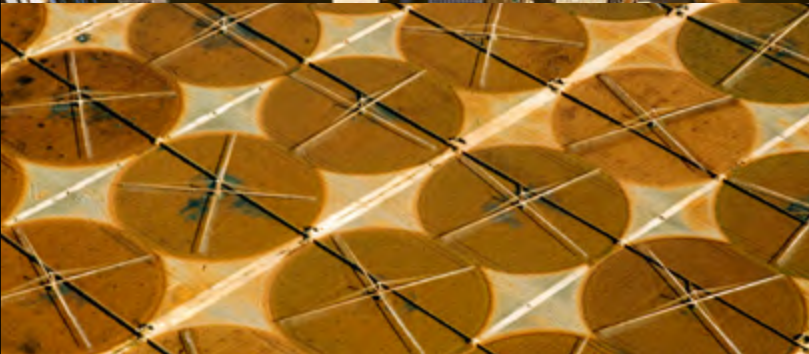
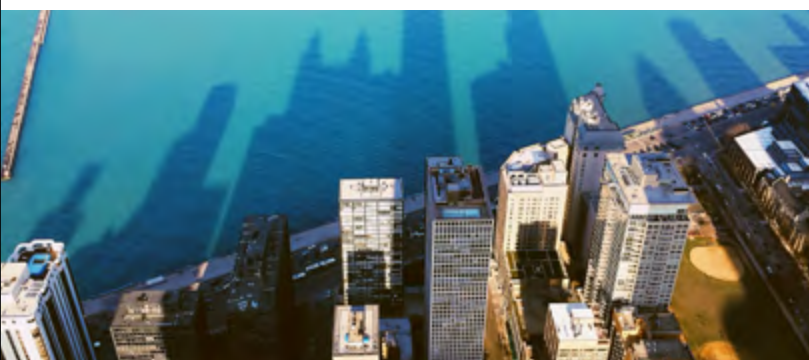


One Water Roadmap:
The Sustainable Management of
Life's Most Essential Resource



Preface

America's water future is at a crossroads. On the one hand, we are experiencing challenges like we have never seen before, from drought to flooding to water contamination. On the other, the stewards of water—utility managers, public officials, farmers, river keepers, businesses, manufacturers, community leaders, philanthropy, and more—are forging transformative solutions. We have come a long way to get to this tipping point.

We present this compendium to build the field of practice and make the case for the One Water approach. This roadmap puts forward key strategies and real-world examples of One Water management in action. Most importantly, this document is a testament to what can be achieved when all water stakeholders work together.

The US Water Alliance was formed in 2008 to bring together diverse interests to identify and advance common-ground, achievable solutions to our nation's most pressing water challenges. Our work is designed to accelerate the adoption of One Water policies and programs that advance a better quality of life for all. This report was conceived and developed by US Water Alliance members, who know that to succeed requires stretching out of comfort zones, engaging new partners, creatively leveraging resources, and much more.

Together, we are on a journey to a sustainable water future.



Kevin Shafer
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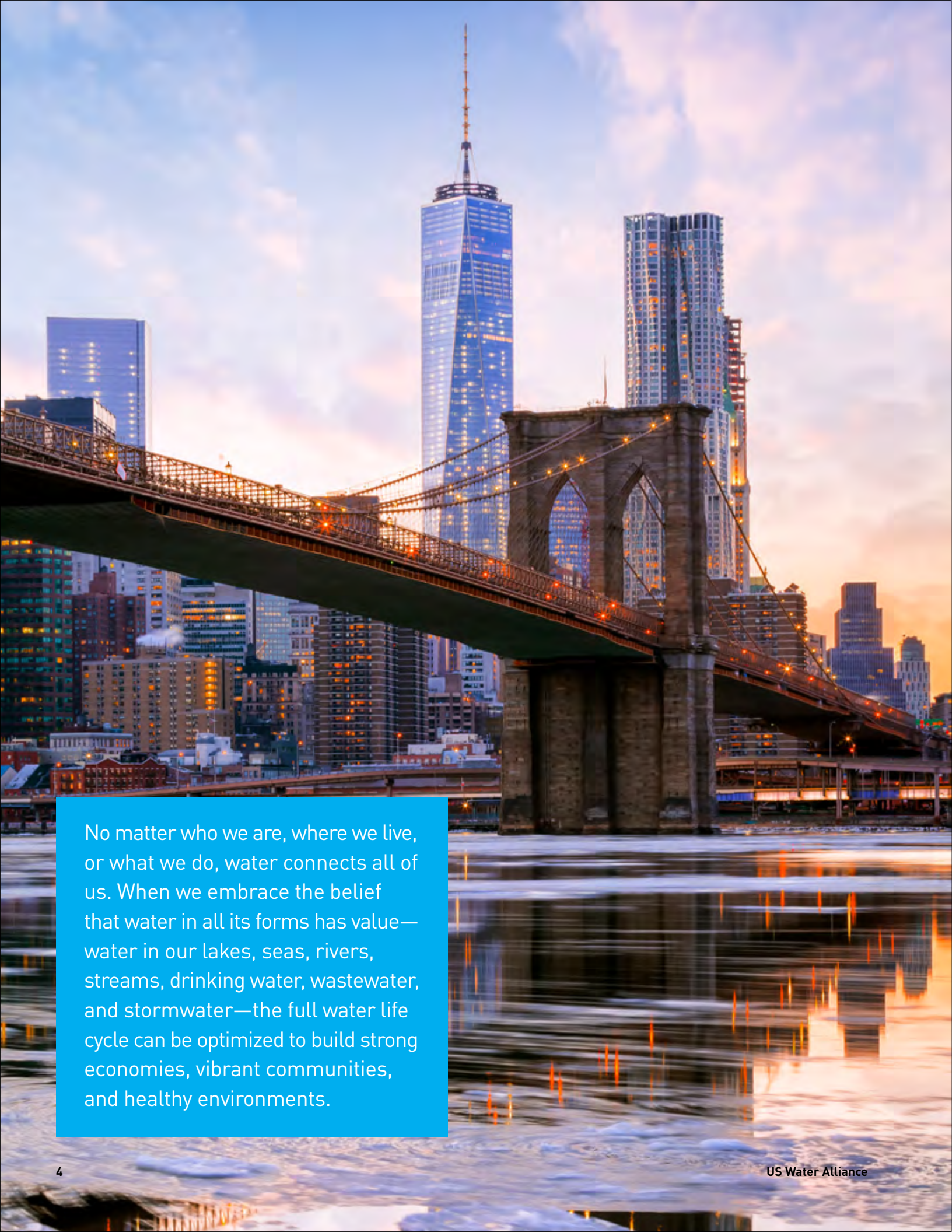
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No matter who we are, where we live, or what we do, water connects all of us. When we embrace the belief that water in all its forms has value—water in our lakes, seas, rivers, streams, drinking water, wastewater, and stormwater—the full water life cycle can be optimized to build strong economies, vibrant communities, and healthy environments.

Introduction

Water is our world's most precious resource and essential to everything we do.

It nourishes us. It cleans and sustains us. Put simply, we ARE water. On average, every American uses 176 gallons of water per day—that is over 64,000 gallons a year.¹ Food production alone is responsible for 80 percent of all water consumed in the United States.²

No matter who we are, where we live, or what we do, water connects all of us. When we embrace the belief that water in all its forms has value—water in our lakes, seas, rivers and streams, drinking water, wastewater, and stormwater—the full water life cycle can be optimized to build strong economies, vibrant communities, and healthy environments.

Our country should rightfully be proud of our investment in the systems and infrastructure that provide so many residents and businesses with reliable water and wastewater service, while protecting public health and the environment. However, many of the traditional assumptions and approaches used over the past 200 years to design, build, and operate our existing systems are insufficient to meet the 21st century challenges we face.

For example, regulatory, financial, and governance structures have put water into separately-managed silos for drinking water, wastewater, and stormwater. The stovepipes have been reinforced at every level of government—from the Clean Water Act and Safe Drinking Water Act at the federal level, to how water rights and regulation are managed at the state level, to the fragmented nature of how local utilities and city agencies are organized. In addition, water resources are influenced by agricultural, industry, and ecosystem management—often in ways that are separate from the decisions made by water utilities and community actors within the same watersheds.

Solving today's water problems requires breaking down barriers not only within the water industry, but also among all the other stakeholders who influence, and are influenced by, the management of water resources. This includes community and business leaders, industries, farmers, environmental advocates, conservationists, policymakers, academics, and many others. They all play important roles in the quest to secure a sustainable water future for all.

The idea of an integrated systems approach to water is not new. Its full-scale implementation, however, has yet to be realized. There are many signs that water management in the US is entering another great era of change and innovation. All around the country we are seeing silo-busting examples of integrated and inclusive approaches to water resource management. These approaches exemplify the view that *all* water has value and should be managed in a sustainable, inclusive, integrated way. **We call this perspective One Water. And while our focus is water, our goals are thriving local economies, community vitality, and healthy ecosystems.**

This report offers a framework for bold leadership towards One Water management in the United States. The report is organized in the following manner:

- **The Current Landscape** provides an overview of the varied water-related challenges that face our nation;
- **The One Water Approach** describes the vision and core principles that guide the One Water approach; and
- **Arenas for Action** reviews six key arenas where progress is already being made and greater success can be realized.



All around the country we are seeing silo-busting examples of integrated and inclusive approaches to water resource management. These approaches exemplify the view that *all* water has value and should be managed in a sustainable, inclusive, integrated way. **We call this perspective One Water.**

The Current Landscape

Water is the defining issue of our time. According to the World Economic Forum annual survey, representing 750 of the world's top business and political leaders, water crises were identified as one of the top global risks to industry and society over the next decade.³ While many regions across the country face water-related challenges, they are nuanced and different depending on local circumstances. Some of the varied challenges we face with respect to water are summarized below.

Water Quantity—Too Much, Too Little

While water scarcity and flooding seem at opposite ends of the spectrum, they are the result of the same dynamics occurring globally and can have equally devastating impacts. Communities are confronting increased frequency and intensity of floods due to rising sea levels, extreme weather, and inadequate infrastructure. While today's discussions about water shortages tend to focus on drought in the Western states, episodic water shortages have hit many communities throughout the US in the past decades—even traditionally water-rich areas like New York City, Atlanta, and Philadelphia. In addition, many of our aquifers—the underground rock layers that serve as huge storehouses for the groundwater that supplies drinking water to half the US population—are being depleted much faster than rain and snow can refill them.⁴

Water Quality

Although the health of our nation's waters has improved significantly over the past 40 years, threats to water quality remain. The US Environmental Protection Agency and state governments have identified nearly 39,000 bodies of water nationwide that do not meet federal or state standards for water quality because of pollution.⁵ In the Mississippi River Basin, for example, nutrients from 31 states are turning thousands of square miles of the Gulf of Mexico into a "dead zone," where nutrient-fed algae blooms consume so much oxygen that fish and other sea life cannot survive. It is the largest of 166 dead

zones documented in the United States, and the second largest in the world.⁶ Urbanization has increased the area of impervious surfaces, leading to increased urban pollutants such as sediments, heavy metals, and others to be washed into waterways like the Chesapeake Bay and Puget Sound. In addition, contaminants such as pharmaceuticals and microbeads are entering our waters and potentially harming aquatic species and drinking water supplies for many communities.

Ecosystem Degradation

Watersheds—land areas containing a common set of streams and rivers that all drain into a single larger body of water—represent our fundamental natural water system. They collect our rainwater, preserve it, and transport it. Communities rely on healthy watersheds and ecosystems to provide enough clean water supplies, assimilate waste, and much more. More than just for our own consumptive needs, healthy watersheds are critical for the natural world, sustaining the health of wildlife populations, aquatic species, forests, and other thriving ecosystems. Over the ages, nature has shaped our watersheds and positioned them in balance with their surroundings, but industrial development has taken its toll. The global ecosystem has been valued as high as \$145 trillion per year in 2007 dollars, and it is vanishing at a rate of \$4 trillion to \$20 trillion per year.⁷ In addition, as cities develop and generate more stormwater and wastewater and as storm activity grows more intense, existing infrastructure often no longer has the capacity to accommodate the increased volumes of water flowing into it. This leads to flooding, erosion, combined sewer overflows, and habitat destruction as runoff rushes untreated into local rivers and streams.

Aging and Inadequate Infrastructure

While nature provides water, it takes pipes, pumps, reservoirs, treatment plants, and people working 24/7 to deliver clean water to homes and businesses, and to remove and treat wastewater so it can safely be reused or returned to the environment. Much of that infrastructure was built more than 100 years ago, often for communities with drastically different population and economies than exist today. Some communities are growing, and water systems are straining to keep up in the face of a growing population and economic base. Meanwhile other communities, particularly in America's Rust Belt, have systems built for larger populations and now face the challenges of systems with excess capacity and a declining fiscal base. Additionally, different climate conditions and weather patterns stress and strain systems. We average about 250,000 water main breaks per year in the US—that's nearly one every two minutes. The American Society of Civil Engineers gave our drinking and wastewater systems a D grade.⁸ Neglected and outdated infrastructure causes a number of water quality problems, from lead in drinking water to contaminated lakes and oceans that suffer from raw sewage overflows. According to the US Environmental Protection Agency, our nation needs \$300 billion in wastewater infrastructure investments⁹ and \$335 billion in drinking water infrastructure investments over the next 20 years.¹⁰ Failing pipes also undermine streets, causing ancillary damage, safety hazards, and negative impacts on economic activity.

Pricing and Affordability

Water is arguably the world's most undervalued resource, as traditional approaches to pricing have not reflected the true cost of service. This is a particularly acute problem as there has been a steady decline in federal funding for water infrastructure. As a result, about 98 percent of water projects are financed by local water utilities.¹¹ A recent survey found that *only one-third of water utilities* are operating under rate structures that provide adequate revenue to fully cover their costs. As infrastructure continues to age, utilities need to raise rates to pay for upgrades. Keeping rates affordable for economically disadvantaged people is a growing problem in both urban and rural communities. A multi-faceted approach is needed—one where water is priced to meet the growing

needs for investment in the system, while ensuring that lower-income households have reliable and affordable water service.


A Changing Climate

Changing climate patterns are putting additional stress on our water resources and water infrastructure. In 2016, the World Bank released a report that illustrated how the impacts of climate change will primarily be felt through the changing water cycle, with large and uneven consequences to our food, energy, urban, and environmental systems.¹² Some communities are suffering from drought as water supplies shrink, temperatures rise, and weather patterns shift, while other communities are experiencing increased flooding and severe storms. Aquatic ecosystems will be stressed by lower flows, higher temperatures, and more concentrated pollutant levels. Both inland and coastal communities are at risk for increasing flooding and severe weather changes, and demographic shifts, such as population centers increasing in dry states that do not have sustainable water supplies. Across the country, communities of all sizes need tools and strategies to become resilient to the effects of climate change. Smart land use planning, flood protection, coastal protection, and strengthening our water infrastructure are all important.

Clearly, the water challenges facing America are great. However, all across the country, innovative leaders are turning these challenges into opportunities to advance more sustainable and inclusive approaches to managing water resources.



From nature to tap, from farms to food, from toilet back to river, there is just one water cycle.



While nature provides water, it takes pipes, pumps, reservoirs, treatment plants, and people working 24/7 to deliver clean water to homes and businesses, and to remove and treat wastewater so it can safely be reused or returned to the environment.

The One Water Approach

The One Water approach envisions managing all water in an integrated, inclusive, and sustainable manner to secure a bright, prosperous future for our children, our communities, and our country.

One Water approaches are progressing in multiple arenas: from using advanced technologies to recover nutrients and energy from wastewater; to using green stormwater techniques to mitigate flooding while beautifying neighborhoods; to undertaking watershed-level planning and collaboration to address water quality issues; to implementing innovative financing and partnership models. A One Water approach can take many different forms, but has some unifying characteristics.

The hallmarks of One Water are:

A mindset that all water has value. One Water starts with the recognition that all water has an intrinsic value—the water in our reservoirs, rivers, lakes, seas, streams, and aquifers; the water we drink; the water used for food or energy production or for industrial needs; the water we waste or turn into waste flow; and the water that runs off from our lands and farms. All water can and must be managed carefully to maximize its benefit.

A focus on achieving multiple benefits. One Water leaders design and implement projects and programs with a focus on achieving multiple benefits—economic, environmental, and social. The One Water approach recognizes that the resources we have do not match the level of investment needed to achieve a sustainable water future. One Water leaders therefore design and implement projects that seek an optimal balance among programmatic costs, benefits, and priorities—looking across economic, social, and ecosystem needs.

A systems approach. One Water embraces water's complexity and interdependence, the multiple actors that affect water resources, and the ecosystem's reliance on those resources. One Water recognizes that if we tackle problems based on the complete life cycle of water and larger infrastructure systems—rather than limiting ourselves to one piece of the equation—we can identify and advance more effective and lasting solutions.

Watershed-scale thinking and action. The One Water approach recognizes that water must be managed in ways that respect and respond to the natural flows of watersheds and the natural ecosystem, geology, and hydrology of an area. It is within the context of a watershed that communities either have too much water, too little water, or poor quality water. It is within the watershed context that communities must reconcile their water demands with the imperative to sustain the resource for future generations. Watershed-level management brings together regional partners from within and beyond the water sector in joint planning and collaborative action to protect the shared natural resource that is essential for health, agriculture, industry, aquatic species, forests, wildlife, recreation, and life itself.

Right-sized solutions. One Water solutions require a focus on the appropriate scale of intervention to achieve the desired outcome. For example, focusing green infrastructure projects in a few square blocks of an urban neighborhood may be the best investment for addressing flooding that affects that community. Or watershed-scale planning and action might be necessary to harness the natural geology and hydrology of an area to achieve water quality goals.


Partnerships for progress. One Water recognizes that all sectors are part of the solution to a water-secure future. No one stakeholder group—whether it's water utilities, agriculture, businesses, community organizations, environmental advocates, or policymakers—has the control, responsibility, expertise, political support, or legal authority to manage the sources of pollution, the impacts of climate activity, or even the consumption rates of water. Partnerships and collaboration are the cornerstone to progress.

Inclusion and engagement of all. One Water recognizes that when all people have a stake in ensuring a water-secure future, we achieve the best results. Low-income people and communities of color are often disproportionately impacted by environmental justice and equity issues, and that includes clean, safe, reliable water. One Water leaders are committed to robust community engagement in planning, decision making, and water stewardship. One Water strives to achieve equitable outcomes and leverages investments in water systems and water resources to build stronger communities, a clean environment, and thriving local economies for all.

One Water is a transformative approach to how we view, value, and manage water. In the following section, we describe how the guiding principles of One Water are being utilized to forge progress in communities across the country.

A photograph of three surfers in black wetsuits walking away from the camera on a sandy beach. They are carrying surfboards under their arms. The scene is backlit by a bright sun, creating long shadows and a shimmering reflection on the wet sand. The sky is clear and blue.

One Water leaders design and implement projects and programs with a focus on achieving multiple benefits—economic, environmental, and social.

An aerial photograph of a river winding through a rural landscape. The river is the central focus, flowing from the top left towards the bottom right. It is bordered by a thick, vibrant green line of trees. On either side of the river, there are large, flat fields. The fields on the left and right are a rich brown color, indicating they have been plowed. The fields at the top of the image are a bright, lush green. The overall scene is a mix of natural and agricultural elements.

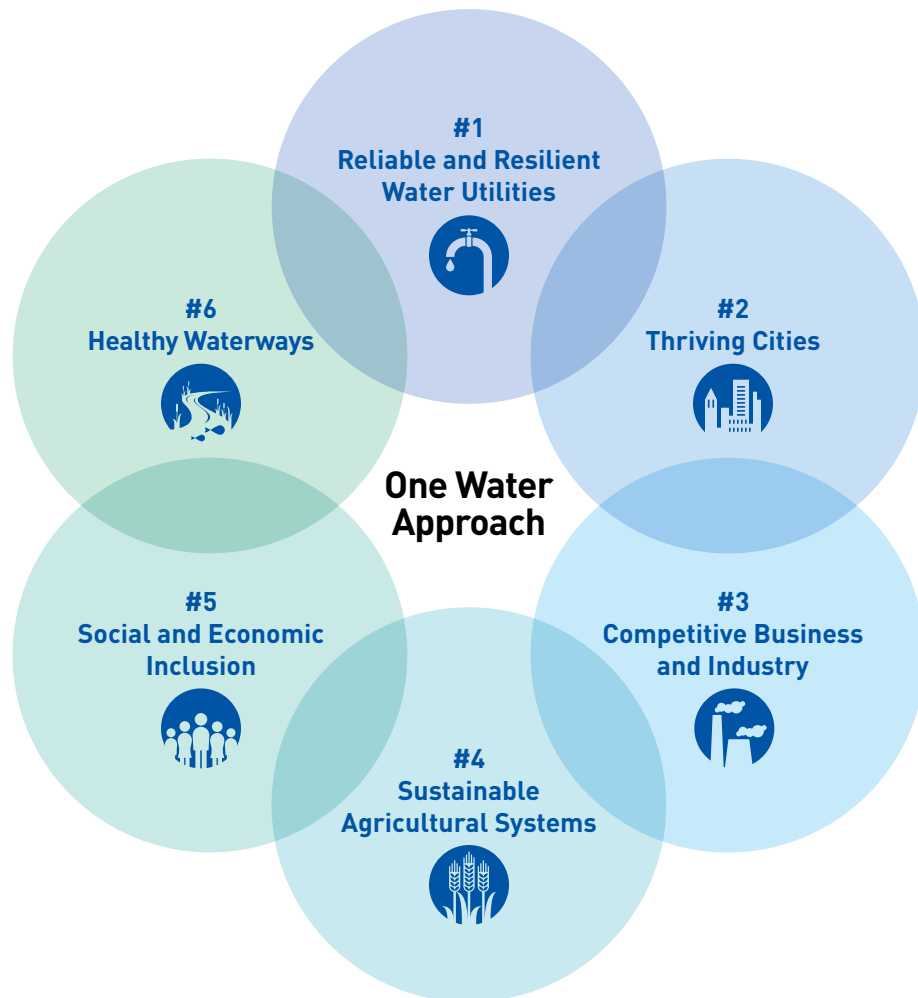
The One Water approach recognizes that water must be managed in ways that respect and respond to the natural flows of watersheds and the natural ecosystem, geology, and hydrology of an area.

Arenas for Action

This section of the report is organized into six arenas for action, offering concrete strategies that advance the One Water approach. The arenas for action cover a range of issue areas, including: reliable and resilient water utilities; thriving cities; sustainable agriculture; competitive business and industry; social and economic inclusion; and healthy waterways.

Taken together, these arenas for action can lead to tangible progress in how we manage water resources in America. Each arena begins with an overview of the issue, lays out strategies that are being deployed, and spotlights promising practices.

It is important to note that while the report segments the major strategies into these six arenas, there is a natural interdependence. True to the One Water approach, water involves complex and interwoven solutions with many partners across jurisdictions. The six arenas are an imperfect but earnest attempt to structure the strategies in a logical fashion to support reflection and replication.



Arenas and Strategies for Action

Arenas for Action	Strategies	Case Studies
#1 Reliable and Resilient Water Utilities	Diversifying and stretching water supplies	Santa Clara Valley Water District Deploys Water Reuse on a Massive Scale
	Utilizing green infrastructure to manage flooding and revitalize neighborhoods	Philadelphia's Green City, Clean Waters: A Model for Green Infrastructure
	Transforming wastewater into a resource	DC Water Leads Our Nation's Capital to a More Resilient Future
	Forging new business models	Louisville: Sharing Services, Finding Efficiencies
#2 Thriving Cities	Integrated planning across the water cycle	One Water Los Angeles Exemplifies an Integrated Approach to Planning
	Utilizing onsite water systems	Emory WaterHub® Shows Students that Recycling is Not Just for Trash
	Adopting a "dig once" approach	Spokane Looks Above and Below Ground to Leverage Infrastructure Investments
	Deploying advanced technologies to improve decision-making	Harnessing the Power of Data to Tackle Water Main Breaks in Syracuse
	Managing water to foster climate resilience	Rebuilding for Resilience in New Orleans
#3 Competitive Business and Industry	Fully integrating water stewardship into company strategy	Coca-Cola Launches 500 Projects to Manage Water Sustainably
	Deploying water efficiency, stormwater management, and water reuse at industrial facilities	Dow Tackles Water Efficiency at its Largest Chemical Manufacturing Complex
	Developing upstream and downstream partnerships in priority watersheds	Change the Course Replenishes more than 225 Million Gallons of Water
#4 Sustainable Agricultural Systems	Using on-farm strategies to reduce water consumption and manage nutrients	Salinas Valley: Recycled Water Saves the Agricultural Sector
	Creating partnerships among upstream and downstream communities	Cedar Rapids: Multi-Pronged Coalition for Change
	Using watershed-scale planning and monitoring	Madison, Wisconsin uses Adaptive Management to Target Phosphorous Runoff
#5 Social and Economic Inclusion	Building a water safety net	Detroit Water and Sewerage Department Offers Low-Income Customers Rate Assistance
	Leveraging water investments to generate community benefits	A Good Neighbor: The San Francisco Public Utilities Commission's Community Benefits Program
	Fostering community resilience in the face of a changing climate	Ironbound: Empowering Newark Residents to Revitalize Their River
	Enhancing community capacity to engage in water planning and governance	Community Water Center Helps San Joaquin Valley Residents Build Their Water Knowledge
#6 Healthy Waterways	Maximizing natural infrastructure for healthy ecosystems	Working Together to Deploy Natural Infrastructure in Saginaw Bay Watershed
	Managing groundwater for the future	Tucson Replenishes Aquifer by Diversifying Supply
	Protecting forests to protect water	Chesapeake Bay Uses Forest Buffers to Boost Water Quality
	Utilizing citizen science for ecosystem monitoring and watershed restoration	Chattahoochee Riverkeepers Empower Citizens on Local Water Quality Monitoring

Arena for Action #1: Reliable and Resilient Water Utilities



Water systems in the US were designed, built, and incorporated based on models appropriate to their time of founding. Treatment and distribution networks, for example, followed the growth of the communities they served. Drinking water systems were largely placed in service at the turn of the 20th century, using chlorine and filtration to manage epidemic levels of yellow fever and typhoid. Wastewater systems largely came later, after rivers, lakes, and seas became intolerably polluted due to human and industrial waste. Much of the nation's stormwater management infrastructure initially was designed and built by developers, with the intention of discharging runoff as quickly as possible from development projects. Stormwater utilities have been established more recently, as communities grappled with the need to mitigate flooding and manage the demands that runoff places on sewer and drainage systems.

While the approach to building our nation's water systems was a natural outgrowth of overall development patterns in the United States, it leaves us with challenges that present-day utility managers must contend with. For example, utilities responsible for providing healthy, abundant drinking water often have little ability to manage activities that impact the quality of their source waters. Stormwater utilities have no control over the amount of runoff received from public or private lands. A central issue for modern water utility management is how to break down the silos among water, wastewater, and stormwater. Utilities who are committed to a sustainable water future are driving a transformation of the industry by looking beyond their traditional domains.

Water utilities increasingly recognize that the One Water approach can be instrumental in creating efficiencies in service delivery, achieving water quality and environmental improvements, and diversifying and stretching a community's water supplies. These approaches push far beyond the historic mandate for utilities to comply with the Clean Water Act and the Safe Drinking Water Act.

Innovative water utilities are also transforming themselves as responsible managers of valuable resources, partners in local economic development, and proactive members of the watershed community who are working to deliver maximum environmental benefits at an affordable cost. Utilities of all types are focused on resource recovery and following natural processes wherever possible; for the utility manager of today, there is no such thing as "waste."

As described earlier, there are huge capital investment needs facing utilities. As opportunities to upgrade or repair systems arise, utilities are not only examining existing needs but making changes to modernize and make systems more resilient. This includes increasing energy efficiency, reducing vulnerabilities, and improving overall management of systems using technology and best management practices. It also means examining projects to make sure they are "right-sized" and sited optimally using the best available science and data.

Some of the key One Water strategies being deployed include:

Diversifying and stretching water supplies

In response to local shifts in the availability and demand for water, utilities are deploying new strategies to diversify their water portfolios. Traditional approaches such as dam construction, increasing reservoir storage capacity, or extending water systems to new sources of fresh water are often no longer an option. Conservation has been an important and successful tool used to decrease demand, but in many communities, conservation alone will not meet the growing demand for water. Water utilities are proactively pursuing new strategies that combine water conservation and efficiency, major water reuse projects, rainwater harvesting, and other approaches. A key component of water supply diversification is a growing sophistication in matching the quality of the water product to its actual end use. Water suppliers have made tremendous progress in diversifying their sources of water available locally so that they can remain efficient, resilient, and sustainable through the next century and beyond.

Transforming wastewater into a resource

Wastewater is not waste; rather, it's a precious resource. Water utilities throughout the country are recovering nutrients, reclaiming water, and producing energy from waste streams—all of which help reduce carbon and nitrogen emissions to the atmosphere and generate power and heat. Water utilities are using biogas cogeneration, wind turbines, heat exchangers, and solar systems to recover and produce net energy positive facilities. They have embraced the idea that wastewater treatment plants can be transformed into resource recovery facilities, as some produce more energy than required for their operations and sell the excess energy back to the grid. Similarly, biosolids management has evolved from a “disposal” problem to a “reuse” opportunity.

Utilizing green infrastructure to manage flooding and revitalize neighborhoods

Pipes, pumps, and treatment facilities are the backbone of our water and wastewater systems. Increasingly, utilities are integrating green infrastructure with traditional grey infrastructure to help manage, infiltrate, store, and treat stormwater. Rain gardens, bioswales, tree plantings, green roofs, community gardens, green open space, parks, and porous surfaces are just a few of the techniques that fall under the green infrastructure umbrella. A successful green infrastructure program can address subsidence, combined sewer overflows, and surface water management, while also enhancing parks, streetscapes, and neighborhoods. At their best, green infrastructure projects achieve multiple benefits at the neighborhood and city scale. In addition to compliance programs to address water quality issues, these projects can help support a city's goal of driving revitalization and beautifying neglected spaces. While the concept is not new, strategies have matured and are achieving a different scale. New financing, policies, and programmatic approaches can accelerate the adoption of this effective One Water strategy.

Forging new business models

Water utilities are responsible for providing an essential, uninterrupted service in the face of a number of stark challenges, including limited funding to address a mounting backlog of maintenance and modernization projects. In addition, the fragmented governance of drinking water, wastewater, and stormwater limits opportunities to leverage funding and advance integrated solutions. Utilities recognize that the current model is not sustainable to provide essential services; they are finding new ways to cooperate, share services, and identify new revenue streams. Additionally, a range of public and private stakeholders are developing a new generation of funding and financing tools for water infrastructure to complement current investment options. Innovative approaches include public-private partnerships with appropriate risk sharing; public-public partnerships that offer greater collaboration and economies of scale; green infrastructure bonds; state infrastructure exchanges; and tax breaks to incentivize pension investments in water infrastructure—just to name a few.

A number of leading national water organizations are assisting utilities in advancing the One Water approach:

- The **National Association of Clean Water Agencies**, the **Water Environment Federation**, and the **Water Environment & Reuse Foundation** are capturing the groundbreaking transformation happening at wastewater utilities through their *Utility of the Future* Initiative. Initially published in 2013, the initiative includes an annual report and a special recognition program for utilities pushing the envelope with One Water innovations.
- The **Water Research Foundation** and the **Water Environment & Reuse Foundation** have partnered in the development and dissemination of a report entitled *Institutional Issues for Integrated “One Water” Management* in 2015.

One Water in Action

Diversifying and stretching water supplies

Santa Clara Valley Water District Deploys Water Reuse on a Massive Scale

In Silicon Valley, most of the farms have long since been replaced by companies like HP, Apple, and Google; the growing region requires careful water management and stewardship from the Santa Clara Valley Water District. In July 2014, it opened the \$72 million Silicon Valley Advanced Water Purification Center to help diversify and stretch water supplies for an area grappling with drought, changing weather patterns, and water service issues amidst a thriving economy and growing population.

As the primary new water resource for Silicon Valley, the purification center—the largest of its kind in Northern California—produces 8 million gallons a day of high-quality purified water from recycled wastewater that is primarily used for landscaping and industrial cooling.

The facility takes water that has already gone through two levels of wastewater treatment and puts it through three additional high-tech cleansing processes—micro-filtration, reverse osmosis, and ultraviolet light disinfection. Instead of being released into the bay, this high-quality purified water is distributed through the regional recycled water system, which serves approximately 835 industrial and municipal customers who are heavily reliant on water to do business. Compared with standard recycled water,



The Santa Clara Valley Water District's Silicon Valley Advanced Water Purification Center in San Jose, CA. *Courtesy of Santa Clara Valley Water District.*

the enhanced variety has lower levels of total dissolved solids, so it reduces chemical and maintenance costs for users. The water also has less salt, so it's easier on plants.

The goal is to vastly expand its potential use. Before the plant came online, recycled water made up about 5 percent of the county's total water demands. The plant will double that figure. Ultimate goal by 2025: up to 45,000 acre-feet per year of purified recycled water used to replenish groundwater supplies and potentially piped to customers for drinking water—a true One Water approach.

Utilizing green infrastructure to manage flooding and revitalize neighborhoods

Philadelphia's Green City, Clean Waters: A Model for Green Infrastructure

Like many older cities, Philadelphia had an outdated stormwater infrastructure that, when large storms hit, led to combined sewer overflows in the city's rivers and streams. As a result, water quality testing revealed high levels of fecal coliform, elevated water temperatures, and high amounts of litter in the water.

Green City, Clean Waters is Philadelphia's 25-year plan to improve the health of the city's creeks and rivers, primarily through a land-based approach. The program will transform the city's impervious surfaces into spaces that aid in the natural capture and filtration of stormwater.

To capture rainwater before it gets to the pipes in the first place, the Office of Watersheds is creating stormwater roadside trenches, green roads, rain barrels, pervious pavement, and rain gardens throughout the city. Rainwater will recharge long-neglected groundwater aquifers, rather than piping it into already-stressed tributaries. By implementing these projects, the city can reduce water pollution, improve environmental health, and beautify neighborhoods.

Five years into the project, Philadelphia is already seeing some impressive results. The utility, in partnership with private developers, has added over 1,100 green stormwater infrastructure projects since 2011 and kept 1.5 billion gallons of polluted water out of the cities' rivers and streams in 2016 alone. The ultimate goal is to reduce stormwater pollution entering local waterways by 85 percent and save the city an estimated \$5.6 billion.

DC Water Leads our Nation's Capital to a More Resilient Future

Increasing energy efficiency is an important part of increasing resiliency and reducing costs for DC Water. Their Blue Plains Plant is the largest single user of electricity in the District, using 25–30 Megawatts of power. That is enough energy to power 25,000–30,000 homes, but DC Water needs it to pump, filter, aerate, and disinfect the 370 million gallons of effluent flowing through Blue Plains each day.

DC Water's Resource Recovery Program is the largest in the world, and has captured attention around the globe by producing a net 10 megawatts of electricity from the wastewater treatment process. This clean and renewable energy offsets the energy needs of their Blue Plains Plant by approximately one-third. Wastewater treatment plants are some of the largest energy consumers. By investing in wastewater treatment innovations, utilities like DC Water can cut emissions, reduce reliance on fossil fuels, and recover resources.

The project broke ground in 2011 and is the product of extensive research and piloting by DC Water's award-winning wastewater and resource recovery team. The facilities include a dewatering building, 32 thermal hydrolysis vessels, four 80-foot tall concrete digesters, and three turbines the size of jet engines.

DC Water has some lofty long-term goals as well. Their *Blueprint for the Future* sets ambitious targets for the utility that align with the city's vision as part of Sustainable DC. As a guidance document designed to leverage existing initiatives in the District, targets for 2050 include reducing greenhouse gas emissions by 80 percent from a 2008 baseline and reducing reliance on fossil fuels by 50 percent by 2032.



The Blue Plains Plant is the largest user of electricity in the District, but is reducing its energy footprint. *Courtesy of DC Water.*

Forging new business models

Louisville: Sharing Services, Finding Efficiencies

Like many cities, Louisville has aging drinking water, wastewater, stormwater, and flood protection infrastructure, and a very limited budget to address maintenance backlogs and service issues. In 2005, Louisville MSD, the wastewater, stormwater, and flood protection agency, entered into a Federal Consent Decree to minimize combined sewer overflows and eliminate sanitary sewer overflows, requiring additional investments.

Louisville's wastewater, stormwater, and drinking water services operate independently of one another and have significantly different governance structures, yet face similar challenges. In 2012, after the creation of an Advisory Group by the Mayor, it was recommended that both entities, Louisville Water Company and Louisville MSD, enter into a Comprehensive Interlocal Agreement in an effort to become more efficient with taxpayer dollars and provide better services.

Using a phased approach, the two utilities joined their information technology and fleet services groups in order to establish a more robust management system. Although the transition is still in the early stages, this new business model shows promise as a way to reduce costs and increase efficiency.

Arena for Action #2: Thriving Cities



According to the 2010 Census, 80 percent of the US population lives in a city. That number is expected to grow—thereby increasing the stressors on dwindling water supplies. Without adequate water resources and water infrastructure, urban development and economic growth is stymied. As our population becomes more urbanized, the social, economic, and environmental vitality of our growing cities are largely dependent on the sustainable management of water.

Water is rapidly growing in strategic importance for cities and their elected leaders, and sustainability has become a key unifying theme for innovative local governments around the world. It has redefined the use of metrics in government, requires planning for resilience in assets and operations, and calls for the alignment of local government policies and practices. US cities are an ideal laboratory for One Water implementation.

Integrated and inclusive management of water resources can create more vibrant neighborhoods, increase jobs, reduce crime, increase property values, support green space, create green industry hubs, increase resistance to floods and sewage overflows, and reduce the impacts to local business and industry resulting from unexpected shutdowns due to water emergencies.

Strategies being deployed in this arena include:

Integrated planning across the water cycle

One promising strategy to overcome the fragmented nature of water governance is coordinated water resource planning among utilities and other stakeholders in a region or watershed. The movement towards “One Water planning” recognizes that no community can go it alone, and that what happens in one part of a watershed impacts another. For example, the decisions made by a community sitting at the headwaters impacts water quality downstream. Utilities, metropolitan planning organizations, and other regional organizations are assuming lead roles

in bringing together various stakeholders to plan for and balance multiple water needs within a community.

Utilizing onsite water systems

Many communities are increasingly confronted with dwindling freshwater supplies and extended periods of drought. As a result, cities are coming up with new ways to develop, conserve, and reuse water. Some communities are opting for more localized, linked networks that manage water resources as an integrated component of larger, more centralized systems. At the smallest scale, localized onsite systems can treat and reuse water within individual buildings. Buildings in cities such as New York, San Francisco, Seattle, and others have begun to collect, treat, and reuse water for irrigation, toilet flushing, and cooling. The next step to larger-scale deployment is to review and update policies, codes, and regulations to support and incentivize the use of these decentralized water systems.

Adopting a “dig once” approach

Infrastructure often involves many overlapping and interdependent layers—water pipes, electrical and gas lines, and roads all share a confined space, but each one typically is governed by a different department within a city. The coordination of street repair with water, energy, and telecom construction sounds like a sensible concept, but it is much more difficult to put in practice with the myriad of agencies and stakeholders involved. However, an increasing number of cities are maximizing public dollars through integrated capital planning and operations.

When an agency opens a road to address one utility service, it often makes sense to address other needs at the same time, which can simplify permitting, construction activities, and close-out. Project coordination across entities and agencies can prevent digging up the same road twice, save money, and decrease construction disruptions for residents and businesses. Some cities are using high-tech databases to geocode their work, in addition to lower-tech strategies like coordinating councils to schedule work and find opportunities to combine projects.

Deploying advanced technologies to improve decision-making

Advances in water and wastewater technology are changing the way we treat and manage our water resources. For instance, smart meters are being installed in neighborhoods across the country to improve efficiency and reduce water loss. Advanced sensors are being deployed to detect vulnerable or leaking pipes before a pipe breaks, proactively preventing water loss and improving asset management. Low-risk, high-yield innovations like this are game changers for the water industry.

Urban centers face both the challenge of combating aging systems with limited funding and the tremendous opportunity to leverage new technologies that are enabling “smart cities” and connecting infrastructure systems. Cities around the world will invest \$108 billion in smart city infrastructure over the next 10 years, according to Navigant Research.¹³

As population booms in cities put an added burden on urban infrastructure already beyond capacity, pioneering cities are looking to integrate their systems with technology and apply advanced monitoring and analytics to continuously measure and improve performance. In particular, smart water systems can gather meaningful and actionable data about the flow, pressure, and distribution of a city’s water and wastewater, and can forecast water use.

Managing water to foster climate resilience

Water is a key concern when considering climate impacts, and by design, water and wastewater utilities are often located near rivers and in flood-prone areas. Critical infrastructure such as hospitals and schools cannot afford water service interruptions. So, cities are taking proactive and holistic measures to become resilient to the effects of climate change, including smart land use planning, flood protection, and utility strengthening. Some cities have built resilience into their day-to-day operations throughout departments and established a baseline to measure future improvements—defining what type and amount of infrastructure will provide basic protection to respond to future demands. They recognize that as water, wastewater, and stormwater infrastructure ages and needs to be replaced, it should be modernized and rebuilt with an eye to the future.

One Water in Action

Regional planning across the water cycle

One Water LA Exemplifies an Integrated Approach to Planning

The City of Los Angeles is facing a perpetual drought, and reuse is a key part of their strategy to remain sustainable. Mayor Garcetti has issued a directive to reduce imported water by 50 percent by 2024, and launched the development of the One Water LA Plan, an integrated approach for water supply, wastewater treatment, and stormwater management that embraces a more sustainable and resilient way to manage the City’s future water needs. The plan is managed by LA Sanitation in partnership with the Department of Water and Power and provides a framework for City departments, regional entities, and stakeholders to work together on the big water picture—water supply, water uses, environmental needs, and long-term challenges and solutions. One of their key strategies is to improve local water supply reliability by increasing stormwater capture, conserving potable water, and expanding water reuse. And they know that the only way they will succeed is by working together outside jurisdictional boundaries.

Los Angeles has already seen some measurable progress from collaboration, including code changes to allow recycled water in concrete, identification of climate-resilient trees for city landscaping projects, and a partnership with UCLA on regional water planning.

Utilizing onsite water systems

Emory WaterHub® Shows Students that Recycling is Not Just for Trash

Recycling up to 400,000 gallons of water per day, the WaterHub project at Emory University is a campus-scale water reclamation and reuse system that stands as a model for sustainable water management. Serving Emory University’s main campus in Atlanta, Georgia, the WaterHub uses eco-engineered treatment processes to recycle up to two-thirds of campus wastewater production—reducing the use of potable water by up to 40 percent.



The WaterHub reclaims and recycles 400,000 gallons of water per day on Emory's main campus. *Courtesy of Emory University.*

It is designed to mimic natural methods of water treatment, such as those found in wetlands. Its natural, odor-free design helps the WaterHub blend seamlessly into the existing campus. Nestled between campus housing and the baseball field, two sites previously considered undevelopable, the primary treatment facility resembles a glass greenhouse. On an adjacent parcel, additional treatment capacity is provided in a series of inconspicuous outdoor planting beds which are filled with a host of native plant species. Nearby pedestrians do not realize this is a wastewater treatment plant, but beneath the surface is a highly engineered system.

In addition to its functional use as a water reclamation facility, the WaterHub is designed as a living, learning laboratory to enhance the University's academic environment. With built-in lab space and easy access ports for water quality testing, the facility enables research in a number of disciplines and is used as an immersion learning tool to enhance curriculum.

Through an innovative new program launched in February 2016, the WaterHub at Emory University is proving its success beyond wastewater reclamation as a "hub" for community outreach. The Student Docent Program utilizes the WaterHub as a platform to engage communities across the country in water awareness. Over 1000 tours have been performed at the facility with many individuals from Fortune 500 companies, other universities, and local and national government agencies.

Since its commissioning in May 2015, the WaterHub at Emory has displaced over 90 million gallons of potable water with recycled wastewater and has offered numerous economic, environmental, and social benefits to the University and broader community. The WaterHub is expected to save tens of millions of dollars over the next 20 years. And in a time when budgets are on the decline for capital projects across the country and returns on investment are of paramount importance, this ambitious undertaking was constructed at no capital expense to the University under an innovative Water Purchase Agreement. Water savings produced by the project are used to pay off the cost of the facility over the course of a 20-year contract.

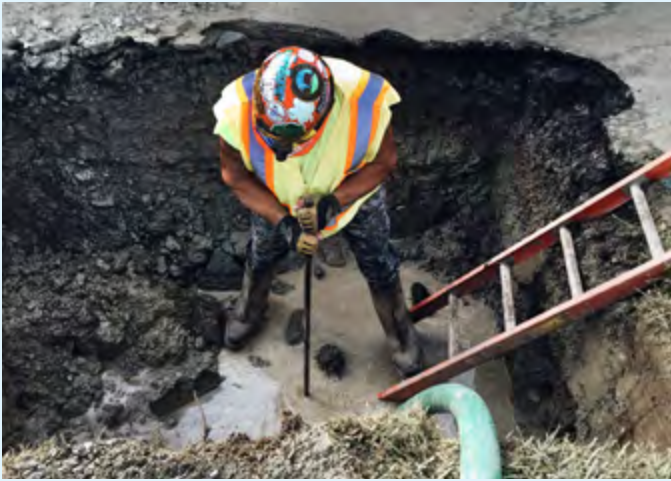
Adopting a "dig once" approach

Spokane Looks Above and Below Ground to Leverage Infrastructure Investments

Facing significant costs, an aggressive timeline, and a changing regulatory environment, the City of Spokane decided to take a new look at its plans to improve water quality in the Spokane River and meet Clean Water Act mandates, adopting an integrated approach to its planning. As part of these investments, they wanted to take into account additional infrastructure work and improvements for neighborhoods, integrating street rehabilitation, water main replacement, park improvements, sidewalks, sewer pipe upgrades, and pedestrian/bike lanes or trails.

For Spokane, the criteria are simple but crucial—they want projects that have multiple benefits for their citizens, who ultimately are paying the bill.

Rather than just considering the surface transportation uses for streets, the City is taking a three-dimensional view of its streets that includes connectivity for pipes and conduit and management of stormwater, along with multi-modal connections. While it can be difficult to get people excited about utility projects that primarily occur underground, the benefits of this work, combined with the potential for above-ground improvements, should help bridge that divide. The City will codify this integrated approach to infrastructure planning as part of its Comprehensive Plan called Link Spokane.



Syracuse has a new plan to get ahead of the curve on water main breaks by predicting hot spots. *Courtesy of the City of Syracuse.*

Deploying advanced technologies to improve decision-making

Harnessing the Power of Data to Tackle Water Main Breaks in Syracuse

During the first eight months of 2016, the City of Syracuse experienced 106 water main breaks and leaks. Often those breaks are addressed immediately and the impact on the community is minimal, but sometimes such breaks cause water damage, or require that water service be turned off to businesses and residents for days on end. That is why Syracuse developed and launched a series of initiatives to improve its water system.

Water main data shows that there are certain hotspots in the City of Syracuse where breaks are more prevalent. The most common area for water main breaks is in downtown, and when water infrastructure fails in the middle of the Central Business District, it is especially inconvenient. Restaurants are forced to shut down, offices send their employees home, and roads are closed to traffic. Over the spring and summer of 2016, the City of Syracuse has been piloting water main sensors that detect acoustic waves transmitted through the pipes. These waves identify water main leaks and their locations before they become debilitating breaks, thereby allowing the Water Department to repair the water main during off-peak hours, allowing businesses, offices, employees, and residents to function as normal.

In partnership with student fellows, the City of Syracuse was able to use existing data to develop an early warning system with predictive modeling to assign risk scores to each water main. The new system should increase the

accuracy of predicting risky water mains six-fold over a random choice. Knowing which mains are most at risk of failing allows the City to make the most efficient choice when replacing water mains.

Managing water to foster climate resilience

Rebuilding for Resilience in New Orleans

Just over 10 years ago, Hurricane Katrina devastated New Orleans, becoming the costliest disaster in United States history. The levee system protecting the city of New Orleans failed, flooding 80 percent of the city and the homes and businesses of 1 million people in the region. The city has spent time rebuilding in a deliberate fashion with an eye to the future. City leadership released a comprehensive strategy in 2015 called Resilient New Orleans, which outlines a new path forward for a region where water is both essential to survival and a threat to existence.

Subsidence is a major issue facing the city; sea level rise and the increased frequency and intensity of extreme storm events are projected to accelerate coastal land loss. Adding to the challenge, the state of Louisiana is experiencing the highest rate of relative sea level rise in the world: an estimated 4.3 feet by 2100.

Accordingly, the infrastructure of the future city will look different than it does today. Parks and schoolyards are being designed with native plants and trees to soak up water; canals and streets will provide greenways for recreation and water management; and the infrastructure will work with natural systems, rather than try to resist water. The Sewerage and Water Board of New Orleans has launched several new green infrastructure projects, and the city as a whole is embracing this approach. For example, rather than conventionally paved streets that require frequent and expensive repairs, innovative street materials and designs can slow and store rainwater, reducing flooding and slowing subsidence.

They have also made some significant capital improvements to strengthen the city. Greater New Orleans is surrounded by 133 miles of newly strengthened levees, floodwalls, and pump stations—the largest coastal flood control system in the nation. This recent \$14.5 billion investment in hard infrastructure is critical, but coastal restoration and comprehensive urban water management is an equally important facet of their strategy.

Arena for Action #3: Competitive Business and Industry



Achieving a secure One Water future would not be possible without direct business involvement. Likewise, long-term economic prosperity depends on a secure and sustainable water future. From heating and cooling to manufacturing and production, water is essential for all industries to thrive. Water challenges—whether it’s too much, too little, or poor quality—threaten business growth, impact bottom lines, and create direct operational risks (e.g., water availability for manufacturing) and indirect ones (e.g., power shortages due to water scarcity). Energy companies and transportation, for example, are particularly reliant on water and both sectors have a large water footprint. There is a business imperative for companies to adopt One Water practices both within their operations as well as in their engagement in the broader communities and watersheds in which they do business.

Businesses rank water as a top corporate concern and a priority investment for a secure supply chain. Almost two-thirds of companies, worldwide, report that water presents a substantive business risk and almost half (44 percent) expect water to negatively impact business operations within the next three years, according to a 2015 survey.¹⁴ Business as usual is no longer an option, especially as clean and reliable water supplies become strained.

Corporate water stewardship is evolving and expanding in reach. Historically, stewardship efforts have focused on how water affects direct business operations. Increasingly, forward-looking businesses are taking a more comprehensive approach to water sustainability—thinking and acting across their supply chains and within the watersheds in which they operate and source. A growing cadre of companies recognize that their best bet for securing their own water needs is to be active partners in protecting and restoring the watersheds upon which their businesses depend.

For business leaders, One Water means adopting a holistic, systems approach to their companies’ water footprints, and identifying and prioritizing investments that achieve maximum impact. By prioritizing healthy

watersheds and waterways and building water stewardship into business models, companies can enhance decision making, reduce costs, manage long-term water-related risks, improve resiliency and competitiveness, attract investor interest, and enhance their brand and reputation.

Some key One Water strategies being deployed include:

Fully integrating water stewardship into company strategy

As a key business input, water must sit at the heart of business, investment, and policy decision making. Businesses can set water stewardship as a priority by comprehensively integrating water into company-wide risk assessments, strategic plans, and sustainability goals. Businesses are establishing water stewardship strategies that include public goals for conservation and sustainability as a way to drive decisions that benefit water resources *and* the corporate bottom line. Just as reducing carbon footprints has become a central component of corporate social responsibility goals, reducing a company’s “water footprint” is quickly becoming just as important a metric. Holistic strategies must look at both direct operations and supply chains, and be based on robust data and science-based action plans for implementation. Increasingly, companies are collecting and reporting water-related data to illustrate risk to stakeholders, focus investments in watersheds where risks are present, and benchmark corporate-wide water stewardship goals.

Deploying water efficiency, stormwater management, and water reuse at industrial facilities

Today, smart and sustainable corporations are finding value in used byproducts, including water, to reduce waste, pollution, and risk. Businesses are embracing the circular economy by treating all water—drinking water, stormwater, reclaimed water, and wastewater—as resources to be mined for various purposes in the manufacturing process. There is a suite of approaches to onsite water stewardship. For example, identifying opportunities to improve water efficiency in the manufacturing process or in corporate headquarters is low-hanging fruit for meeting water conservation goals. Additionally, some facilities are installing innovative water reuse systems

for industrial and irrigation purposes in order to reduce their onsite water footprints. In other cases, businesses are investing in technologies such as xeriscaping and zero liquid discharge to manage stormwater and wastewater, and to reduce pollutants reaching receiving waters. These strategies have proven to yield high returns, both for bottom lines and for long-term water supplies. Businesses must strategically assess the right solutions to address their unique water risks, as well as the broader challenges facing the watersheds in which they operate.

Developing Upstream and Downstream Partnerships in Priority Watersheds

Just as business leaders are addressing water sustainability onsite, there is increasing attention given to offsite solutions for One Water management. Solely managing water within a business's operations is insufficient; a business can have the most water-efficient facility and still face water-related challenges outside its fence line. Shared water risk has driven collective action among companies, customers, environmental groups, community organizations, and government to improve water management. Collaboration across sectors and across the supply chain on shared water goals is a linchpin strategy for realizing sustainable One Water management.

A growing cadre of companies recognize that their best bet for securing their own water needs is to be active partners in protecting and restoring the watersheds upon which their businesses depend.

One Water in Action

Fully integrating water stewardship into company strategy

Coca-Cola: Setting Ambitious Water Sustainability Targets

For a company as large as Coca-Cola, managing their water footprint is not a simple task—every facet of Coca-Cola's production, from bottling to the beverage itself, uses water. That is why Coca-Cola views sustainable water management as a smart business strategy: by investing in the sustainability of their water usage, they are ensuring the long-term viability of their business, as well as the environment.

The company aims to restore the amount of water used in its finished products back to local watersheds. Coca-Cola conducts Source Vulnerability Assessments to help mitigate the water-related risks and impacts of their bottling plants. Working with the United States Forest Service, the Nature Conservancy, and community groups, Coca-Cola is restoring watersheds, improving access to safe water and sanitation, and raising awareness about water issues.

So far, the work performed by the Coca-Cola Company has benefitted over three million individuals, with 500 distinct projects in 100 countries. Coca-Cola and its bottlers have spent up to \$2 billion on conservation since 2003. The company is on track to safely return 100 percent of water used in beverages and production by 2020.

Deploying water efficiency, stormwater management, and water reuse at industrial facilities

Dow Tackles Water Efficiency at its Largest Chemical Manufacturing Complex

Water is used for a variety of purposes at The Dow Chemical Company's production facilities across the globe. But at the Freeport, Texas facility, the largest integrated chemical manufacturing complex in the Western Hemisphere, local drought conditions and increasing water demand projections have heightened the need for innovative solutions to water management.

Dow's facility, other businesses, and ecosystems in the basin could not function without sufficient supplies of fresh water from the Brazos River. When water is in short supply, purchasing it can be expensive, and shortages have the potential to impact both manufacturing operations and the surrounding community.

To help reduce waste, conserve resources, and realize cost savings, Dow collaborated with the City of Lake Jackson to divert their treated wastewater to Dow's raw freshwater canal, rather than discharging it to the river. The water is then used within Dow's facilities.

This innovative water reuse project is expected to reduce Dow's freshwater use by over 1.3 billion gallons per year. To put it into perspective, the equivalent freshwater savings represented by this project could supply a community of approximately 30,000 people for one year. Additionally, the project has helped enable new growth opportunities at the Freeport site, including the production of ethylene and polyethylene at lower cost. The City of Lake Jackson has also realized operational savings through the project.

Moving toward a circular economy model by targeting the efficient use of water and closing the resource loop is vital to ensure a sustainable water future.

Developing upstream and downstream partnerships in priority watersheds

Change the Course Replenishes more than 225 Million Gallons of Water

Change the Course is a water conservation and restoration initiative that engages the public, corporations, and the conservation community in restoring water for people and nature. For every personal pledge to conserve, Change the Course restores 1,000 gallons to depleted ecosystems, funded by corporations interested in balancing their water footprints. Change the Course aims to permanently redefine how society values, manages, and uses fresh-water to meet human and environmental needs. Change the Course provides customized engagement opportunities for corporations, universities, and sports teams to inspire daily water conservation actions with employees, customers, students, and fans.

So far, Change the Course has inspired over 225,000 pledges to conserve, enlisted the support of over 30 diverse corporate sponsors, and supported over 30 restoration projects across 10 states and Mexico.



DOW is using a circular economy model to reduce annual freshwater use by 1.3 billion gallons. *Courtesy of Dow Chemical Company.*

Arena for Action #4: Sustainable Agricultural Systems



Freshwater is the lifeblood of agriculture—food production is responsible for 80 percent of all water consumed.¹⁵ In America, approximately 80 percent of the population lives in urban areas that encompass less than three percent of our landmass.¹⁶ And the food, feed, fiber, and fuel on which we all rely is produced on 75 percent of the land where two percent of the population lives. The labor force that processes and manufactures agricultural goods contributes to local and regional economies. In the last 30 years, only computer technology has been a more significant contributor to the economy than agriculture.¹⁷ These realities highlight the interdependence of urban and rural agriculture communities, and the importance of partnership for a more sustainable and resilient food production system *and* a secure water future.

Water is of growing strategic importance to the agricultural sector as it grapples with challenges such as nutrient loading, soil erosion, habitat degradation, and flooding. Changing weather patterns have a direct impact on farmers. Their ability to adapt is key for managing crops and water.

When landowners and producers upstream work together with cities downstream in water management, everyone benefits.

The One Water approach can help the agriculture sector achieve triple-bottom-line outcomes—meeting the growing demand for food, increasing farmer profitability, and protecting the environment and public health.

One Water leaders are implementing innovative ways to manage soil, water, and nutrients to achieve higher-performing systems that not only lead to more productive agriculture, but also minimize downstream and off-site impacts.

Some of the key strategies for One Water action to support sustainable agriculture systems include:

Using on-farm strategies to reduce water consumption and manage nutrients

Farmers are adopting techniques that keep nutrients in fields, where crops need them, and out of streams, lakes, and rivers. Several technologies and strategies are enabling the farming community to increase the efficiency of agricultural water use and reduce nutrient loads. On-field practices such as cover crops, filter strips, and no-till or strip-till farming are gaining traction. Soil and plant moisture-sensing devices and computer-based crop-growth simulation models can assist with water management. One such technique that is increasing in popularity is the use of bioreactors, placed at the edge of a field, that act as an organic line of defense for nitrate and sediment runoff. The average bioreactor is estimated to remove 35 to 50 percent of nitrate from water, depending on size and location, and the technology has shown promising results in the Mississippi River Basin.

Creating partnerships between upstream and downstream communities

Central to the long-term preservation of our water systems is the protection of our watersheds, whether through the management of developed lands, conservation of natural lands, controlling water withdrawals, or managing point and nonpoint discharges. Healthy watersheds and waterways require a place-based regional approach, and the power of watershed management is in uniting stakeholders around a common vision and approach. When landowners and producers upstream work together with cities downstream in managing shared water resources, everyone can benefit. Collaboration between urban and rural entities is key to maintaining the health of watersheds and the sustainability of waterways. These partnerships can promote source water protection, thriving ecosystems, and improved water quality.

Using watershed-scale planning and monitoring

Coordinated planning that addresses the ever-increasing demand both for clean water and for agricultural products is gaining momentum. All water users—agricultural, industrial, and urban alike—are under pressure to keep water resources clean. Leaders within the agricultural sector are finding innovative ways to manage soil, water, and nutrients to achieve higher-performing systems that not only lead to more productive agriculture, but also minimize downstream and off-site impacts. Applying the latest technology, monitoring, and mapping is key to moving forward in this arena. Strategies such as predictive watershed modeling using well-established parameters and standardized data collection are essential to the sustainability of water resources and can aid in the adapting to future scenarios, watershed restoration, and protection planning efforts.

One Water in Action

Using on-farm strategies to reduce water consumption and manage nutrients

Salinas Valley: Recycled Water Saves the Agricultural Sector

The Salinas Valley, south of San Jose and east of picturesque Monterey, California, is prized for its rich, fertile soil that is ideal for crops. It is one of the most productive growing areas in California, but heavy agriculture and municipal groundwater demands have resulted in over-pumping and saltwater intrusion in the area.

For years, growers pumped groundwater from their wells to meet high irrigation demands, but the water usage was ultimately unsustainable. The Monterey Regional Water Pollution Control Agency, in partnership with local farmers, introduced a project that started as a salt water intrusion barrier but morphed into what is now the largest agricultural reuse irrigation project in the country.

Artichokes, lettuce, and strawberries are among the edible crops that are safely and efficiently produced in this region with recycled water. Now, recycled water is distributed to 12,000 acres of farmland in Northern Monterey County with an average of 60 percent of water recycled each year.

Creating partnerships between upstream and downstream communities

Cedar Rapids: Multi-Pronged Coalition for Change

In Iowa's Middle Cedar River community, government entities, water providers, agriculture, and environmental groups are all coming together to try to solve the area's most pressing water challenges. Responding to flooding concerns and potential nitrate in drinking water, the city of Cedar Rapids and 15 partners applied for funding from the USDA Natural Resources Conservation Service's Regional Conservation Partnership Program.

The five-year project connects downstream water consumers with upstream agricultural producers to improve water quality, reduce flood risk, and improve soil health. Initial partnership efforts focus on five watersheds in the larger Cedar River region and build on two state-funded water quality projects already underway.

The first step led by the Iowa Soybean Association was to develop watershed plans. In the next phase, efforts will focus on implementation—using bioreactors, saturated buffers and cover crops where they will have the most impact on water quality. Additionally, partners will focus on outreach to encourage greater adoption of promising practices.

Using watershed-scale planning and monitoring

Madison, Wisconsin Uses Adaptive Management to Target Phosphorous Runoff

At the Madison Metropolitan Sewerage District, their mission is to “respect every drop,” and work to recover resources and clean wastewater for return to nature 365 days a year. One major hurdle facing the utility is to meet federal requirements to reduce phosphorous runoff within the 185-square-mile service area in the Yahara River Watershed.

Traditionally, municipal utilities tend to work independently to meet regulatory obligations, using relatively expensive solutions such as filtration technology that can have limited geographic impact. The District, in collaboration with over 30 partners, pioneered a new regulatory approach to address phosphorus called adaptive management, a strategy that allows farmers, utilities, and developers to work together to reduce nutrients and improve water quality within a watershed. As a new compliance option, adaptive management had no precedent in Wisconsin, so Madison decided to launch a small-scale pilot project called the Yahara Watershed Improvement Network (Yahara WINs).

The four-year pilot project ran until the end of 2015 and brought together a diverse group of partners including cities, wastewater treatment plants, agricultural producers, Dane County, the University of Wisconsin-Madison, the Wisconsin Department of Natural Resources, environmental organizations, and others. As the first effort in the state, it acquired valuable data, engaged community members, helped answer regulatory questions, and left project partners with enough confidence in adaptive management to transition to a full-scale project to comply with phosphorus requirements. This 20-year project has a total cost of just over \$100 million and a phosphorus reduction goal of approximately 106,000 pounds per year at full buildout.

By working in their watershed with landowners, municipalities, and counties to target sources of phosphorus runoff, utilities like Madison can maximize the impact of their overall investment, meet compliance requirements, and improve water quality.



Strip tillage minimizes soil disturbance and reduces runoff and soil loss. *Courtesy of Madison Metropolitan Sewerage District.*

Arena for Action #5: Social and Economic Inclusion



A sustainable water future requires that all people—regardless of income, race, or geographical location—have access to clean, safe, and affordable water and wastewater service. Across the United States, there are vulnerable communities who struggle with water contamination, affordability, and inadequate infrastructure.

For example, in California, extreme drought has left 275,000 people without access to safe and reliable drinking water.¹⁸ Many groundwater wells have dried up, leaving small farming communities, like Tulare County, reliant on old, contaminated backup wells for water. There are infrastructure inequities—like on Native American reservations, where 13 percent of homes lack access to clean water or sanitation due to lack of infrastructure and water resources, a significant number compared to only 0.6 percent for non-Native Americans.¹⁹ Low-income people and communities of color—who are already overburdened with economic, environmental, and health challenges—are also the most vulnerable in the face of climate change, whether it's flooding, storm surges, or compromised water and wastewater infrastructure.²⁰ We have affordability issues—like in rural Appalachia where residents rely on private springs and wells, some with questionable water quality, because financing small water treatment and distribution systems is not feasible.

At the same time, investments in the water sector have the potential to generate a multitude of benefits for communities facing water challenges. The infrastructure investments needed to rehabilitate aging systems and adapt to climate change can fuel job creation and workforce development, while also improving quality of life and public health.

Equitable and sustainable water management can increase social and economic inclusion. For example, utilities are deploying a range of approaches to contribute to a more equitable society—from low-income assistance programs to workforce development and inclusive contracting to the leveraging of capital projects to foster neighborhood revitalization. Community-based organizations that have historically worked on issues such as affordable housing and transportation are turning their attention to local water concerns. A growing number of philanthropic organizations are incorporating water into their portfolio of investments to build a society and economy that works for everyone.

Promising One Water strategies that are taking root in communities include:

Building a water safety net

One of the nation's crowning achievements over the past century was the development of systems that provide the majority of Americans with drinking water and wastewater service. However, millions of people living in the US still lack access to safe, reliable, affordable water and sewer service. Infrastructure shortfalls and environmental crises mean that many communities must rely on contaminated water sources. Climate change and extreme weather increase the risk of flooding and public health concerns. And as costs for system improvements and maintenance increase, affordability for lower-income residents is a growing concern.

We must build a water safety net that provides Americans with a basic level of access to safe, reliable, and affordable drinking water and wastewater service. Addressing water affordability goes beyond discounts and assistance efforts. Financially sustainable approaches can, and must, be developed to assure access to service without compromising utilities' financial integrity. Additionally, the causes of water safety issues must be resolved in order to ensure long-term, reliable access to water. This is an imperative for public health and community well-being.

Leveraging water investments to generate community benefits

Investments in water infrastructure create economic growth, jobs, and neighborhood revitalization. A report, *National Economic and Labor Impacts of the Water Utility Sector*, calculated the economic impacts of the 30 largest public utilities, serving in aggregate more than one-quarter of the US population.²¹ In total they are investing \$23 billion per year, contributing \$52 billion in economic output, and supporting 289,000 jobs annually. As utilities rebuild and maintain water systems, there is an opportunity to leverage these investments to maximize economic, environmental, and social gains, especially for historically under-served populations. This includes workforce training, access to high-quality jobs with career pathways, contracting opportunities, and catalyzing neighborhood improvements. These strategies can enhance the local economy *and* the utility's financial sustainability.

Fostering community resilience in the face of a changing climate

Integrated water resource management and water infrastructure investment are essential to ensuring that communities are resilient in the face of more extreme and uncertain climate events. Low-income people and communities of color are more likely to reside in areas that are already economically and environmentally burdened, and will likely be hit first and worst by the negative water-related impacts of climate change. As utilities and cities undertake water resilience strategies, planning for and making investments in a manner that protects disadvantaged communities is critical. Environmental justice concerns must be considerations in how water-related climate investments are allocated.

Enhancing community capacity to engage in water planning and governance

A secure water future depends on long-term and meaningful engagement from the public. Economically disadvantaged communities may lack the resources to effectively engage in complex planning and decision-making processes associated with the management of our water and wastewater systems. Community organizations, non-profits, academia, and utilities are finding ways to effectively engage local leaders in water infrastructure planning, communicating with decision-makers about local water challenges, and working to raise community-wide awareness and understanding of these issues.

One Water in Action

Building a water safety net

Detroit Water and Sewerage Department Offers Low-Income Customers Rate Assistance

The city of Detroit has introduced innovative practices to address water affordability, help low-income customers pay their bills, and avoid water shutoffs. In 2015, the Detroit Water and Sewerage Department (DWSD) convened a Blue Ribbon panel of national experts and local stakeholders to discuss affordability measures. As a result of the panel's recommendations, DWSD and the Great Lakes Water Authority (GLWA) adopted a number of practices designed to provide relief to disadvantaged communities struggling with water affordability.

The Water Residential Assistance Program (WRAP), led by GLWA, offers low-income residents benefits including monthly credits and assistance with arrears, as well as connecting them with other needed social services. Participating customers are eligible to receive technical and financial assistance to lower their bills by fixing leaky plumbing. The program will put \$1.5 million, funded by GLWA, towards assisting residents in the Detroit region. WRAP responds to a dire need for rate assistance: of the 175,000 residential water accounts in Detroit, 44,000 are on a payment plan.

Apart from the WRAP, DWSD has initiated a payment plan—called 10/30/50—to help avoid shutoffs for customers with bills in arrears. If customers make a down payment of as little as 10 percent, they can enroll in the plan, and DWSD will spread the remainder of the balance over 24 monthly payments. DWSD is also easing the burden on low-income ratepayers by ensuring that commercial and public spaces are charged fairly for drainage. By assisting low-income residents, Detroit is making important strides towards guaranteeing safe, affordable water for all.

Leveraging water investments to generate community benefits

A Good Neighbor: The San Francisco Public Utilities Commission's Community Benefits Program

The SFPUC became the first public utility in the nation to adopt an Environmental Justice Policy and Community Benefits Policy to guide the agency's efforts to be a good neighbor to everyone who is impacted by the SFPUC's operations, programs, and policies. To encourage the agency's partnering contractors to adopt the community benefits goals, the SFPUC has embedded community benefits criteria into professional service and alternative design requests for proposals of \$5 million and above.

Multinational and local engineering, construction, and architecture firms are invited to incorporate firm, quantifiable, and measurable commitments into their proposals in exchange for up to five percent of the total points allocated in the proposal review. Firms can voluntarily commit financial contributions, volunteer hours, in-kind donations, and trainee hours to schools, workers, and nonprofits in the communities where the SFPUC operates to advance workforce development, education, economic development, environment/environmental justice, and other community benefits goals.

To date the SFPUC has commitments in over 51 professional service contracts, leveraging over \$13.5 million in the form of workforce development programs, habitat restoration, and partnerships with local public schools. With the success of this program, the SFPUC is exploring embedding community benefits agreements into construction and procurement contracts.

Fostering community resilience in the face of a changing climate

Ironbound: Empowering Newark Residents to Revitalize Their River

The Ironbound Community Corporation strives to create a more vibrant, sustainable community in one of Newark, NJ's most environmentally-overburdened communities. The Ironbound is a historic, low-income neighborhood that sits at the intersection of railroads, highways, one of our nation's busiest airports and seaports, the polluted Passaic River, the remains of declining industrial factories, the state's largest garbage incinerator, the largest waste-

water treatment facility on the East Coast, and many other industries. Hurricane Sandy caused major flooding and displacement of residents in the already disadvantaged area, and on-going extreme weather events continue to cause stormwater management issues.

Ironbound Community Corporation works to empower the community by raising awareness of air and water pollution among local residents and advancing strategies that foster neighborhood resilience in the face of a changing climate. Part of this effort is its Riverfront Revitalization Project, which includes both the cleanup of the river (the longest Superfund site in the country, which entails the lower 8 miles of the river) and the creation of green space and recreational opportunities for Newark residents with the opening and stewardship of Newark Riverfront Park. By changing the community's relationship to the river and closely monitoring environmental quality in partnership with Newarkers, Ironbound Community Corporation is establishing a sense of empowerment among residents and inspiring revitalization of the Passaic River.

The Corporation is addressing climate impacts through a partnership with Clean Water Action and the New Jersey Environmental Justice Alliance to lead regional climate adaptation and develop a Newark Resiliency Action Plan. This initiative will convene community leaders, residents, and local government to develop climate adaptation measures that address public health and community engagement.



San Joaquin residents have worked with the Community Water Center to improve the quality of their drinking water. *Photo by Jenny Rempel.*

Enhancing community capacity to engage in water planning and governance

Community Water Center Helps San Joaquin Valley Residents Build Water Knowledge

The work of the Community Water Center (CWC) is driven by the vision that clean water is a basic human right. The organization has a strong history of community organizing with rural, low-income communities, and communities of color in California's San Joaquin Valley to secure reliable access to safe and affordable drinking water. Through effectively connecting on-the-ground community organizing in the southern San Joaquin Valley to state policy work, CWC is an effective environmental justice organization whose policy agenda is formed by the voice of impacted community residents. The San Joaquin Valley has disproportionately high rates of drinking water contamination in the state. Many Valley communities also suffer from water quantity issues; in drought years, thousands of wells run out of water entirely. These communities are often underrepresented within regional governance structures.

Since opening its doors in 2006, the Center has worked with local residents from 82 California communities. CWC provides technical and financial assistance for water management operations and maintenance, advocates for state and regional policies that protect San Joaquin Valley communities from agricultural runoff, and builds strategic grassroots capacity to address water challenges in the rural, low-income communities they serve. The Center has trained over 2,600 residents as clean water advocates and provided technical assistance to over 15 local water boards struggling with how to manage efficient and accountable water systems in their communities. Through grassroots advocacy and community building, CWC has also supported more than 20 individuals from low-income communities who have successfully obtained positions on local and regional water decision-making bodies. As a result, many rural, economically disadvantaged communities in the San Joaquin Valley now have improved access to clean and affordable drinking water.

Arena for Action #6: Healthy Waterways



The American landscape is bound by an intricate web of waterways and water sources—rivers, streams, lakes, wetlands, underground springs, and groundwater. These waters provide vital services to human populations and have benefits and values far beyond what we take from them. Water sustains life for all species and ecosystems. Outdoor enthusiasts from boaters to sportsmen understand that smart water resource management is key to sustaining vibrant wildlife populations. Maintaining the purity and abundance of water needed for fish, wildlife, native plants, forests, and other critical habitats must be balanced with municipal, agricultural, and industrial (or human-centric) needs.

What happens on the land or in the air affects the health of our waters. Industrial development and the effects of human interventions on the environment have taken their toll. Pollutants reach not only surface waters, but also groundwater, an increasingly important water source in many areas. Even non-consumptive uses of water—for example, hydropower generation and cooling systems for other forms of electrical power generation—can impact important aquatic and terrestrial ecosystems. About 55 percent of the waters in the US are of poor quality, according to the EPA.²² In the continental US, we have lost more than half of our wetlands, which act as filters for pollutants, sponges for floodwaters, and habitat for wildlife. Nearly 40 percent of fish in freshwater streams, rivers, and lakes are vulnerable, threatened, or endangered.²³

Tremendous progress has been made since the passage of the federal Clean Water Act. Impressive examples abound: Cleveland's Cuyahoga River, site of the infamous river on fire in 1969, is now open for swimming. The Potomac, flowing into the center of the Nation's Capital and labeled a "national disgrace" by President Johnson in the 1960s, is today dotted by hundreds of kayakers and rowers next to waterfront restaurants in Georgetown and Alexandria. The Clean Water Act has inspired innovative solutions and partnerships—and the results, for many waterways and watersheds, have been outstanding. More

innovative and bold solutions will be required to continue meeting the challenge of safeguarding our waters and the ecosystems dependent on them.

In addition to the many approaches to foster healthy waterways that have been discussed in previous sections of this report, some additional One Water strategies include:

Maximizing natural infrastructure for healthy ecosystems

Natural infrastructure—which is sustainably managed open spaces like forests, riparian habitat, and wetlands—provide important ecosystem benefits. Natural infrastructure can help control water flows, prevent nutrient and sediment discharges downstream, mitigate the effects of drought, and help maintain healthy waterways and lands. Natural infrastructure can be an economic win for communities, and many forward-looking localities are institutionalizing policies that put an emphasis on ecosystem benefits and services.

Managing groundwater for the future

As an alternate source of water to rivers, lakes, and streams, groundwater is a vital source of drinking water for about half of the US population, including many rural communities. Over the last 50 years, water and groundwater withdrawals have increased by 46 percent.²⁴ Groundwater in many locations is pumped out of the ground faster than it can be replenished, and some deep underground aquifers are beyond the point of restoration. Groundwater levels are also falling in areas most severely affected by drought. Water leaders recognize that groundwater is not limitless, and they are increasing conservation efforts, actively managing multiple water sources, using rainwater to replenish aquifers, and investing in new technologies to enable large-scale water reuse.

Protecting forests to protect water

Forests provide natural filtration and storage systems for nearly two-thirds of the water supply in the United States.²⁵ Forests act as natural systems of buffers for waterways and filter out harmful pollutants, nutrients, and sediments by capturing rainfall and reducing runoff. Research has shown that declines in forest cover are closely correlated

to declines in stream health and water quality. Conversely, it is estimated that forests adjacent to waterways can reduce the amount of excess nutrient runoff by as much as 90 percent. Forested buffers along stream and river corridors are particularly effective tools in watershed restoration and source water protection. More resilient forests create a more resilient water supply, and can even improve the bottom line for utilities—forest buffers can, for example, reduce the need for enhanced filtration at drinking water plants.

Utilizing citizen science for ecosystem monitoring and watershed restoration

Local citizens have become powerful advocates for their waterways and streams—monitoring and serving as “early warning systems” if something is amiss. They can be the first to recognize when their drinking water or local fishing spot is in trouble or when their community is threatened by flooding or drought. “Citizen scientists” play a critical role in galvanizing support among a wide range of stakeholders and forging alliances to advance solutions. They are most effective when empowered with the knowledge of what systems need to remain healthy in a changing world, the toolbox of solutions and innovations to protect waters, and the ability to bring others to the table to expand influence.



The Sweetwater Wetlands water treatment facility is a key part of Tucson's reclaimed water system. *Courtesy of Tucson Water.*

One Water in Action

Maximizing natural infrastructure for healthy ecosystems

Working Together to Deploy Natural Infrastructure in Saginaw Bay Watershed

Sometimes watershed health requires a coordinated approach towards completing many small improvements, rather than one large infrastructure project. The Saginaw Bay Watershed covers 8,700 square miles of Michigan's lower peninsula and encompasses all or part of 22 counties. As Michigan's largest watershed, it is home to 138 threatened or endangered species and contains the largest contiguous freshwater wetland system in the United States.

The Saginaw Bay Watershed Initiative Network includes strong local partners such as the Dow Chemical Company, Conservation Fund, and Mott Foundation, and has provided over \$5 million to support projects throughout the watershed that include remediation of contaminated soils, conservation tillage, dam removals, and wetland and wildlife restoration. Dam removals on several rivers are designed to return the river to a naturally flowing state—one that has been obstructed for 150 years and involves coordinated habitat improvement and restoration design, along with implementation of restoration plantings and activities. Communities, conservation groups, foundations, and businesses are working together to enhance the Saginaw Bay Watershed and create a more sustainable future for all of its inhabitants.

Managing groundwater for the future

Tucson Replenishes Aquifer by Diversifying Supplies

With little annual rainfall and no nearby surface water supplies, a key objective for the Tucson region is ensuring that growth is based on sustainable water management. Tucson has relied on groundwater to supply its water needs, but over time, the pumping associated with residential, agricultural, and industrial water use has outstripped nature's ability to replenish the underground aquifers.

Ambitious state regulations limiting the use of groundwater and requiring more stringent water conservation programs were powerful motivators for change. These regulations outline the goal of a long-term balance between the annual amount of groundwater withdrawn

and the annual amount of natural and artificial recharge occurring in the area. Tucson Water has worked with American Rivers on a comprehensive integrated water management plan that holistically examines water supply, with an eye towards conservation and an expanded integration of stormwater into the water supply portfolio.

As a result, Tucson leaders are shifting to more reliance on renewable water supplies in the region. In addition to its Clearwater Program, which uses the city's Colorado River allocation, the city of Tucson operates an extensive reclaimed water system for turf irrigation and is expanding the program for regional riparian habitat restoration and future potable reuse.

The Sweetwater Wetlands facility is one of the most important facets of the city's reclaimed water system. Treated water filters through sediments beneath recharged basins and replenishes the local aquifer. The wetlands habitat also supports a huge variety of wildlife, from dragonflies to bobcats, and is used as an educational opportunity for students and residents to learn more about the watershed.

Looking to the future, Tucson and Pima County agencies are examining policies and practices that can capture larger volumes of seasonal rains to support community greening goals and augment aquifer recharge. The vision of the community is to use green infrastructure, rainwater harvesting, and stormwater infiltration to increase flexibility in water supply management, restore and sustain surface flows in local creeks and river channels, and boost the region's resilience to drought and climate change.

Protecting forests to protect water

Chesapeake Bay Uses Forest Buffers to Boost Water Quality

Forests in the 64,000-square-mile Chesapeake Bay watershed near Washington, DC provide drinking water for three-quarters of the over 17 million people who live in the region. Up until recently, the watershed was losing an estimated 100 acres per day of forestland.

The Chesapeake Bay Commission recognized that forests protect drinking water better than any other land cover, and in 2007 adopted forest protection and restoration goals for the five Bay states and federal partners as key strategies. Since then, the Conservation Fund, USDA

Forest Service, and other important partners have worked to fulfill the initial forest protection goals and preserve the health of the Chesapeake Bay and its residents.

Conserving and expanding forest cover is a critical, cost-effective way to reduce pollution and restore the Bay. As part of the 2014 *Chesapeake Bay Watershed Agreement*, Chesapeake Bay Program partners committed to try to restore 900 miles per year of streamside forest buffers and conserve existing buffers until at least 70 percent of the areas along streams throughout the watershed are forested. More than 8,000 miles of forest buffers have been planted along creeks and streams across the watershed since 1996.


Utilizing citizen science for ecosystem monitoring and restoration

Chattahoochee Riverkeepers Empower Citizens on Local Water Quality Monitoring

The Chattahoochee River in Georgia flows 430 miles through the cities of Atlanta and Columbus to its confluence with the Flint River at the Florida border. While its water quality has improved significantly in the last 20 years, many of its tributaries flowing through Atlanta's neighborhoods remain polluted.

Many waterways such as the Chattahoochee lack resources for routine water quality monitoring and bacterial contamination can go undetected for lack of water quality data. The Chattahoochee Riverkeepers was formed as an environmental advocacy organization dedicated to protecting and preserving the Chattahoochee River Basin through river patrols, water testing, and educational programs.

One of the Riverkeepers' greatest assets is a robust network of volunteers. Neighborhood Water Watch groups are a way to engage and educate local communities while working to eliminate bacteria pollution. Local neighborhood association members and volunteers are trained to collect water quality samples, and the number of samples collected has grown to more than 6,000 across 100 sites as of 2015. Thanks to citizen scientists, numerous sewer leaks have been reported and thousands of gallons of raw sewage have been prevented from reaching local streams and the Chattahoochee River.

A group of people is sitting on a grassy bank by a lake at sunset. The scene is framed by large trees with autumn foliage. The sun is low on the horizon, creating a warm, golden glow. The people are silhouetted against the bright light of the setting sun. The water of the lake is visible in the background, reflecting the light. The overall atmosphere is peaceful and communal.

At its heart, the One Water approach is about diverse stakeholders coming together to advance common-ground solutions to our water challenges.

Conclusion

The strategies and policies highlighted in this report illustrate the rich diversity and growing sophistication of the One Water approach that is taking root all across the country. This agenda for action represents an integrated and inclusive approach to how we manage water in America. It cuts across bureaucratic silos and encourages holistic thinking and practices. Local stakeholders will need to determine the right combination of strategies for their communities.

At its heart, the One Water approach is about diverse stakeholders coming together to advance common-ground solutions to our water challenges. Every individual, every sector, every stakeholder group has a role to play. Water providers, farmers, industries, philanthropic organizations, watershed-based organizations, city and regional planners, land owners and developers, policymakers, regulators, and researchers—only together can we secure a sustainable water future for all.

We hope that you will take inspiration from the strategies and case studies outlined here to move forward with a One Water approach in your own communities.

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