Charting New Waters

Convening Report

Financing Sustainable Water Infrastructure

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The Johnson Foundation AT WINGSPREAD

Conferences that Inspire Solutions

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Convening Report

Financing Sustainable Water Infrastructure

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American Rivers
Rivers Connect Us

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Executive Summary

Our nation's freshwater infrastructure faces a critical juncture. Largely built on systems developed during the 19th and early 20th centuries, our water infrastructure is aging, our technology outdated and our governance systems ill equipped to handle rising demand and environmental challenges. Additional strain is being placed on these systems from a variety of sources, including pressures from urbanization and changing climate conditions, such as increases in both droughts and extreme one-day precipitation events.

While these challenges are significant, they are not insurmountable. In fact, they can be viewed as drivers of much-needed change in how we finance and develop our water systems to meet future demands. New financing models and pricing flexibility, which are necessary to pay for new infrastructure and to support legacy systems, provide enormous opportunity for positive transformation necessary to keep pace with the rapid changes being experienced by counties, municipalities and investor owned utilities.

This report seeks to tackle these issues and deliver some recommendations on how to understand and confront the pressing need for more sustainable and integrated water infrastructure financing models. This report is the product of a meeting convened by The Johnson Foundation at Wingspread, in collaboration with American Rivers and Ceres, which brought together a group of experts to discuss ways to drive funding toward the infrastructure we need for the 21st century. Specifically, this group focused on the following questions:

- What new financing techniques can communities use to pay for integrated and sustainable infrastructure approaches?
- How can we direct private capital toward more sustainable water management projects?

The report finds that while options for more cost-effective, resilient and environmentally sustainable systems are available, they are not the norm. In fact, investment in inflexible and expensive "siloed" water systems is still pervasive, despite the fact that money available for financing water infrastructure is increasingly scarce.

Of equal concern is the inefficiency of the existing systems, which lose some 6 billion gallons of expensive, treated water each day due to leaky and aging pipes–some 14 percent of the nation's daily water use. This point is underscored by the fact that the American Society of Civil Engineers gives the nation's water systems a D-, the lowest grade of any infrastructure including roads and bridges.

The report also details the various financing mechanisms available to different water systems. While municipal bonds are the debt instrument of choice for utilities large enough to be able to attract capital from markets, the vast majority of water systems must rely on cash, state revolving loan funds, or other low-interest loan programs at the state and federal level. In fact, only about 1,500-2,000 of the roughly 52,000 water systems in the United States are large enough to issue their own bonds. Given these constraints, some systems are turning to private equity as a financing source.

There are, of course, numerous obstacles and challenges that stand in the way of transforming our water systems to ones that are more sustainable, resilient and cost-effective. One of the main impediments to change is the very nature of the systems themselves, where potable water, wastewater, stormwater, greywater and rainwater are not treated as part of an interconnected system, but rather as distinct, separately financed and regulated units.

In addition, the rate-paying public and locally elected officials must come to grips with the temporary nature of federal subsidies for infrastructure. Once these subsidies expire, ratepayers are left holding the bag for funding further maintenance, inspection and upkeep, which can be politically unpopular. Therefore, many jurisdictions are not able to fully recapture all relevant costs, leading to long-term financial shortfalls and suboptimal maintenance and upkeep of systems.

While these challenges and obstacles are formidable, the report makes clear that they are not insurmountable. Progress towards more sustainable, resilient and cost-effective systems is attainable, particularly if a long-term view is taken. While there is no silver bullet, the report outlines pathways that will improve chances of success. These include:

- **Recognize that local pressures will drive local solutions.** Our water systems are as diverse as the drivers of change that impact them. But solutions are emerging at the local level, including green infrastructure, closed loop systems and recycling. Financing models need to be developed that can support this type of local activity, which can then be scaled up.
- **Consumers should be given choices and options.** Today's water systems typically provide one product at a single price–focusing on potable water. While that has served us well, it is also true that potable water is the most expensive kind of water and is widely used for non-drinking purposes such as watering lawns, flushing toilettes and showering. Consumers should be given options that include differentiated rates for drinking water versus other types. Additionally, water systems should explore how to move beyond "minimum cost rates" in order to meet customer demands.

- **The financial health of our water systems is directly linked to their long-term sustainability.** Our nation's water systems need to embrace various financing changes in order to ensure long-term sustainability. These include full-cost accounting of water services; incorporating value-added services into the revenue picture to better align customers' perceived value with products delivered; improving the capture and dissemination of performance data to drive efficiency; and considering consolidation of certain systems to enhance efficiency.

- **Innovative financing models should be pursued to increase efficiency, add value to customers, and lower costs for providers.** These models should include: mechanisms to expand the pool of water service funding to non-traditional partners; increasing incentives and markets for distributed water services that include "low impact development," such as on-site treated wastewater for buildings; and other green infrastructure initiatives.

- **Alternative market-based solutions should be explored and evaluated for scalability.** These solutions could include: properly valuing and pricing ecosystems services, which provide enormous value yet are largely unaccounted for in the present system; developing securities to aggregate customer-financed projects such as greater "where it falls" water management; and creating private investment opportunities for efficiency gains from such things as retrofitting and closed-looped water systems in order to reduce system impacts and improve efficiency at both the building and neighborhood levels.

This summary provides an overview of the main sections and themes contained in the report, but is not a substitute for the full breadth of depth offered in the following pages.

Report Process

The Johnson Foundation, in collaboration with American Rivers and Ceres, convened a group of experts at Wingspread to discuss ways to leverage public funding and incentives as well as private financing to drive innovation and resources toward more sustainable and integrated management of water resources in the United States. This meeting was set apart from similar efforts to discuss water infrastructure systems by the unique mix of expertise represented. Public and private water utility managers, investment managers, investors, municipal bond raters and underwriters, non-governmental organizations, foundations and other stakeholders gathered to discuss the range of issues being faced and begin to chart the pathways toward innovative and sustainable funding mechanisms that support the long-term sustainability of our water systems–both built and natural.

The needs of communities vary significantly even though their challenges are similar. There is not a consistent approach that will work for all, rather a range of options and tools that allow for customized approaches that meet a range of interests. The shift toward a more sustainable and economically viable future will not likely be driven primarily by sweeping legislation or legal mandates, but by thousands of local infrastructure investment decisions. If those decisions are going to result in a more sustainable future, utilities must look for a portfolio of financing alternatives at the same time they are developing alternatives for more resilient systems. The convening was designed around three elements of a facilitated dialogue process. Two virtual convenings and one in-person meeting were conducted during the summer of 2011 as follows:

- Webinar 1, July 26, 2011: "What is Sustainable Water Infrastructure?"
- Webinar 2, August 10, 2011: "Unpacking the Financing Options"
- In-person convening at The Johnson Foundation at Wingspread, Racine, Wisconsin, August 16–18, 2011

Commitments to action

A unique component of this meeting was that each of the participants offered to advance solutions to the issues brought forth in the conference by committing to specific actions. Those commitments are included in this report.

Background

As the nation's water infrastructure ages and populations grow beyond the capacity of existing systems, we will need to deploy hundreds of billions of dollars to repair and expand drinking water, wastewater, and stormwater infrastructure. Simultaneously, our water infrastructure needs to be more flexible and resilient to increasingly unpredictable climate conditions that are forecast to become even more volatile in the future. As with our transportation and energy infrastructure, the nation's water infrastructure is at a critical juncture. An increasing array of options are emerging for transitioning toward more cost-effective, resilient, and environmentally sustainable solutions. However, investment in expensive, inflexible "siloed" water systems remains the norm. Regardless of the kind of systems we design, money for water infrastructure will be tight. We will need to identify new financing alternatives and spend those funds on the most effective use of our limited resources.

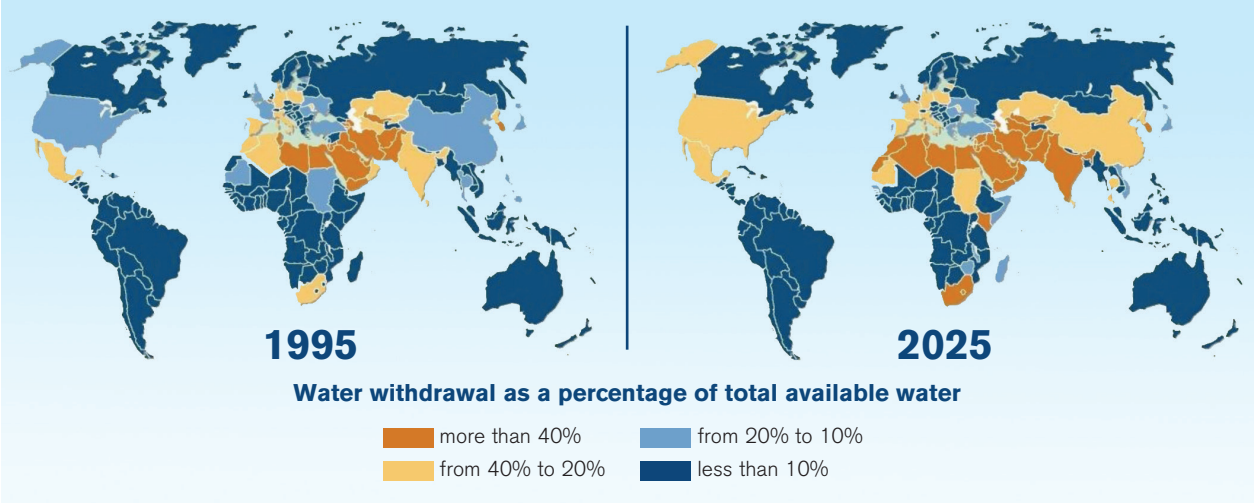
Through presentations, breakout session discussions and background materials, participants in the convening explored the fundamental underpinnings of the challenges we face. In order to identify lasting and more sustainable solutions, we first need to understand:

- The looming freshwater crisis
- The water industry and water sector, and how our infrastructure is managed
- What "sustainable" water infrastructure means
- Principles of financing water systems, including how funds are raised and deployed

A looming freshwater crisis

Many parts of the world face serious freshwater problems, and these are forecast to increase dramatically over the next 10 to 15 years (see Figure 1). Arid areas in the United States have long been challenged by scarce water, but population growth, competing economic uses, and dramatic changes in precipitation patterns are straining many areas to previously unknown levels.

Figure 1 **Average Sector Use: Domestic 10 percent, Industry 20 percent, Agriculture 70 percent**

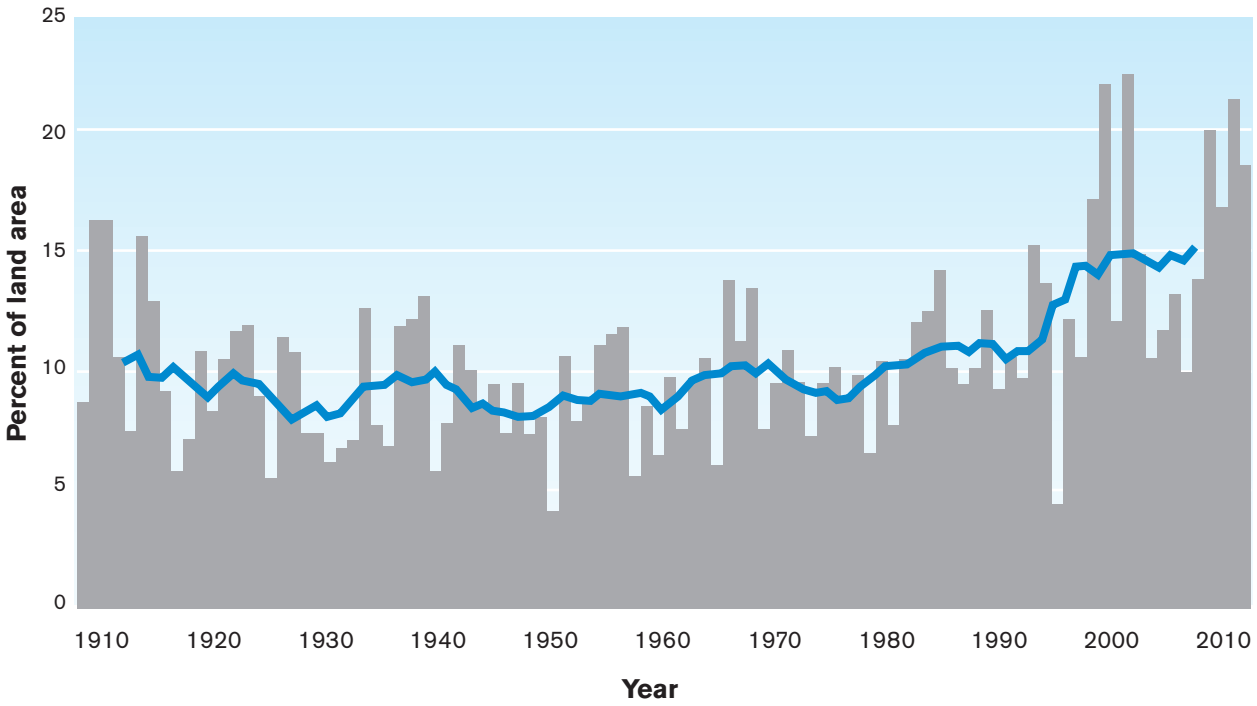


Source: World Meteorological Organization (WRO), Geneva, 1996, Global Environmental Outlook (GEO), 2000, United Nations Environment Programme (UNEP), Earthscan, London, 1999. Slides courtesy of Mark Shannon, Center of Advanced Materials for the Purification of Water with Systems (WaterCAMPWS), used with permission.

A USGS study that looked at tree rings over the past 500–1,000 years showed an unprecedented decline in snowpack in the Rockies since the 1980s as compared to the historical record. Snow "reservoirs" provide water for 70 million people in the West, thus precipitation shifts will have a major impact on a large swath of the economy.[1] Nationally, estimates suggest that by 2040 we may need from 29 to 62 percent more water to serve our growing population and higher energy demands.[2] (Energy uses more water, primarily for energy generation and cooling, than any other sector except agriculture.) And although technology and water efficiency efforts may flatten that curve, we will still need to be vigilant to avoid having clean water supplies become a serious constraint to economic growth.

Across the entire country, communities are struggling to meet increased water needs, to respond to longer and deeper droughts, and changes in snow and rainfall patterns, and also to limit damage from more intense storms. Over the past 100 years, the occurrence of extreme one-day precipitation events has increased (see Figure 2). Models for the Great Lakes, the drinking water source for 40 million people, suggest that raw sewage overflows into the lakes could increase by 20 to 50 percent as city sewers are increasingly overwhelmed by

Figure 2 **Extreme One-Day Precipitation Events in the Lower 48 States, 1910-2008**



The figure shows the percentage of the land area of the lower 48 states where a much greater than normal portion of total annual precipitation has come from extreme single-day precipitation events. The bars represent individual years, while the line is a smoothed nine-year moving average.

Source: U.S. EPA, "Climate Change Indicators in the United States," April, 2010, http://www.epa.gov/climatechange/indicators/pdfs/ClimateIndicators_full.pdf.

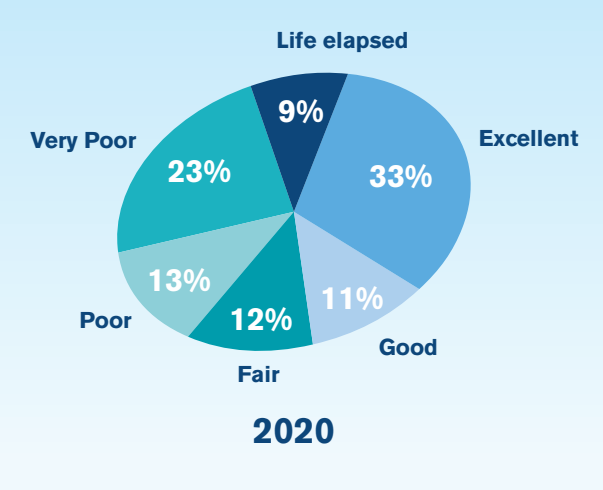
[1] "USGS Study Finds Recent Snowpack Declines in the Rocky Mountains Unusual Compared to Past Few Centuries," U.S. Department of the Interior, accessed January 6, 2012, http://www.doi.gov/news/pressreleases/USGS-Study-Finds-Recent-Snowpack-Declines-in-the-Rocky-Mountains-Unusual-Compared-to-Past-Few-Centuries.cfm.

[2] Figures courtesy of Mark Shannon, Center of Advanced Materials for the Purification of Water with Systems (WaterCAMPWS).

more intense storms.[3] The U.S. EPA estimates that today between 1.8 and 3.5 million Americans get sick annually from recreational contact with sewage-contaminated waters from sanitary sewer overflows.[4] And if pathogens in sewage penetrate water treatment defenses the risks are much more serious, as Milwaukee experienced in 1993 when 400,000 were sickened and 80 people died from cryptosporidium in the city's drinking water.[5]

Added to these challenges is the fact that existing water infrastructure systems in the United States are rapidly aging, with many pipes and treatment plants already beyond their effective lives. The American Society of Civil Engineers (ASCE) gives the nation's water systems the lowest grade of all infrastructure, a D-, though bridges and roads get much more attention.[6] Ten years ago, EPA estimated that by 2020 the deteriorating age and condition of nearly half the water and sewer pipes in the United States would be considered "poor," "very poor," or "life elapsed" (see Figure 3). This is not only inconvenient and a strain on local ratepayers when replacement costs hit, but nationally, we lose over six *billion* gallons of expensive, treated water each day because of leaky, aging pipes. That represents 14 percent of the nation's daily water use. Even more worrisome, we are losing large elements of our natural or "green infrastructure" that provide hard-to-price but extremely valuable ecosystem services from flood storage to water supply and filtration, and that also serve as the basis for $730 billion in annual United States economic activity, according to the outdoor recreation industry.[7]

Figure 3 **Projected Percentage of Pipe by Classification, 2020**



Source: U.S. EPA, "The Clean Water and Drinking Water Infrastructure Gap Analysis," September, 2002, http://water.epa.gov/aboutow/ogwdw/upload/2005_02_03_gapreport.pdf.

According to the EPA, 22 states have lost at least 50 percent of their original wetlands and seven states have lost over 80 percent of their original wetlands (see Figure 4). Wetland losses continue to climb despite efforts over the past thirty years to slow the pace. Many small streams–the capillaries of the watershed–are also routinely filled in or forced underground into pipes where they are not available to wildlife and unable to perform essential functions like slowing and storing rainwater and recycling excess nutrients. In addition, development in floodplains and engineered structures like riverbank hardening, levees, and floodwalls eliminate the natural ability of rivers to move within their floodplains and store floodwater.

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[3] U.S. EPA, *A Screening Assessment of the Potential Impacts of Climate Change on Combined Sewer Overflow (CSO) Mitigation in the Great Lakes and New England Regions (Final Report)*, (Washington, DC, EPA/600/R-07/033F, 2008).

[4] "SSO Fact Sheet: Why Control Sanitary Sewer Overflows?" U.S. EPA, July 21, 2003, accessed January 10, 2012, http://www.epa.gov/npdes/sso/control/index.htm.

[5] N.J. Hoxie, J.P. Davis, J.M. Vergeront, R.D. Nashold, and K.A. Blair, "Cryptosporidiosis-associated mortality following a massive waterborne outbreak in Milwaukee, Wisconsin," *American Journal of Public Health* 87 (1997): 2032-2035.

[6] American Society of Civil Engineers, accessed January 6, 2012, http://www.infrastructurereportcard.org.

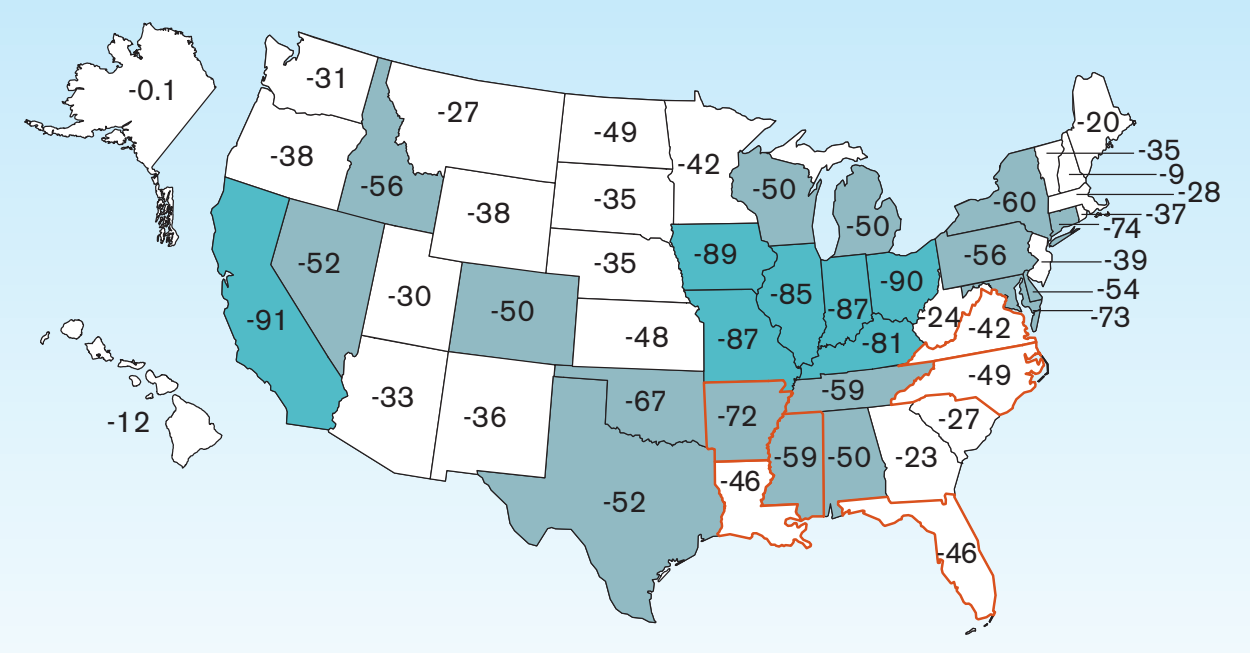
[7] Outdoor Industry Foundation, "The Active Outdoor Recreation Economy," Fall, 2006, http://www.outdoorindustry.org/images/researchfiles/RecEconomypublic.pdf?26.

Losing our natural infrastructure has costly impacts. As wetland losses have risen, the Army Corps of Engineers has increased flood control expenditures, but flood damages have risen faster.[8] The effect on aquatic fish and wildlife is also telling: In North America, 40 percent of freshwater species are extinct or at risk of extinction, and scientists have documented a 50 percent decline in populations of freshwater species over 30 years.[9]

Managing our water infrastructure

Our water infrastructure serves a number of purposes. Water supply, wastewater, and stormwater are the most recent divisions, though in reality it is all "one water" simply moving through our systems in stages of cleanliness and delivery. In this meeting, the conversation focused primarily on urban uses of water: residential, commercial, and industrial supply, wastewater treatment, and stormwater management. The agencies that oversee these responsibilities vary in their form, governance, ownership and structure. They include public as well as private systems, and public systems that are managed by private contract. Their jurisdiction may coincide with a municipality or they may be a special district that doesn't directly align with political boundaries. Oversight can be appointed or elected. They may supply directly to "retail" customers (homeowners, businesses, etc.) or supply to a wholesale customer which in turn redistributes, or both.

Figure 4 **Percentage of Wetlands Acreage Lost, 1780s–1980s**



Twenty-two states have lost at least 50 percent of their original wetlands. Seven states—Indiana, Illinois, Missouri, Kentucky, Iowa, California, and Ohio—have lost over 80 percent of their originial wetlands. Since the 1970s, the most extensive losses of wetlands have been in Louisiana, Mississippi, Arkansas, Florida, South Carolina, and North Carolina.

Source: Mitch and Gosselink, *Wetlands, 2nd Edition*, (Van Nostrand Reinhold, 1993).

[8] D. Hey, J. Kostel, and D. Montgomery, "An Ecological Solution to the Flood Damage Problem," in *Finding the Balance Between Floods, Flood Protection, and River Navigation*, ed. Criss and Kusky (Center for Environmental Sciences at Saint Louis University, 2009), 73-80. http://www.wetlands-initiative.org/images/pdf-docs/pulblications/FLOOD/research/eco_soln_flood_damage_problem.pdf.

[9] "Native Aquatic Species," Pacific Rivers Council, accessed January 6, 2012, http://pacificrivers.org/conservation-priorities/native-aquatic-species.

What do we mean by "sustainable" water systems?

Rather than re-hash the meaning of "sustainable" in the context of municipal water systems, we were able to build upon earlier efforts that addressed the components of sustainability.[10] Multiple themes emerge from among the reports. Our water infrastructure, designed in the 19th and early 20th centuries, no longer meets today's needs and challenges. Water management agencies have focused for over 100 years on the hardware of water and wastewater management: the pipes, pumps and reservoirs needed to move the drinking water, waste and stormwater through the system or store it until needed. These rigid systems were designed and operated based on the assumption of stationarity in our natural systems. Those assumptions are now seen as short-sighted and no longer match our understanding of nature. We need to transition from systems built around managing water under historical conditions of "certainty" to those built around flexibility to respond to unpredictable or rapidly changing conditions. First, we need to conceptualize our water infrastructure as an integrated system of natural water resource systems (green), and built/engineered pipes and treatment plants. We also need to move from an emphasis on centralized infrastructure to decentralized systems that are more resource and energy efficient, and scalable from the site to city level. We have to integrate all water systems to use the "right water for the right need" (e.g. watering landscapes with rainwater or non-potable water), reducing treatment costs and the length of pipe needed to fulfill specific water needs. We must start extracting the significant resources (nutrients and energy) found in wastewater rather than discarding them as waste. And finally, every dollar spent on water infrastructure must provide multiple benefits, such as lowering urban temperatures, increasing green space and parks, or creating local jobs.

Principles of sustainable water infrastructure

Basic principles for sustainable water infrastructure management:

1. **Adaptable**—Maximize flexibility and future adaptability to climate change and other conditions
2. **Watershed scale**—Plan and implement infrastructure at a watershed scale
3. **Natural infrastructure**—Protect and restore natural system functions
4. **Decentralize**—Integrate decentralized, distributed green infrastructure that replicates natural hydrology with built infrastructure
5. **One water**—Integrate drinking water, wastewater, and stormwater and fit the best water to the use
6. **Resource Efficiency**—Optimize conservation and efficiency investments before developing new supply or expanding treatment
7. **Multiple benefits**—Maximize the environmental, social, and economic benefit of every infrastructure dollar
8. **Pricing**—Price water, wastewater, and stormwater for ratepayers/customers to meet the total cost of sustainability requirements
9. **Full life cycle**—Plan, manage, and account for full life cycle infrastructure expenditures
10. **Asset management**—Apply best industry practices for repair/rehabilitation and replacement and innovative management
11. **Good governance**—Governing boards, city councils, and special utility boards should be designed to ensure sustainability and transparency

[10] R.D. Bolger, D. Monsma, and R. Nelson, "Sustainable Water Systems: Step One—Redefining the Nation's Infrastructure Challenge. A report of the Aspen Institute's Dialogue on Sustainable Water Infrastructure in the U.S.," May, 2009. Additional references can be found in Attachment A: Background Materials.

These are the realities of our fiscally-constrained and climate-altered world. We are at a turning point with our water infrastructure investment. We can either continue to build the equivalent of 1960s-era mainframe computers or move to laptops, tablets and cloud storage. (Refer to Attachment A for more background on sustainable water infrastructure.)

Understanding the financing of water systems

Water systems have two primary approaches to financing system improvements and maintenance: cash financing or debt financing. Cash financing is limited to the revenue at hand, which is usually from water rates, service fees, connection fees from new accounts, or taxes. Because water treatment and delivery is a capital-intensive endeavor, cash is usually insufficient to finance major system enhancements. Debt financing is the typical way that utilities raise upfront capital to invest in their systems. For systems large enough to sell debt on the capital markets, municipal bonds are the debt instrument of choice. Water utilities can issue revenue bonds that are backed by cash flows from water rates, fees or dedicated taxes, or they can issue general obligation bonds that are backed by the general tax-raising ability of the local government.

Systems whose capital needs are too small for the bond market typically rely on state revolving loan funds or other low-interest lending programs at the state and federal level. Only about 1,500-2,000 of the roughly 52,000 water systems in the United States are large enough to issue their own bonds (see Figure 5). For the rest, cash or federal or state loans and grants are the predominant means of financing system improvements.

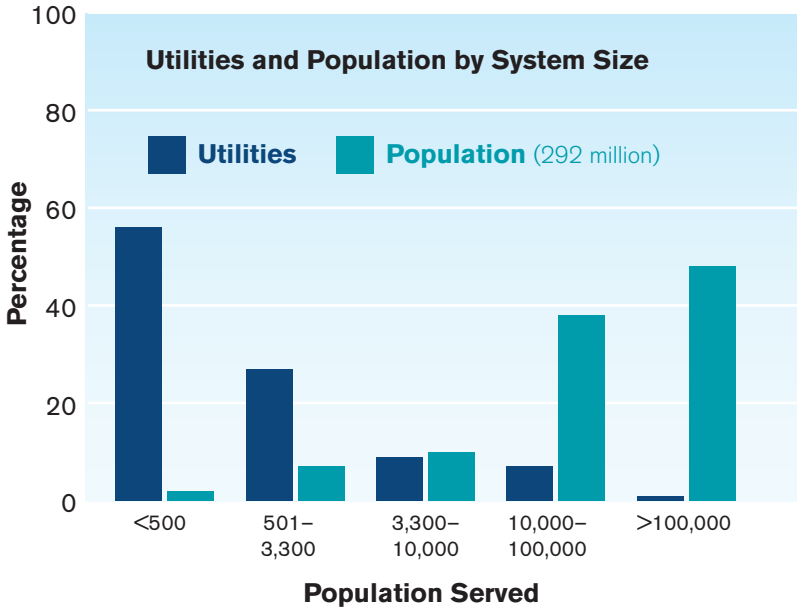
Because cash, public grants and low-interest loans are limited, and because smaller systems may be serving populations with lower income and operating at diseconomies of scale, their funding needs and solutions are very different from those of large water systems which deliver the majority of water in the United States. As funding needs and system disrepair become dire, many of these systems may have few options other than public-private partnerships or privatization.

Funding options

- Rates and charges
- Property taxes
- Fees (e.g. connection)
- Grants
- Insurance
- Customer services
- Private investment
- Debt-based capital financing

Following the economic downturn, the ease of financing capital improvement plans through the capital markets changed. The housing collapse took with it the bond insurers that protected investors from unexpected credit default of bond issuers, meaning that credit quality–including the ability to honor debt obligations by securing sufficient revenue–was more important than ever. In addition, the spread (or difference in interest rate) for AAA-rated issuers and AA or A widened significantly from before the

Figure 5 **One percent of the utilities serve 46 percent of the population**



Source: U.S. EPA, *EPA Factoids: Drinking Water and Ground Water Statistics for 2008*, (EPA/816/K-08/004, 2008).

downturn. Whereas AA-rated systems in 2008 that may have only paid 0.20 percent more to finance a capital improvement project than the highest-rated entities, in 2011 they were paying 1.0 percent more in interest. The spread in interest rates is even higher for issuers in some states–in 2010, some 1.8 percent higher for California systems, for example. For a typical bond issuance of several hundred million dollars, this higher interest brings significantly more cost to ratepayers. The increased spread is offset, however, by extraordinarily low market rates. Whether the spread between the least risky utilities and the rest will remain as wide after economic recovery is unknown. However, the increasing sensitivity of investors to hidden risks and the growing repository of tools available to investors to assess water risks suggest that utilities can expect to see increasing costs and scrutiny for capital financing.

Investor-owned utilities (IOUs)

While most water utilities in the United States are owned by local governments, around 20 percent of water is delivered and treated by investor-owned utilities. Many of these are publicly-traded companies, but some are privately owned. For these companies, the ongoing need to recover costs and build more efficient systems to manage costs remains the same as in the public sector. Unlike most utilities owned by local governments, IOUs must submit proposed rates to regulators in Public Utility Commissions. These regulators shape the operating environment, recoverable costs and return on equity for IOUs and are an important audience for enabling sustainable water management within regulated markets.

As the debt capacity of public systems comes against significant funding needs, some systems are turning to private equity or infrastructure funds to finance system improvements. Private capital can and does play very different roles in the water sector, a nuance that is often lost in the discussion around "privatization" of water assets. At one end of the spectrum, public water utilities can outsource management of some aspects of the system to the private sector–this is often done through a time-limited contract or may even be implemented through a lease of assets. For example, a public water utility may contract a large water services provider to manage the day-to-day operations of a water or sewage treatment plant. In many cases, private capital may have nothing to do with this arrangement, as the water services provider may be a publicly-traded company.[11] This arrangement is very different from the role that a private equity or infrastructure fund may play. A private equity fund may construct a water treatment plant using investor capital, with return to investors generated by water sales to a public utility. In some instances, a private equity or infrastructure fund may even wholly privatize a water system, so all assets and management responsibilities are in the hands of the fund. Privatization of public systems can meet the immediate needs of distressed systems, but the rate of return required by private investors is generally much higher than for municipal bond investors.

Whatever the source of financing, capital is never free. Ultimately the money invested in the system and the premium to the investor must be paid. Revenues from ratepayers will continue to be the primary source of repayment.

[11] Though often confused with each other, the private sector and private capital are not synonymous.

The Challenges We Face: Obstacles to Transforming Our Water Systems

As we think about a strategy for financing more sustainable water infrastructure systems, we need to do so with a clear understanding of the complex challenges the industry is facing and an understanding of the financing factors influencing the alternatives. By helping industry members and key stakeholders understand the challenges, we hope to generate more promising decisions and a new way of doing business. At the same time, we are beginning to shift the conversation with the capital investment community to help create a means of better informing their decisions and helping to remove financial hurdles to developing more resilient water systems. The group discussed a wide range of potential challenges.

A historically segregated approach to water management

Presently, most systems are managed as centralized and single-purpose water infrastructure, each focusing on one part of a whole: drinking water, wastewater and stormwater (see Figure 6). There is a growing consensus that such siloed systems are not effectively adapted to the challenges that the water industry will face in the 21st Century. Furthermore, they do not allow for an integrated approach to managing for mutual benefits and harnessing the value of the resources. Several negative consequences result, one of which is financial.

The cost of financing siloed systems

Because water systems are rarely integrated, many households and businesses are being serviced by two to three different water utilities. This means that the water-related debt burden for households and businesses may be multiples of the average system's long-term debt per household. If drinking water utilities' unmet capital needs are representative of the water sector as a whole, the upfront capital and resulting rate increases that will be sought as these systems age could accumulate to present real affordability challenges to customers. In recent years funding shortfalls have led to renewed calls for federal funding of infrastructure. The National Infrastructure Bank is one vehicle that has been proposed to allocate federal funding to leverage private capital. At present, however, the proposed fund does not address the need to prioritize sustainable and resilient infrastructure.

Increasing conservation, decreasing revenue, increasing costs

One trend that many utilities are seeing is decreased per capita use of water. For example,

Figure 6 **Siloed Systems**

Source: CollinsWoerman

starting in the 1960's, Seattle Public Utilities has periodically projected water demand and proactively responded by implementing conservation programs, including conservation pricing, to help offset future demand (see Figures 7a and 7b). Despite a near doubling of the population the projected increases have never materialized and total water use has instead *decreased* over the last twenty years. The Seattle experience is an extreme example of a trend observed in other regions. From a natural resource conservation perspective, this trend is beneficial. But it raises challenges for utilities faced with large fixed costs for infrastructure capitalization, growing per unit operating costs and decreasing revenues.

Full life cycle costs of water systems

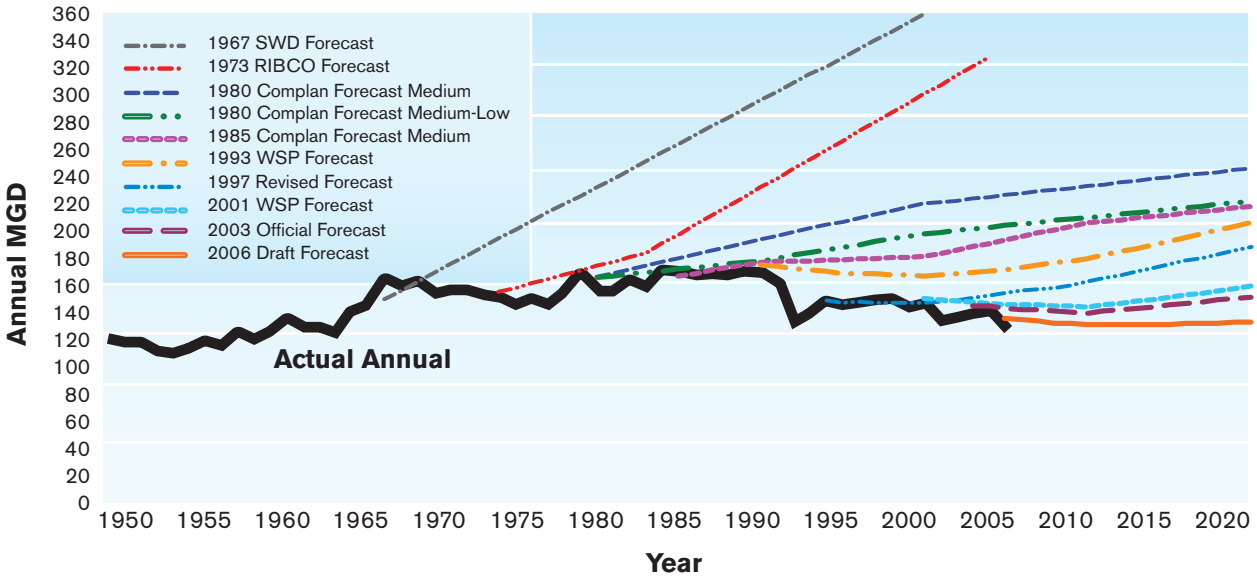
- Operations
- Maintenance
- Repair and replacement
- Growth/expansion
- System improvements consistent with industry standards
- Evolution and transformation

This covers drinking water, wastewater, and stormwater. Additionally, some participants highlighted the costs associated with un-captured externalities such as carbon emissions.

Lack of full-cost pricing

Another broad challenge for the full spectrum of water agencies is the need to recover costs for the regular maintenance and improvement of the system. In most cases, a substantial portion of the initial capital investment was heavily subsidized by federal grants, thus allowing utilities to provide service without passing on the infrastructure's full cost, much less the externalized costs of water withdrawal or pollutant discharge. Customers who have enjoyed these subsidies often do not understand why their water rates are suddenly increasing as new investments are made to maintain infrastructure. As a result, many utilities choose to defer maintenance, deploy capital investments, and instead forgo improving their systems' environmental performance while running operating deficits. Understandably, locally elected or appointed officials are often reluctant to accept a rate structure that would allow full recapture of all relevant costs, including the routine inspection and maintenance of the system. This leads to long-term financial shortfalls and equipment that is insufficiently maintained and updated.

Figure 7a **Long-Range Planning**
Water Demand and Past Forecasts for Seattle Public Utilities



Source: Seattle Public Utilities

Lack of continuous funding that covers long-term, full life cycle of our water systems

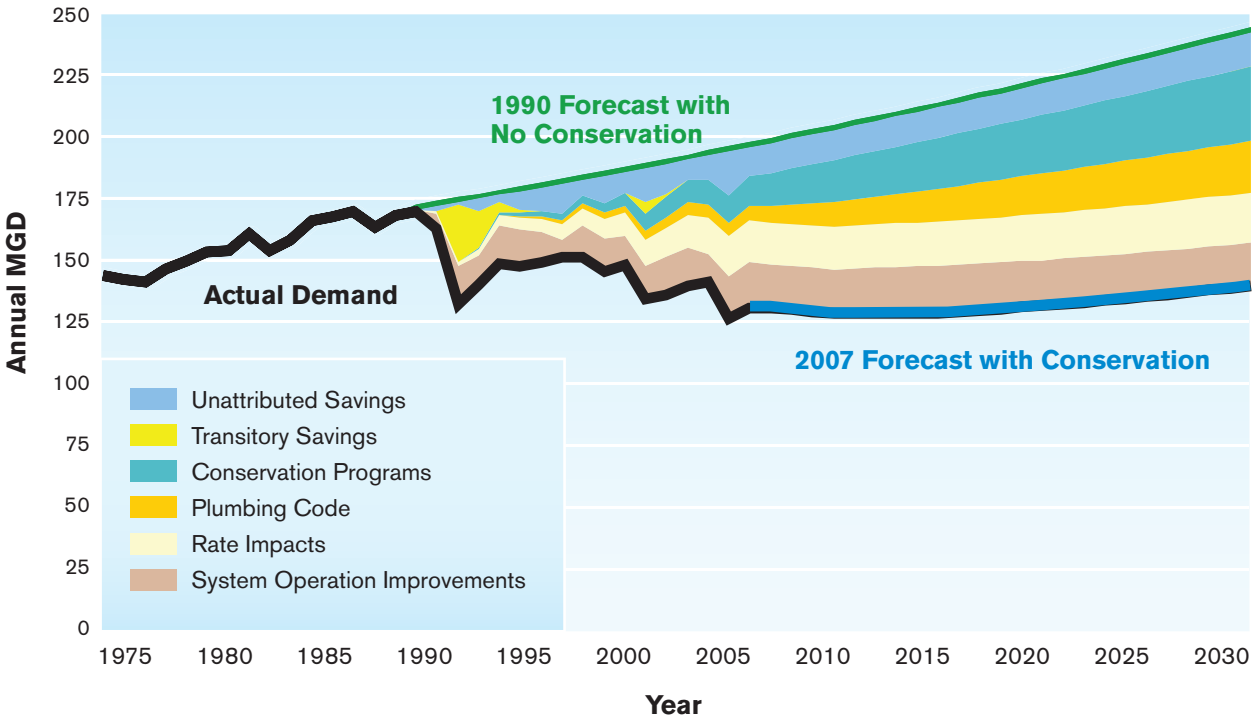
Cash flows from rates, fees and taxes often fall short of covering the full costs of the system. As a result, systems must seek debt financing to address both upfront capital and long-term maintenance. Within the sector, there is no expectation of utilities consistently matching revenues to the full cost of service delivery and system maintenance (including replacement and repair schedules, triple bottom line impacts and long-term asset management). Furthermore, the utilities are not expected to take system maintenance costs into consideration for long-term planning (see Figure 8). As a result, systems are chronically underfunded.

Instead, needed system improvements frequently are deferred as revenues are only sufficient to meet debt obligations and operational costs. In some places, growth itself was relied upon to finance the maintenance of the existing system, in the form of connection fees. When growth slowed, some utilities absorbed significant shocks to their revenue. The alternative–matching the full costs to maintain the system to consistent revenues–is so rarely practiced that the sector as a whole could benefit from guidance.

Lack of accounting for natural infrastructure or other ecosystems services

Our accounting systems have difficulty recognizing unconventional assets, particularly the natural assets that provide water storage, filtration, and delivery. This makes it difficult to include the value such assets provide on a utility's balance sheet, or to finance the acquisition or development of these assets. In many cases the acquisition and management of these assets are much more

Figure 7b **Impact of All Forms of Conservation Water Demand and Past Forecasts for Seattle Public Utilities**



Source: Seattle Public Utilities

economical than built infrastructure such as treatment plants and reservoirs; the most well-known case of this is New York City's purchase of forested upstream land that filtered the city's water at a tenth of the cost of a conventional filtration plant.

Investor expectations

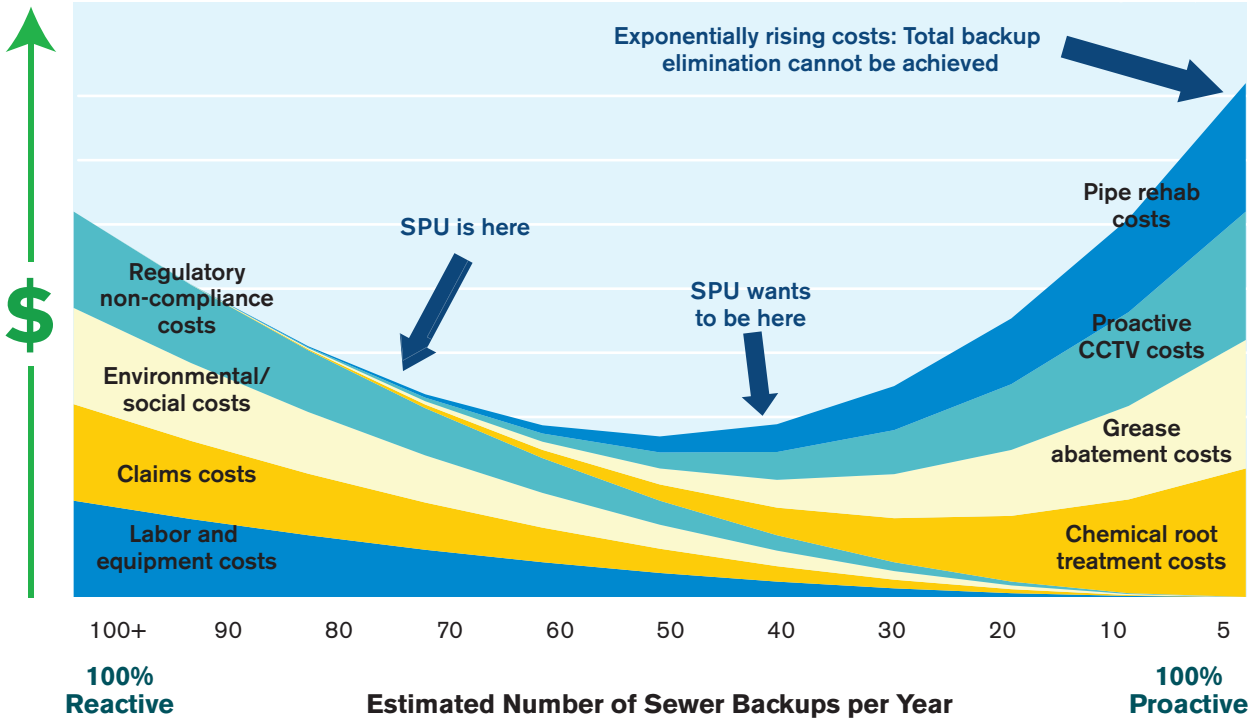
Whether public or investor-owned, utilities rely on capital markets to finance water infrastructure. While public water systems have traditionally been financed through the municipal bond market, the extraordinary needs of many systems are leading policymakers and utility directors to look beyond the bond market for much-needed capital. For investor-owned utilities, both shareholders and bondholders provide investment capital. Consequently, investor expectations shape the way both public and investor-owned utilities manage water.

Among those expectations are that the sector's revenue streams are secure because the service is essential and monopolistic, and that the sector is managed by risk-averse professionals using proven technology. These factors cause the sector to be viewed as low risk, which for public systems especially results in a low risk premium demanded by municipal bond investors. Participants at Wingspread discussed emerging trends that might cause these assumptions to break down over the long term.

Rates of return

Public systems looking for new financing streams beyond the tax-exempt bond market should recognize that equity investors will expect a higher rate of return. Eventually that higher premium has to be recovered, whether through rates, fees or taxes.

Figure 8 **An Example: Tying Together Service Levels, Lifecycle Costing, and the Triple Bottom Line**



Source: Seattle Public Utilities

Monopolistic, essential service provider

While utilities largely operate in a non-competitive environment, new technologies are emerging that could disrupt their historic status as monopolies. Onsite water filtration can allow water users to obtain high quality water and wastewater without any reliance on centralized water utilities. While this is an emerging trend, most utilities do not factor this variable into future demand projections. Even without disruptive technologies, demand for municipal water has dropped significantly over past decades. Yet many systems tend to linearly extrapolate historic demand to determine the necessary rate adjustments to repay capital programs. As the cost of utilities' services increase, water behavior and technologies are likely to adapt to force demand downward. For overleveraged systems, this inward demand shift can trigger a credit deterioration spiral. Utilities and investors should recognize these dynamic trends.

Risk aversion, dependable technology

One theme that was clear is that even though utility managers are very risk averse, rate-setting bodies may not be. Chronic deferred maintenance and under-investment are hidden risks that may not be reflected in the price paid for capital. Further, the challenges facing the sector will require new approaches, including decentralized and less proven technologies. This will require new skills, experimentation, and the acceptance that not everything will succeed. Increased innovation will need to become part of routine operations and should be rewarded appropriately.

Data-poor market

Investors have typically valued the traditional monopolistic, essential-service aspects of the water infrastructure sector. Very little data is available on the state of water systems or their sensitivities to declining water demand, volatile supplies, and variable costs of energy and other system inputs. As a result, the market does not factor the risk or resilience of the system into the prices. Instead, investor biases (for example, biases against water utilities in the Southwest or Great Lakes) trump the actual performance of these utilities. Even rating agencies are challenged to find material information on system performance since so few utilities collect that information. Consequently, the utilities that are at the top of their class in terms of risk management or system maintenance are unlikely to see more competitive cost of capital. Better data would help the market price more correctly and would help utilities manage their risks by benchmarking themselves against other systems.

Rate suppression

Americans pay around a dollar for ¾ ton of water delivered to their homes each day[12] and similarly low rates for sewerage services. Some cities have experienced significant rate increases in recent years, yet resistance to bringing rates in line with the real costs of services persists despite the relatively low cost of service. That is due in part to the reality that rate decisions tend to be short-term and politically influenced. Lack of political will to evolve our water systems and short political timelines can have a tendency to reinforce status-quo decision-making and put downward pressure on rates. Going forward, meeting public health and system performance needs while maintaining rates at 2 percent Area Median Household Income (a threshold commonly used by the EPA) will be increasingly difficult, especially if we continue to build systems in the same way. In the meantime, the negative impacts of suppressed rates are felt in several ways.

[12] Denver Water, "2010 Comprehensive Annual Financial Report," June 1, 2011, http://www.denverwater.org/docs/assets/ 6C28411A-E112-FBD9-E5A84D8D42B9A128/2010_annual_report.pdf.

Short-term management decisions and higher cost of capital

Ultimately, this resistance to higher water rates often results in utilities exhibiting less-than-optimal system maintenance and neglecting long-term needs until a crisis forces them to act. At that point, a rate increase can be justified as a response to pending system failures. Ultimately the artificial suppression of water rates can defeat the very intention of keeping water affordable. Financing system improvements in response to crisis can force systems to go to market when their weak financial condition demands a higher rate of return. Ratepayers then end up paying more for system repairs in the form of higher interest payments and may be paying for poorer services. Perversely, this crisis-response mode can make utilities eligible for emergency funding available from state or federal government that is offered at a lower cost than market, which perpetuates the problem of reactive system management and persistent underpricing.

Under-valued water distorts consumer behavior

Historically, low rates for water services in many instances have encouraged inefficient water use and excessive water treatment demand by consumers. At one ideological extreme, consumers see water as an unlimited "right" and feel it should be free–without regard for the cost of treatment and delivery.

Lack of public understanding and awareness

The general public, and ratepayers in particular, often don't have the right information to understand the full costs of providing their clean drinking water, sanitation, and stormwater services. In addition, water utilities do not necessarily invest in understanding what services their customers value most. As a result, they have been resistant to rate increases to cover more costs, and the expectation remains that water should be as inexpensive as it has been historically.

Limits of existing market instruments to fund decentralized systems

As utilities look beyond their own system to the built environment of the communities they serve, some are seeing that decentralized approaches may actually deliver higher value for their customers. For example, Philadelphia decided that a centralized stormwater system was less desirable for the city's residents than a network of green infrastructure that yielded the multiple benefits of flood control, water quality protection, temperature moderation, and recreational amenities or aesthetic enjoyment. Yet the existing markets for financing water systems are not adapted to financing decentralized, customer-financed interventions. In many ways the problem is similar to the financing of energy efficiency or distributed energy generation. The bond markets are traditionally used to finance development of centralized systems that are wholly owned by the issuing entity and secured by the revenues and physical assets of the system. When a utility wants to finance work with its customer base to develop a citywide network of green infrastructure on private land, the bond market may no longer be a viable option.

Variability in the systems

While the majority of the utilities represented at the conference served large urban municipalities with growing customer bases, they recognized that significant diversity exists in the industry. There is not a consistent need among utilities that allows for a one-size-fits-all approach to financing transitions to sustainable systems. As a result, more work remains to understand and address the unique financial needs of big versus small systems, the related challenge of urban versus rural systems, and systems that serve growing, versus declining populations.

Opportunities and Solutions: Sustainable Financing for Sustainable Infrastructure

Through presentations, plenary discussions, and small group sessions, participants explored incentives for funding sustainable water infrastructure, innovative financing options and mechanisms for transforming the industry. There was a recognition that near-term modest steps needed to be taken at the same time that the industry moves toward more transformative change. Discussion confirmed that utilities and resource planners across the country are using a range of mechanisms for financing capital investments in infrastructure and ecosystem restoration. Yet there is no silver bullet. No matter how water systems are financed, the primary challenge will remain: ensuring sufficient revenues to support repayment of the needed financing for capital improvements and resource intensive system upgrades.

This is the case with both traditional hard infrastructure and natural system designs. And it is especially true when considering the need to fund the full life cycle of sustainable systems. Given the tendency for systems to set rates and manage reserves to meet only near-term operating needs, the conference participants emphasized the imperative to plan for long-term needs (including aging, in-place systems) and begin to incorporate more resilient and flexible natural infrastructure elements. This shift in the culture of infrastructure planning must happen rapidly, as municipalities throughout the country face pressing needs.

Is there a way to harness the sense of acute urgency to inspire action? The following steps were identified as key elements of a roadmap toward more sustainable decision making and more resilient systems.

We need to change our expectations of how we manage water

The conversation made clear the fact that no single actor is going to catalyze change. Many players need to work together to realize a more sustainable vision for the future and design better alternatives, including:

- System "owners," whether they are shareholders, or customers and ratepayers.
- Capital providers (the capital markets, investors, state revolving funds)
- Sector leaders and norm setters (leading utilities and trade associations)
- Interested "outsiders" (disruptive innovators, consultants, service providers, and non-governmental organizations)

Solutions will be locally-driven

While there is no single solution for the distinct needs of communities, there are a growing set of tools that can be adapted to the needs of particular places. Participants agreed that the shift toward a more sustainable and economically viable future will not be driven by top-down mandates, but by thousands of local infrastructure investment decisions. These decisions will be forced by different pressures. In some places, the need to comply with strong water quality standards will spur innovation in distributed systems. In other instances, disruptive technologies like closed-loop water designs for buildings may be such a threat to water utilities' traditional business models that utilities will have to change their approach to service provision. Whatever the drivers, there are changes happening in the water sector that demand new financing

tools and renewed attention by investors on how well-prepared water systems are to face the sector's changing business environment.

A handful of cities were cited as models in integrated water management, including Seattle, Philadelphia, and San Francisco. In size and socioeconomics, these cities face different realities than many other water systems in the country. While these leadership utilities can chart a path forward, the solutions for smaller or less wealthy communities may be different.

Customers needs and values drive innovative and customized solutions

There is a difference between what people value about water and what their water service providers value. There is, however, agreement on what each group thinks is being provided: gallons of water at the lowest possible price. This shared definition of the product is a key factor that drives permanent under-investment in infrastructure. However, the spread in values creates an opportunity to price water based on its use–what the customer is willing to pay for such uses–and can create a new way of doing business for water service enterprises.

Nearly 200 gallons of water enters our houses each day. Most of the water we use is for keeping our lawns green, flushing, cleaning, and showering. Very little of it is actually used for drinking, the use that requires the highest standards for cleanliness. Users value each of those applications differently, and would probably pay different prices for each type of use. That small fraction that we drink, however, is what drives the cost of our water. Similarly most of what goes into the sewers is not sewage. But the cost of conveying and treating sanitary waste back to near-potable standards is what drives our bills.

Water service providers have been very good at delivering the most expensive goods (drinking water and sewage treatment) at minimum costs. Utilities strive to provide service (gallons of an undifferentiated product) at the lowest cost. And because water services have been provided relatively inexpensively and in an undifferentiated fashion, the infrastructure tends to be invisible to ratepayers until there is a problem: service is interrupted, basements get flooded, a boil order is issued, sewers overflow, etc.

But we are being charged too little for a product that is on average better than what we need. As long as costs are low, we will use it without differentiating or prioritizing among the various uses. When that small fraction of what we use makes every other use much more expensive, then different values might start to matter.

There is an opportunity in this era of increasing costs and infrastructure replacement needs to differentiate what customers are offered. Some may not wish to pay for irrigating lawns with drinking water, but would be willing to use a different source for a lower cost. Some may wish to pay a bit more for filtered water provided at the tap. Others may wish to secure insurance on their lateral connections so that they do not suffer (or inflict) sewage backups. Others might wish to invest in natural resource health in the areas their water comes from as insurance against future costs. Water "systems" should explore how to move beyond "minimum cost rates" to providing differentiated services based on what their customers value. This can be as straightforward as revisiting maintenance and construction activity based on the level of service customers want (as Seattle recently implemented), or it might be as complex as marketing other consumer goods. What is required, however, is that in an era of increasing rates, customers have the option to choose what they value and that providers begin to move from engineering economics to market economics.

Recognizing the link between financial strength and sustainability

Participants underscored that financing and good management of water systems are inextricably linked and should include these steps:

- **Recognize the full cost of water services as part of a solution for creating sufficient and more stable revenues.** Full life cycle pricing, a term for setting rates to reflect the true cost of current water services as well as future water supply and treatment needs, is the backbone of sustainable systems. Without stable and sufficient revenues, systems cannot deliver high quality services or environmental performance.
- **Building support among ratepayers and regulators to support financially viable systems.** Securing adequate rates or setting higher prices takes political will. If ratepayers are to willingly pay more for water, system managers must better understand what services their customers value and use that knowledge in messaging to regulators, political decision makers, and ratepayers. Ultimately, people will be more willing to pay increased rates if they understand the increased public benefits that will result.
- **Incorporating value-added services into revenue generation structures.** Most water systems still rely solely on volumetric pricing to generate revenues. When the economy softens or droughts persist, this business model puts systems at financial risk. In good times, volumetric pricing also encourages water systems to invest more in hard infrastructure to deliver more water than in tools to manage demand for water. By linking revenue to the value-added services, the rates will be based on an array of services provided and better align the system costs with the values customers are willing to pay for.
- **Improving performance data.** Both investors and water managers need better information to drive improved performance in the water sector. Capturing performance data and measuring against industry benchmarks (e.g., "non-revenue" water from leaks) would create a competitive environment critical to improving performance. Increased data transparency helps internal management decisions, public understanding of costs, and investor evaluation of risk, which should be a key driver for this data. Overall, better data would help encourage the hard questions while also providing better answers.
- **Changing the utility business model to be more resilient to the emerging business environment.** Historically, water utilities have functioned as monopolies with no competition in delivering water resources or treating wastewater. Additionally, in many places drinking water providers have been distinct from stormwater and wastewater treatment providers. But utilities' business environment is changing. Emerging technologies like closed-loop water designs can enable buildings, city blocks, and neighborhoods to be completely "off the grid." In the coming decades, those technologies may undermine the monopolistic structure of the sector and force utilities to approach their mission as service providers instead of movers of water.

Managing sustainable water systems

Managing for sustainability requires a more flexible, forward-thinking and integrated approach that considers the following factors:

- Adaptability
- Watershed scale
- Integration of natural systems
- Decentralized infrastructure
- Integration of drinking, waste and stormwater as "one water"
- Resource efficiency
- Multiple benefits across sectors
- Full life cycle management and pricing
- Asset management
- Good governance

- **Consolidating systems to achieve better economies of scale, better economies of scope, and improved system management.** Increased pressures on water quantity and quality, existing utility debt burdens, and significant capital costs for replacing aging systems may create greater efficiencies by consolidating water systems that can take the form of consolidating among multiple water utilities. Consolidation can also take place in a single service area by pursuing "one water" integration of drinking water, stormwater, wastewater, and flood control needs. In that environment, utilities that expand their mission to focus beyond drinking water and sewage services to watershed stewards can find new cost efficiencies and discover even higher-quality service by connecting with the range of values that water systems (built and natural) provide to the community. Integration of water utility services may also be a more stable business model in light of disruptive technologies on the horizon.

Innovative financing strategies

Transforming our water systems will require new financing tools. Participants identified several areas for focusing attention on developing more transferrable models.

1. Expanding the pool of water service funding

a. Water systems are more than pipes and treatment plants. In many places, water utilities are partnering with other city agencies to coordinate infrastructure plans, recognizing that roads, green spaces and buildings are all critical to effective water management. This more expansive definition of water systems expands the funding pool. For example, permeable roadways and alleys laid by departments of transportation reduce stormwater runoff and help stormwater agencies comply with water quality standards.

b. Industrial customers can also be partners in financing system improvements. For example, Chevron Energy and multiple California utilities, including East Bay Municipal Utility District, supported the financing of wastewater treatment system upgrades and developed innovative water re-use systems to reduce the load on the local wastewater service providers.

c. For many systems, water treatment and delivery is their sole source of revenues. Yet water and wastewater carry embedded energy and nutrients that can be new sources of revenue generation for water utilities. Developing systems to enable waste or energy recovery can give water utilities more diverse revenue sources.

2. Accounting and paying for ecosystem services

a. Ecosystems provide clean drinking water, often at a fraction of the cost of built infrastructure. Yet today those ecosystem benefits are not valued on utility balance sheets or reflected on income statements. The accurate valuation of the services those systems provide was recognized by participants as a "game-changer."

b. Watershed ecosystems provide highly cost-effective storage, filtration, and temperature regulation, and some utilities are considering how to account for ecosystem services to increase their balance sheet assets as a tool for expanding debt capacity to take on other capital improvements.

c. Watershed services are often physically separated from the communities that benefit most. Payment for watershed services is a growing area of interest to link payments from downstream beneficiaries to support natural ecosystem protection and restoration throughout a watershed. These approaches can cost magnitudes less than treatment plants and new supply development.

3. Implementing distributed water services

a. On-site stormwater management through "green infrastructure" and "low-impact development" designs is growing rapidly in the United States. Cities now realize that it's cheaper to capture and manage water where it falls than to pay billions to build large underground sewer tunnels to handle increasing runoff, and green roofs, rain gardens, and street trees also provide many other community benefits. Some developers are also integrating non-potable rainwater and on-site treated wastewater for building cooling, toilet-flushing, and irrigation. This represents a significant shift from centralized, publicly-controlled water management and offers both challenges and opportunities for financing.

b. At the same time, stormwater fees (e.g. based on total imperviousness area of individual properties) and credits for holding more stormwater onsite are opening up opportunities for private investment. In many cities, businesses that install green infrastructure are rapidly expanding, creating more need for capital. Developing securities to aggregate customer-financed projects–for example, removal of impervious surfaces–is a present-day challenge whose solution could lead to a secondary market for investments that provide a clear public value.

c. Similar private investments could also be developed for water efficiency retrofits and installation of closed loop water systems at the building and even neighborhood scale. Utilities have traditionally seen these as a threat to revenues, but these strategies can also be a powerful tool for sustainable system management.

Steps for Creating Change

While significant improvements can be made within existing institutions, transformative change will require intentional steps and practical tools that can be shared and transferred. The group identified a range of specific actions and tools that could help to advance change:

Building support among ratepayers and regulators to support financially viable systems

- Develop marketing tools for water providers to show the true value of water for their regulators and customers.
- Frame for elected officials and regulators what the "disruptive technology" future looks like and how business models, rate-setting, and financial strategies must change accordingly.
- Develop materials to help water utilities educate their public utilities commissions (PUCs) and city councils on full cost pricing and rate setting structures for sustainable water systems.
- Develop a primer for utilities to help them to learn more about how their customers value different water services so that utilities can develop new service models and market their services in a more targeted way.

Improving performance data

- Create a rating scale that offers a consistent standard for sustainability as it is applied to water utilities (similar to the LEED standard applied to buildings). Consider third-party accreditation to ensure credibility and accountability.
- Give credit rating agencies guidance on the right questions to ask utilities that drive toward financial, management, and water system sustainability.
- Recruit a group of leadership utilities to model "platinum" financial disclosure/reporting.
- Develop standard methods and metrics to value natural capital and triple bottom line benefits and to guide how to incorporate them into accounting systems.

Changing the utility business model to be more resilient to the emerging business environment

- Put forward a vision for "the 21st Century Water Utility" and promote this as the new standard for the industry.
- Present a methodology for utilities to undertake risk-based scenario planning for demand forecasting.
- Work with academic institutions, especially engineering schools, to align curriculum with latest sustainability practices.

Consolidating systems to achieve better economies of scale and system management

- Develop tools for co-managing, co-budgeting, and planning among water systems for "one water" integration.
- Convene regulatory agencies to examine ways that policy can help to remove impediments to "one water" management, full-cost pricing, etc., and better align regulatory tools.

Expanding the pool of water service funding

- Encourage a range of partnerships including public-private alternatives to address case-specific needs.
- Convene financial players engaged in distributed energy generation or energy efficiency finance to assess market/product potential for similar projects in the water sector.

Accounting and paying for ecosystem services

- Convene a group of utilities, practitioners, and academics to look at methodologies for valuing natural capital and implementing projects.
- Engage FASB (Financial Accounting Standards Board) and GASB (Government Accounting Standards Board) in the discussion of accounting practices and a process for putting natural capital assets onto utility balance sheets.
- Build off of existing demonstration projects by creating and supporting additional pilot ecosystem services payments systems that capture and compensate for a broader suite of ecosystem services benefits such as downstream flood protection, water storage upstream, water quality improvements, etc.

Participants also recognized the need to share success stories across the sector to enable transformative change. In particular, sharing experiences and successful innovations through publications and other communication materials was seen as an important role for trade associations and NGOs.

Commitments

Each of the participants demonstrated their commitment to advancing solutions to the most pressing issues brought forth in the conference by committing to specific actions.

Gary Breaux, Assistant General Manager and CFO, Metropolitan Water District of Southern California

Transfer the use of PPP to develop recycling projects and waste-to-energy projects, and the use of Joint Power Authority (JPA) structures to manage watersheds, develop water supplies and implement recycling projects. Share these learning with other organizations such as the Association of California Water Agencies (ACWA).

Lynn Broaddus, Environment Program Director, The Johnson Foundation at Wingspread

Work to disseminate the results of this conference and to convene subsequent meetings to further the recommendations in this report.

Chuck Clarke, Chief Executive Officer, Cascade Water Alliance

Work on developing the financial tools to determine ways to bring "alternative assets" on to the books of water companies.

Janet Clements, Senior Economist, Stratus Consulting

Use triple bottom line and ecosystem services expertise to train others on how to integrate into utility/organization management, and contribute to efforts to explore valuing non-traditional assets.

Helen Cregger, Senior Vice President, Public Finance Investment Banking, Piper Jaffray & Co.

Encourage best practices in full cost pricing, capital planning and debt financing.

Chris Crockett, Deputy Commissioner, Philadelphia Water Department Planning and Environmental Services Division

Work on issues related to stormwater marketing, the development of a LEED/WEED program and new financial disclosure metrics. I will also explore integrating the "one water" approach into academic curricula.

Martha Davis, Executive Manager for Policy Development, Inland Empire Utilities Agency

Take the discussion from this convening and use it to help inform the development of the 2013 California Water Plan Update and the development of the southern California 5 County Regional Stormwater Initiative and initiate a water-wastewater-renewable energy initiative.

Disque Deane, Jr., Co-Founder and Chief Investment Officer, Water Asset Management, LLC

Determine ways to use WAM's access to capital to develop alternative water markets.

Michael Deane, Executive Director, National Association of Water Companies

Work with the American Water Works Association to investigate the feasibility and benefit of the development of a LEED/WEEDs protocol for the water industry.

Harriet Festing, Director of Natural Resources, Center for Neighborhood Technologies

Develop national partnerships with some of the participants involved in the dialogue in order to further specific initiatives. Test the concept of a LEED/WEED program in Illinois.

Emily Gordon, Senior Associate, State and Local Initiatives, Green For All

Produce national report exploring the number and types of jobs that would be created by a significant investment in our stormwater infrastructure. Disseminate report broadly and assist with the development of strategies to help deepen public understanding of the job and economic impact of investing in our water infrastructure.

Ed Harrington, General Manager, San Francisco Public Utilities Commission

Work with water utility and other interested parties to further the discussion of Natural Resources Accounting—that is having the value of natural capital put into governmental financial reporting. The initial focus will be discussions with the Governmental Accounting Standards Board and expanding the knowledge of the issue through the Government Finance Officers Association.

Patty Healy, First Vice President, Bayern LB

Make final report available to municipal bond analyst community through national and local industry functions. Provide auxiliary support to peers' work on issues discussed at convening with GASB. Connect with banks regarding energy sustainability financing ideas that may be applicable to the water industry.

Bill Holman, Director of State Policy, Nicholas Institute for Environmental Policy Solutions, Duke University

Assist by matching knowledge resources to discern barriers and opportunities for "one water" integration with special attention focused to the regulatory agencies (PUCs).

Kirsty Jenkinson, Director, Markets and Enterprise Program, World Resources Institute

Continue to participate in sustainable water financing discussions with The Johnson Foundation, American Rivers, Ceres and other parties, and connect those discussions with WRI's work on global and U.S. water risk.

David LaFrance, Executive Director, American Water Works Association

Work with the National Association of Water Companies to investigate the feasibility and benefit of the development of a LEED/WEEDs protocol for the water industry.

Sharlene Leurig, Senior Manager, Insurance Program, Ceres

Help utilities to engage GASB/FASB on natural asset valuation and to develop a leadership standard for performance-based disclosure in bond financing. Continue to engage municipal bond investors and credit rating agencies on credit factors related to sustainable water management.

Peter Malik, Director, Center for Market Innovation, Natural Resources Defense Council

Promote the Philadelphia example of stormwater pricing and management by blogging, writing a piece for *Environmental Finance*, and through additional speaking and writing engagements.

Scott Miller, Environmental Sustainability Manager, The Russell Family Foundation

Act as conveyor of intelligence gained from the Johnson Foundation proceedings and to other water funders and help them discuss next steps.

Betsy Otto, Vice President, Conservation and Strategic Partnership, American Rivers

Help convene a meeting on valuing and accounting for the myriad water benefits and services provided by natural ecosystems. Provide support to EPA for including smart financing strategies in updated stormwater regulations. Continue to work with The Johnson Foundation, Ceres, and groups represented at the Wingspread conference to advance some of the most promising ideas and strategies discussed for driving toward more sustainable water infrastructure management.

David Rankin, Vice President and Director of Programs, Great Lakes Protection Fund

Use the results of this convening to help shape Protection Fund programming. I will share these results with our project teams working in this space, interested applicants, funders and other key audiences working on freshwater issues. The Fund is particularly interested in testing innovative models for what water utilities will become.

Adam Rix, Managing Partner, TurningPoint Capital Partners, LLC

I will contact my political network and inform civic leaders of the outcomes from this convening. Additionally, I plan to educate utilities on the value of skunk working and will encourage corporations and corporate investors to bolster the evolution of the water infrastructure network.

Eric Sandler, Director of Finance/ Treasurer, San Diego County Water Authority

Work with utility finance officers and other relevant stakeholders regarding the valuation and recognition of ecosystem assets. Knowledge transfer regarding best practices for the deployment of private capital to develop public water infrastructure--specifically with respect to a fair and efficient allocation of risk and return. Work with interested parties to better characterize potentially disruptive developments to the existing landscape of public water utility management in the U.S.

Attachment A: Background Materials

The following background and concept document and excerpts from the materials below were circulated to the group in preparation for the convening:

Regional Plan Association. *America 2050: An Infrastructure Vision for 21st Century America.* 2008. http://www.america2050.org/AM2050Infra08sm.pdf

Bolger, R., D. Monsma, R. Nelson. *Sustainable Water Systems: Step One–Redefining the Nation's Infrastructure Challenge. A report of the Aspen Institute's Dialogue on Sustainable Water Infrastructure in the U.S.* May, 2009. http://www.aspeninstitute.org/sites/default/files/content/docs/pubs/water_infra_final.pdf

Additionally, the following optional readings are also available for further background.

Water Environment Research Federation–New Paradigm for Water
http://www.westcas.org/PDF/A_New_Paradigm_for_Sustainable_Water_Infrastructure.pdf

Baltimore Charter for Sustainable Water Management (2007)
http://sustainablewaterforum.org/baltimore.html

Sustainable Infrastructure Management by Dr. Valerie Nelson,
Coalition for Alternative Wastewater Treatment
http://sustainablewaterforum.org/new/white4.pdf

Charting New Waters
www.johnsonfdn.org/chartingnewwaters

Fitch Ratings Revenue Special Report–2011 Water and Wastewater Medians
http://www.stlmsd.com/aboutmsd/organization/rateproposal/Exhibit-MSD-67H-Fitch-WaterWastewater-Medians-2011.pdf

National Federation of Municipal Analysts Recommended Best Practices
in Disclosure for Water and Sewer Transactions
http://data.memberclicks.com/site/nfma/DG.BP.rbp_water_sewer.doc.pdf

Attachment B: Concept & Background

Convening on Financing Sustainable Water Infrastructure Systems

July – August, 2011

Purpose:

The Johnson Foundation, in collaboration with American Rivers and Ceres, will convene a group of experts at Wingspread to discuss ways to leverage public funding and incentives as well as private financing to drive innovation for more sustainable and integrated management of water resources in the United States.

Background:

As the nation's water infrastructure crumbles and populations grow beyond the capacity of existing systems, we will need to deploy hundreds of billions of dollars to repair and expand drinking water, wastewater, and stormwater infrastructure. Local governments currently fund 98 percent of all water and wastewater infrastructure and will rely on the capital markets to finance this critical infrastructure. Yet, as the debt capacity of cities and utilities declines, we will need to adapt our mechanisms for assessing the financial resilience of water systems and deploy financing vehicles that will bring new resources to the development of reliable systems. As capital markets are buffeted by global economic and debt concerns, private financing may be constrained and increasingly expensive.

This is not simply a funding crisis, however. As with transportation and energy, the nation is at a critical juncture. We can either transition toward cost-effective, resilient, and environmentally sustainable solutions or continue to sink investment in expensive, inflexible "siloed" water systems. In other words, money for water infrastructure will be tight and what we spend it on will be more important than ever.

Achieving more sustainable water systems in this century means reconsidering the designs we've been using for the past 200 years. Ironically, a more sustainable approach means reinvesting in our beleaguered natural infrastructure systems, whose damage and disrepair puts added strain on our built infrastructure. We will need to restore damaged watersheds and boost the stock of urban green spaces and green infrastructure that can serve as primary water supply and treatment and help traditional gray infrastructure–dams, canals, pipes and treatment plants–perform optimally. Similarly, we must capitalize on what more cities are learning, that restored floodplains offer far cheaper flood storage and risk management.

The price we pay for water should reflect full life cycle infrastructure costs, the increasing marginal cost of new supplies, and the way we account for the costs of our water infrastructure must internalize rising energy costs. Finally, we must maximize the supply we gain from conservation, efficiency and integrated water system designs to minimize the financial burden of new water storage and diversion projects.

The shift toward a more sustainable and economically viable future will not be driven primarily by legal mandates, but by thousands of local infrastructure investment decisions. If we are to build that sustainable future, utilities building more resilient systems must be able to differentiate themselves in the capital markets, and investors must price-in and reward resilience. We can rise to this enormous challenge because this vision is in the mutual interest of utilities, cities, water users, investors and the environment.

At Wingspread, our goal will be to explore and begin to chart the pathways toward markets and innovative funding mechanisms that support and enable sustainable water systems. Admittedly, this is an enormous topic with many complex elements–accounting for ecosystem services, pricing for the true cost and value of water, and the interplay of municipal services with private capital markets–and we will work to focus our discussion on the most promising and urgent opportunities. These issues were highlighted frequently during the yearlong discussion that culminated in The Johnson Foundation's "Charting New Waters" report, and the Foundation is committed to continuing to move the dialogue forward.

The Johnson Foundation at Wingspread approaches issues without preconceived ideas or fixed agendas. A distinctive feature of the Foundation's convening model is that it promotes candid, yet collegial, conversation among those with divergent ideas and perspectives. This model fosters the trust and collaboration needed for innovative solutions that can also be broadly supported.

A three-step process format

To address the issues proposed, we have designed three elements of a facilitated dialogue process. Two webinars will be held in advance of the meeting to balance convenience with the value of face-to-face conversation. The events are scheduled for summer 2011 as follows:

- Webinar 1, July 26, 2011
- Webinar 2, August 10, 2011
- In-person convening at The Johnson Foundation at Wingspread, Racine, Wisconsin, August 16–18, 2011

Participants are asked to commit to all three companion events. The conversations will be progressive–designed to build off of one another and the information previously presented.

Guiding questions:

We seek to address this question during the course of this convening:

How can we drive funding toward the new infrastructure we need in the 21st Century? There are two key elements to this question:

- What new financing techniques can communities use to pay for integrated and sustainable infrastructure approaches?
- How can we direct private capital toward the right kinds of water management projects?

Outcomes

As a result of the series of events, we anticipate the following outcomes:

1. Create the opportunity for a diverse range of financial and policy experts to share expertise, familiarizing each other with respective issues and concerns, build understanding of diverse perspectives and build partnerships.
2. Explore sustainable water infrastructure financing alternatives.
3. Identify priority issues and possible solutions. Understand the range of perspectives and identify where common ground, divergent views and strong agreement exist.
4. Catalyze action for future efforts by identifying leadership organizations and larger groups dedicated to ongoing coordination and cooperation.
5. Agree on whether there is value in creating a body for ongoing policy coordination and cooperation.

Key stakeholders

We are targeting a diverse range of perspectives for this conversation with a target toward individuals and organizations that are in a position to design and affect change, including the following groups:

- Investors–pension funds and advisors, socially-responsible and faith-based investors, retail funds, private equity
- Public policy groups
- Experts on sustainable water
- Experts on water infrastructure financing
- Municipal utilities
- Investor-owned utilities
- Utility regulators
- Financial advisors
- Credit rating agencies and assurance providers

Attachment C: Wingspread Meeting Program

Day 1: August 16, 2011

12:00 p.m.
Buffet Luncheon

3:30 p.m.
Gathering and Orientation to Accommodations
Wendy S. Butler, Special Initiatives Coordinator
The Johnson Foundation at Wingspread

4:00 p.m. Plenary Session
Welcome to The Johnson Foundation at Wingspread
Lynn E. Broaddus, Director, Environment Programs
The Johnson Foundation at Wingspread
Participant Introductions

4:45 p.m.
Agenda Review, Goals and Groundrules
Molly Mayo, Facilitator, Meridian Institute

4:50 p.m. Opening Presentation
Reframing the Water Infrastructure Issue and Its Financing Dimensions

Betsy Otto, Vice President, Conservation and Strategic Partnerships, American Rivers

Sharlene Leurig, Senior Manager, Insurance Program, Ceres

Kick-off and overview proposed goals and outcomes for our time together. Frame our priority challenges and opportunities.

5:40 p.m. Plenary Discussion
Group discussion of the sustainable infrastructure issue and its financing dimensions.

Outcomes: *refine assumptions and definitions, identify priorities for discussion.*

6:45 p.m. Day 1 Wrap-up
Discussion of priorities for Day 2

6:50 p.m. Hospitality

7:15 p.m. Dinner

8:30 p.m. Evening Hospitality

Day 2: August 17, 2011

Breakfast will be available from 6:30 a.m. to 8:15 a.m. in the Living Room of the Guest House.

8:30 a.m. Plenary Session
Welcome and Agenda Review
Facilitator

8:40 a.m. Reflections on Day 1

8:50 a.m. Presentations
Case Studies on Financing Sustainable Water Infrastructure
What new mechanisms are water systems employing to finance resilient water infrastructure?

- **Financing Stormwater Controls**
  Chris Crockett, Deputy Commissioner, Planning and Environmental Services Division, Philadelphia Water Department and Peter Malik, Director, Center for Market Innovation, NRDC
- **Incentive Ratemaking for Investor-Owned Utilities**
  Matt Diserio, Co-Founder and President of Water Asset Management (possible joint presentation with John Bohn, Former Commissioner, California Public Utilities Commission)
- **Discuss additional innovative case examples**

10:15 a.m. Break

10:30 a.m. Plenary Discussion
Discuss lessons from case studies. Identify small group topics to dig into options for directing capital to "good" infrastructure investments.

Outcomes: *identify priority obstacles and opportunities that we want to explore further. Agree on breakout group topics.*

11:15 a.m. Introduce Breakout Session
Clarify guidance and desired outcomes for breakouts. Break and move to small group discussions.

11:30 a.m.
Small Group discussions to identify obstacles & opportunities

12:30 p.m. **Small Groups break for Luncheon**

1:15 p.m. **Continue Small Group discussions**

2:15 p.m.
Presentations: Reports from Small Groups

3:15 p.m. **Break**

3:30 p.m. **Plenary Discussion**
Open discussion of opportunities identified in breakout groups.

5:30 p.m.
Day 2 Wrap-up and planning for Day 3 Agenda

6:00 p.m. **Leisure**

6:30 p.m.
Hospitality and Tour of Wingspread (optional)

7:00 p.m. **Cookout**

8:30 p.m. **Evening Hospitality**

Day 3: August 18, 2011

Breakfast will be available from 6:30 a.m. to 8:15 a.m. in the Living Room of the Guest House.

8:30 a.m. **Plenary Session**
Welcome, Agenda Review & Reflections on Day 2
Facilitator

9:00 a.m. **Plenary Discussion**
Identify the range of opinions in the group about what is needed to catalyze change. How can the ideas of this group help to inform other efforts? Discuss how to best leverage the ideas and resources of the group to create momentum toward more sustainable infrastructure investments.

10:30 a.m. **Break**

10:45 a.m. **Plenary Discussion**
Who are the key players and partnerships needed for leadership and action?

11:30 a.m. **Plenary Discussion**
Commitments and Next Steps

12:00 p.m. **Wrap-up**

12:30 p.m. **Luncheon**

Attachment D: Meeting Participants

John Bohn
Former Commissioner
California Public Utilities Commission
220 Montgomery St., Penthouse 10
San Francisco, CA 94109
914-671-8475
jbohn@globalnetpartners.com

Gary Breaux
Director of Finance
East Bay Municipal Utility District
375 Eleventh St.
Oakland, CA 94607
925-708-4430
gbreaux@ebmud.com
www.ebmud.com

Chuck Clarke
Chief Executive Officer
Cascade Water Alliance
Suite 440
11400 SE 8th St.
Bellevue, WA 98004
425-453-1555
cclarke@cascadewater.org
www.cascadewater.org

Janet Clements
Senior Economist
Stratus Consulting
1881 Ninth St., Suite 201
Boulder, CO 80521
303-381-8000
jclements@stratusconsulting.com
www.stratusconsulting.com

Helen Cregger
Senior Vice President
Public Finance Investment Banking
Piper Jaffray & Co.
1200 17th St., Suite 1250
Denver, CO 80202
303-820-5856
helen.x.cregger@pjc.com
www.piperjaffray.com

Chris Crockett
Deputy Commissioner
Planning & Environmental Services Division
Philadelphia Water Department
1101 Market St.
Philadelphia, PA 19107
215-520-5058
Chris.Crockett@phila.gov

Martha Davis
Executive Manager for Policy Development
Inland Empire Utilities Agency
6075 Kimball Ave.
Chino, CA 91708
mdavis@ieua.org
www.ieua.org

Disque D. Deane, Jr.
Co-Founder and Chief Investment Officer
Water Asset Management, LLC
509 Madison Ave., Suite 804
New York, NY 10022
212-754-5132
d.deane@waterinv.com
www.waterinv.com

Michael Deane
Executive Director
National Association of Water Companies
Suite 850
2001 L St., NW
Washington, DC 20036
202-669-0641
michael@nawc.com
www.nawc.org

Matthew J. Diserio
Co-Founder and President
Water Asset Management, LLC
Suite 804
509 Madison Ave.
New York, NY 10022
212-754-5132
m.diserio@waterinv.com
www.waterinv.com

Harriet Festing
Director of Natural Resources
Center for Neighborhood Technologies
2125 W. North Ave.
Chicago, IL 60647
773-269-4042
hfesting@cnt.org

Emily Gordon
Senior Associate, State and Local Initiatives
Green For All
Suite 600
1611 Telegraph Ave.
Oakland, CA 94612
510-271-9822
emily@greenforall.org
www.greenforall.org

Ed Harrington
General Manager
San Francisco Public Utilities Commission
1155 Market St., 11th Floor
San Francisco, CA 94103
eharrington@sfwater.org

Patty Healy
First Vice President
Bayern LB
560 Lexington Ave.
New York, NY 10022
917-843-6178
phealy@bayernlbny.com
www.bayernlb.com

Bill Holman
Director of State Policy
Nicholas Institute for Environmental Policy Solutions
Duke University
Box 90335
Durham, NC 27708
bill.holman@duke.edu

Kirsty Jenkinson
Director, Markets and Enterprise Program
World Resources Institute
10 G St., NE
Washington, DC 20002
202-729-7748
kjenkinson@wri.org
www.wri.org

David LaFrance
Executive Director
American Water Works Association
6666 Quincy Ave.
Denver, CO 80235
dlafrance@awwa.org

Peter Malik
Director, Center for Market Innovation
Natural Resources Defense Council
40 W. 20th St.
New York, NY 10011
212-727-2700
pmalik@nrdc.org

Richard Metcalf
Director, Corporate Affairs
Laborers' International Union of North America (LiUNA)
905 16th St., NW
Washington, DC 20006
202-942-2249
rmetcalf@liuna.org
www.liuna.org

Scott Miller
Environmental Sustainability Manager
The Russell Family Foundation
PO Box 2567
Gig Harbor, WA 98335
scott@trff.org

David Rankin
Vice President and Director of Programs
Great Lakes Protection Fund
Suite 880
1560 Sherman Ave.
Evanston, IL 60201
847-425-8196
drankin@glpf.org

Adam Rix
Managing Partner
TurningPoint Capital Partners, LLC
Suite 113
1053 Grand Ave.
St. Paul, MN 55105
651-600-3477
arix@turncappartners.com
www.turncappartners.com

Eric Sandler
Director of Finance/Treasurer
San Diego County Water Authority
4677 Overland Ave.
San Diego, CA 92123
858-522-6671
ESandler@sdcwa.org
www.sdcwa.org

Doug Scott
Managing Director, U.S. Public Finance Group
Fitch Ratings
Suite 2010
111 Congress Ave.
Austin, TX 78701
512-215-3725
douglas.scott@fitchratings.com
www.fitchratings.com

Facilitator

Molly Mayo
Senior Mediator
Meridian Institute
PO Box 773
Talkeetna, AK 99676
907-733-8340
mmayo@merid.org
www.merid.org

Planning Partners

Fay Augustyn
Conservation Associate
American Rivers
Suite 1400
1101 – 14th St. NW
Washington, DC 20005
faugustyn@americanrivers.org

David Gordon
Policy Associate
Nicholas Institute for Environmental Policy Solutions, Duke University
P.O. Box 90335
Durham, NC 27708
973-801-9654
david.r.gordon@duke.edu
www.nicholasinstitute.duke.edu

Sharlene Leurig
Senior Manager, Insurance Program
Ceres
99 Chauncy St.
Boston, MA 02111
617-247-0700
leurig@ceres.org

Betsy Otto
Vice President, Conservation and Strategic Partnerships
American Rivers
Suite 1400
1101 – 14th St., NW
Washington, DC 20005
202-243-7033
botto@americanrivers.org
www.americanrivers.org

The Johnson Foundation at Wingspread

Roger C. Dower
President
The Johnson Foundation at Wingspread
33 E. Four Mile Rd.
Racine, WI 53402
262-681-3331
rdower@johnsonfdn.org
www.johnsonfdn.org

Lynn Broaddus
Director, Environment Programs
The Johnson Foundation at Wingspread
33 E. Four Mile Rd.
Racine, WI 53402
262-681-3344
lbroaddus@johnsonfdn.org
www.johnsonfdn.org

Wendy Butler
Special Initiatives Coordinator
The Johnson Foundation at Wingspread
33 E. Four Mile Rd.
Racine, WI 53402
262-681-3321
wbutler@johnsonfdn.org
www.johnsonfdn.org

About The Johnson Foundation at Wingspread

The Johnson Foundation at Wingspread, based in Racine, Wisconsin, is dedicated to serving as a catalyst for change by bringing together leading thinkers and inspiring new solutions on major environmental and regional issues. Over the course of 50 years, The Johnson Foundation at Wingspread has inspired consensus and action on a range of public policy issues. Several organizations have roots at Wingspread, including the National Endowment for the Arts, National Public Radio, the International Criminal Court and the Presidential Climate Action Plan. Building on this legacy, The Johnson Foundation at Wingspread has set a new, strategic mission designed to achieve greater, more sustained impact on critical environmental issues. Launched as part of this new direction is Charting New Waters, an alliance of leading organizations calling for action to avert the looming U.S. freshwater crisis.

The Johnson Foundation AT WINGSPREAD

Conferences that Inspire Solutions

www.johnsonfdn.org/chartingnewwaters