State agencies can facilitate the development of equitable emergency plans by providing utilities with guidelines and best practices, as well as ensuring that water crises are recognized as emergencies in a timely fashion and receive adequate resources. Responding quickly to crises is crucial to prevent prolonged exposure to unsafe water or health impacts tied to floods.

Emergency plans should be informed by a nuanced understanding of the conditions in vulnerable communities in order to offer effective assistance. There has been some progress in the region in creating inclusive responses to heatwaves; for example, the city of Chicago brings mobile cooling centers to people in high-crime neighborhoods who are afraid to walk to other public spaces.[41] This kind of on-the-ground detail is important for water emergency plans as well. As the Flint example demonstrates, offering free crates of water at a central location does not reach everyone. Organizations like food banks, places of worship, and small nonprofits are often the most familiar with community needs and can be very responsive to crises. An organization called Flint Rising has been delivering water to low-income households throughout the crisis, and community service organizations delivered water to vulnerable people when Toledo's drinking water was unsafe. Utilities, state agencies, foundations, and larger organizations can partner with them to scale up their services.

Stable, prosperous, and healthy communities with access to services and opportunities will be better prepared to handle water crises. Without a baseline of social services providing a safety net to vulnerable people, water crises only widen disparities. Therefore, increasing overall funding to the social infrastructure of vulnerable communities builds emergency preparedness, even if it is not directly linked to water systems. Neighborhoods with community centers, health clinics, public transportation, homeless shelters, food banks, and other resources will be better able to handle crises. Foundations and large nonprofits can work with communities to develop appropriate emergency plans.

Case Study

Genesee County Hispanic Latino Collaborative

The Genesee County Hispanic Latino Collaborative (GCHLC) is a nonprofit organization that advocates for undocumented and documented Hispanic/Latino communities in Genesee County in the areas of education, cultural awareness, and social needs. GCHLC provides educational and social services including ESL classes, a food pantry, and youth engagement programs. Through its advocacy, GCHLC brings awareness at a local, state, and federal level to the importance of providing public information in languages other than English.

As a trusted organization, GCHLC also provided resources and support to Flint's undocumented community during the water crisis. Flint is home to roughly 3,000 undocumented immigrants, many of whom have lived in the US for years and are under threat of deportation. When National Guard troops and state police distributed filters and bottled water in Flint, many undocumented immigrants worried that they would be questioned or even deported if they used these services. Because communications and outreach were mostly in English, some residents were not well-informed of the risks of drinking tap water.[42]

In response, GCHLC organized a door-to-door campaign to share information on water risks, provided bilingual informational materials, and delivered water to homes. They informed people of their right to attend free lead testing clinics and receive water at distribution sites. Thanks to strong relationships with the community, GCHLC could provide effective outreach and essential resources to extremely vulnerable populations.

Support capacity-building of tribal governments on water issues

Key Issues

Native American communities in the Great Lakes face water challenges both on and off reservations. Like many rural areas in the region, tribal governments on reservations can have difficulty building the economies of scale necessary to fund maintenance and improvements of aging and inadequate infrastructure. Insufficient water infrastructure capacity can make it difficult to address other needs like housing construction and fire suppression. Most tribes get their drinking water from wells, and there are water quality issues in both surface and groundwater. Funding and oversight for tribal water systems comes from the federal level rather than the state level, and this can create obstacles to accessing funding.

Hunting, fishing, and wild rice cultivation are important for many tribes in the region, and these activities depend on a healthy watershed and ecosystem. More than 160 Indigenous communities in the Great Lakes basin rely heavily on fish as a diet staple; fishing also plays a religious, social, and cultural role in some communities.[43] Tribes hunt and fish off-reservation in accordance with treaties that secure their rights to harvest these lands in traditional ways.

Agricultural, urban, and industrial runoff affect water quality in the off-reservation areas where tribes hunt and fish. Fish in the Great Lakes can contain toxic chemicals like PCBs and mercury that cause cardiovascular disease, cancer, and reproductive health problems.[44] Drilling, mining, and fracking operations, as well as oil pipelines, pose a threat to water bodies that support tribal food sources. For example, in Minnesota, the state's plan to allow the expansion of a taconite mine could compromise water supplies used for tribal cultivation of wild rice.[45] Tribes in the region are taking action to protect their water supplies from pollution. Plans to replace and expand Enbridge Energy pipelines, which connect Wisconsin, Michigan, and Minnesota to Canada, have been met with Indigenous opposition.[46] Proposed construction would cross tribal lands, and there is concern that spills or leaks could contaminate water supplies.

Promising Approaches

There are significant opportunities to invoke tribal water protections in the region; however, tribes may lack the capacity and resources to successfully carry out these processes. Philanthropic organizations, large environmental nonprofits, and research institutions are well-positioned to offer support, whether through funding, legal support, advocacy, or research.

Tribes have treaty rights that allow them to influence land use decisions both on and off reservations. Tribal governments in the Great Lakes have exercised those rights to address threats to water. For example, the Bad River Band of Lake Superior Chippewa recently denied an easement renewal request for an oil pipeline, citing the risk of a spill affecting water quality.[47] While tribes do not have direct regulatory authority over off-reservation lands, they have some ability to use the Clean Water Act. Federal statutes allow tribes to be treated as states in Clean Water Act regulation cases, giving them the right to set their own water quality standards and apply them to upstream point source pollution outside reservations. The EPA must consider these quality standards in evaluating permits, and can deny permits that violate them.[48] At the state level, governments can consult tribes on decisions that will affect their access to natural resources. It is important to create mechanisms for regular communication between state and tribal governments; otherwise the level of engagement fluctuates with specific governors and administrations. Outside stakeholders can provide staffing, research capacity, and expertise to ensure that tribes have a strong voice in water policy and regulation.

Data is essential for tribes to understand and address water challenges both on- and off-reservation. This includes baseline data on water quality in lakes and rivers used for tribal subsistence, and the effects of industrial contamination on food supplies and human health, as well as data on water quality and affordability on reservations. Tribes have limited research capacity, and it can be difficult for them to identify reliable experts to consult. Data and informational materials can help mitigate the risks of water contamination in tribal fisheries. For example, the Great Lakes Indian Fish & Wildlife Commission, an organization that represents 11 Ojibwe tribes in the region, creates maps of mercury levels in lakes where tribes fish. The maps include different

guidelines for children and women of childbearing age, and explain how many servings of fish are safe to eat per month.[49]

Government agencies and other organizations can also partner with tribal governments to make needed improvements to water systems on reservations by developing initiatives that build the capacity of small utilities on reservations, provide technical assistance, and train Native American water system operators. This could include identifying and removing barriers for water operators to participate in existing water sector trainings and certification programs. The EPA also offers free certification for tribal water system personnel through the National Tribal Drinking Water Operator Certification Program. Although funding is available for reservation water systems through the EPA and USDA, tribes may have a hard time meeting the prerequisites to apply. Outside organizations can work to build tribal capacity to be eligible to apply for this funding.

Case Study

Fond du Lac Band of Lake Superior Chippewa

The Fond du Lac Band of Lake Superior Chippewa is a tribe with hunting, fishing, and gathering rights in and around the Superior National Forest in Minnesota. In recent years, the tribe has become involved in the environmental review and permitting processes for a proposed mine in the area. The company PolyMet Mining has submitted several permit applications to develop an open-pit copper and nickel mine on land that is currently part of Superior National Forest. The mine would involve a land exchange with the US Forest Service that transfers part of the national forest into private ownership. The tribe, in its formal objection to the land exchange, expressed concerns that the mine would contaminate water resources in the forest and downstream, and in turn damage fisheries and wild rice. Water from the proposed mine site would flow downstream into the Fond du Lac reservation.[50] Environmental groups have also raised concerns: according to the Sierra Club, acid mine drainage could pollute Lake Superior and the St. Louis River.[51]

The tribe registered its opposition in a letter to the House Natural Resources Committee, as they were considering legislation to override legal challenges and expedite the land exchange, stating that the proposed mine would interfere with its treaty rights to hunt, fish, and gather on the land. A tribal representative stated that the mine could degrade or destroy the tribe's treaty resources.[52] While the PolyMet mine's permits are still being decided, the strategy of invoking treaty rights to have an influence over water resources in the region is a promising one.

Build an inclusive water workforce

Key Issues

Many cities and communities in the Great Lakes region are confronted with economic challenges. Overall, 1.2 million manufacturing jobs were lost since 2000. While there has been some job growth, it is primarily in lower wage employment, for example in the healthcare and service sectors. Median income in many of the Great Lakes states dropped significantly in the first decade of the 21st century, with Michigan income falling almost 20 percent.[53]

Small cities, rural areas, and communities of color have been hit particularly hard by the changing economy. While overall unemployment and poverty rates in the Great Lakes are comparable to national averages, there are significant racial disparities. In Illinois, the unemployment rate for African-Americans is the highest in the nation and more than double the white unemployment rate.[54] Michigan and Pennsylvania also rank among the worst in the nation in racial employment disparities.[55]

In a changing economic landscape, the water sector is an often-overlooked source of stable, fulfilling, living-wage jobs. Just as the region's identity is tied to water, its economy is also dependent on water. Across the region, 9.1 million jobs are in water-dependent industries.[56] These jobs represent a substantial economic base: water-dependent industries make up 15 percent or more of total employment in all the Great Lakes states but New York. In Indiana, they reach 24 percent.[57] Maintaining and upgrading water infrastructure also creates employment opportunities. Over the next decade, water, wastewater, and stormwater utilities across the nation are poised to invest billions of dollars a year in capital improvements. In some cases, water utility spending will be the biggest investment made by any city department. This opportunity is especially timely because the water sector workforce is aging and nearing retirement: experts estimate that about a third of water and wastewater utility workers will retire in the next ten years.[58]

Promising Approaches

The water sector can harness upcoming investments and workforce openings in the Great Lakes. Water sector positions span a range of skills—from engineering to customer service to accounting to construction—creating opportunity for people from many different backgrounds. Utilities and the engineering, design, and construction firms that they work with can actively recruit in more vulnerable neighborhoods by advertising job postings in community centers, places of worship, and local newspapers, as well as holding local hiring fairs. In some jurisdictions, regulations can make it difficult to implement local hire requirements or preferences for permanent, non-construction positions. In these cases, utilities can still build an inclusive pipeline by giving graduates of training programs priority for permanent job openings, and making sure that trainings and apprenticeships follow through and connect people to jobs.

Actively recruiting and hiring from vulnerable communities is only successful if potential workers have the skills and qualifications to meet future utility workforce needs. As utilities gather more data on their specific workforce needs based on retirement trends, they can partner with workforce investment boards, community-based organizations, community colleges, and philanthropy to develop training and certification programs that connect to traditional apprenticeship programs.

Inclusive hiring is also an opportunity to strengthen a utility or municipality's relationship with the community it serves and improve decision-making by hiring staff and managers who understand all customers' needs. Placing people in water sector careers that they are passionate about is mutually beneficial—they bring their knowledge and enthusiasm back to their communities, and spread information about water systems.

Case Study

Buffalo Sewer Authority and PUSH Buffalo

In finalizing its combined sewer overflow reduction strategy in 2014, the City of Buffalo recognized the potential of green infrastructure to improve water quality, public health, property values, and quality of life. In 2015, the Buffalo Sewer Authority (BSA) issued a Request for Proposals for a Community Water Quality Partnerships program. One of the successful contracts under the program was awarded to People United for Sustainable Housing (PUSH) Buffalo. The "PUSH Blue" eco-landscaping team works with low-income community members and communities of color to create job skills and opportunities in green infrastructure and sustainable landscaping.

The BSA project involved a field study of the feasibility of using a four to six inch layer of water-absorbing soil and low maintenance turf on post-demolition sites instead of the city's traditional demolition specifications. Over the course of three field seasons, BSA worked with PUSH and its subcontracting team to pilot the installation of the technique on 221 sites and a total of 19.03 acres. In studying the approach and how the city might maximize the triple bottom line benefits of green infrastructure, the team actively engaged local minority- and women-owned landscape installation businesses, soil and seed suppliers, and hydroseeding companies.

Through the BSA contract, PUSH provided onsite training and technical assistance to subcontractors, including a day where they shadowed BNSC's installation crew. The training helped ensure that contractors understood the importance of proper site grading and soil application in maximizing stormwater absorption while minimizing risks to adjacent sites and buildings. For the duration of the project, 53 jobs were created resulting from the Post Demolition Green Infrastructure Project. Of the workers hired for these new positions, 64 percent were Buffalo residents. Fifty-three percent were people of color, including 20 African Americans, five Hispanic workers, and three Native Americans. Women made up 36 percent of the project workforce.

The BSA feasibility project was very well received by the community, city staff, contractors, and Buffalo's Common Council members. While the demolition of blighted properties removes structures with environmental and structural hazards like asbestos and lead, the introduction of low-growing turf also promotes safe, healthy, walkable neighborhoods.

Expand opportunities for small, minority-, and women-owned businesses in the water sector

Key Issues

The construction industry currently accounts for four to six percent of the American economy, and is projected to grow by three percent annually through 2020.[59,60] That, coupled with the billions of dollars to be invested by water and wastewater utilities creates a sizeable opportunity for positioning small, local, minority, women-owned, and disadvantaged businesses to compete for water sector contracts. Nearly half of the nation's private sector workforce is employed by a small business; supporting them is an important strategy in creating prosperity.[61] Research has shown that minority-owned businesses hire a greater percentage of minority employees, doubling the positive equity impact of creating contracting opportunities for these businesses.[62]

Although small, minority- and women-owned businesses create a host of economic benefits, there are barriers to their participation in water sector projects. While many utilities or water sector firms have existing policies on contracting with small, minority- and women-owned businesses, implementation can be difficult. Some cities require these businesses to be officially registered as disadvantaged businesses. Some of these businesses lack the upfront access to bonding, insurance, and capital to take on large capital projects, and they may have difficulty navigating government processes. Larger companies and contractors sometimes have insurance requirements that are difficult for smaller companies to meet. There is also a need to align the capacity and expertise of small, minority- and women-owned businesses with future needs in the water sector, and to build specialized skills for emerging technologies like green infrastructure.

Promising Approaches

As they maintain and upgrade water systems, utilities can build wealth in vulnerable communities by creating contracting opportunities for local, small, minority-, and women-owned businesses along the supply chain. Utilities with existing programs that provide incentives for local, small, minority-, and women-owned business participation can take steps to ensure that they are effective, and share their knowledge and experience with their peers. If businesses are required to register for a list of certified contractors, utilities can conduct outreach to ensure that they are aware of this requirement. They can also work with other businesses and nonprofits along the supply chain to remove barriers for these businesses—for example, by creating business incubators or offering low-interest small business loans.

Breaking contracts into smaller pieces can also help. Utilities can work with local credit unions to facilitate these businesses' participation, as well as offering timely payment arrangements. Contractor-controlled insurance and bonding programs are also helpful: a primary or general contractor provides insurance and bonding capacity for smaller subcontractors, making it easier for smaller businesses to get involved. Offering discounts or incentives to these enterprises can help them get started. Utilities can extend the positive impact of these programs by requiring that larger companies they contract with include opportunities for minority- and women-owned businesses in their supply chains.

Case Study

Milwaukee Metropolitan Sewerage District

One of the goals of the Milwaukee Metropolitan Sewerage District is to build the capacity of local, small, veteran-, minority-, and women-owned businesses to participate in district and city projects, and to increase the number of minorities and women in management and leadership positions.[63] As part of its Workforce and Business Development Resource Program, MMSD maintains a database of disadvantaged businesses, including minority-, women-, and veteran-owned (SWMBE).

To encourage SWMBE participation in contracting, the utility has established procurement goals of 13 percent for minority-owned businesses, five percent for small and veteran-owned businesses, and two percent for women-owned businesses.[64] In 2013, MMSD awarded contracts or subcontracts totaling $9.9 million, or 25.2 percent of all procurement awards to SWMBEs.

In order for a business to be recognized as a MMSD Small Business Enterprise (SBE), applicants must submit a vendor registration, including providing proof of gross sales less than $2.5 million in the most recent fiscal year. These application materials and information are available online.[65] This lowers the barriers for these businesses to become involved in contracting, thus expanding opportunities for small, minority-, veteran-, and women-owned businesses in the water sector.

Ensure that equity concerns are central to climate planning and investment

Key Issues

In no uncertain terms, the Great Lakes region is experiencing the impacts of a changing climate. Overall precipitation has increased by 11 percent in the past century, and average ice coverage on the lakes decreased 71 percent from 1973 to 2010. In many areas rainfall, snowfall, and snowmelt are becoming increasingly unpredictable—raising the risk of floods and straining water infrastructure designed for steadier weather patterns. Not only is rainfall erratic, but the most extreme precipitation events are also getting heavier. More precipitation is falling as rain, rather than snow, leading to increased runoff.[66] This, combined with warmer water temperatures, contributes to nutrient loading and algal blooms in the lakes.[67]

The Great Lakes region is also experiencing hotter summer days; Minneapolis is one of the 10 cities nationwide with the most intense urban heat islands.[68] Hotter days can be life-threatening, as higher ozone pollution levels contribute to a higher incidence of heart attacks, asthma attacks, and other health problems. They can also lead to heavier energy and water usage to keep cool, putting pressure on lower-income people who struggle to pay their water and electricity bills. Risk areas for extreme heat tend to overlap with flood risk areas, since both are worsened by paved surfaces and lack of green space.

Promising Approaches

There are many opportunities to incorporate equity into the process of climate adaptation. Involving vulnerable communities and community-based organizations in planning processes means that their concerns help define goals and spending priorities. Community engagement should begin with outreach and education, since climate change is a complex subject that most people do not understand in depth—and it can seem distant and abstract to people with other urgent worries. Outreach can encompass educational events, public art, social media, and partnerships with schools. Nonprofits and environmental groups can facilitate public involvement by offering trainings on climate adaption and bringing community members into policymaking forums.

Utilities and government agencies can include an equity lens throughout the climate adaptation process, from planning, to funding, to project implementation. Vulnerability assessments are often the first step in climate adaptation planning, and they are used to allocate funding and set priorities. They assess an area or system's exposure to and ability to adapt to weather events, and usually focus on infrastructure assets: for example, determining the damage that a wastewater treatment plant would sustain in a 100-year flood. Incorporating data on race, income, public health, access to transportation, homeownership rates, hazardous sites, and other factors into vulnerability assessments gives a more holistic picture of risk and can lead to better-informed climate investment priorities. To build on the above example, planners can prioritize adaptation measures at a wastewater treatment plant that is both vulnerable to flooding and located in an extremely low-income neighborhood where residents lack flood insurance. This would also help planners understand interconnected and cumulative climate impacts.

Case Study

Cleveland Climate Fund

The effects of a changing climate are becoming visible in Cleveland, where heavy rainstorms have become more frequent, increasing the risk of urban flooding and sewer overflow.[69] Cleveland also faces socioeconomic challenges: more than 35 percent of the population lives in poverty.[70] Persistent poverty means residents are less able prepare for and recover from climate impacts. To address these twin challenges, Cleveland's Office of Sustainability is making community participation a core component of their climate adaptation strategy. The Cleveland Climate Action Plan is informed by engagement with more than 50 organizations, many of them representing the city's most vulnerable communities. The Climate Resilience and Urban Opportunity Plan, led by Cleveland Neighborhood Progress, focuses on opportunities to build neighborhood-level resilience. Finally, the city partnered with several local foundations and organizations to create the Cleveland Climate Action Fund. The fund allows companies and individuals to mitigate their carbon footprints by funding local climate mitigation and adaptation projects.

As part of the Cleveland Climate Action Plan, the city created a Neighborhood Climate Action Toolkit to guide residents and neighborhood groups in developing these projects. The toolkit was piloted in a participatory planning process led by community development corporations representing neighborhoods with large low-income, senior citizen, and African-American populations. Residents can use the toolkit to identify neighborhood assets and challenges, develop project ideas, and apply for implementation funding from the fund. So far, the Toolkit's approach has resonated with communities, creating greater social cohesion and dialogue around climate adaptation. Over the last couple of years, the fund has awarded almost $100,000 to 25 neighborhood projects, ranging from rain barrels and community gardens to a program that hires local youth to work on sustainable landscaping.[71]

Leverage water improvements to bring multiple benefits to disinvested areas

Key Issues

Lower-income neighborhoods and communities of color in the Great Lakes region are often disinvested and under-resourced. Disinvested areas are characterized by lower-quality housing stock, crumbling infrastructure, and environmental hazards.[72] While they are often urban, rural areas in the region face similar risks.

Inadequate infrastructure and lack of funding puts these areas at risk of water-related challenges like flooding, especially as changing climatic conditions increase the prevalence of extreme precipitation events.[73] A study of Cook County, Illinois showed that zip codes with incomes below the median sustained the most severe damage during floods.[74] Vulnerable communities often have concentrations of impermeable surfaces that worsen flooding. In cities with combined sewer systems, this can mean that streets, basements, and backyards flood with untreated wastewater. In addition to being expensive, flooding is linked to stress, ill health, and lost hours of work.[75]

Vulnerable communities often lack natural recreational spaces. Research has shown that communities with high levels of poverty or high percentages of African American or Latino residents have less access to parks and green space.[76] This has environmental impacts, as green spaces can help absorb stormwater, filter air, and lower temperatures. It also has implications for public health. Green spaces that are accessible to all promote healthy recreational activities as well as improving psychological and emotional wellbeing.[77]

Promising Approaches

As utilities, other public agencies, and the private sector implement infrastructure upgrades to address flooding and climate change, they can leverage these improvements to create multiple benefits for vulnerable communities. Utilities can help address disparities and environmental injustices by channeling improvements to disinvested areas with the greatest need. Improvement projects that do not consider equity can deepen existing divides between wealthier and lower-income areas. Vulnerable communities stand to benefit the most from initiatives like green infrastructure and flood protection measures. Utilities can work with communities to develop tools to target funding and implementation to the neighborhoods most in need. They can also coordinate with other agencies, such as energy utilities, that are developing resilience and sustainability plans, to ensure that benefits are maximized across multiple initiatives.

As the Great Lakes region experiences heavy rainfall and flooding, green infrastructure is becoming a more common stormwater management strategy. Rain gardens, bioswales, permeable pavers, and other techniques are an environmentally-friendly complement, and in some cases, alternative to traditional gray infrastructure. Green infrastructure can also offer equity benefits by greening disinvested neighborhoods and reducing burdens like basement flooding. In cities with high vacancy rates, green infrastructure can turn unused land into an asset by creating parks and community gardens. As green infrastructure becomes increasingly common, the water sector will need specialists to build and maintain it. Partnerships between community-based organizations, utilities, schools, and environmental groups can offer training and placement programs to connect underemployed communities to green infrastructure jobs.

Defining terms

Green infrastructure is a water management strategy that replicates or restores natural processes by creating permeable surfaces and allowing stormwater to infiltrate into the soil or return to water bodies. Green infrastructure includes techniques like rain gardens, bioswales, and permeable pavers, which reduce flooding and improve water quality.

Case Study

Detroit GSI Working Groups

Green infrastructure can help turn vacant, underutilized properties and land in cities into productive spaces that revitalize neighborhoods and improve water quality. In Detroit, researchers at the University of Michigan and other partners are exploring the potential of green infrastructure by constructing bioretention gardens to manage the city's stormwater. Led by the University of Michigan (UM) School for Environment and Sustainability, the team consists of partners from the Detroit Land Bank Authority, the Detroit Water and Sewerage Department, and researchers from UM and Wayne State University. The team is working with several green infrastructure pilot projects in residential areas with vacant property, to create neighborhood-level products to address flooding and downstream water quality. They are monitoring these effects, as well as public health and perceived neighborhood attractiveness. Before installing the gardens, researchers involved the community in their decision-making process by surveying 163 households near potential garden sites. They found that members of the community were in favor of installing bioretention gardens on otherwise unused vacant lots, and saw the proposed garden designs as more attractive, neater, better cared for, and safer than lots without them.[78]

This project builds on previous work by the research team and their collaborators at the City of Detroit. Funding from the Erb Family Foundation will help the team measure the effectiveness of bioretention gardens at improving water quality in Detroit and understand residents' perspectives on the gardens.[79] The team plans to work with the city to develop new green infrastructure design concepts for urban watersheds in Detroit, and to identify governance systems that will support the successful installation and sustained maintenance of green infrastructure. This initiative shows how a wide range of stakeholders—from philanthropy to small community groups—can come together to develop green infrastructure projects that provide multiple benefits.

CONCLUSION
Regional Assets to Secure an Equitable Water Future

The challenges described in this report are significant and deep-rooted. It will take creative and diverse approaches, aligned across a range of organizations and stakeholders, to shift the course of the region's water future. Fortunately, the Great Lakes region is well-positioned to take on these challenges. The region's many stakeholders have taken important steps, and they are poised to make more progress.

While there are differences in the priorities and strategies they are advancing, stakeholders in the Great Lakes broadly agree that they must protect water resources for future generations. Achievements like the Great Lakes Compact, a legally binding water management agreement adopted by the region's eight states and two Canadian provinces, show that many different stakeholders can work regionally to form consensus on water management. In 1989, the governors of the Great Lakes states created the Great Lakes Protection Fund, the first private endowment focused on protecting a specific ecosystem. The fund provides grants to drive practical regional action and innovation to help protect the Great Lakes. Healing Our Waters Coalition, an initiative made up of more than 145 stakeholders that advocates for investment in Great Lakes restoration, including cleaning up pollution and investing in water infrastructure, is another example of collaboration on water issues. Water transcends party lines and ideological differences, because it is seen as essential to health and wellbeing. These effective water-related initiatives can prioritize equitable water management as a core component of their mandate.

Some regional assets that can be leveraged to secure an equitable water future include:

Engaged utilities

Historically, water utilities have operated as a "silent service:" they provide essential services 24/7, but they are often out of sight and out of mind. Utilities have a core mandate of providing reliable water and wastewater service. Now, some utilities are taking a more proactive role in vulnerable communities. Innovative utilities recognize that in addition to being service providers they are also anchor institutions, and their operations and investments have broader impacts on people in their service area. As this report illustrates, utilities such as the Milwaukee Metropolitan Sewerage District are utilizing innovative procurement practices to open up contracting opportunities for smaller businesses. Others like the

Buffalo Sewer Authority are partnering with community organizations to target workforce training to disadvantaged residents. The Northeast Ohio Regional Sewer District is balancing infrastructure investment with an eye towards affordability to ensure that lower-income residents are not unduly burdened by their water bills. The Metropolitan Water Reclamation District of Greater Chicago is partnering with the school district to revitalize school yards with green infrastructure investments. Utilities across the Great Lakes region can embrace equitable water management and create positive impacts on the communities they serve. This will require sustained engagement with residents and new forms of collaboration with stakeholder organizations.

Dedicated community-based organizations

Vulnerable communities in the region have responded to poverty and disinvestment with extraordinary resilience. There is a network of community-based organizations that provide much-needed services to vulnerable people who have few other options. Frontline service providers and community-based researchers have extensive knowledge of the on-the-ground realities of water challenges, and can provide essential perspectives and data to inform policy solutions. As a primary point of contact and source of information for vulnerable communities dealing with water stress, community-based organizations can prepare people to engage in water decision-making by educating them about water systems and illuminating the connections between water and other equity issues like food security, housing, and health. These organizations can share their expertise on water equity issues by conducting community-based research and presenting it to a larger audience. Organizations like Milwaukee Water Commons bring people together for conversations about water systems and how they affect communities. Investing in community-based organizations to build their capacity to engage on water issues is essential.

Robust philanthropic ecosystem

Thanks in part to its industrial history, the Great Lakes is home to national philanthropic organizations as well as regional and community foundations. Many of these foundations have been leaders on water and environment initiatives that can inform more equity-focused investment strategies. Funding strategies can play an important role in articulating the relationship between vulnerable communities and water, and framing water as an equity issue. Foundations are well-positioned to convene cross-sector leadership, support and scale up the work of community-based organizations, create knowledge exchange opportunities among stakeholders in the region, and much more.

Strong presence of tribal governments and agencies

Many sovereign tribal governments and tribal agencies manage and protect natural resources in the region, including water supplies, fisheries, and wilderness areas. Inter-tribal federations like the Chippewa Ottawa Resource Authority (CORA) regulate and oversee treaty fisheries and natural resources in the region. The Great Lakes Indian Fish and Wildlife Commission provides natural resources management expertise and policy analysis in support of tribes with hunting, fishing, and gathering treaty rights. These agencies have extensive data on ecosystems, hydrology, and water quality in the region, particularly in remote areas where state governments have a limited presence. There are significant opportunities for tribal governments and agencies to partner with other stakeholders to address water equity issues in Native American communities.

Conservation and environmental organizations

The region's abundant natural resources have nurtured a strong set of conservation and water quality-focused environmental groups that play an important role in protecting and restoring the Great Lakes. While many of these organizations have traditionally had a primary focus on environmental issues like ecosystem preservation and endangered species protection, they are broadening their thinking on water issues to encompass socioeconomic equity. Environmental nonprofits can advance water equity by building their capacity around equity and inclusion. They often have access, contacts, and resources that they can share with equity-focused organizations. Environmental organizations also have a key role to play in shaping the water equity narrative and sharing it with a broader environmental audience. As trusted institutions in the environmental world, these groups can articulate the interconnections between water issues and equity, showing that impacts on natural systems are often directly linked to impacts on vulnerable communities.

Renowned research institutions

The Great Lakes region is a hub of academic, medical, and scientific research, with some of the highest-ranked universities in the nation. Research institutions have been instrumental in studying and responding to water crises. They have driven scientific understanding of the threats to water resources in the region, collaborated with community-based organizations to document their challenges, and supported utilities in advancing innovative technological solutions. Community members often work as citizen scientists by testing water quality, mapping water issues, and analyzing data to reveal disparities. Academics and researchers can support citizen science efforts by providing data, materials, and expertise, as well as trainings and educational programming. Research institutions can be stewards of trustworthy, independent public data. As anchor institutions, they are also potential partners in workforce development and neighborhood benefits programs.

Innovative, water-focused private sector

Great Lakes communities like Milwaukee, the Twin Cities, and Cleveland have water-focused companies that are driving technological innovation. These companies not only contribute to economic growth in the region, they are also developing global solutions to water management challenges. Harnessing this entrepreneurial spirit and focusing it on the water equity challenges in the Great Lakes is an opportunity for progress. For example, technology competitions are common in the water industry, but they have not traditionally focused on solving challenges that vulnerable people and disadvantaged neighborhoods face. The Great Lakes region could be a model for the nation in terms of how to deploy technological solutions to address thorny water equity issues such as lead service line removal and water quality testing. The private sector can also support workforce development in the water sector through trainings and internships.

Water is central to the history, culture, and lifestyle of the Great Lakes. As the location of some of the most visible and significant water crises in American history, the Great Lakes region has a singular awareness and understanding of the urgency of water issues, and a determination to work towards progress. The region is home to passionate, creative leaders working to incorporate equity into water systems. Now is the time to build on their inspiring work and set the course for an equitable water future.

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ABOUT THE US WATER ALLIANCE

The US Water Alliance advances policies and programs to secure a sustainable water future for all. Our membership includes water providers, public officials, business leaders, environmental organizations, community leaders, policy organizations, and more. A nationally recognized nonprofit organization, the US Water Alliance brings together diverse interests to identify and advance common ground, achievable solutions to our nation's most pressing water challenges. We:

- **Educate the nation about the true value of water and the need for investment in water systems.** Our innovative education and advocacy campaigns, best-in-class communications and media activities, high-impact events, and publications are educating and inspiring the nation about how water is essential and in need of investment.

- **Accelerate the adoption of one water policies and programs that manage water resources to advance a better quality of life for all.** As an honest broker, we convene diverse interests to identify and advance practical, achievable solutions to our nation's most pressing water challenges. We do this through national dialogues, knowledge building and peer exchange, the development of forward-looking and inclusive water policies and programs, and coalition building.

- **Celebrate what works and spread innovation in water management.** We shine a light on those who engage in groundbreaking work through story-telling, cataloguing and disseminating best practices, and spearheading special recognition programs that focus attention on how water leaders are building stronger communities and a stronger America.

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