Navigating to New Shores
Seizing the Future for Sustainable and Resilient U.S. Freshwater Resources

Executive Summary

After more than six years of intensive, solution-oriented work on U.S. freshwater issues, The Johnson Foundation at Wingspread is concluding its Charting New Waters initiative. Through convening hundreds of experts representing different sectors and perspectives, we have amplified important ideas and innovations that can make a difference. This executive summary of our final report synthesizes insights from the full arc of Charting New Waters and is meant to provide a platform for our many partners and other leaders as they continue to address water resource and infrastructure challenges.

Without significant changes, existing water systems will soon no longer be able to provide the services that citizens have come to expect. Recent water crises have illustrated that the economic and social consequences of inaction are far too great for this nation and its communities. It is time to accelerate the adoption and implementation of the transformative solutions we know are possible.

Our full report leads with a vision that illustrates what The Johnson Foundation believes is both possible and necessary to achieve if our nation is to successfully navigate our water challenges. It then presents a set of principles, summarized below, to help guide the efforts of leaders in various sectors as they act upon the recommendations we offer. The recommendations themselves, which are also summarized in brief below, fall under the following five key ideas:

1. Optimize the use of available water supplies
2. Transition to next-generation wastewater systems
3. Integrate the management of water, energy and food production
4. Institutionalize the value of water
5. Create integrated utilities

The Johnson Foundation selected the recommendations presented in the report because of their timeliness and promise for leveraging existing momentum. We hope the recommendations shed light on what is needed to catalyze transformative change and the benefits we can reap as a result. We also hope they will inspire additional action to seize the future for sustainable and resilient U.S. freshwater resources.
1. Optimize the Use of Available Water Supplies

With water scarcity affecting an increasing number of regions across the United States, one could argue that diminished water supply is the greatest threat to the economic security and social stability of major portions of this country. In addition, we are losing a significant amount of water due to aging, leaky infrastructure; we are not capturing and using readily available sources; and we are using available water inefficiently or unwisely. To counteract these trends, we need to implement a mix of strategies that will optimize the use of available water and increase resilience to acute and chronic water scarcity.

In the short term, water-supply utilities need to dramatically increase the efficiency of their distribution systems through effective asset management, water audits, pressure management and systematic monitoring. Communities need to establish water rates as well as policies and programs that incentivize conservation and efficiency while maintaining service providers’ financial stability. And the agricultural sector should continue to pursue water savings by expanding the adoption of water-wise practices such as high-efficiency irrigation technologies, soil moisture monitoring and cover crops.

To ensure water security over the long term, communities need to build more flexibility and redundancy into their water-supply storage and distribution infrastructure. They can diversify their water supplies by tapping underused water resources, such as rainwater, and by taking greater advantage of natural and engineered ecosystems. Water reuse is arguably the most promising way to extend existing water supplies, and water utilities should more aggressively integrate indirect and direct nonpotable and potable water reuse into their supply portfolios. We also need to shift away from the traditional paradigm of treating all water to the highest public health standards. Using technology that treats water to different quality levels and enables its delivery for safe and appropriate residential, commercial and industrial uses, we can match the right quality water to the right use.

Guiding Principles for the Future of U.S. Freshwater Resources

- Forge partnerships and collaborate to solve problems
- Develop integrated solutions
- Incentivize and promote innovation
- Highlight multiple benefits
- Recognize the value of water
- Plan for adaptation to and mitigation of climate change impacts
- Balance human and environmental needs
- Design infrastructure to restore ecosystem function
- Prioritize local water sources
- Redefine “waste” as valuable resources
- Right-size water systems and services
- Tap into sustainable financing streams
- Ensure accountability
2. Transition to Next-Generation Wastewater Systems

Most existing wastewater systems in the United States were built with technology developed in the mid-20th century and have served our nation well for many decades. But times have changed, and today’s wastewater utilities and municipalities are struggling to cope with everything from rising operating costs to difficulty garnering financing to the effects of climate change. Combined sewer overflows remain a public health hazard in many cities, stringent nutrient standards demand more energy-intensive treatment processes, and large, centralized wastewater systems are vulnerable to single-point failures that can quickly leave entire communities without service. Given these challenges, it is imperative that leaders invest in forward-looking solutions that leverage the surge of innovation in the wastewater sector and bring legacy wastewater systems into the 21st century.

For example, communities can keep stormwater runoff and groundwater out of wastewater systems using a combination of effective asset management, sewer separation and green infrastructure, so that wastewater plants can be reserved for treating water that truly needs treating. To reduce pressure on centralized treatment plants and to bolster resilience, wastewater utilities should consider integrating small-scale distributed systems into their existing infrastructure. Furthermore, the wastewater sector can also use new technologies to transition from minimizing pollution to maximizing the recovery of valuable resources such as nutrients and energy. With biogas produced on-site and other renewable energy technologies, treatment facilities can become net-energy-positive, reducing operating costs and the potential for grid-induced power outages while reducing greenhouse gas emissions.

3. Integrate the Management of Water, Energy and Food Production

As a nation, we need to be cognizant of the many important intersections between water, energy and food production and establish a comprehensive approach to integrating the management of these essential resources and services. Despite the fundamental links among these sectors and the potential to leverage infrastructure investments, the sectors generally conduct planning and innovate independently. Yet opportunities for coordination are increasing, and great potential exists to integrate the management of all three sectors and collaboratively plan for a sustainable future.

Water and wastewater utilities need to continue to implement energy-efficiency measures and other technological innovations to reduce or eliminate their net energy use and work better with the power grid. As power providers confront climate-driven shifts in water availability and plan for the impending retirement of many fossil fuel plants, they can reduce their dependence on freshwater with low-water cooling technologies or the use of reclaimed water for cooling. Food producers can integrate sustainable nutrient and energy practices borrowed from the water and power sectors, including nutrient recovery and biogas-fueled electricity. In addition, urban and rural water leaders need to collaboratively plan for sustainable rural water supplies. Working together they can implement strategies that eliminate short-sighted municipal and industrial water-supply solutions that transfer water away from farms, ranches and rural communities.

Times have changed, and today’s wastewater utilities and municipalities are struggling to cope with everything from rising operating costs to difficulty garnering financing to the effects of climate change.
4. Institutionalize the Value of Water

Historically, capital investments in water infrastructure have been heavily subsidized by federal grants, and water rates have not reflected the externalized costs of water withdrawal, pollutant discharge and other community impacts. This approach to water pricing has conditioned Americans to assume that water delivery and wastewater treatment are and always will be inexpensive services, which in turn has driven utilities to defer maintenance and upgrades so that rates remain low. But with the decline of federal grant funding and the massive water infrastructure investment gap facing our communities, we can no longer afford to maintain the illusion that water and water services are cheap. It is time to rethink how we value water and adopt new strategies and tools that institutionalize its true worth.

To repair and revamp water infrastructure, communities and utilities need to tap into new sources of capital and use innovative financing mechanisms such as green bonds and public–private partnerships. Utilities need to institute sustainable pricing for water services so that they are able to recoup operating costs, pay off long-term debt and have funds to invest in innovation. In addition, financial systems need to assign value to the capacity of ecosystems to provide clean water and replenish water supplies, as well as to the human effort that goes into preserving and restoring ecosystem services. Perhaps most importantly, we must instill appreciation for the complexity, importance and benefits of reliable water, wastewater and stormwater management infrastructure so that Americans value water highly and are willing to pay the real costs of water services.

5. Create Integrated Utilities

The best solutions to our resource management challenges stem from collaboration and integration among the agencies and authorities that oversee water, energy, solid waste, land and air resources. To achieve a sustainable and resilient future for U.S. freshwater, we must push beyond the regulatory and disciplinary silos of the past and reinvent the infrastructure and utility services that Americans depend on. Utilities need to reflect the realities of the physical world and provide integrated services under a common organizational structure that optimizes resource use and minimizes waste. Many of the technological and management characteristics that constitute integrated utilities are captured in the preceding recommendations, but additional elements are necessary to truly transform the management of water and other interdependent resources.

For example, new utility design principles must be established that embrace public values, local control and innovation along with evaluation criteria that center on meeting sustainability and resilience goals. Utilities of the future will go beyond service provision and manage built and natural infrastructure that bridges the urban–rural interface. They will recover nutrients and energy, generate electricity from renewable energy sources and implement distributed systems that ensure redundancy in water-supply and wastewater treatment systems. New business models will foster internal innovation, ensure financial sustainability and generate new revenue streams. Federal and state agencies will need to revisit regulations and policies that hinder integration between traditional service areas and institute mechanisms for flexibility that support new ways of conducting business. Finally, utilities will cultivate partnerships with the communities they serve as well as with well-informed customers who actively participate in how the utility and the resources it relies on are managed.

New utility design principles must be established that embrace public values, local control and innovation along with evaluation criteria that center on meeting sustainability and resilience goals.
Overview of Charting New Waters

Charting New Waters was initiated in 2008 following The Johnson Foundation’s decision to apply our resources and convening model to a concentrated exploration of U.S. freshwater issues. It evolved through the three phases illustrated in the timeline on the next page.

In phase one, participants in a series of Wingspread conferences examined freshwater challenges associated with climate change, the built infrastructure, agriculture and food production, the water–energy nexus and public health. That phase culminated with the CEO-level Freshwater Summit on June 9, 2010, and with the September 2010 release of Charting New Waters: A Call to Action to Address U.S. Freshwater Challenges. The consensus-based Call to Action drew from the earlier convenings and detailed potential solutions to the nation’s looming water crisis. A diverse group of signatories agreed on the recommendations and made commitments to action.

Driven by those commitments, phase two of Charting New Waters took place between 2011 and 2013 and focused at first on the issue of water infrastructure financing. During the summer of 2011, we hosted two webinars and a conference in partnership with American Rivers and Ceres to examine challenges and emerging options for financing sustainable water infrastructure – an effort that culminated with a report and invited testimony before Congress. This phase also included work with diverse stakeholders in New England, Colorado and the Pacific Northwest to explore how freshwater challenges were playing out in specific regions. Our forums in Denver and Boston generated insights into the kinds of solutions that are viable in two very different parts of the country.

The third and final phase of Charting New Waters focused on catalyzing the widespread adoption of sustainable and resilient water infrastructure systems in the United States. In 2013 and 2014, we hosted discussions about transforming the nation’s water infrastructure to adapt to and mitigate climate change; fostering collaboration between water and electric power utilities; ensuring urban water security; improving urban nutrient management; advancing the use of distributed water infrastructure; and developing an action plan for New Jersey’s urban water infrastructure.

The entire body of work under Charting New Waters has been built on strong partnerships. More than 600 individuals from approximately 265 organizations participated in one or more meetings, bringing their experience and perspective to the conversations. Some organizations partnered with us to develop and convene meetings, and these collaborations contributed greatly to the outcomes of those conferences. It is this rich history that informs the ideas and recommendations presented in our final report.
Navging to New Shores: Seizing the Future for Sustainable and Resilient U.S. Freshwater Resources

CNW 1.0
2008–2011
Catalyzed new coalitions, new energy and increased visibility around U.S. freshwater challenges

2008
March 17–18, 2009
Impact of Climate Change on Freshwater Resources and Services in the U.S.

2009
May 20–22, 2009
Infrastructure and the Built Environment

September 1–3, 2009
Agriculture and Food Production

November 16–18, 2009
Reducing Conflicts at the Water–Energy Interface

December 15–16, 2009
Public Health Threats and Solutions

2010
June 9, 2010
Freshwater Summit

September 2010
Charting New Waters: A Call to Action to Address U.S. Freshwater Challenges Washington, DC

2011
October 18, 2011
Colorado Regional Freshwater Forum Denver, CO

CNW 2.0
2011–2013
Focused on following through on commitments made as part of CNW 1.0

Summer 2011
Financing Sustainable Water Infrastructure

July 26, 2011
Webinar #1: What Is Sustainable Water Infrastructure?

August 10, 2011
Webinar #2: Unpacking the Financing Options

August 16–18, 2011
Financing Sustainable Water Infrastructure Systems

Click on the report covers to view the full reports or visit www.johnsonfdn.org/chartingnewwaters for a list of publications.

NOTE: Unless otherwise noted, all conferences took place at The Johnson Foundation at Wingspread in Racine, Wisconsin.
CNW 3.0

2013–2014
Focused on catalyzing the widespread adoption of more sustainable and resilient water infrastructure systems in the United States

2012

May 30–31, 2012
New England Regional Freshwater Forum
Boston, MA

2013

April 17–19, 2013
Catalyzing the Transformation of U.S. Water Infrastructure

December 11–13, 2013
Ensuring Urban Water Security in Water-Scarce Regions of the United States

March 19–21, 2014
Optimizing the Structure and Scale of Urban Water Infrastructure: Integrating Distributed Systems

2014

February 13–15, 2013
The Road Toward Smarter Nutrient Management in Municipal Water Treatment

October 28–29, 2013
Part 2
Warrenton, VA

May 20–21, 2014
Developing an Agenda for Change for New Jersey’s Urban Water Infrastructure
Jersey City, NJ

August 21–23, 2013
Building Resilient Utilities: How Water and Electric Utilities Can Co-Create Their Futures

Winter and Fall 2013
The Road Toward Smarter Nutrient Management in Municipal Water Treatment

December 11–13, 2013
Ensuring Urban Water Security in Water-Scarce Regions of the United States

CNW 3.0
2013–2014
Focused on catalyzing the widespread adoption of more sustainable and resilient water infrastructure systems in the United States