



Innovation Network
for Communities

The Economy & Sustainable Water
A Great Lakes & St
Lawrence Cities Mindset
about Water

INC's 2013 REPORT TO ROCKEFELLER FOUNDATION:
**“ACCELERATING THE DEVELOPMENT OF
SUSTAINABLE WATER SYSTEMS IN THE U.S.”**

1. Along with climate change, the economy is becoming a big driver of change in water systems.
2. Urban water systems are a key leverage point for overall change.

IS YOUR CITY'S WATER SYSTEM...

- Efficient?
- Resilient?
- Regenerative?
- Clean and Safe?
- Equitable?

How do you know?

SUSTAINABLE WATER MANAGEMENT

“A system of water management practices that recognizes the interconnected systems within a watershed region, and which meets current economic, ecological, and quality of life needs without compromising the ability to meet the needs of future generations.”

California Water Foundation

MANY DECISIONS CITIES MAKE ARE OPPORTUNITIES OR FAILURES TO BUILD THE WATER SYSTEM THEY WILL NEED

- Investments in physical infrastructure: sewers, streets, parks, flood control, etc.
- Land use plans
- Commercial, residential and industrial development and growth
- Water pricing
- Board appointments
- Capital budgeting

**Your water system's goals affect these decisions.
What are your water system's goals?**

WHAT, ME WORRY?

“An abundance of high quality fresh water...
The water rich Great Lakes-St. Lawrence River region has
historically been *immune from serious water shortages
and other water supply problems.*”

– Great Lakes Regional
Water Use Database 2013

6.5 Quadrillion	Gallons of freshwater in Great Lakes
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WHAT'S WRONG WITH THIS PICTURE I: UNRELIABLE WATER SYSTEMS

1. Aging Infrastructure
2. Chronic Underinvestment
3. Fragmented & Siloed Water Management
4. Declining Ecosystems
5. Chronic Water Budget Deficits

WHAT'S WRONG WITH THIS PICTURE II: DRIVERS OF CHANGE

- Climate Change
- The Economy's Thirst
- Markets for Water – Prices Going Up

CLIMATE CHANGE

Shifting the predictability, timing, and extent of natural rainfall patterns.

- Earlier snowmelt causes earlier peak stream flow in the West and New England
- Decline in proportion of precipitation falling as snow in the West
- Decline in duration of the snow cover
- Decline in rainfall in Central Rockies and southwest
- Increase in frequency of heavy precipitation events
- Decline in runoff and stream flow in the Colorado and Columbia River basins
- Reduction in ice cover of the Great Lakes
- Periods of drought in the West
- Sea level rise threatens freshwater supplies of coastal cities
- Increasing water temperatures, which affects water pollution.
- Reduced fluctuations in water levels (Great Lakes)

Economic Impacts

“Products and services that require large amounts of water to produce or to use may be phased out by law, lose market share to less water-intensive products, or may lead to reputational damages for the company.” (Pacific Institute)

“Climate change will constrain North America’s already over-allocated water resources, thereby increasing competition among agricultural, municipal, industrial, and ecological uses.” (Intergovernmental Panel report)

A 2010 report for the Natural Resources Defense Council: Under business-as-usual scenario, **water supplies in 70 percent of U.S. counties “may be at risk to climate change”—meaning demand will outstrip supply—and about a third of all counties are likely to be at “high or extreme risk.”** In those regions, “the pressure on public officials and water users to creatively manage demand and supply—through greater efficiency and realignment among competing uses, and by water recycling and creation of new supplies through treatment—will be greatest.”

THE ECONOMY'S THIRST

- *Most water is used to drive the economy*
- Without sufficient water, farms fail, urban growth slows, electricity generation fails
- Economy's thirst leads to water overuse, continuing problems maintaining water quality for human use, heated competition between urban areas and economic interests, especially agriculture
- Conflict between energy use/availability and water use—U.S. water systems use 3-4% of nation's energy; recent study estimated 8%.

4.5 Trillion

Gross *Regional* Product in \$US

MARKETS FOR WATER— PRICES RISING

- Increased competition over water and need to assure water quality and access
- More water becoming subject to market forces
- **“Nation’s Water Costs Rushing Higher”**—*USA Today* (9.28.12)
- Increased spending on water infrastructure
- Increased regulatory requirements
- Heightened competition for scarce water
- Higher risks factored in by financial and insurance markets

% of Water Consumed by...

30% Public Supply

37% Livestock, Irrigation, Industry

33% Power (nuclear, fossil fuel)

DO OLD ASSUMPTIONS STILL HOLD?

- Is our water abundance at risk?
- Is our performance in managing the tradeoffs between economic activity/growth and water quality—and somehow have both—successful enough?
- **Are our water systems able to meet these 21st century goals for sustainability?**
 - ✓ **Efficient**
 - ✓ **Resilient**
 - ✓ **Regenerative**
 - ✓ **Clean & Safe**
 - ✓ **Equitable**

IMPLICATIONS FOR CITIES IN GREAT LAKES & ST LAWRENCE

Do everything you can to accelerate the transformation of all water systems in region to make them:

- Efficient
- Resilient
- Regenerative
- Clean and Safe
- Equitable

Urban water may be a small % of all water use, but cities have great leverage:

- Urban households are bulk of consumer markets (food, products, services) that need water for production
- Consumers are voters
- Cities are where most of the economy happens
- Cities link water to other sustainability concerns (health, quality of life)

40 Million

People living in region

THE GOOD NEWS

- New principles for sustainable water management
- Repertoire of transformative innovations
- Emerging market niches

THE NEW PRINCIPLES OF SUSTAINABLE WATER MANAGEMENT

New Principle	Some Features
Ecology – Mimic Natural Systems	<ul style="list-style-type: none"> • Preserve/restore natural systems • Value environmental services • Adopt biological technologies
Performance Management – Use Data and Standards to Drive System Changes	<ul style="list-style-type: none"> • Seek “whole system” outcomes • Conduct “one water” planning and management • Focus on water productivity • Match water quality to different water uses
Market – Use Market Dynamics to Achieve Outcomes	<ul style="list-style-type: none"> • Use economic incentives to influence water consumption behavior • Adopt full life-cycle costing • Uncouple revenues from volume • Embrace competition among water providers
Adaptation – Maximize System Resilience	<ul style="list-style-type: none"> • Build climate change into risk assessment • Invest in/maintain resilience/flexible capacity • Adopt adaptive management

TRANSFORMATIVE INNOVATIONS IN SUSTAINABLE WATER MANAGEMENT

Ecology	Management	Markets	Adaptation
<ul style="list-style-type: none"> • Green infrastructure • Dam/canal removal • Zero waste/recycling 	<ul style="list-style-type: none"> • “One water” integrated planning • Community-based monitoring • Water use auditing • Water reuse/recycling • Consumer demand management • Fit-for-use water • Measurable performance standards for water suppliers—and a “sustainable utility” rating system 	<ul style="list-style-type: none"> • Wastewater mining • Markets for water rights • Markets for water-pollution credits • Insurance-driven incentives for investment in flood and pollution prevention • Seasonal block rates • Decoupled costs/rates • Full cost-of-service accounting • Water technology accelerators 	<ul style="list-style-type: none"> • Risk/vulnerability assessment • Decentralized service models

Great Lakes Protection Fund Active Projects

- Vacant Land as Green Infrastructure
- GL Clean Communities Network
- Improving Water Management in the GL Basin
- Applying Water Stewardship Tools
- River Mouth Development
- Watershed Sustainability -- Agriculture

NEW MARKET NICHEs DEVELOPING

New value creation includes...

- Installing green infrastructure
- Monetizing environmental services
- Protecting in-stream flows
- Providing bottled water or residential water treatment
- Monitoring and testing equipment/services
- Creating market exchanges for water rights and water-pollution credits
- Mining wastewater for minerals and nutrients
- Injecting water into coastal aquifers to prevent saltwater incursion
- Using micro-filters, membranes, and non-technologies to clean water
- Developing regional water-technology business clusters

Payback Curve

Rising price of water increases incentives for water conservation and shorten the “payback” curve on investing in new practices and technologies.

A CITY WATER MINDSET FOR THE GREAT LAKES

- Yes, the sky is falling
- Abandon old assumptions
- Adopt sustainable-system goals and principles
- Embed them into decision-making processes (investment & management)
- Accelerate development and adoption of innovations to achieve the goals
- Use your leverage to drive other water systems' goals/decisions/behaviors



Innovation Network
for Communities

2013 Report to Rockefeller Foundation
“Accelerating Development of
Sustainable Water Markets
in the U.S.”

Great Lakes Water & Economy

<http://water.in4c.net>

A FRAMEWORK for DEVELOPING
SUSTAINABLE WATER MARKETS AND SYSTEMS

HOME PROJECT RESOURCES ABOUT US CONTACT US

INNOVATION NETWORK FOR COMMUNITIES MATERIALS

Click on the folders to the left to view the files they contain or click the + symbol to drill down into the sections of a folder and view their files.

- Main Report: Accelerating the Development of Sustainable Water Markets and Systems in the U.S.
- Background: Water Users, Providers, Issues and Solutions
 - Characteristics of Sustainable Water
 - Water Value Chain
 - Water User Groups
 - Water Service Providers
 - Issues and Solutions
 - Economic Impact Analysis
- Frameworks
 - Water Value Chain
 - Characteristics of Sustainable Water
 - Categories of Solutions
 - Building Blocks of Practice

field of practice framework issues service providers solutions sustainable water water user groups



APPENDIX

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CHARACTERISTICS OF SUSTAINABLE WATER SYSTEMS/MARKETS

Efficient	System values water conservation and using the least amount of water possible for the desired use
Resilient	System can withstand variations in water availability and quality caused by aging of infrastructure, population growth, climate change, and other factors
Regenerative	System manages water use to maintain the natural system's "water budget" as its regenerative capacity
Clean and Safe	System delivers water that is safe for its intended use and meets government/scientific standards
Equitable	System provides all segments of population with fair and equal access to water supply and services needed for health and life, while offering non-discriminatory opportunities to use water for economic gain

“SUSTAINABLE UTILITY” PERFORMANCE STANDARDS/CERTIFICATION

Project:

Support industry processes to get consensus on a performance standards and certification regime for the sector that reinforces and rewards sustainable water management practices.

- No recognized industry standards for measuring and certifying the sustainable performance of water systems in the U.S.
- Several categories of performance standards need to be considered, including basic best management practices; financial disclosure standards; risk management; and system environmental performance.
- Several efforts underway (Alliance for Water Stewardship; EPA EMS and Sustainability Handbooks; Effective Utility Management standards; AWWA sustainability rating tools; Institute for Sustainable Infrastructure *Envision* rating system), but they are not well coordinated, none has emerged as an accepted industry standard, and none brings sufficient market benefits to incentivize providers to use them.
- Many potential ways to approach this issue, including a national standards setting process, such as those managed by the American National Standards Institute (ANSI).

*“There are no consistent standards or other tools for distinguishing and and acknowledging utilities that are on the cutting edge of financing and technologies.”
(Restoring Flows)*

2030 DISTRICTS – WATER METRICS

Project:

Support central city public-private partnerships, led by commercial property owners—“2030 districts”—in achieving ambitious goals for reducing building’s water use and spreading water-efficiency practices through a national 2030 Districts Network.

- 2030 Districts, an initiative of Architecture 2030 (<http://architecture2030.org/>), seeks rapid transformation of the U.S. building sector, focused on GHG emissions reduction. 2030 Districts are operating in Seattle, Cleveland, and Pittsburgh, and are starting in other cities.
- 2030 Districts target water-use reduction: All new and renovated developments / neighborhoods / towns / cities / regions immediately adopt and implement a 50% reduction standard below the regional average/median for water consumption.
- Under development: A Water Metrics project to develop regionally specific baseline water metrics for the built environment, which can serve as a foundation for developing a nationwide Water Use Intensity (WUI) for the built environment that inform EPA’s Energy Star Portfolio Manager Program, the STAR Community Rating System, and the Architecture 2030 Challenge for Planning.
- 2030 Inc. is developing a national network of 2030 Districts.

“The built environment is the major source of global demand for energy and materials that produce by-product greenhouse gases (GHG). Planning decisions not only affect building energy consumptions and GHG emissions, but transportation energy consumption and water use as well, both of which have large environmental implications.”

The Architecture 2030 Challenge

URBAN INNOVATION LABORATORIES

Project:

Focus investments in a series of organizations that have the capability to manage a distributed portfolio of innovation projects that are designed to change the market dynamics of sustainable water systems.

- There are a number of insufficiently-capitalized organizations that are investing in a range of market-changing innovations. Examples include the Charles River Watershed Association, Center for Neighborhood Technologies, Ceres, and the Pacific Institute.
- Funders could invest in the development of a more deliberate distributed applied R&D network for this sector by:
 - More clearly defining the applied R&D agenda
 - Developing multi-year product development plans with defined stage-gates
 - Enabling collaboration across the innovators

“The Charles and its watershed is our laboratory, but the principles, methods, and infrastructure approaches we have developed and are developing apply to virtually any urban watershed.”

*Robert Zimmerman,
ED of the Charles
River Watershed
Association*

URBAN SUSTAINABILITY DIRECTORS “LEADING EDGE” NETWORK

Project:

Develop a network with the Urban Sustainability Directors Network (USDN) of sustainability directors and staff focused on leading edge sustainable urban water practices.

- USDN is the leading North American network of municipal sustainability directors.
- Sustainable water management is emerging as a new practice and policy area for many of the lead innovators in this network.
- USDN has a robust system for developing content-focused sub-networks, and has an Innovation Fund that can provide modest seed capital for best practice scanning and innovation development.
- This network could help connect progressive water utilities more clearly to the climate mitigation and adaptation goals of municipalities.

“I would argue that we have to nurture urban development in the West. If you want to preserve agriculture and the environment, and do it in ways that don’t waste massive amounts of water and energy, then you have to have vibrant, dense urban living as a model for the West.”

*Jim Lochhead, CEO,
Denver Water*