SWRR
Sustainable Water Resources Roundtable

March 31, 2015

Bureau of Land Management, Washington, DC

Collaboration and Resilience Proceedings

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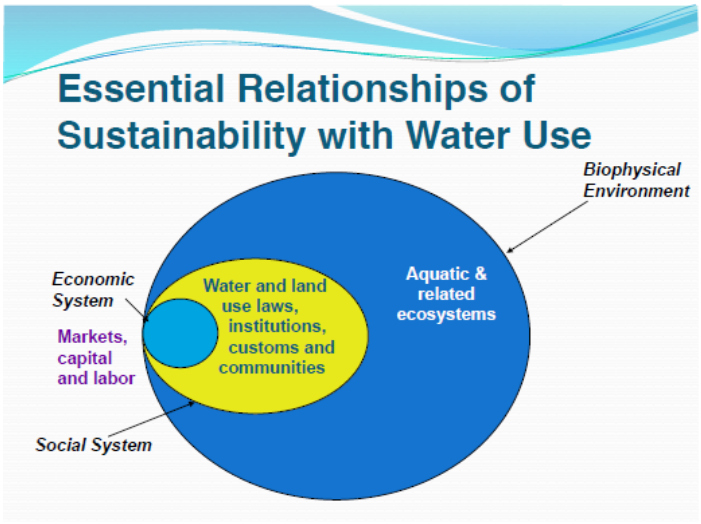
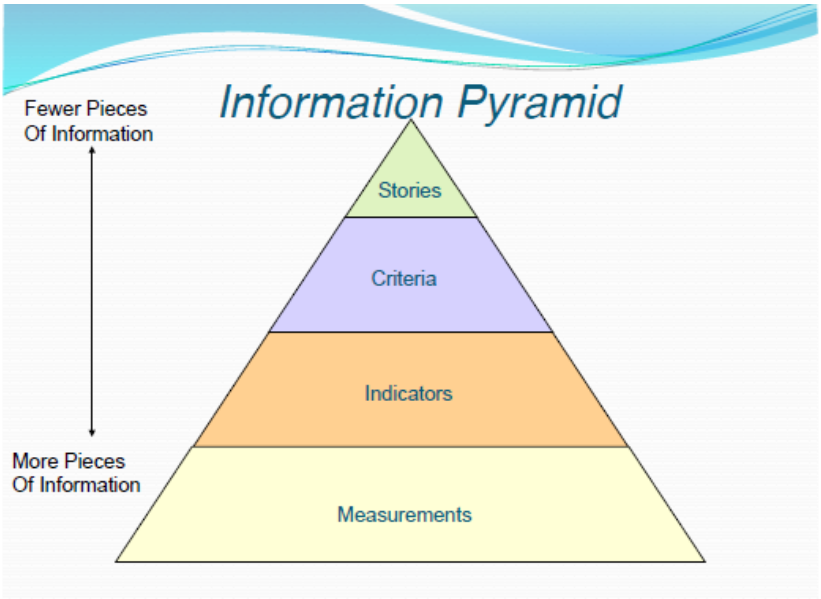
Sustainable Water Resources Roundtable Activities & History: John Wells Co-chair

John Wells outlined for the benefit of participants at their first SWRR meeting, that the Roundtable is a national collaboration of federal, state, local, corporate, non-profit and academic interests. Our formal organization is that we are a subcommittee of the USGS Advisory Committee on Water Information. Over a thousand people from federal, state and local governments; corporations; nonprofits and academia have participated in SWRR meetings. Meetings have been held in California; Colorado; Florida; Maryland; Michigan; Minnesota; New Hampshire; Virginia; and Washington, D.C.

- Web site http://acwi.gov/swrr/index.html
- 2005 Preliminary Report http://acwi.gov/swrr/Rpt_Pubs/prelim_rpt/index.html
- 2010 SWRR Report http://acwi.gov/swrr/Rpt_Pubs/SWRRReportMarch2010.pdf



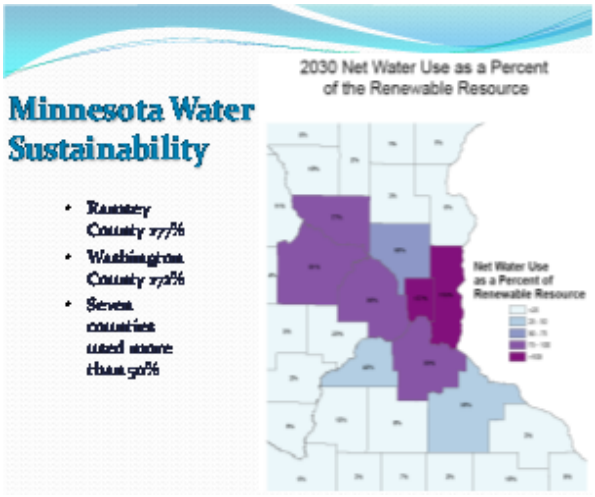
John Wells explained that in the SWRR framework, capital is the capacity to produce value over time. Environmental, social and economic systems produce value through flows of services, experiences, or goods that meet human and ecosystem needs over time. We achieve sustainability by maintaining capacities to meet needs. This includes the capacities of the ecosystem and of our societies. Making informed decisions requires information in various forms and Wells illustrated this with the Information Pyramid.



The SWRR Indicator Framework has five major elements:

- Water availability
- Water quality
- Human uses and health
- Environmental health
- Infrastructure and institutions

Water use sustainability is the degree to which water use meets current needs while protecting ecosystems and the interests of future generations. Water use is currently not sustainable. John Wells illustrated this with examples from California and Minnesota. In both states, population centers rely heavily on water imported from other regions.



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SWRR Co-Chairs: Robert Wilkinson, Bren School of Environmental Science and Management, UC Santa Barbara, wilkinson@es.ucsb.edu

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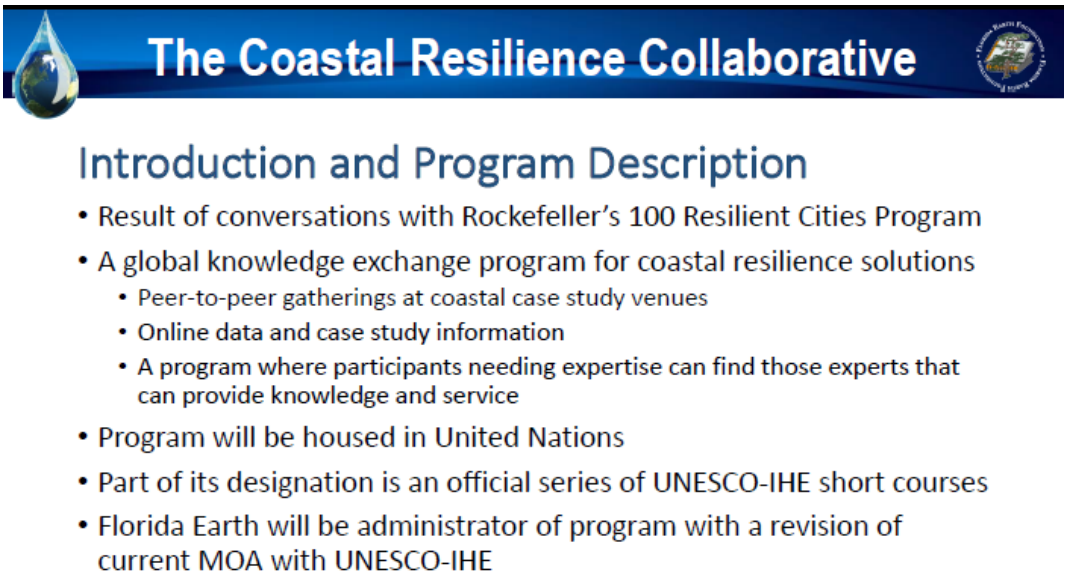
Round of BRIEF Self-Introductions: As happens at most SWRR meeting, David Berry facilitated a session of self introductions in which participants took a moment to share their interest in sustainability and water. This custom helps the participants get to know each other quickly and supports networking and collaboration.

Panel 1. Resilience and Water Resources. Moderator: Stan Bronson, Florida Earth Foundation Coastal Resilience Partnerships

Stan Bronson, Florida Earth Foundation



Stan Bronson introduced The Coastal Resilience Collaborative which the Florida Earth Foundation administers under a memorandum of understanding with the UNESCO International Institute for Infrastructural, Hydraulic and Environmental Engineering.

The organizational structure has two levels or "Tiers":

A Leadership Tier that provides vision and direction for the program

- No more than 35 representatives from partners and their designates
- Cap of 15 representative from US organizations
- Formed in Fall 2014 and meets online and in person

A Technical Tier that provides venues where knowledge exchange takes place

- When appropriate and available, attaches to a convening of partner organizations
- Can be a stand-alone when necessary or desired by Leadership Tier
- Maximum number of participants determined by each venue
- Fiscal Responsibility is a partnership between Florida Earth and UNESCO-IHE as defined in new MOA

The Coastal Resilience Collaborative (CRC) is just being launched and the first Leadership Tier Workshop will be held at UNESCO-IHE, in Delft, Netherlands May 7-9, 2015. The CRC will have a Global Knowledge Exchange (GKE) at the IIAHR Global Congress in The Haag, Netherlands,

June 22-26, 2015. The theme of that congress will be: Overview & Info Gathering Assembling & Structuring

Bronson told participants that one key to success of the Leadership Tier is to not have it be US centric. It is divided into four sector groups with a chair for each group. The current chairs are temporary with permanent chairs to be elected in May. The organization of GKE I will be done through virtual meetings, GKE II in May at UNESCO-IHE and virtually after that. The CRC Executive Committee will oversee the Leadership Tier.

The Coastal Resilience Collaborative

Sector Groups

	Government	Private Sector	NGO's	Academia
Temporary Chair	Tom Armstrong	Whitford Remer	Emily Pidgeon	Joan Fitzgerald
Chair's Organization	White House USGCRP	ASCE	Conservation Int.	Northeastern Univ.
Member Organizations	City of Durban, S.A.	Rand Corporation	World Wildlife Fund	University of Florida
	Bangladesh DOI	Atkins	ICMA	Stanford Woods Inst.
	City of Rotterdam	Arup	ICLEI	MIT
	Rijkswaterstaat	Twynstra Gudde	IAHR	Louisiana State Univ.
	City of Danang	IBM	R!SE	Rice
	City of Alexandria	Swiss RE	100 Resilient Cities	TU Delft
	USACE IWR	UBS	IWA	Tyndall Institute
	South Florida CCC	Stantec	The Royal Society	Scripps Oceanographic
	NASA Earth Sciences		Ashoka	Ohio State

The Coastal Resilience Collaborative Technical Tier will operate online through The Water Network for both data and case studies. As a part of the IAHR World Congress, June 22-26 there will be five days of discussions with a theme for each day:

- Monday, June 22 – Introduction and orientation, sea-level rise science
- Tuesday, June 23 – Engineering solutions
- Wednesday, June 24 – Ecological Solutions
- Thursday, June 25 – Models and the use of Data
- Friday, June 26 – Framing a format to move forward and wrap-up

Stan then summarized the RISE Initiative which is a new UN program launched December 10, 2014 in Cali, Colombia and March 2, 2015 in Boston. It encourages investment in disaster risk reduction to create resilient societies. Developed by Price Waterhouse Coopers, it takes a comprehensive approach to many risk classifications. Within the RISE initiative, the CRC covers coastal solutions.

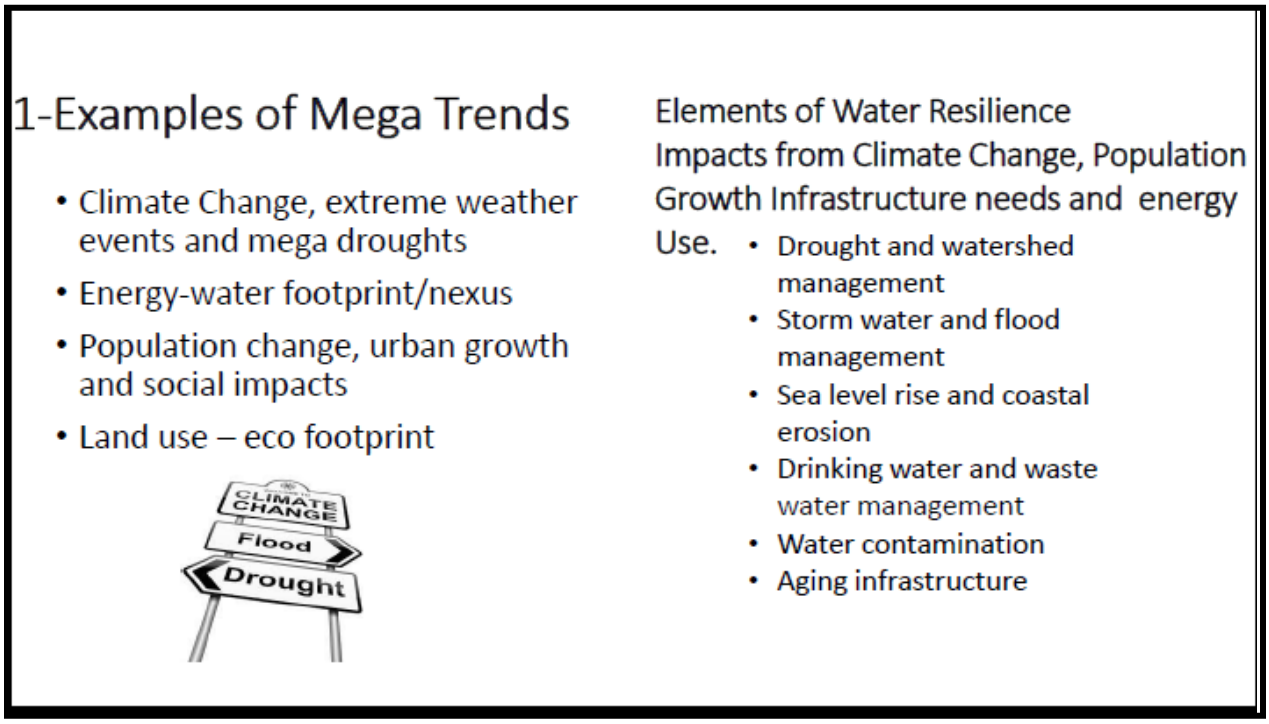
Stan concluded by outlining the Coastal Resilience Collaborative Outcomes and Products:

- Inventories
- Identification of ten “hot spots” with coastal resilience challenges
- Places in the world that have put in place some type of risk reduction
- List of global physical characteristics
- List of entities/organizations/individuals with resilience expertise
- The “Scale Up” Candidates
- Example: Pearl Project in the EU
- Facilitate location and engagement of social entrepreneurs

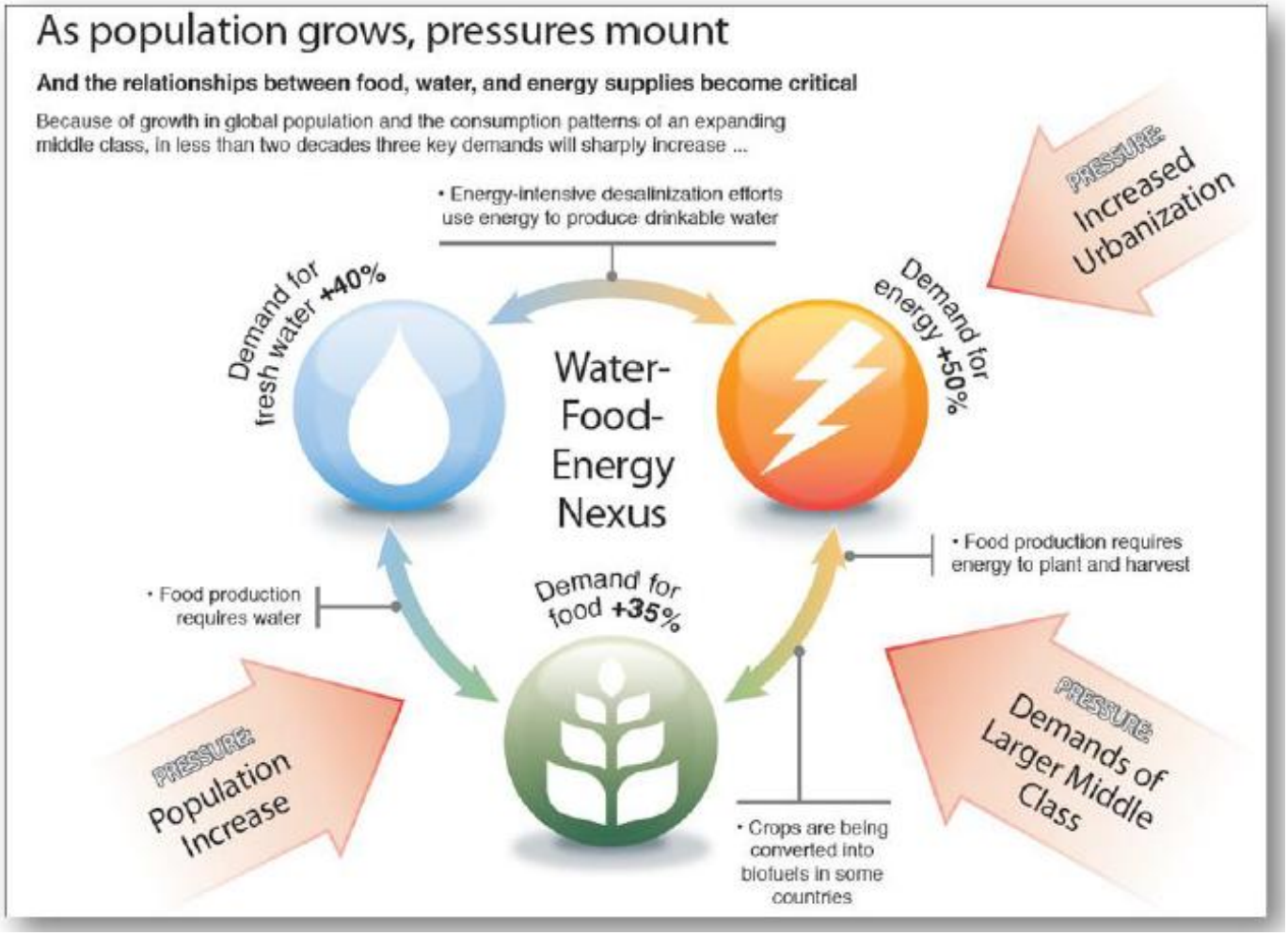
The Coastal Resilience Collaborative Partnership in funded through direct and indirect funding, registration fees for trainings, corporate sponsorships, grants and other sources.

Alan Hecht, Director for Sustainable Development, Office of Research and Development (ORD), EPA, Resource Resilience and Collaboration

Alan Hecht told participants that he would discuss the mega-trends we are facing, tools to assess the impacts of those trends, development of innovative and resilient solutions, collaborations and applications, and the achievement of sustainable outcomes.



Alan pointed out that with the reality of climate change, mega droughts will grip U.S. in the coming decades. The UN Global Assessment Report predicts that disasters are expected to cost the global community up to $300 billion in annually in the coming decades.



We are only beginning to confront America's water infrastructure challenge. The investment needs for buried drinking water infrastructure total more than $1 trillion nationwide over the next 25 years, assuming pipes are replaced at the end of their service lives and systems are expanded to serve growing populations.

Alan asked participants to consider how to anticipate and respond to impacts of mega trends, how to build resilient systems and how to think in terms of system approaches. He then presented a summary of a wide variety of tools and approaches which is reproduced here for convenient reference:

Resilience Tool	Purpose
My Environment	Integrates environmental and health data at the community level using maps based on a user's location
CANARY and TEVA-SPOT	Provides early warning & detection of harmful contaminants in drinking water distribution systems
Community-Based Water Resiliency Tool (CBWR)	Helps water utility personnel gauge current preparedness efforts and increase community awareness of including the water sector in emergency planning
Emergency Water Supply planning guidance	Provides guidance on how to plan for disruptions in drinking water services
Flood Resilience: A Basic Guide for Water and Wastewater Utilities	Aids water utility personnel understand flooding threats, identify vulnerable assets and evaluate mitigation options.
Water Resiliency Action Planner Kit	Meeting-in-a-box for hospitals, emergency services, major water users, public officials and stakeholders to discuss roles & responsibilities during interruptions in water service
Water Security Toolkit	Evaluates & designs rapid responses to water contamination incidents
Water/Wastewater Agency Response Networks (WARN)	Intra-state network of utilities for effective sharing of local water sector resources during disasters or service disruptions

Resilience Tool	Purpose
I-WASTE	Aids decision makers in estimating types of debris and selecting appropriate waste management following a disaster
Waste Estimation Support tool (WEST)	Estimates waste from a wide-area radiological incident as a function of selected decontamination approaches
Municipal Solid Waste Decision Support Tool (MSW-DST)	Aids solid waste planners in evaluating environmental aspects & cost of integrated waste management strategies
Climate Resilience Evaluation and Awareness Tool (CREAT)	Allows water utility stakeholders to explore long-term impacts of climate change & adaptation strategies
Urban Resilience to Climate Change Tool	Based on urban resilience indicators and their proximity to threshold values, stakeholders evaluate community resilience to gradual and extreme climate events.
Decontamination Selection Tool (Decon ST)	Provides decision support to select decontamination options for an incident involving *Bacillus anthracis*
Environmental Justice (EJ) View	Users create on-line maps to view factors affecting public & environmental health in Environmental Justice communities
Provisional Advisory Levels (PALs)	Informs decision-makers on health-based advisory levels for chemical exposure in air & water at different time periods & severity levels following a chemical incident

Innovative and Resilient Solutions

"Our struggle for sustainability will be won or lost in cities." —Ban Ki-Moon

EPA has identified 50 communities for assistance as part of the Making a Visible Difference in Communities with regard to air, climate & energy; safe & sustainable water resources; sustainable & healthy communities; chemical safety for sustainability, human health risk assessment and homeland security. http://www2.epa.gov/smart-growth/making-visible-difference-communities

Alan outlined several collaborations and applications:

- Executive Order 13653: Preparing the United States for the Impacts of Climate Change Sec. 4. Providing Information, Data, and Tools for Climate Change Preparedness and Resilience (a) In support of Federal, regional, State, local, tribal, private-sector and nonprofit-sector efforts to prepare for the impacts of climate change
- Presidential Directive 21: Critical Infrastructure Security and Resilience 2013. This directive identifies 16 critical infrastructure sectors including Water and Wastewater Systems
- EPA-Rockefeller Resilient Cities; UN-R!SE

The Water Infrastructure Finance Challenge

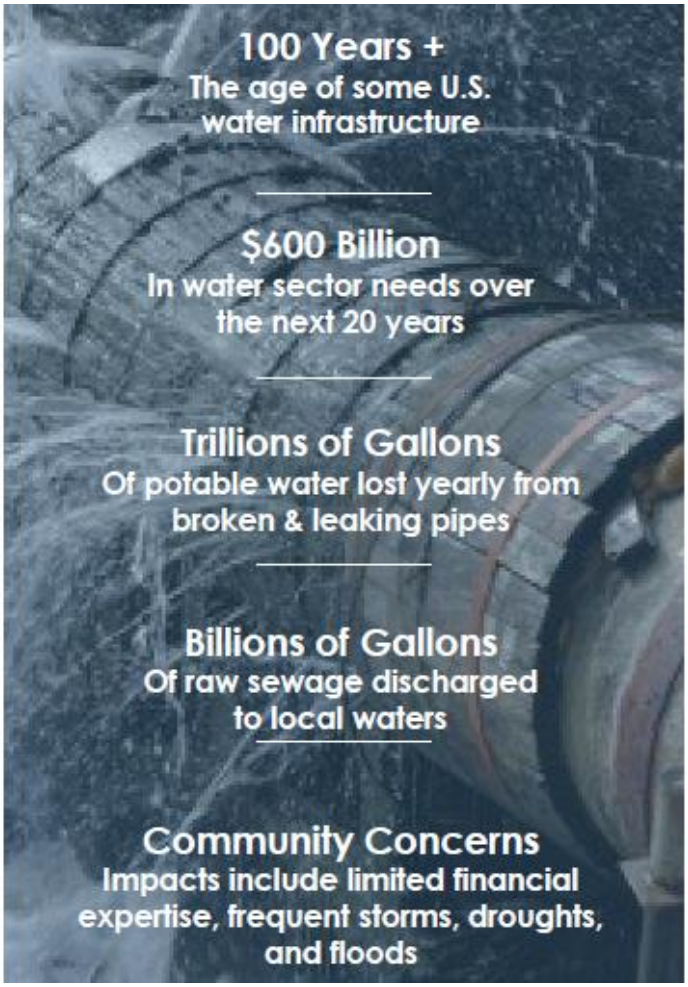
Failing Infrastructure

Dependable, available drinking water and sanitation in communities depends on working, modern infrastructure, but leaking water collection and distribution systems and inadequate wastewater treatment continue to plague municipalities.

Community Financial Gap

Some communities lack financial capacity and resources, face multiple demands and are experiencing affordability concerns.

Infrastructure financing and resiliency are key components to help communities address economic and environmental needs.



EPA: Water Infrastructure and Resiliency Finance Center: help communities across the country improve their wastewater, drinking water and stormwater systems, particularly through innovative financing and by building resilience to climate change.

Alan Hecht summarized by saying that to achieve sustainable outcomes we need to:

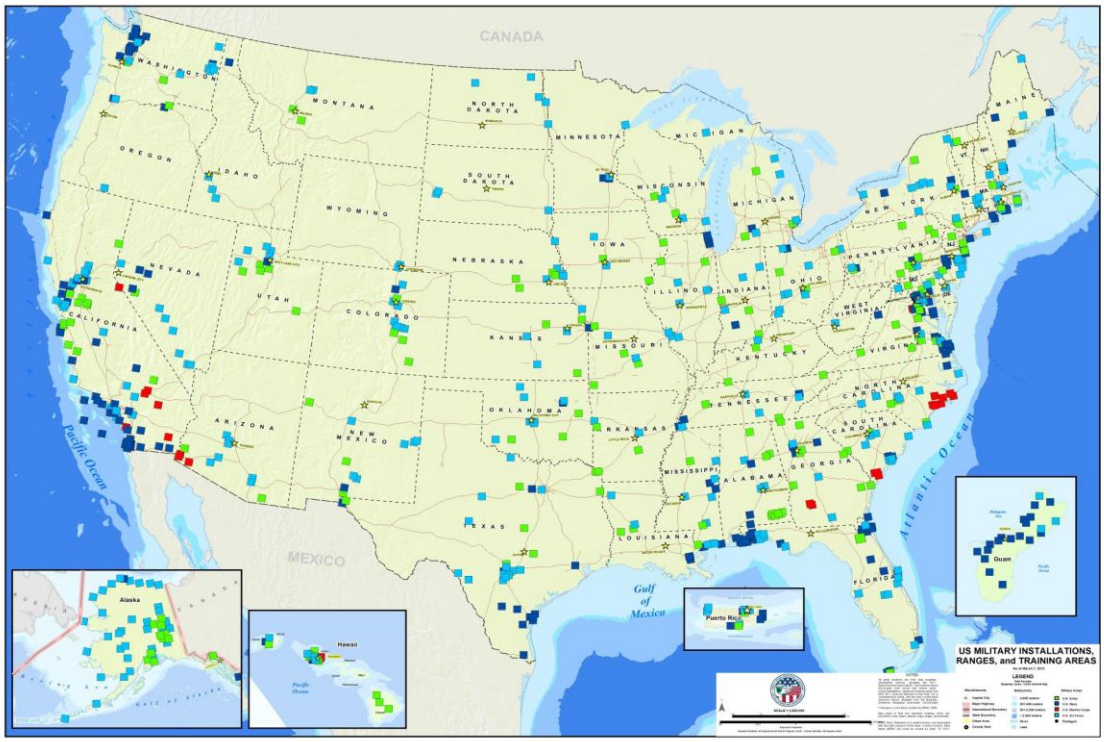
- Anticipate and respond to future trends
- Promote effective infrastructure development (America 2050)
- Create effective business-government-public collaborations
- Promote innovation in science and technology and application of decision support tools
- Promote access and use of decision support tools
- Enhance public understanding and support

Becky Patton, Climate Change Adaptation Integration, Office of the Undersecretary of Defense for Energy, Infrastructure, and Environment

Becky Patton began by telling the participants that access to safe and reliable water supply is critical to the Department of Defense mission. DOD has a large footprint with over 3 million service members, employees, families, and contractors; 28 million acres of land; 420 endangered species, 523 species at risk, and more than 75 species found only on DOD installations. In FY 2012, DOD consumed 90 Billion gallons of water – of which they could measure.

DOD needs safe, dependable water for a variety of reasons, including:

- People: Hospitals, family housing, schools, barracks, and child-development centers.
- Operation and maintenance of aircraft, ships, support equipment, and facilities.
- Aviation safety and compatible land use requirements. For example, agricultural land uses often surround airfields to provide a buffer from development that would be incompatible with safety and noise contours of military operations. This land use necessarily requires reliable water allocation.



U.S. MILITARY INSTILLATIONS, RANGES, AND TRAINING AREAS

Becky noted that DOD recognizes it is going to face challenges with water, including access, availability, and cost. In addition, the impacts of a changing climate are expected to exacerbate the issues of managing water resources. DOD can see those challenges coming, and is acting now.

Policies and Programs

In order to ensure adequate water resources are available to support DOD's mission, they are developing policies, plans and procedures to ensure we have a consistent approach, appropriate level of documentation, and thorough understanding of the management needs for this key resource.

Water Rights

DOD has well established programs for safe drinking water, water conservation, storm water management, and wastewater treatment. They recognize that they have not addressed water rights, availability, and the minimum amount of water that we need to support the mission Department-wide.

DOD's lands have been acquired over hundreds of years and by many different means. So have the associated water rights. This presents a complicated legal challenge – what are those water rights and are they appropriately documented? The records are inconsistent and maybe incomplete. Therefore, the Department is beginning an effort to ensure each installation has the appropriate legal documentation readily available and records are maintained.

Becky noted that having water rights doesn't equal access to water. The next step will be to determine how much water is available to the installation. This will be a complicated effort because it will be essential to understand who else is competing for the available water. In addition, it will require analysis of the long-term availability of water. Since many of DOD's military installations will exist for decades to come, we must determine if there will be sufficient water available to meet mission needs for a long-term future. For example, will military installations in the desert southwest have a sufficient water supply for the next 30-50 years?

Water Needs

Water needs determinations are historically based on usage and are calculated using a variety of algorithms. DOD is developing a methodology for installations to use that looks at actual water requirements to support the mission of each installation. This will include all support functions (housing, commissary, hospitals/clinics, administrative, etc). In 2014 it was pilot tested at four locations in the mid-Atlantic region. After refinement, they anticipate further testing of tool in other regions before final role out.

Becky summarized but saying that ultimately, the Department intends for each military installation to manage their water to meet the long-term mission needs. By completing these keys activities related to water rights, availability, and needs, each installation will have the tools to make informed decisions about how to effectively manage their water resources.

Panel 1. Questions and Discussion

In the U.S. we decision making occurs within a shorter and shorter time frame, often based on a 90 day window when quarterly reports come out of corporations. The Dutch use a 200 year horizon for planning. How do we get longer term thinking?

In government we deal with immediate budget situations, but we need to adopt a future visioning approach. We're not there in any federal agencies.

DOD has a planning window of up to two years. Yet our operations exist for 20 to 100 years for weapons and facilities. For example, ships need to last 50 years. What would we have done 20 years ago that we can apply to new ships?

Resilience is an integral part of what we do. It should not be treated as an option.

Events drive actions. Prior to Hurricane Sandy in 2012 there was little interest in resiliency. Then the issue became huge within agencies. Events drive action external to federal government; business began to push and thinking down the road. Federal agencies do not have the cultural capability of thinking down the road.

We all need to articulate and get out the pieces of information we have and of what we are doing. Education, press releases, etc.

The mission of DOD is to respond to threats. Our biggest threat is climate change. It should be added to DOD's purpose and the agency should lead with that authority

Climate change is a threat internationally to stability of governments. Arab spring, issues in Syria can be traced back to drought. There is no infrastructure for people moving to cities due to climate change for example. These results can lead to civil unrest and civil war. DOD reads CIA intelligence reports along with its own to identify areas where there are problems. The National Defense University spent time with military attaches in Central and South American and the Caribbean. The attaches actually asked why the US thought water was important to the military. They do agree that Climate Change is important. In June there will be a meeting to develop an approach for how militaries can deal with climate change.

We need an organizing tool box to help identify tools that are forward thinking. Is there a vision to consolidate tools?

There was a time when DOE worked with DOD on resiliency. There were a number of analyses done including on bases, threats, and climate change vulnerability assessments. There is an enormous amount of data that could be transferred to usable data to inform decision.

Vulnerability assessments are not one time things. They are ongoing and need to be updated regularly.

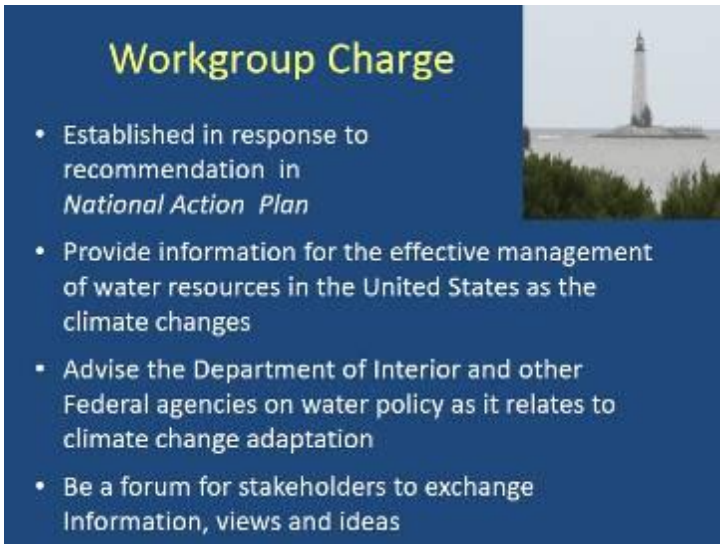
Water Resources Adaptation to Climate Change Workgroup of the Advisory Committee on Water Information (ACWI): Jeff Peterson, Federal Co-chair

The Water Resources Adaptation to Climate Change Workgroup was created in June 2012, co-chaired by the Water Environment Federation and the EPA Office of Water. It has forty member organizations with participation by state, local, academic and non-profit organizations, federal agencies and subgroups of the Advisory Committee on Water Information (ACWI).

In October 2011, the Interagency Climate Change Adaptation Task Force published its *National Action Plan: Priorities for Managing Freshwater Resources in a Changing Climate.* The key recommendations included:

- Establish Planning Process
- Improve Water Information
- Strengthen Vulnerability Assessments
- Expand Water Use Efficiency
- Support Integrated Water Resources Management
- Support Training and Outreach

The Water Resources Adaptation to Climate Change Workgroup was established in response to recommendations in the National Action Plan and charged with the following activities:

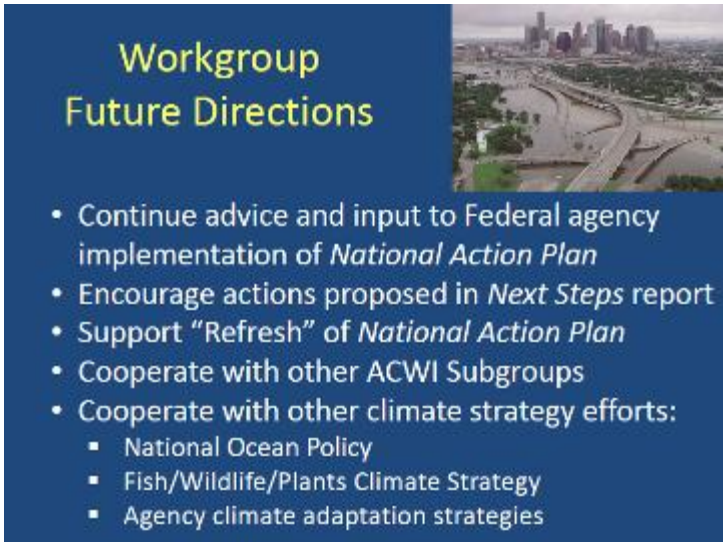


Jeff Peterson told participants that the workgroup has monthly meetings and subcommittees have been established to create webinars and a reference database. An in-person meeting was held in Crystal City, Virginia in February 2014 and a Next Steps Report issued in the spring of 2014. The workgroup makes annual work plans and reports to ACWI.

At the meeting, teams worked on five areas of National Action Plan:

1) Data and Information
2) Vulnerability
3) Water Use Efficiency
4) Integrated Water Resources Management
5) Outreach and Training

- Vulnerability Assessment
  - Develop guidance for and assistance to communities in use of existing tools
  - Create strategic plan for engagement with non-Federal partners to inform and improve future tool development
- Water Use Efficiency
  - Give priority to agriculture for development of nationally consistent metrics
  - Dept. of Energy should update Federal efficiency standards for plumbing products
  - Develop national program to support water efficiency and reuse comparable to Bureau of Reclamation program in West
- Integrated Water Resources
  - Facilitate Federal agency coordination
  - Create incentives for State/local/tribal for climate resilience planning on a watershed or aquifer basis
  - Incentive use and protection of ecosystem services
- Training and Capacity Building
  - Expand information sharing (e.g.: Water Resources Research Institutes)
  - Expand training for workforce and technical service providers
- Additional Recommendations
  - Consider new investment in natural infrastructure (e.g.; State Revolving Loan Fund)
  - Strengthen community flood preparedness (e.g.; flood insurance premium sharing with communities)
  - Consider support of non-profit organization to promote water/climate training /accreditation and project recognition on a voluntary basis
- ACWI Input
  - Workgroup briefed ACWI members on Next Steps report in August 2014
  - Draft report revised consistent with comments
  - Agreement to post report on ACWI website
  - Summary of comments posted on ACWI website



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http://acwi.gov/climate_wkg/index.html

Questions and Discussion

JP: Integrated approach would make climate issues easier to resolve. We need a framework to do it together rather than separately.

Q: Has the federal approach to flood management changed?

JP: Models and tools for vulnerability assessment are being used to identify area of greatest risk. We can't focus just on flood or drought individually. A vulnerability assessment approach integrates them. Would like to go broader, and to be able to look at the sector and say for that sector we are concerned about X or Y (e.g. a dam),

Q: How does EPA's initiative help with water finances focused on more on traditional water infrastructure?

JP: EPA just launched a water infrastructure finance center. The climate workgroup recommends in its report that investment in infrastructure should include natural infrastructure.

Q: When you say natural, are you including green infrastructure as part of that, or just wetlands?

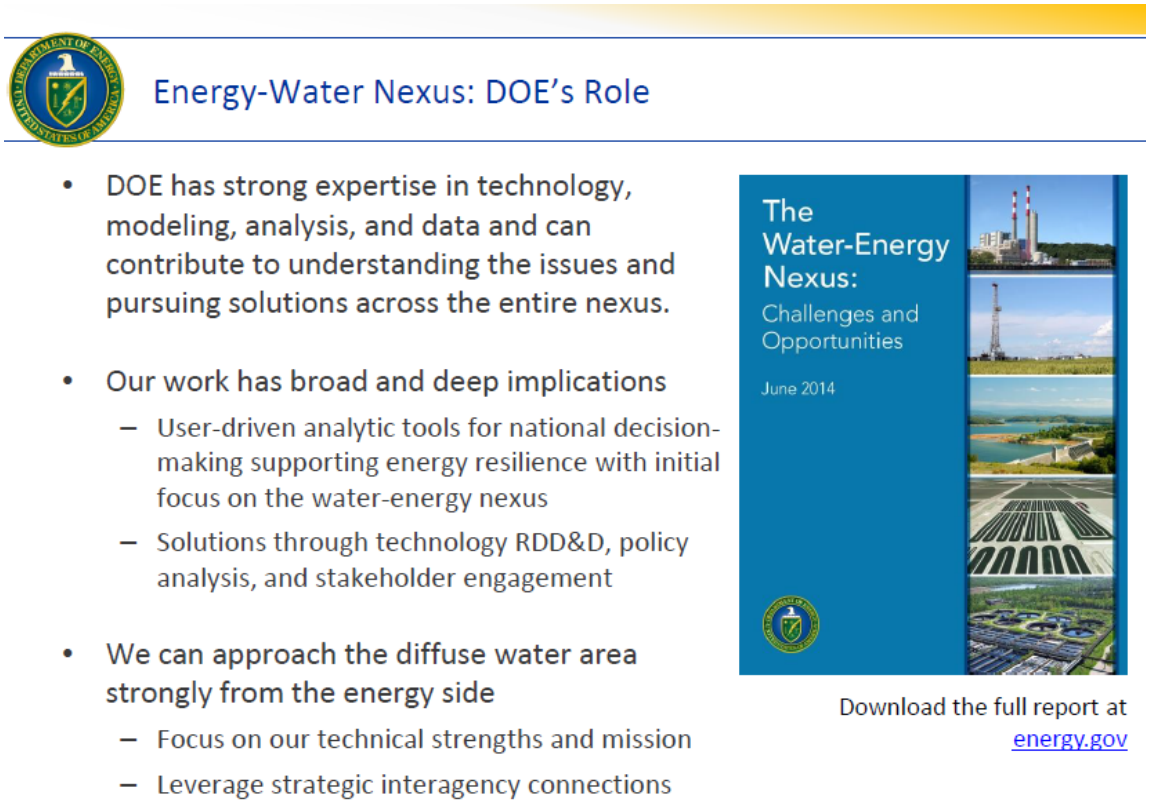
JP: Climate adaptation is much more advance then in 2011 when the report was published. Feds are more focused with the President's Action Plan etc. that are intended to recognize that federal agencies have key core missions. Many have overlapping interests such as coastal policy and water resources.

Panel 2. Collaboration on Water Sustainability - Federal, Private, and State Initiatives: Moderator Jill Parsons, Ecological Society of America

Water-Energy Nexus: Challenges and Opportunities. Diana Bauer, Director, Energy Systems Analysis & Integration; Dept. of Energy

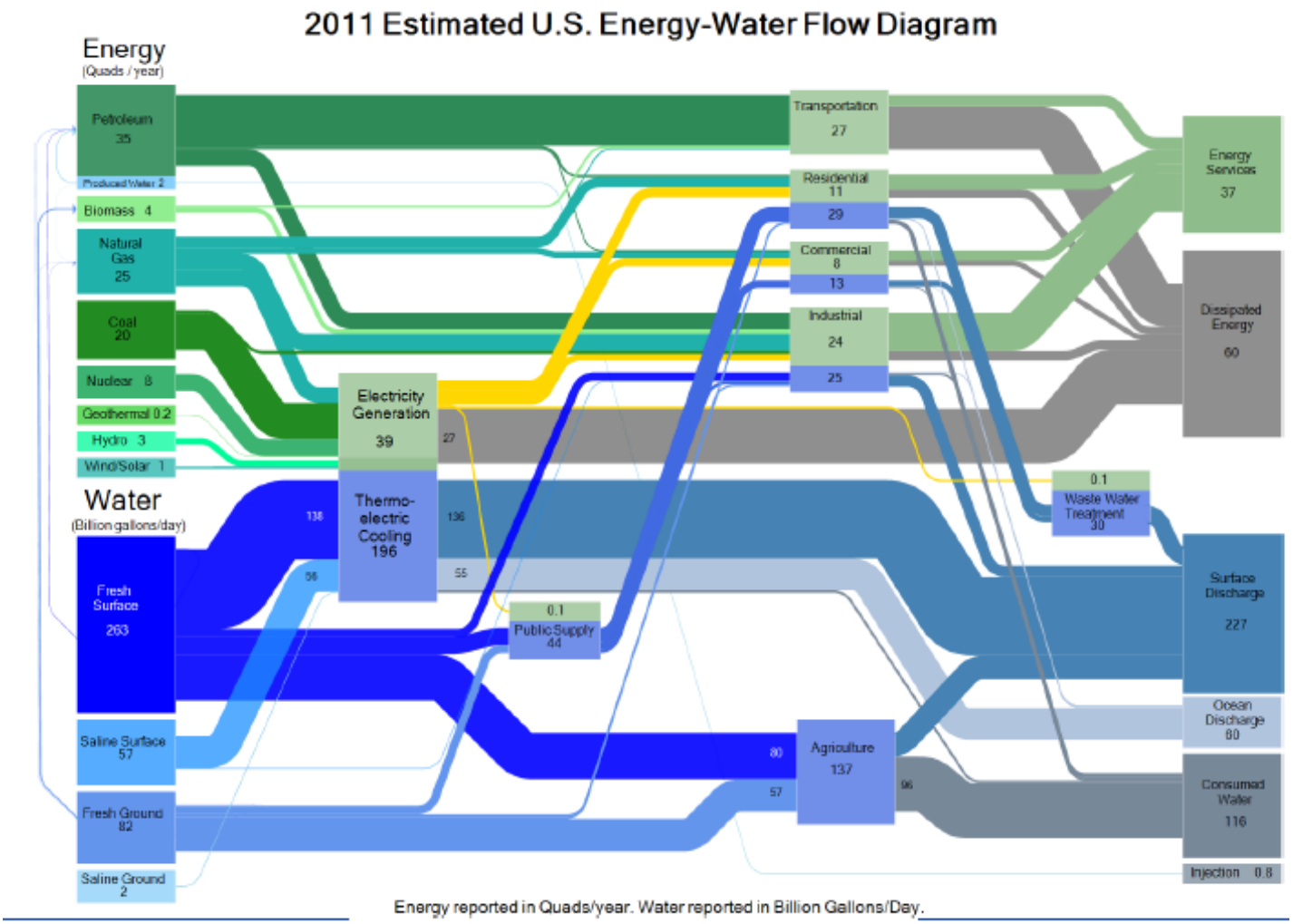
Diana Bauer said that the Energy-Water Nexus illustrates the interdependence of two critical national needs. Energy and water issues are gaining international prominence.

Water scarcity, variability, and uncertainty are becoming more prominent and this is leading to vulnerabilities in the U.S. energy system. We cannot assume the future is like the past in terms of climate, technology, and the evolving decision landscape. Replacing aging infrastructure brings an opportunity to make some changes.



Diana Bauer outlined the strategic pillars of actions on the energy-water nexus:

- Optimize the freshwater efficiency of energy production, electricity generation, and end use systems
- Optimize the energy efficiency of water management, treatment, distribution, and end use systems
- Enhance the reliability and resilience of energy and water systems
- Increase safe and productive use of nontraditional water sources
- Promote responsible energy operations with respect to water quality, ecosystem, and seismic impacts
- Exploit productive synergies among water and energy systems



The complex interconnections of energy and water systems are shown in the above diagram. For example, thermoelectric power plants withdraw large volumes of water for cooling and other processes. Depending on the technology used, attempts at carbon capture at power plants can dramatically increase water requirements for thermoelectric cooling.

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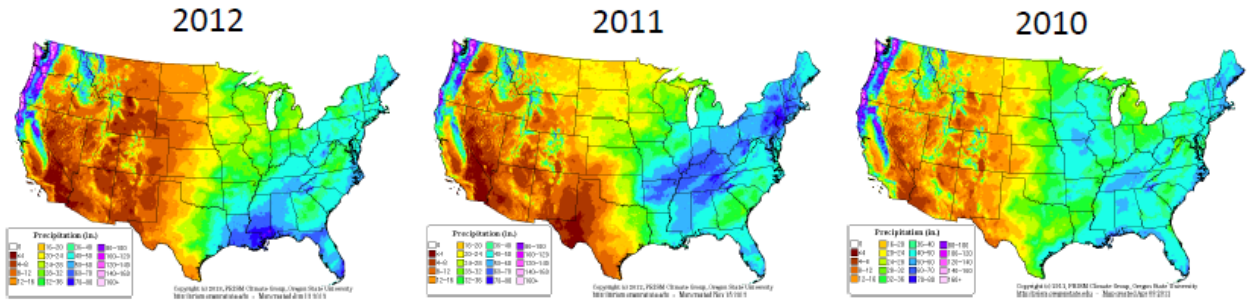
Variability in Water Resources



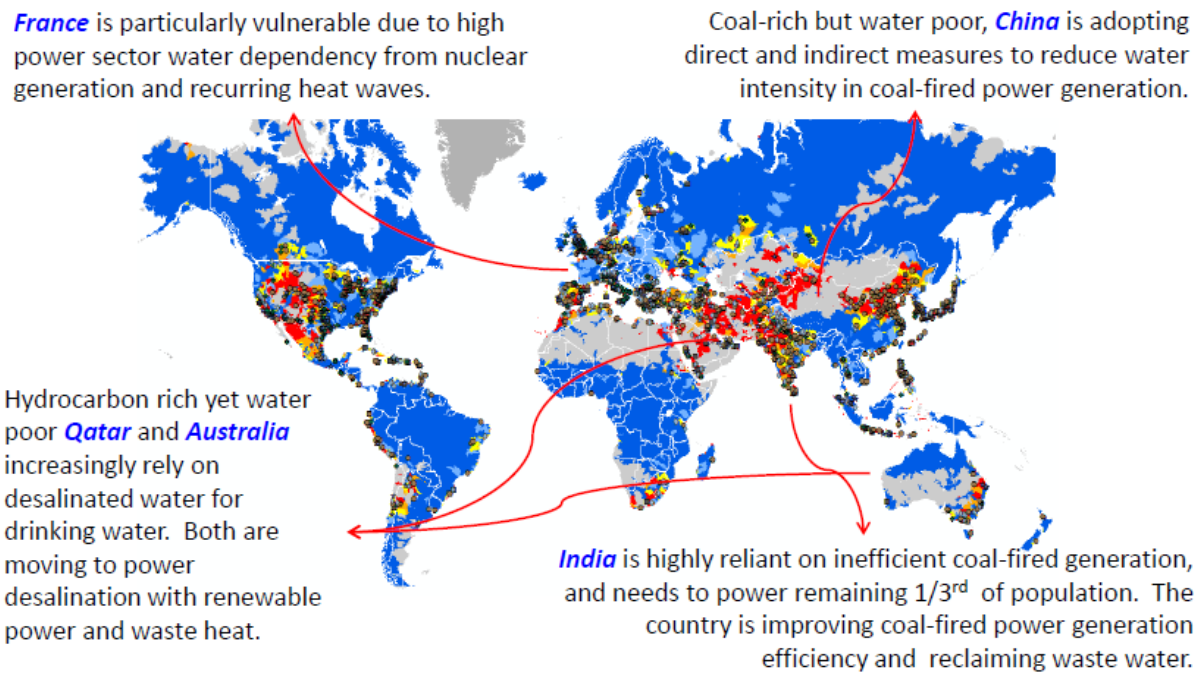
Annual Average Precipitation (2010 -2012)

- Variability in available water resources will pose challenges for:
  - Optimizing operations (especially for hydroelectric plants)
  - Developing effective water management strategies
  - Choosing sites for energy production activities

There is increasing diversification of cooling water sources. The power sector is moving toward reclaimed wastewater, groundwater, and dry cooling. Brackish and saline sources may be an opportunity. Proposed systems are scheduled to come online between 2013 and 2022.

The water-energy decision-making landscape is characterized by market and institutional factors varying by region and sector. The market drivers of decisions are water prices and costs, relative fuel prices and costs, and financial incentives. The institutional factors include water rights and permitting, aging infrastructure, oil and gas regulatory response to rapid growth, and power and transportation renewable energy mandates.

There is regional variation in water policy regimes. Eastern states tend to operate under riparian water policies, while the western states typically use prior appropriation.



Responding to challenges in the Energy-Water System requires attention to:

- Energy technology pathways
- Policy and institutional changes
- Land use and land cover change
- Changes in stakeholder & consumer preferences
- Population and migration
- Urbanization & dynamics of infrastructure
- Regional economic development

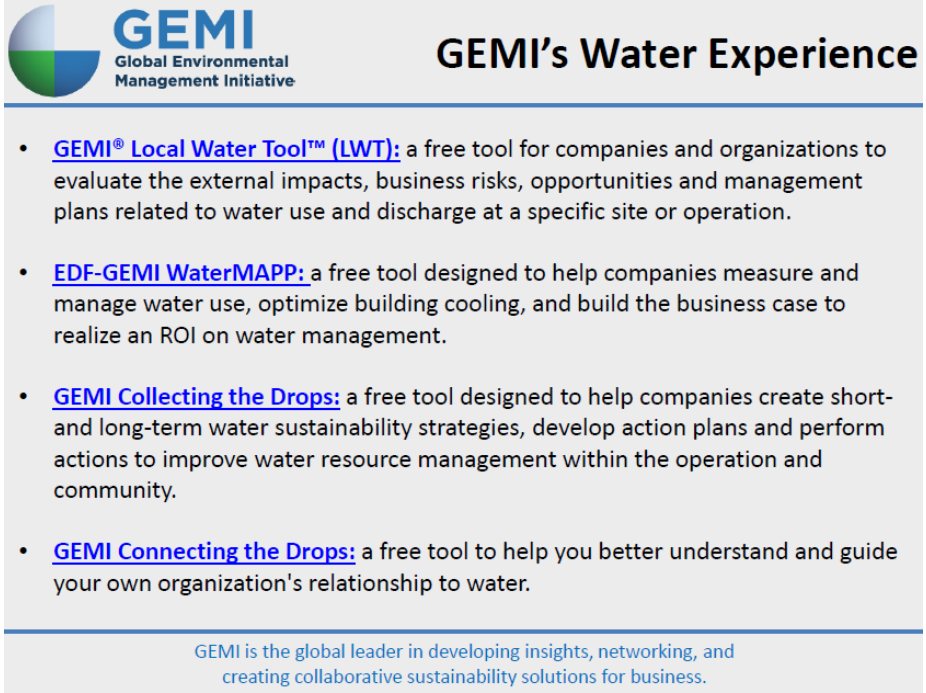
Diana Bauer said the next steps for the Department of Energy are to:

- Pursue technology R&D; provide technical assistance; develop in-depth technology roadmaps
  - Water-efficient cooling
  - Treatment, management, and beneficial use of nontraditional waters
  - Net positive energy water utilities
  - Improved water efficiency in bioenergy systems
  - Coupled water and energy efficiency in buildings
- Fill data gaps and improve data accessibility
- Analyze connections between policy developments and technology opportunity
- Pursue fundamental advances to enable models to inform regional decision-making
- Collaborate domestically and internationally

Contact: Diana Bauer, Director, Energy Systems Analysis & Integration, Department of Energy, Diana.bauer@hq.doe.gov

Steve Hellem, Executive Director, GEMI. Collaborating for Sustainable Business Solutions

Steve Hellem told participants that GEMI is a global leader in developing insights, networking, and creating collaborative sustainability solutions for business. Its mission is collaboration for sustainable business solutions.



Steve Hellem said the GEMI Local Water Tool™ (LWT) is a free tool made by a group of 40+ global companies to help them and other companies identify external impacts, business risks, and opportunities related to water use and discharge at a specific site or operation.

It provides a common and consistent "visualization platform" for internal and external communication and provides interconnectivity between global and local water risk assessments and a uniform approach between site assessments. It creates a central repository of information to create reports for multiple water questionnaires.

The GEMI LWT™ was developed in cooperation with the World Business Council on Sustainable Development and its Global Water Tool. The GEMI LWT™ for Oil and Gas was developed in cooperation with the International Petroleum Industry Environmental Conservation Association (IPIECA) and its Global Water Tool for Oil and Gas. The tools are mutually compatible and provide best practices for sustainable water management at the global, regional, national and local levels. References and web links to the respective tools are posted on the three organization's web sites.

The GEMI, WBCSD and IPIECA water tools are intended for free use by the public and are posted in the public domain.

In 2012, EDF and AT&T launched a pilot project to identify opportunities to reduce water and energy use in buildings, with a focus on cooling towers. Through the pilot, the initial WaterMAPP Tools and Resources were developed to help AT&T and other organizations reduce their water

use. The toolkit has the potential to save 28 billion gallons annually if deployed across all U.S. companies. Seeing an opportunity to scale, GEMI and EDF collaborated on the redesign, hosting and co-promotion of the EDF-GEMI WaterMAPP as our joint effort to help organizations reduce water and energy use in buildings.

The EDF-GEMI Water Management Application (WaterMAPP) is a MS Excel-based, multi-tabbed spreadsheet with three complimentary tools:

- The EDF-GEMI Water Scorecard helps you assess your company's water efficiency and can be used to create visibility for water performance at facilities.
- The Water Efficiency Calculator estimates water and financial savings from cooling tower or free-air cooling improvements -- key data for making the water-efficiency investment business case.
- Cycles of Concentration Estimator takes information about your water quality and estimates the recommended maximum Cycles of Concentration (COC)—a key indicator of cooling tower water efficiency—when using chemicals to treat the water. It also helps identify appropriate non-chemical water treatment options to increase the potential COC.

Contact: Steven Hellem, Executive Director Phone: 202-296-7449 ext 201

Email: shellem@navista.net Web site: www.gemi.org

GEMI Water Tools

- GEMI Local Water Tool (LWT): www.gemi.org/localwatertool
- EDF-GEMI WaterMAPP: www.gemi.org/EDFGEMIwaterMAPP/
- Collecting the Drops: http://waterplanner.gemi.org/index.htm
- Connecting the Drops: http://www.gemi.org/water

Jeff Lape, Deputy Director, Office of Science and Technology, Office of Water, U.S. Environmental Protection Agency

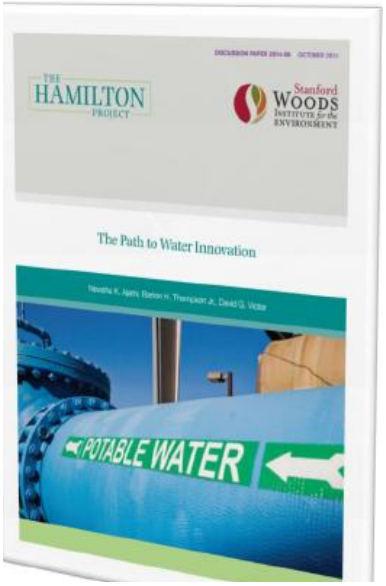
Jeff Lape began by going over the main discussion questions related to water sustainability:

1. What are the elements of water sustainability?
2. Do we have a common understanding of what constitutes "water sustainability"? Does one exist? Do we need one?
3. What is the ideal geographic scale to consider water sustainability?
4. What is the ideal timeframe for considering water sustainability?
5. How do we achieve progress toward water sustainability?
6. What is EPA's role and opportunities to support progress toward water sustainability?
7. What are the right questions?

He then gave a series of examples of publications from various sources to make clear that the conversation on water sustainability is happening in many places:

The Path to Water Innovation (Stanford & Brookings)

- Change in the water sector has historically been reactive instead of proactive.
- Identifies numerous barriers to innovating in the water sector.
- Several key recommendations:
- Price water to the full economic cost
- Revised reg. frameworks to make governance open and flexible
- Financing & funding mechanisms (e.g., public benefit charge on water)

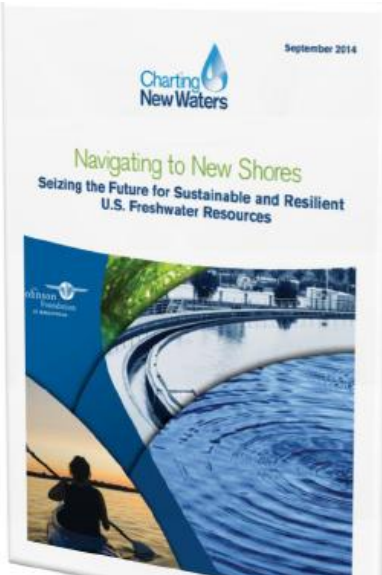


Water 4.0 – The Past, Present and Future of the World's Most Vital Resource (David Sedlak)

- Water Supply—Upgraded, centralized systems with imported water will be supplemented or replaced by desalination and potable water recycling along with array of water conservation incentives and measures.
- Waste Treatment—Centralized sewage treatment will evolve to systems that recover water, energy, and nutrients from sewage.
- Integration of water systems.

"*To make informed decisions about the future, we need to understand the three revolutions in urban water systems that have occurred over the past 2,500 years and the technologies that will remake the system.*"

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

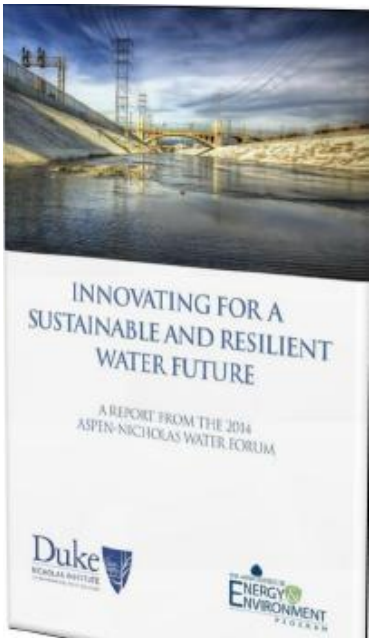


(Johnson Foundation)

- Elevate the profile and community involvement of utility managers.
- Researchers and their advocates cannot let up on new innovations.
- Policymakers need to prioritize flexibility to make room for innovative solutions.
- Elected leaders must champion the cause and maintain government investment.

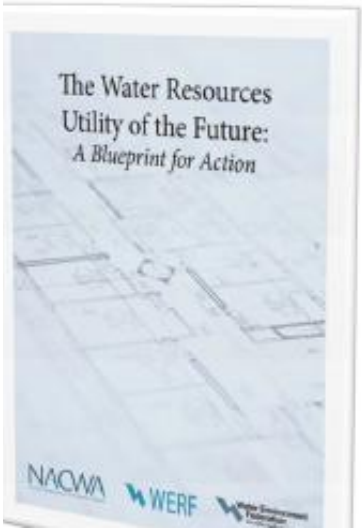
"*Across the nation, we are poised to adopt and scale up the most innovative technologies, management practices, policy incentives and financing strategies.*"

Innovating for a Sustainable and Resilient Water Future (Aspen-Nicholas Water Forum, 2014)



- Identifies challenges and near-term actions to address them. Discusses innovations in water finance and water technologies.
- Outlines priorities for the U.S. water sector:
  - Disseminate and scale innovative practices
  - Focus on resilience as framework
  - Generate awareness of the value of water
  - Define & monitor the country's water budget
  - Help address federal-state-local water tensions.

"State and federal authorities need to find a way to 'say yes' to new opportunities and then to help disseminate, translate, and scale the effective and efficient ideas."



The Water Resources Utility of the Future: A Blueprint for Action

- Makes the business case for innovation.
- Comprehensive discussion of how to create an environment that encourages innovation.
- Identifies tangible steps in key areas of the water sector:
- Regulatory environment
- Financial support and investment mechanisms
- Utility-led initiatives
- Describes concrete steps that can help enact the vision it lays out.

Damned If We Don't – Ideas for Accelerating Change Around Water (Ed. by Christopher Peacock)

- Contains a series of essays written for & by members of the water sector.
- Essays highlight actions the authors and others are taking on a daily basis to accelerate change in the water sector.

• Changes discussed range from policy ideas to behavioral change and from new engineering to new technologies.

"Aside from getting people thinking about new ideas and engaging them in deeper dialogue, the real purpose for this book is to become a catalyst and mobilize a revolution around water."

Water Technology Innovation Blueprint – Version 2 (EPA)

• Ten "market opportunities" can be considered avenues for ongoing and future innovation.

• Identifies potential EPA actions that could encourage or make room for new techs.

• Water sustainability should be viewed holistically, by integrating what are often considered discrete actions.

• Report aggregates case studies, resources, and partners that support or exemplify innovation in the water sector.

Jeff Lape outlined a number of market opportunities for water technology innovation from the Blueprint Version 2

1. Conserving and Recovering Energy
2. Recovering Nutrients
3. Improving and Greening of the Water Infrastructure
4. Conserving and Eventually Reusing Water
5. Reducing Costs and Improving Techniques for Water Monitoring
6. Improving Performance of Small Drinking Water Systems
7. Reducing Impacts from Energy Production
8. Improving Resiliency of Water Infrastructure to the Impacts of Climate Change
9. Improving Access to Safe Drinking Water and Sanitation
10. Improving Water Quality of Our Oceans, Estuaries and Watersheds
11. Putting It All Together – Achieving Water Sustainability!

Putting It All Together: Achieving Water Sustainability

• Challenge: Our programs and priorities are frequently "siloed" and disconnected.

• Aspirational Goal: Imagine if we could integrate our programs and objectives and address/achieve all of the market opportunities (e.g. water, energy, nutrient recovery, climate resiliency) and achieve water sustainability!

EPA Actions to Promote Water Sustainability

• Advocate for technology innovation

• Communicate actions and successes

• Create regulatory space to foster technology innovation

  - Effluent guidelines that consider sustainability and innovation

    - Explore how NPDES permits can foster technology innovation
- Support for speeding delivery of proven technologies
    - Technology evaluation (e.g. LIFT, STEPP)
    - Regional Technology Clusters
- Facilitate Innovative Financing and Funding
- Support research, development, and demonstration projects

"We are making real strides, at EPA and across the entire water sector, to support the use of innovative technologies and practices to achieve a sustainable water future"

EPA Administrator Gina McCarthy EPA

At the end of his presentation, Jeff Lape returned to the discussion questions with which he began and opened the session for questions and discussion. Contact: lape.jeff@epa.gov

Panel 2. Questions and Discussion

The idea is not to manage water, but to manage water business.

Use stories; get info, video, reality shows – use communications vehicles people are using. Do a talk or reality show. Produce a weekly or monthly series about water. We need to have a much broader aspect of how water fits into life. It's harder to make decisions in economy based on that concept.

Everyone uses different discount rates. We need a discussion on discount rates.

Utilities have a longer planning horizon than the short term thinking in the agencies. We need to reframe our federal partners/ regulators ways; they need to think further out.

What is the geographic scale for water sustainability? We need large scale habitat.

We must act locally. Congress talks about local districts. You can find water Sustainability projects in action in Anacostia, DC.

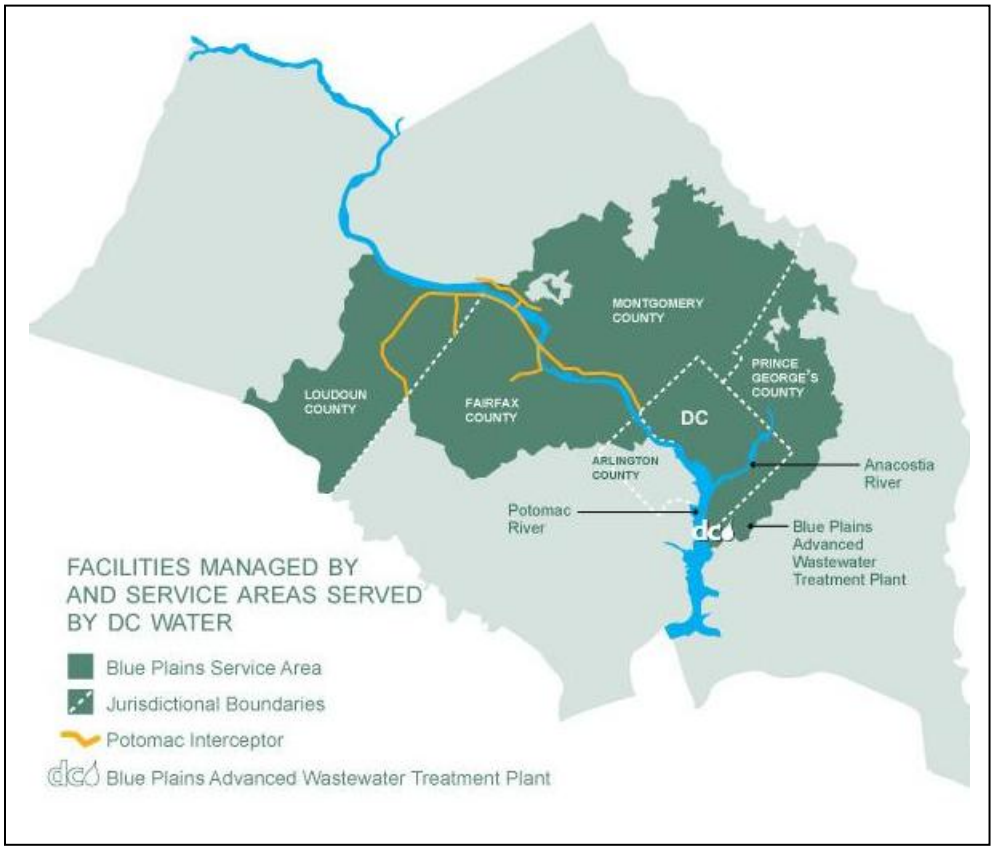
Panel 3. Collaboration on Water Sustainability - DC Metro Region
Moderator: Rhonda Kranz, Kranz Consulting

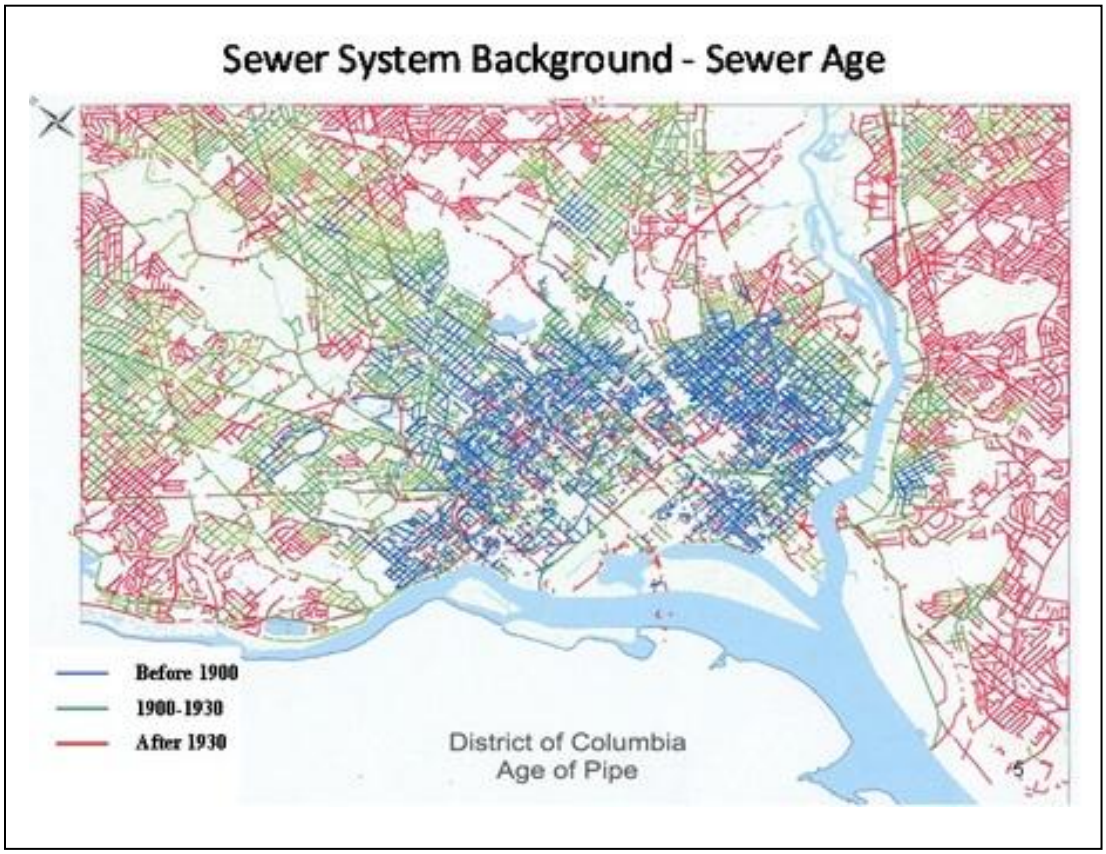
Jonathan Reeves, Manager of Emergency Management, DC Water

Jonathan Reeves began by describing how the Tri State legislation for DC, MD, and VA makes the region somewhat different than elsewhere. For example, it allows for interstate commerce across lines. Rules and regulations are different across the US which makes it difficult for to transfer goods. In the DC region materials and people can be sent to Loudon County in VA, or Montgomery County in MD. The Department of Transportation and other regulations for each state are known. It was even possible to send help to Haiti as it was out of the country. But to send material to other parts of the U.S. can be difficult. Even though DC Water used EMAC It took two years for FEMA to reimburse for resources to help after Hurricane Sandy.

The Metropolitan Council of Government's Water Security Workgroup connects regional partners to address issues of importance/impact to local drinking water and wastewater utilities including water supply, drought monitoring, and water security monitoring. It provides an open forum for utilities to talk about impacts including those associated with climate change.

Jonathan described some of the challenges in the region. Maintaining an available supply of potable water is one is of the region's greatest challenges. How many people assume we have a source of water if there is a problem with the Potomac? In fact there is no water within the nation's capital if anything happens to the Potomac. There is no pipeline, no magical facility to get water from the Susquehanna or elsewhere. The solution to this problem would cost 270 million dollars. Another big challenge is aging infrastructure; the pipes in DC are from 1910.





We assume water is available everywhere. The water supply in India was more reliable in 1940s than it is today. When the British were there water was available 24 hours a day, now it is available only four hours a day.

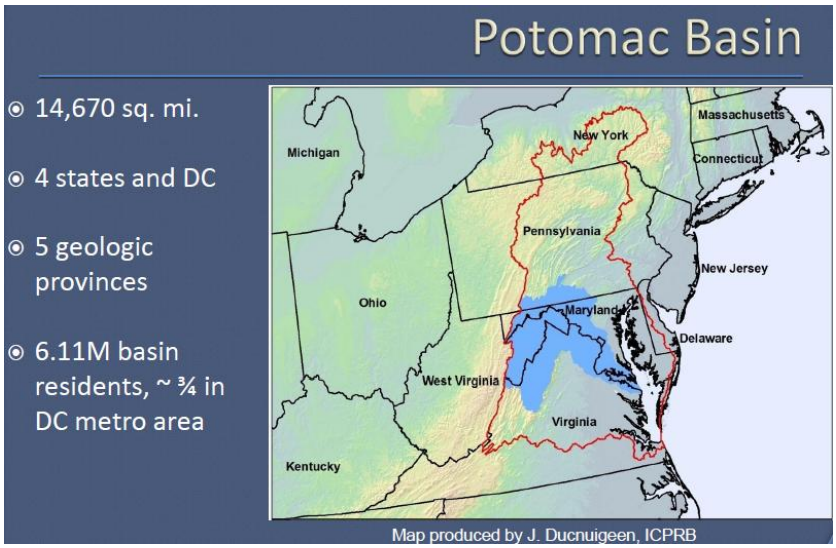
Jonathan told the participants that he was in a workgroup this morning that included people from Pepco, Washington gas, FEMA, other agencies and utilities in the region. The sole purpose was to look at interdependencies and interoperability. He stated that to be most effective way we have to understand how Pepco and the other institutions work is to participate in these types of sessions.

Jonathan noted that some problems can be mitigated but others are more complicated. For Blue Plains to have 100% power they would need to have large amounts of onsite generation. Additionally, the plant currently stores a very large supply of chemicals. Right now they have a five days supply. Adequate supplies for a year would mean an expansion of storage space in the land around the plant and elsewhere. What is the community willing to put up with along the 295 corridor?

Jonathan finished by saying that these types of challenges are faced by all utilities. And that we need to address issues at the local level while thinking about them at a higher level.

Collaborative Planning Potomac River Basin
Heidi Moltz, Interstate Commission on the Potomac River Basin (ICPRB)

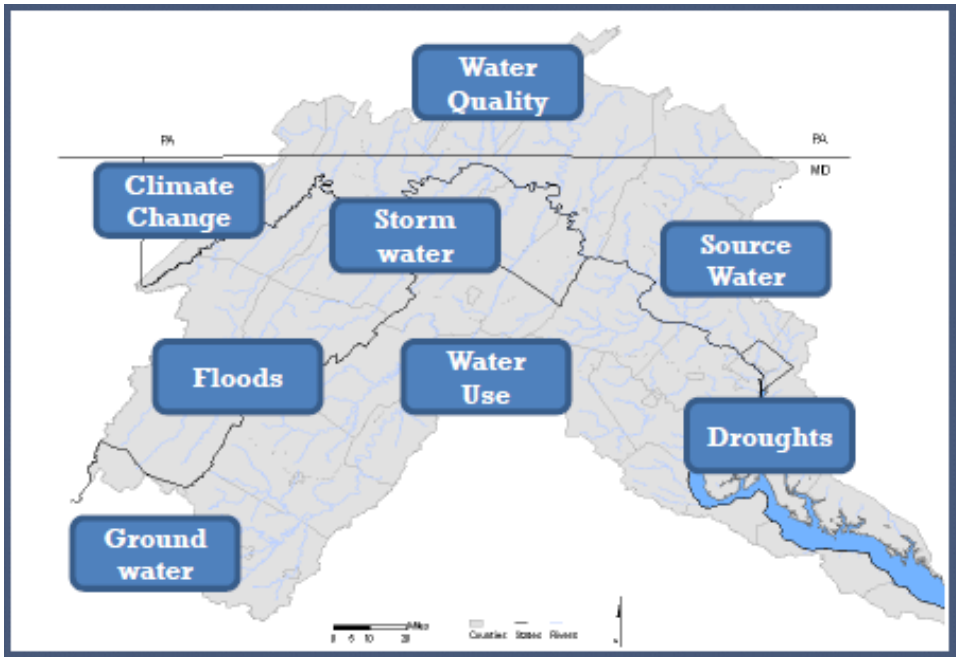
Heidi Moltz said the mission of the ICPRB is "To protect and enhance the waters and related resources of the Potomac River basin through science, regional cooperation, and education"



The objective of basin planning is the collaborative development of an adaptive basin-wide comprehensive water resources plan to serve as a roadmap for the sustainable use of this interstate resource now and into the future. There are four phases to the work on the plan: scope, identify issues, recommendations and develop the plan. The first two are underway

Phase 1 - Scope

- Initiate stakeholder participation
  - ICPRB member jurisdictions
  - Advisory committee
  - Technical committees
  - Public outreach
- Develop shared vision and objectives
- Stakeholders
  - Commission members • (PA, MD, VA, WV, DC, federal government)
  - Local government
  - Non-profits
  - Water utilities
  - Industry
  - Agriculture
  - General public
  - Others

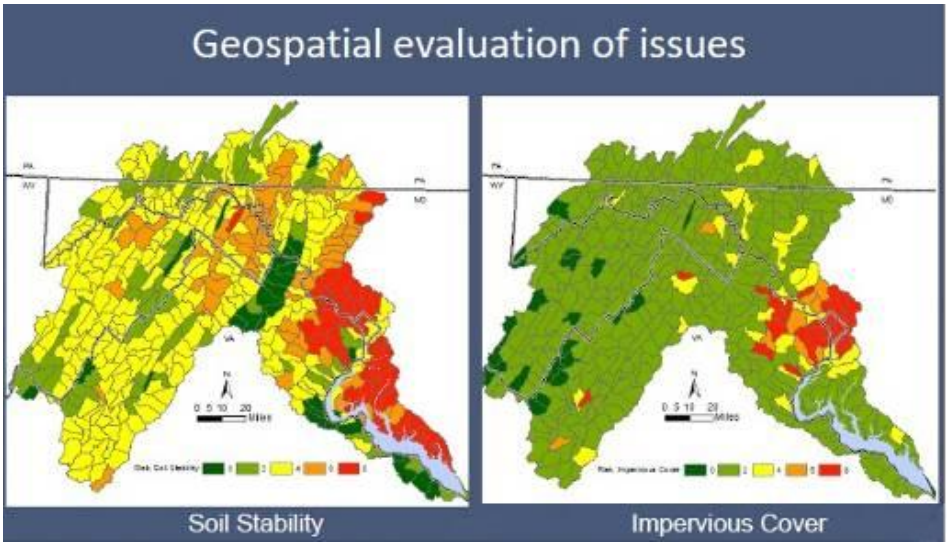


Phase 2 – Identify Issues

- Review of state and local comprehensive plans
- Survey of water resources-related organizations
- Geospatial risk assessment based on EPA Recovery Potential Screening and other tools
- 38 issues identified under 9 topic areas

Heidi Moltz gave two examples of the geospatial evaluation of issues: soil stability and impervious cover.

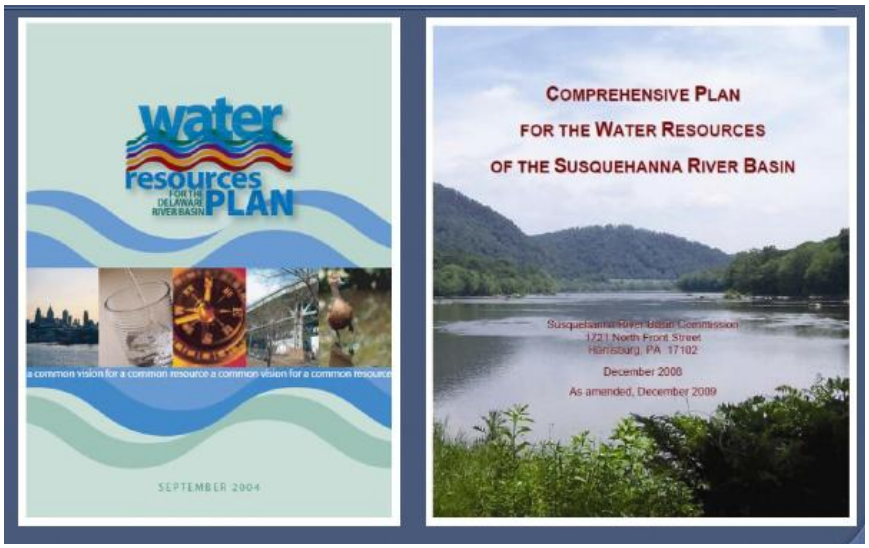
The next steps are to prepare introductory sections of a draft plan with basin background info, and description of water resources issues as a way to continue the stakeholder dialogue and proceed to Phases 3 and 4 of the plan.



Phase 3 – Develop Recommendations

Heidi Moltz gave several examples of the topics of specific recommendations:

- Environmental flow protection
- Flood protection and management
- Hydrologic and floodplain function restoration
- Water supply and sustainable watershed management



Phase 4 – Write Plan

The benefits of creating comprehensive plans included:

- Integrating existing data and research for analysis at the basin-wide scale
- Enhancing interstate collaboration
- Managing an interstate resource at the interstate scale (impacts across state lines)
- Increasing cost efficiency

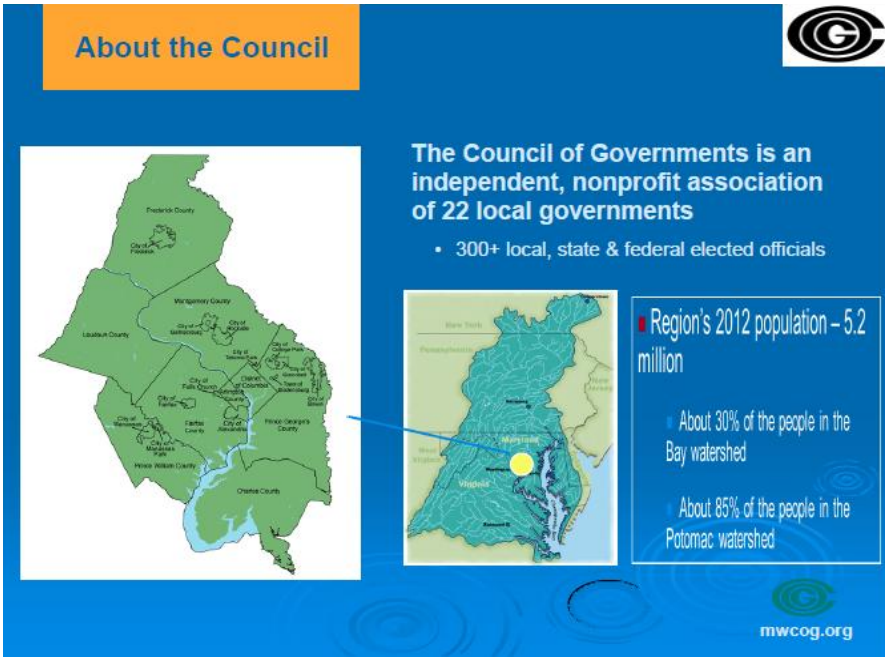
Challenges to the planning process include:

- Diverse, sometimes competing, interests (e.g. ecosystem, human health, economic)
- Scale
  - Focus on interstate issues;
  - Meaningful and implementable at the local level, where action and implementation typically occur; and
  - Statewide principles should also be developed to assist in state planning efforts.

Heidi concluded by saying that collaboration will be an essential component of developing a comprehensive basin-wide water resources management plan.

Contact Info: Heidi Moltz, Ph.D. Associate Director for Water Resources Interstate Commission on the Potomac River Basin hmoltz@icprb.org 301.274.8116

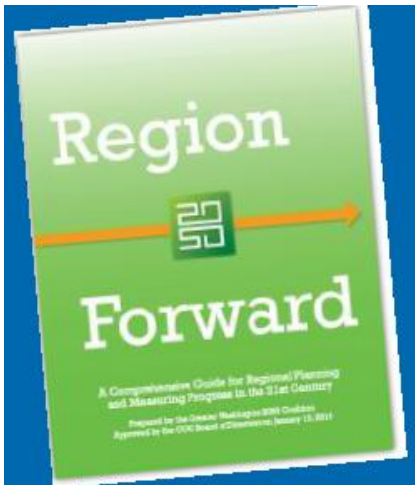
Metropolitan Washington Council of Governments, (MWCOG)
Tanya Spano, Chief, Regional Water Quality Management,

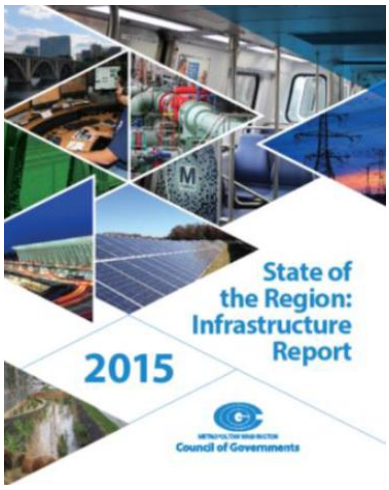


Tanya Spano told the SWRR participants that in addition to the twenty-two regional governments that make up the Metropolitan Washington Council of Governments, there are several participating water and wastewater utilities:

- Alexandria Renew Enterprises
- Fairfax Water
- Leesburg
- Loudoun Water
- Prince William County Service Authority
- Purcellville
- Upper Occoquan Service Authority

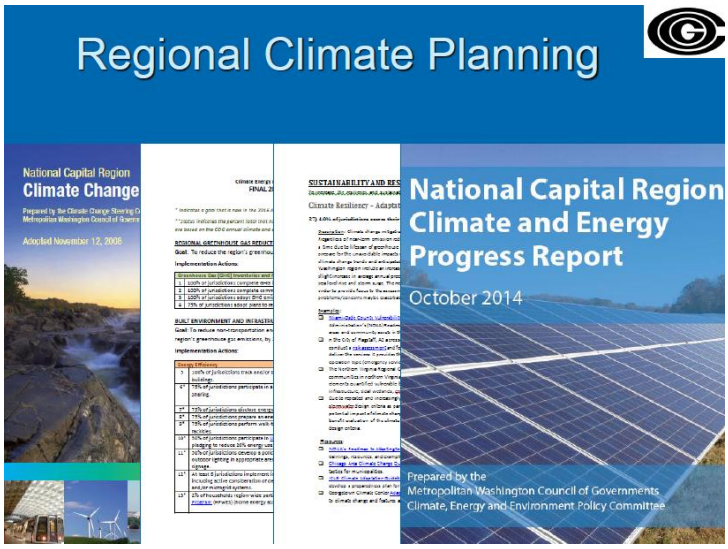
The region's vision for a more accessible, sustainable, prosperous, and livable metropolitan Washington is presented in recent reports:





COG Vision and Priorities

Since 1957 - COG has helped tackle region's challenges (e.g., restoration of Potomac River, getting Metro system built, & strengthening emergency preparedness after September 11, 2001). Today, COG's top priorities include advancing the Region Forward vision, addressing Regional Infrastructure, and supporting Economic Competitiveness.



Regulations in the region are set by the U.S. Environmental Protection Agency (EPA), the Maryland Department of the Environment (MDE) and the Virginia Department of Environmental Quality (VA-DEQ). Responsibility for stormwater rests with local governments and for wastewater with the local governments and wastewater authorities. Wastewater treatment plants in the COG regions have a total of 779 million gallons per day capacity.

Drinking water is the responsibility of the water authorities, local governments and the US Army Corps of Engineers. There are thirteen suppliers and twenty-seven distributors in the region. They are a mix of local governments, water authorities, federal government, and private firms. The water sources for the region are the Potomac River, Occoquan River, other reservoirs, and groundwater.

The regional governments have begun planning adaptation to climate change. The region houses Thousands of critical buildings and functions including the U.S. Capitol Complex, he White House and the Pentagon.

Sector / Challenges	Potable Water	Wastewater (also CSOs/SSOs, & Biosolids)	Stormwater
Replace Existing/Aging Infrastructure *(i.e., plants, ancillary systems, BMPs, and pipe networks)*	X	X	????
Add New Infrastructure or Retrofits/Upgrades	X	X	X
Enhance Linked Energy Infrastructure *(e.g., electrical grid &/or alternative power sources)*	X	X	
Deal with Growth Impacts *(e.g., cap loads versus increased demands/impacts)*	X	X	X
Meet New Standards & Regulations *(e.g., time & ability to implement, available technology, need for permitting flexibility)*	X	X	X
Protect Existing Resources & Address New Environmental Challenges & Risks *(e.g. climate change, extreme events)*	X	X	X
Address Work Force Issues *(e.g., loss of experienced staff, 21st Century training needs)*	X	X	X
Address Major Funding Demands & Rate/Fee Impacts *(e.g., competing demands, economy, affordability, & implementation schedules)*	X	X	X

Tanya Spano concluded by outlining many of the MWCOG Support Activities:

- Wastewater: Regional water quality assessments, coordination on wastewater issues and Blue Plains coordination support
- Stormwater: Coordination, & watershed restoration
- Drinking Water: Drought plan, source water protection, supply/demand planning, and water conservation

Collaborative Efforts include:

- Regional Water Quality Assessments
- Technical/Regulatory Support
- Climate/Extreme Weather Impacts
- Blue Plains IMA Coordination & Support
- Security & Mutual Aid
- Permitting & Regulatory Tracking
- Watershed Restoration – Anacostia
- Policy & Advocacy

Contact: Tanya T. Spano, Chief Regional Water Quality Management, Metropolitan Washington Council of Governments (MWCOG) (202) 962-3776 tspano@mwcog.org

Panel 3. Questions and Discussion

Q: What do you three see as mutual problems?

Jonathan: This stuff is hard. If it was easy, everyone would do it. The discussion is valuable. People talk as if where easy and there is a simple framework for water sustainability, for resilient infrastructure. When we do a good job, people forget how hard it is to make that happen.

Q: Tanya and Jonathan what do you hope Heidi will be able to accomplish?

Tanya: My hope is to end up with a basin wide approach.

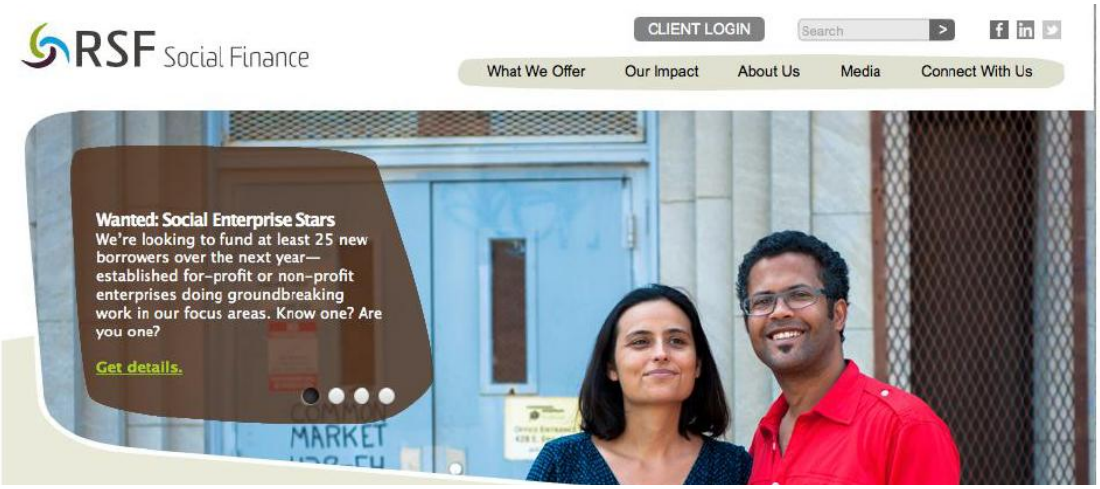
Q: It is interesting that somebody made the decision not to spend $270MM on an alternative backup water supply for the city. It is profound. The money would have been taken from elsewhere. At Fort Bragg, 18 sectors and part of homeland security have to go way outside their footprint to protect energy and water security for the facility. If there were an attack, and there weren't enough people still in the buildings there would be no workforce. There have to be enough people to respond. It's fascinating to listen to the panel talk. The created bureaucracy of federal, state, local utilities make your job is almost impossible.

Jonathan: A threat profile found that 99% of utilities don't have hazmat response. As a utility, we see ourselves as a victim and not as a responder. The decision was made to put the money elsewhere. The US National Guard is who responds.

Jonathan: Utilities provides information to the federal government but it's a one-way communication. The federal data is not available to the utilities.

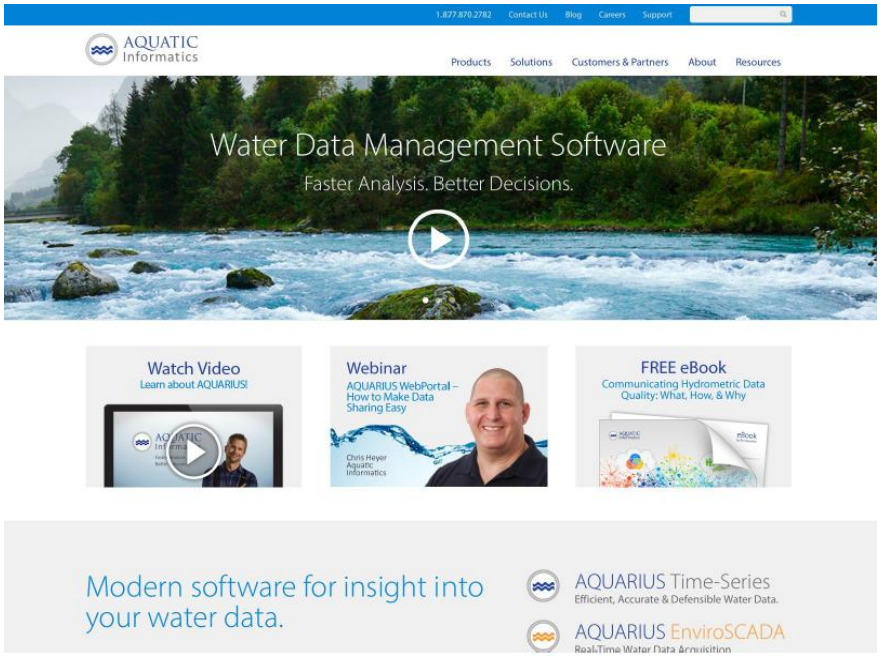
Building environmentally, socially and economically sustainable communities

Sandy Wiggins, Chair of BALLE - Business Alliance for Local Living Economies, Principal, Consilience, LLC, Former Chair, U.S. Green Building Council



Sandy Wiggins began his presentation with a discussion of some of the organizations with which he is associated. RSF Social Finance funds non-profit and for-profit ventures in which the economic activity is a means toward creating significant social or ecological impact. RSF defines a social enterprise as one that views its values as central to all aspects of its work, and is committed to holding itself accountable and transparent in pursuit of its mission.

An example of an enterprise related to water resources that is funded by RSF is Aquatic Informatics, a water data management software company.



“The aquifers are being pumped faster than they can be replenished. If we stopped today, it could take 100 years or more to regain all the water lost in Southern Maryland since 1960.”

David Bolton, Maryland Geological Survey, Program Chief of Hydrogeology and Hydrology

Sandy Wiggins is the principal of Consilience LLC, a design consulting company with the mission to build environmentally, socially and economically sustainable communities. The firm is engaged in sustainability master planning for business and institutions, preplanning and fiscal analysis for green development and capital projects, stakeholder engagement, facilitation of Dynamic Planning and green design charrettes.

The Potomac Watershed Study Center at the Alice Ferguson Foundation is an example of Sandy Wiggins’ work. From the initial charettes to the solar energy and rainwater capture in the design, the Center is designed to achieve both LEED Platinum and the Living Building Challenge certifications.

With respect to water, the goal is to be net positive water which means that one hundred percent of the project’s water needs must be supplied by captured precipitation or other natural closed loop water systems. Water must be appropriately purified without the use of chemicals. Further, one hundred percent of storm water and used project water discharge must be managed onsite to feed the project’s internal water demands or released onto adjacent sites for management through acceptable natural time-scale surface flow, groundwater recharge, agricultural use or adjacent property needs.

The Living Community Challenge includes water among the topics of importance in design. The Water Petal summarizes that focus.

Sandy Wiggins mentioned that a national problem in green design is regulatory barriers to using rainwater capture as a potable source, barriers to natural onsite treatment and recycling of waste water, and barriers to green infrastructure. All three face obstacles in the regulatory environment.

PETAL INTENT

The intent of the Water Petal is to realign how people use water and to redefine 'waste' in the built environment, so that water is respected as a precious resource. Scarcity of potable water is quickly becoming a serious issue as many countries around the world face severe shortages and compromised water quality. Even regions that have avoided the majority of these problems to date due to a historical presence of abundant fresh water are at risk: the impacts of climate change, highly unsustainable water use patterns, and the continued drawdown of major aquifers portend significant problems ahead. A water-independent community is a stronger, more resilient community, and the Challenge calls for Communities that honor the realities of each project's bioregion.

In his conclusion, Sandy Wiggins told participants that in the Global Risk Assessment report released this week by the World Economic Forum in collaboration with Swiss Reinsurance and the Wharton Center for Risk Management, Water Supply Crisis ranked highest in both likelihood and impact of all societal risks over the next ten years.

The relationship of sustainable water technologies to this mounting problem is much the same as renewable energy technologies are to climate change. They are critical components to a systemic solution, and they work best when distributed rather than centralized. Rainwater capture is the simplest of all such solutions and is used all over the world for that reason. The U.S. should be leading the world in the development of technologies, policies and regulations that support the safe use of captured rainwater for potable supplies.

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Questions and Discussion

We have to start looking at each individual situation. What are our challenges? What can we do? Problems and solutions are different in different places. For example Philadelphia chose to deal with its CSO/stormwater issues by investing in green infrastructure at the same time that DC chose to drill holding tunnels for about the same price.

Discussions have been held with EPA about the need to create a classification of rainwater as a drinking water source along with uniquely appropriate protocols. One potential consequence of such a move is the fiscal impact on water suppliers, e.g. if everyone does rainwater capture in DC, it will impact DC water. We need to plan ahead for these things.

When LEED was first introduced people said no one would do it and that LEED Platinum was impossible. But the Chesapeake Bay Foundation pioneered it by developing its LEED Platinum headquarters and thousands of other buildings followed. We need to pioneer.