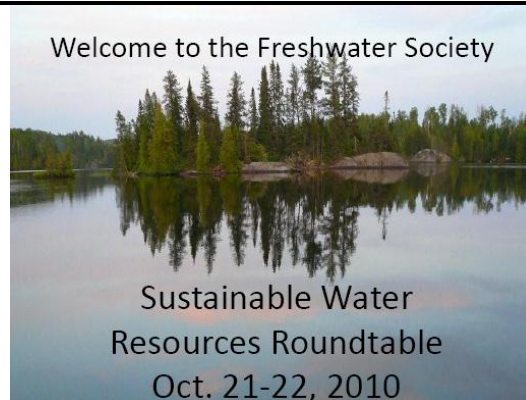


# Sustainable Water Resources Roundtable



## SWRR



Welcome to the Freshwater Society

Sustainable Water  
Resources Roundtable  
Oct. 21-22, 2010

## Proceedings

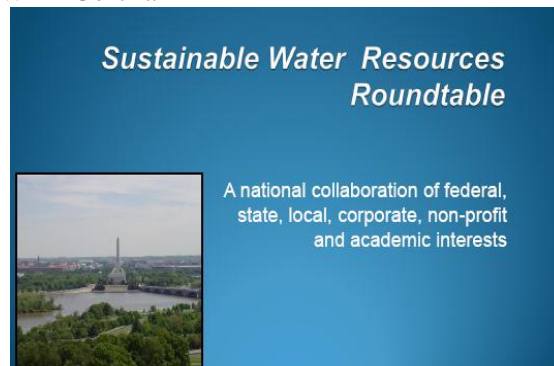
### *Day 1 Thursday October 21, 2010*

**Welcome Remarks:** David Berry, SWRR manager opened the meeting and thanked the SWRR co-chair John Wells for organizing such a good agenda and the Freshwater Society for hosting the meeting and attracting so many people with an interest in sustainability of water resources. Over 100 people registered for the meeting and David let them know that by participating in a SWRR meeting they were now full members of the Roundtable rather than observers and they were invited to share their experience, ideas, views and concerns to help enrich this meeting.

**Welcome by the Freshwater Society:** Blyth Brookman, Chair; Gene Merriam, President; and Joan Nephew, Executive Director.

The leadership team of the Freshwater Society welcomed participants and gave an overview of the history and work of the Society. The Freshwater Society is a 501(c) (3) nonprofit organization founded in 1968 that promotes conservation, protection and restoration of freshwater resources. They invited everyone to look at the many works of art celebrating water that graced the walls of the meeting room that opened onto a deck looking out at a wetlands and one of Minnesota's thousand of lakes.

**Sustainable Water Resources Roundtable Activities and History:** John Wells, Minnesota Environmental Quality Board, and SWRR Co-chair



John Wells began by presenting a history of SWRR and sharing the SWRR Mission: To promote sustainability of our nation's resources through...

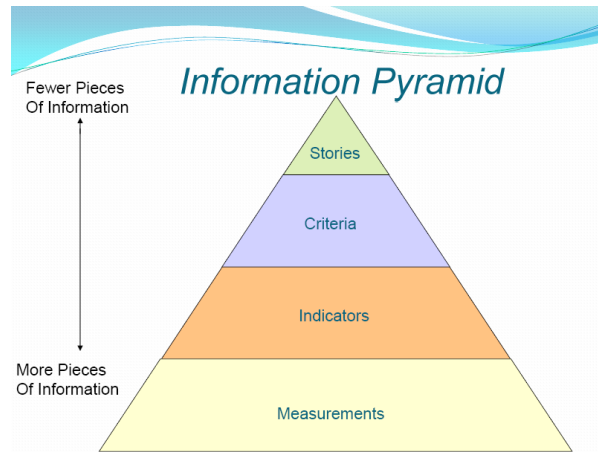
- \* Evaluation of information
- \* Development & use of indicators
- \* Targeting of research
- \* Engagement of people & partners

and the SWRR Vision:

A future in which our nation's water resources support the integrity of economic, social and ecological systems and enhance the capacity of these systems to benefit people and nature

The group has done successful outreach with more than 500 participants from federal, state and local governments; corporations; nonprofits and academia. Meetings have been held in California, Colorado, Maryland, Michigan, Minnesota, Virginia, and Washington, D.C. Several reports and proceedings from many SWRR meetings are available on the SWRR website at <http://acwi.gov/swrr>

John then gave a summary of the SWRR work on indicators in the SWRR effort



Indicators are part of what some call the Information Pyramid which begins with raw data or measurements that is gathered into indicators, categorized through criteria and finally presented to the public as stories that summarize what is happening in a way that is more readily understandable than massive amounts of data.

SWRR defines indicators as measures that present trends information relevant to water sustainability in a readily understandable way.

### The SWRR Indicator Framework

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

### Water Availability

- \* Renewable water: Upper limit of water availability
- \* Water in the environment: Water remaining after human uses
- \* Water use sustainability: Degree to which water use meets current needs while protecting ecosystems and the interests of future generations' water use

### Water Quality

- \* Quality of water for human uses: Drinking, recreation, industry, agriculture, etc.
- \* Quality of water in the environment: Flora and fauna and related ecosystem processes
- \* Water quality sustainability: degree to which water quality satisfies human and ecosystem needs

### Human Uses and Health

- \* Withdrawal & use of water: Amount of water withdrawn from the environment & uses to which it is put
- \* Human uses of water in the environment: Extent to which people use water resources for waste assimilation, transportation and recreation
- \* Water-dependant resource use: Extent to which people use resources like fish and shellfish that depend on water resources
- \* Human health: Extent to which human health may be affected by the use of water and related resources

## **Environmental Health**

- \* Indices of biological condition: Health of ecosystems
- \* Amounts and quality of living resources: Productivity of ecosystems

## **Infrastructure and Institutions**

- \* Capacity and reliability of infrastructure: Capacity and reliability of infrastructure to meet human and ecosystem needs
- \* Efficacy of institutions: Efficacy of legal and institutional frameworks in managing water and related resources sustainably

## **Next Steps for the SWRR**

- \* Continuing roundtable outreach
- \* Building regional connections
- \* Adding new private & public sector partners
- \* Refining the sample indicators
- \* Addressing sustainability and scale
- \* Linking to national and regional indicator sets
- \* Collaborating with the National Water Census and other indicator initiatives across the nation
- \* Assisting agencies in describing the need for programs to collect indicators information

## **Round of brief self-introductions mentioning interest in sustainability and water**

At SWRR meetings around the country participants have reported that one of the most impactful moments was the round of self introductions where everyone in the room learns who the other participants are and what their commitment is to water resources. It leads to a very busy coffee break as people make connections with each other to exchange information and talk about possible collaboration.

With a hundred people in the room would have taken a very long time to make a full introduction so David Berry asked each table of five or six people to introduce their work and interests to the people around their own table in some detail and then invited all the participants to give a forty second summation of their connection and concerns regarding water to the full room. Everyone got a sense of who was in the meeting and who their potential partners for future work might be.

## **National Initiatives:**

**National Water Census:** Eric Evenson, Census Coordinator, USGS.

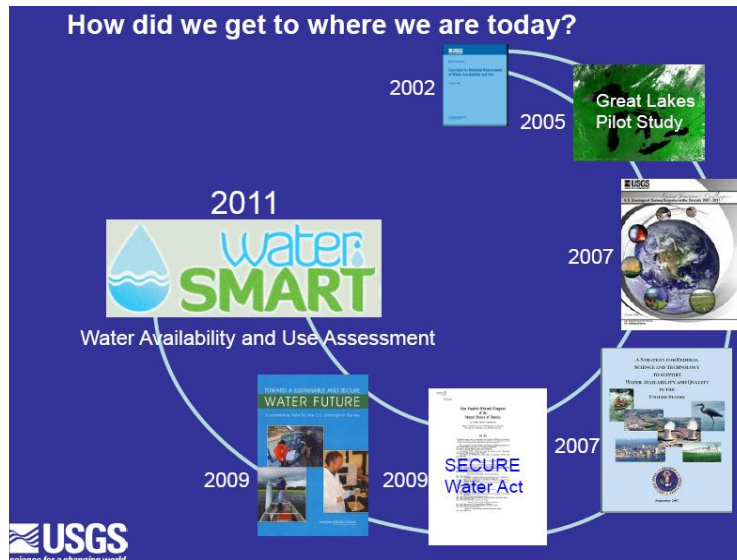


Eric Evenson explained that the National Water Census is a part of the Water Smart Initiative of the U.S. Department of the Interior with the Office of the Assistant Secretary for Water and Science, U.S. Geological Survey and the U.S. Bureau of Reclamation are the principal agencies.

The objective for the Water Census is to place technical information and tools in the hands of stakeholders, allowing them to answer two primary questions about water availability:

- \* Does the Nation have enough freshwater to meet both human and ecological needs?
- \* Will this water be present to meet future needs?

After describing the history of water initiatives over the last decade, Eric gave some details on how the National Water Census and WaterSMART Interrelate. The Water Availability and Use Assessment proposed in the 2011 budget is part of WaterSMART and the National Water Census. The National Water Census is an integral part of the U.S. Geological Survey's Science Strategy to conduct an ongoing assessment of the Nation's water resources called for in the SECURE Water Act signed by the President March 30, 2009.



The Secure Water Act requires a first report in 2012 and every 5 years thereafter on the following:

1. The current availability of water resources in the United States,
2. Significant trends affecting water availability, including documented or projected impacts as a result of global climate change,
3. The withdrawal and use of surface water and groundwater by various sectors,
4. Significant trends relating to each water use sector, including significant changes in water use due to the development of new energy supplies,
5. Significant water use conflicts or shortages that have occurred or are occurring,
6. Each factor that has caused, or is causing, a conflict or shortage.

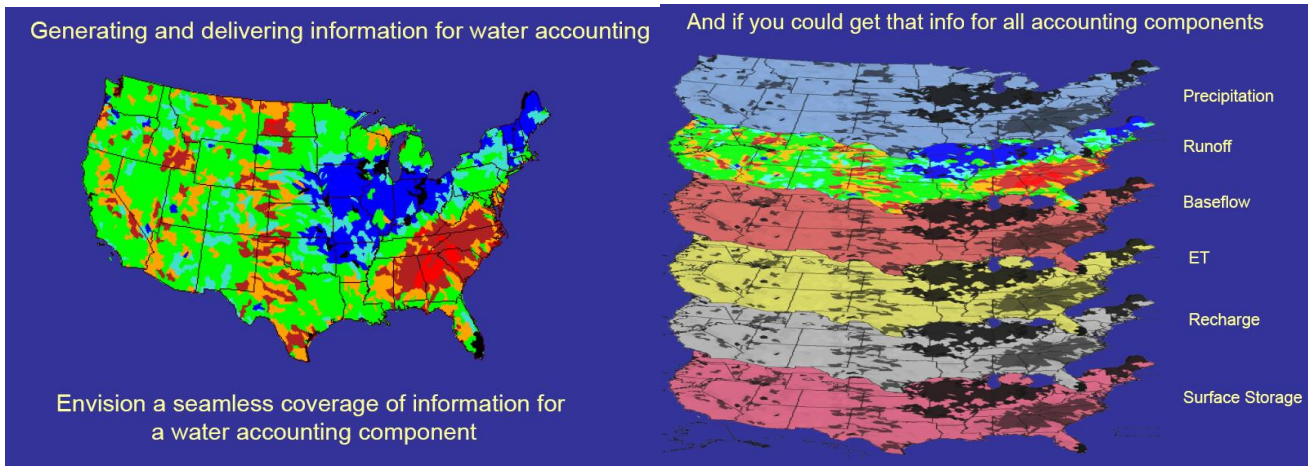
The USGS has created an Implementation Team with focus on many areas relevant to water resources including water use, ecological flows, availability indicators, program integration, and products and decision support.

A multi-stakeholder ad hoc committee of many agencies and organizations has been working with the Implementation Team to improve the concepts, efforts, and products proposed for inclusion in the Water Census so that they best meet stake-holders' needs.

The output from the committee will be brief report to the Associate Director for Water, USGS, on the consensus reached for the Water Census.

The goal of the effort is to create a Nationwide System to deliver water accounting information addressing:

- Precipitation
- Evapo-transpiration
- Storage in Reservoirs, Lakes, Snow and Ice
- Surface Water
- Groundwater
  - Recharge rates
  - Water level in aquifers
- Ecological Needs
- Water Withdrawals
- Return Flows
- Consumptive Uses
- Run-of-the-River Uses



Information Delivery is envisioned as a web application for delivering water availability information at scales relevant to the user. The user of the system would select the area of interest and generate information on water accounting components, trends, or work with the online tool to construct a water budget

The Water Census will enhance the nation's water use information through applying new methods to estimate water use such as stratified random sampling and regression models, models of water use based on land use and provide the ability to track water from point of withdrawal thru to return of flow. New efforts are being launched to assess flows needs for wildlife and habitat, groundwater's role in water availability, the nation's brackish water resources and water quality's role in water availability.

Finally, three studies focused on selected watersheds: the Colorado River, the Delaware River, and the ACF Rivers -where there is significant competition over water resources. Here, the USGS will work collaboratively with stakeholders to comprehensively assess the technical aspects of water availability. There will be other focused water availability assessments at the state, local, and regional levels with stakeholder involvement. The objective is to place the information and tools into stake-holders hands to answer the questions they are facing.

**Building Strong Collaborative Relationships for a Sustainable Water Resources Future:** Ada Benavides, Deputy Chief, South Pacific Division, Regional Integration Team, Project Manager, U.S. Army Corps of Engineers

**Approach to a More Sustainable Water Future**

- 1) Integrated Water Resources Management
- 2) Governance and Management
- 3) Future National Water Resources Direction
- 4) Collaboration
- 5) Water Resources Investment Strategies
- 6) Managing Extreme Events
- 7) Knowledge & Technology Transfer
- 8) Enhance Water Resources Leadership
- 9) Communications and Education

**National Report:**  
Responding to National Water Resources Challenges

BUILDING STRONG®

For each element of the US Army Corps of Engineers approach to Sustainable Water Resources, Ada Benavides outlined what the corps has been working on through a series of meeting with many states and organizations:

## Integrated Water Resources Management

- \* Promote understanding with clear examples about IWRM
- \* Identify watersheds to focus planning using a systems-based approach
- \* Continue to develop system based-watershed policies and guidance
- \* Work with the national water team on pilot IWRM projects

## Governance & Management

- \* Explore mechanisms to better align Federal programs
- \* Establish an interagency mechanism for water policy development/coordination
- \* Develop strategies and governance mechanisms to address fragmentation of policies, communications and coordination at all levels

## Future National Water Resources Direction

- \* What is the water resources direction for this Nation? What does the water future look like?
- \* Continued dialogue about a sustainable national water resources vision. AWRA is collecting proposals
- \* Develop strategies to elevate water resources and related water infrastructure as a critical national priority

## Collaboration

- \* Promote opportunities and mechanisms for collaborative Water resources planning and management
- \* Support an effort for 50 States and 50 Watersheds or a United Watershed program
- \* Response to Executive Memorandum on Transparency & Open Government
- \* Increase opportunities for public participation
- \* Identify gaps and opportunities for partnerships and joint efforts

## Water Resources Investment Strategies

- \* Promote investment strategies to shift crisis-driven funding to integrated water resource management
- \* Explore and promote system-based budgets
- \* Promote legislation that incentivize good planning integrated water resource management
- \* Develop a communication strategy to communicate water resources investment needs

## Managing Extreme Events

- \* Work with Federal/state agencies on emergency planning to summarize the state of readiness, adequacy and effectiveness of response and contingency plans
- \* Incorporate climate change assumptions into water resources planning and models
- \* Provide technical assistance to states to develop comprehensive plans

## Technology Transfer & Knowledge Capacity Building

- \* Develop an interagency Federal Support Toolbox
- \* Promote policies and accountability mechanisms for science-based decision making
- \* Develop formal partnerships with other agencies

## Enhanced Water Resources Leadership

- \* Address governance issues to promote effective management, collaboration, leadership and stewardship
- \* Develop mechanisms or structures that promote alignment and integration across Federal agencies
- \* River Basin Commissions to play a major role in promoting integrated water resource management

## Communications and Education

- \* Work with Native American tribes to raise water resources awareness and conservation
- \* Identify education/outreach programs to develop multimedia communication strategies
- \* Promulgate best practices and good examples to promote outreach and education

## Next Steps

- \* Public release of National Report –Aug 2010
- \* Public release of project documents website
- \* Continue into second phase-implementation

- \* Assemble a small national water team to work on the implementation phase
- \* Develop an implementation plan
- \* Prioritize actions and determine funding streams (leverage interagency resources)

- \* Develop guidance for districts and divisions to act on some of the recommendations/actions
- \* Continue to engage with nationwide partners

**Charting New Waters: A Freshwater Call to Action:** Lynn Broaddus, The Johnson Foundation at Wingspread:

Lynn Broadus began with a brief history of the Johnson Companies which began after H.F. Johnson, Jr.’s trip to Carnaubá, Brazil in 1936. The Johnson companies now include the SC Johnson, Johnson Outdoors, Diversey and the Johnson Financial Group and the Johnson Foundation at Wingspread.

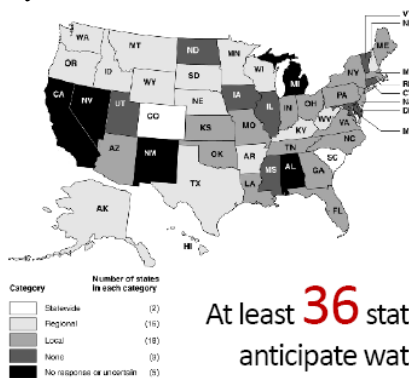
The Johnson Foundation promotes and broadly disseminates its “Call to Action” and its recommendations through public briefings, speaking engagements, online social media, and print and broadcast news outlets. Over the next two years, the Foundation will partner with Freshwater Summit participants and other interested organizations on three conferences to further catalyze, expand and coordinate implementation of the Call to Action recommendations. During that same timeframe, the Foundation will also focus its unique convening resources to address two critical priorities that emerged from The Freshwater Forum: water pricing and nonpoint source pollution. Finally, The Johnson Foundation will continue to play a leadership role in helping coordinate and shape the work of other foundations interested in addressing U.S. freshwater challenges.

The Mission of the Johnson Foundation is: To be a catalyst for environmental and community solutions using leading-edge convening models in a unique, world-class conference center.

Lynn outlined the evolution of the foundation’s “Charting New Waters” program. In 2008, the foundation board chose freshwater as a central focus. In 2009, five topic areas were selected:

- \* Climate change
- \* Infrastructure
- \* Agriculture
- \* Energy
- \* Public health

In 2010, many organizational partners joined and the “Charting New Waters” program was created and presented. In 2011 and beyond the foundation will continue to carry forward recommendations and gather commitments.



At least **36** states anticipate water shortages by **2013**

Lynn pointed out the close ties between water and energy concerns. Dropping water levels result in temporary power plant shutdowns and inability to site new power plants. Nearly every stage of the water-use cycle involves energy inputs, and water takes a lot of energy to move. There are other critical problems: an estimated 240,000 water main breaks every year! Water quality is impaired in 60% of rivers and 50% of lakes. Biodiversity is threatened. Fisheries are disappearing. Aquifer levels and reservoir levels are dropping, Conflicts over water are growing. New contaminants are in our water including herbicides, pesticides, pharmaceuticals and cosmetics: ([http://www.scitopics.com/Occurrence\\_and\\_removal\\_of\\_emerging\\_pollutants\\_in\\_urban\\_wastewater.html](http://www.scitopics.com/Occurrence_and_removal_of_emerging_pollutants_in_urban_wastewater.html))

What can we do? Lynn suggests we work to improve coordination of management across scales and sectors, enhance effectiveness of existing regulatory tools, promote efficient, environmentally wise water management, use and delivery, ensure decision making is based on sound science and data, employ a long-range adaptive approach to planning and management, account for the full cost of water, invest in sustainable water infrastructure, educate the public about challenges and solutions, develop and validate methods for freshwater ecosystem services markets.

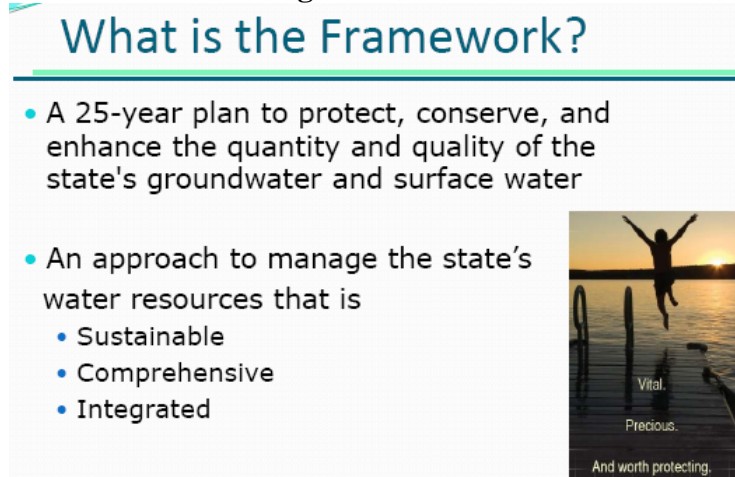
Lynn concluded by summarizing the Johnson Foundation's "Commitments to Action":

The Foundation will use their networks to promote the Commitment to Action; conduct professional training and outreach; develop water footprinting standards; establish clearinghouse for best practices. The Johnson Companies will take action internally: define entire global water footprint; set targets to reduce water consumption; improve quality of water discharge, and externally: provide customers with solutions that make their operations more efficient and sustainable. They will continue to work with and provide funding for water-focused NGO work and commission a study to calculate national job creation potential of the water sector and investment in infrastructure.

They will seek to reduce their environmental footprint every year, with end goal of zero offsets by 2035; aggressively grow sustainable product lines; educate trade base and consumers through marketing and multimedia outreach efforts. They will work to better understand and convey the connections between energy and water; help ensure policy-making is derived from a clear understanding of these connections.

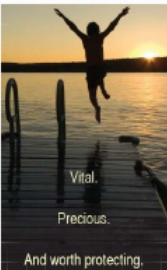
Over the next two years, the Foundation will partner with Freshwater Summit participants and other interested organizations on three conferences to further catalyze, expand and coordinate implementation of the Call to Action recommendations. During that same timeframe, the Foundation will also focus its unique convening resources to address two critical priorities that emerged from The Freshwater Forum: water pricing and nonpoint source pollution. Finally, The Johnson Foundation will continue to play a leadership role in helping coordinate and shape the work of other foundations interested in addressing U.S. freshwater challenges. To download your own copy of Charting New Waters: A Freshwater Call to Action, visit [www.johnsonfdn.org](http://www.johnsonfdn.org)

### **A Framework for Sustainable Water Management**, Dr. Deborah Swackhamer, University of Minnesota



**What is the Framework?**

- A 25-year plan to protect, conserve, and enhance the quantity and quality of the state's groundwater and surface water
- An approach to manage the state's water resources that is
  - Sustainable
  - Comprehensive
  - Integrated



Deborah Swackhamer began her presentation by saying Sustainability Sustainable water use does not harm ecosystems, degrade water quality, or compromise the ability of future generations to meet their own needs. The mandate of the framework effort has been to address needs related to: drinking water, Stormwater, agricultural and industrial use, surface and groundwater interactions, infrastructure, and interface of water resources with climate change, land use, development, and demographics. The work also entails identifying best management practices for waste water treatment, drinking water, source protection, conservation, and water valuation.

The effort has been a collaborative approach with many state agencies, counties, cities and non-profit organizations involved. In total a large group of 34 academics, 46 people from state agencies, 10 from federal agencies, 16 from local and county government, 8 from water districts, 15 from non-profits, 20 from the private sector, 14 from



agriculture, 7 from tribes and 7 independent interested citizens. The foundational materials were white papers prepared in advance of the meetings on:

- \* Water Use in Minnesota
- \* Water Quality in Minnesota
- \* Water Supply in Minnesota

There were presentations on climate change, demographics, and land use and technical teams prepared papers on:

- \* Policy
- \* Education
- \* Valuation
- \* Agriculture
- \* Ecosystem Services
- \* Domestic
- \* Energy/Manufacturing
- \* Recreation/Cultural/Spiritual topics



The framework the group created included ninety specific needs collected under 10 “big” issues contained in the three categories of sustainability.

For each issue the framework made a problem statement, stated a desired future Minnesota condition and outlined possible strategies, actionable tasks, benchmarks of measuring progress and an implementation schedule.

Deborah gave several examples of the framework for individual issues. Her complete presentation is posted on the SWRR website at <http://acwi.gov/swrr> and updates on the framework can be found at <http://wrc.umn.edu>

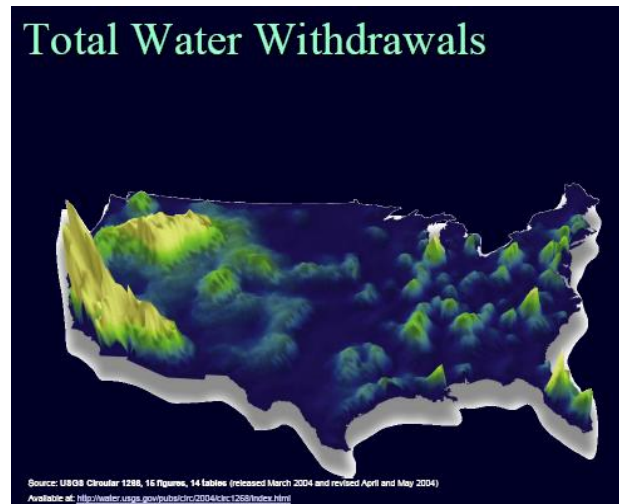
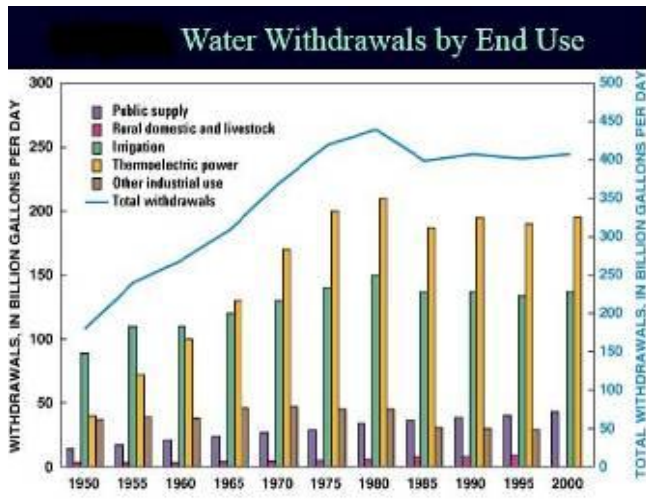
**Panel on Planning for the Future:** Robert Wilkinson, of the Bren School of Environmental Science and Management, University of California, Santa Barbara and also a SWRR Co-Chair moderated a conversation about water sustainability frameworks, the imperatives they suggest if we are to move to a sustainable future, and the lessons for and from others in the region and nation.

Bob Wilkinson gave an introductory presentation to the panel. He said that are two key elements of sustainability and water: information and interpretation (indicators for example) and governance, policy, and management. With regard to information and knowledge the information presented should be open, transparent, accessible (available sources, known assumptions, methods, calculations etc.), it should be accurate revealing “error bars”, it should be timely, show trends and be understandable, useful, and usable.

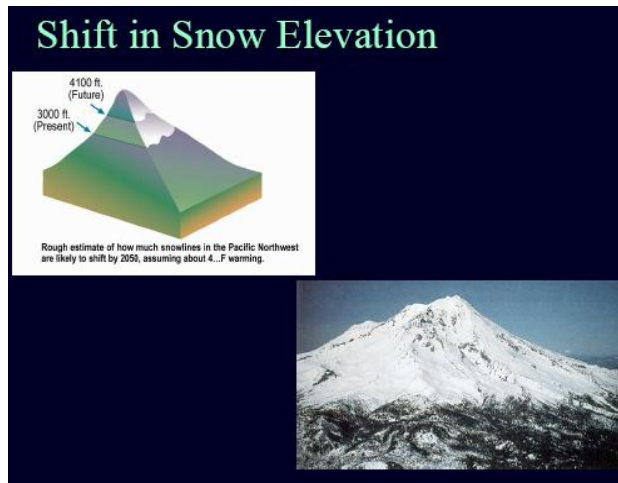
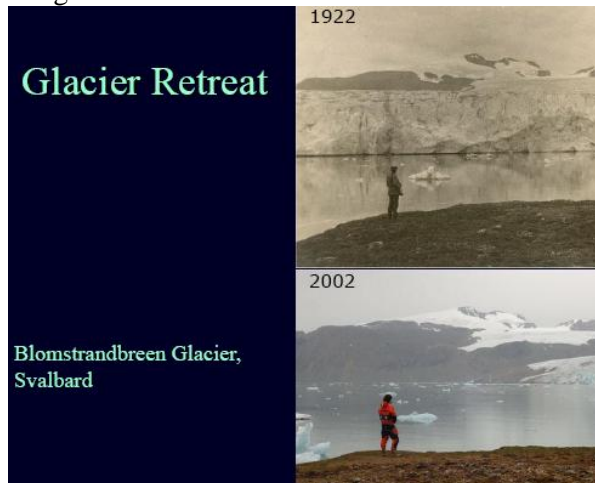
To support interpretation and understanding a whole systems approach using systems dynamics, key links, life cycle analysis, cost- benefit analysis and relationships, feedback, etc. should be used. Trends to show change –or not –over time should be shown and the methodology of interpretation should be open and accessible.

Bob said decision-making should be supported using a full menu of options such as multiple-benefit assessment and approaches like water/energy/greenhouse gas emission reductions that could lead to improved allocation of all resources including water, money, time, effort, staff and research. Bob said we should seek improved prospects for

collaboration in many areas- water, wastewater, stormwater, energy, and climate and pollution prevention. Both in business and government we should support adaptive management and an improved capacity to use information. Bob gave examples of presentations of information:

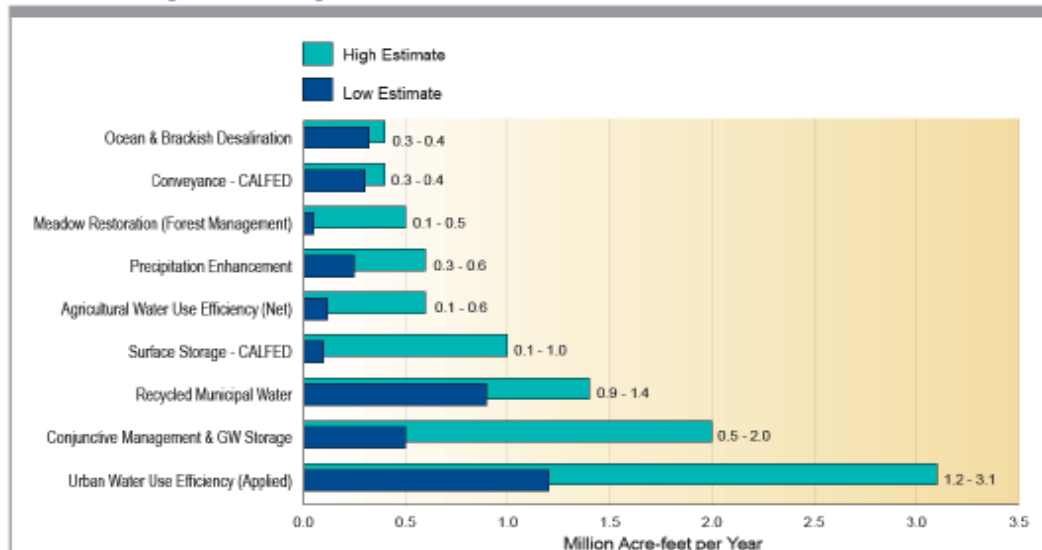


Images can also be effective:



Bob concluded with projections on water supply sources to 2030.

### Resource Management Strategies



The panelists then had an excellent discussion. Lynn Broadus, of the Johnson Foundation at Wingspread and Deborah Swackhamer, of the University of Minnesota referred to the PowerPoints of their earlier talks. The other panelists each gave a short presentation which are highlighted here and shown in full on the SWRR web site.

**Minnesota Environmental Quality Board Water Report** Princesa VanBuren Hansen of the Environmental Quality Board gave a presentation on the work of the board where John Wells, a SWRR co-chair also works.

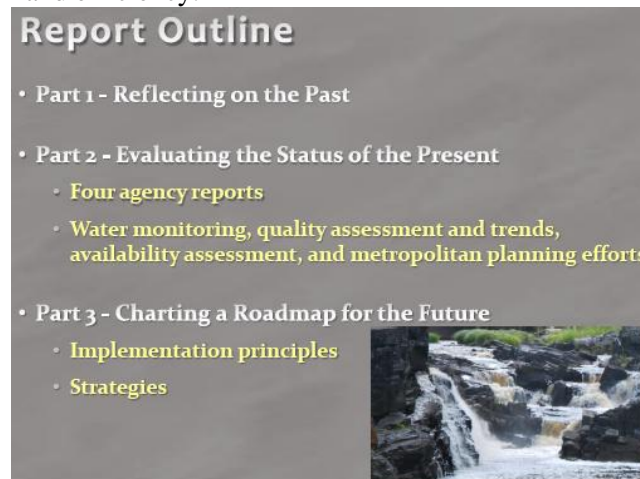


**Environmental Quality Board**

- 5 citizen members
- 9 Commissioners
- Governor's representative

- Administration
- Agriculture
- Commerce
- Employment & Economic Development
- Health
- Natural Resources
- Pollution Control
- Transportation
- Water & Soil Resources

Princesa VanBuren Hansen began with a description of the Environmental Quality Board. The EQB Water Plan Statute is part of the charge to the office. The EQB has a history of working together with other agencies and organizations to benefit future generations in Minnesota. In that spirit the EQB has worked on a report on water resources with participation from many offices in the state government of Minnesota. The goals of the report are to articulate executive branch strategies to achieve sustainable water management; recognize many concurrent and recent agency and stakeholder efforts; build a broad, adaptive framework; define a vision and strategy for the future; and ensure coordination and efficiency.



**Report Outline**

- Part 1 - Reflecting on the Past
- Part 2 - Evaluating the Status of the Present
  - Four agency reports
  - Water monitoring, quality assessment and trends, availability assessment, and metropolitan planning efforts
- Part 3 - Charting a Roadmap for the Future
  - Implementation principles
  - Strategies

In Part 3 of the Report, “Charting a Roadmap for the Future” the strategies recommended include:

- \* Increase Protection Efforts
- \* Promote Wise & Efficient Use of Water
- \* Restore and Enhance Local Capacity
- \* Employ Water Resource Management
- \* Collect Information Necessary for Water Management Decisions
- \* Improve Access to Environmental Data
- \* Provide Up to Date Implementation Tools
- \* Employ Targeted Approach for Protection and Restoration
- \* Employ Targeted Approach for Protection and Restoration
- \* Apply a Systematic Approach for Emerging Threats

The Implementation Principles for the future work on water are:

- \* Shared, long-term vision
- \* Comprehensive land and water management
- \* Adaptive management
- \* Optimized coordination
- \* Goals and measures
- \* Education and outreach
- \* Prioritize resources

## The California Water Plan, Rich Juricich, California Department of Water

**The California Water Plan**

- ◆ First published in 1957
- ◆ Updated 9 times
  - Update 2009 released March 2010
- ◆ Water Code requires CADWR to update Water Plan every 5 years
  - Working on Update 2013
- ◆ Growing interest by Legislature & stakeholders

Rich Juricich gave an overview of the California Water Plan. The plan does not analyze or recommend specific projects, direct regional resource management activities, permit or authorize any actions, create mandates or regulations or appropriate money.

Rich said it is imperative to act and keep pace with changes such as:

- \* Population growth
- \* Increasing flood risk
- \* Climate Change profoundly impacting water systems
- \* Aging water & flood systems challenged by legal remedies & regulatory protections
- \* Growing economic & societal consequences of declining water reliability and degraded quality of surface & groundwater supplies
- \* Shift to permanent crops
- \* Delta & watersheds in decline

Rich spoke about the Sustainability Directive of September 20, 2010. Sustainability targets were established by the Director of the California Department of Water Resources:

- \* Water use -reduce per employee use 20% by 2020
- \* Waste water recycling at facilities –where cost effective and technically feasible
- \* Energy use –Acquisition of 360 GWh of renewables by 2020  
–Reduce grid based retail energy use 20% by 2015
- \* Carbon –50% reduction below 1990 levels by 2020  
–80% reduction below 1990 levels by 2050
- \* Waste –Divert 50% from waste stream by 2020

The Environmental Stewardship Directive released on September 21, 2010 calls for:

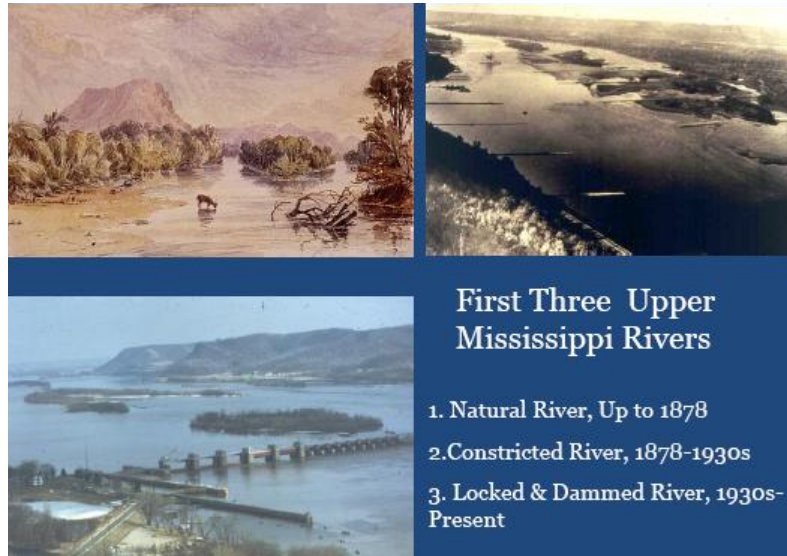
- \* Responsibility to manage and protect natural resources and ecosystems sustainably
- \* Integrate into flood and water planning
- \* Include as criteria in project funding decisions
- \* Plan for conservation, restoration, and maintenance of biodiversity and natural processes
- \* Support projects that contribute to recovery of listed and at risk species

**Panel on Mississippi River Sustainability Issues and Initiatives:** The panel was well prepared and moderated by Barb Naramore, Executive Director, Upper Mississippi River Basin Association. It included discussions of prominent threats to and opportunities for sustainable management of the Mississippi and other river systems including the key issues and what is being done to address them. The speakers were invited to consider on how climate change, land use, water use, water quality, invasive species, ecosystem and energy issues, needs and

initiatives come together. They were invited to mention any coherent indicators by which people could judge whether we're making progress toward sustainable river and community management.

**A History of the Upper Mississippi:** John Anfinson, National Park Service

John Anfinson gave a fascinating presentation of the various approaches to managing the Mississippi River over the past century and a half and how the engineering solutions to the problems of one era caused a new set of problems for the next generation to face.



John said the environmental history of the Mississippi River provides many useful lessons. After 1878 the flows in the natural river were constricted with structures leading out into the river that were called “wings”. The goal was to improve navigation but it was not long before the interventions led to more silting of the navigation channels than before. After the 1930s, there were many major infrastructure projects building locks and dams that those dramatically altered the natural river and had major impacts on the environment.

The modern view of the river as practiced at least in the Upper Mississippi is to let nature take its course to a greater degree with the creation of wildlife refuges along the river. Also rather than building levees everywhere to resist the natural cycle of floods, there are many examples of flood plain agriculture being practiced along the Mississippi. John said policy makers at all levels can ask “What kind of River should the Mississippi and other rivers be?”

Mississippi River floodplain agriculture near Waterloo, Illinois




Upper Mississippi National Wildlife & Fish Refuge



**Issues and Institutions on the Upper Mississippi:** Barb Naramore, Executive Director, Upper Mississippi River Basin Association

## Upper Mississippi River Basin

- 189,000 square miles
- 1,300 miles in total length
- 850 miles of navigable, interstate waters
- 29 locks & dams for navigation
- Limited ability to regulate flows
- Discharge = 9,200 cfs at St. Paul  
205,000 cfs at Thebes
- Leveed floodplain 3% → 53% → 83%
- 250,000 acres in National Wildlife Refuges
- Congressionally recognized as a nationally significant ecosystem & a nationally significant commercial navigation system



Barb Naramore outlined basic information about the Upper Mississippi River Basin and then went on present the Upper Mississippi River Basin Association. The purpose of the UMRBA is to facilitate dialogue and cooperative action on water and related issues in the basin. The work is focused on

- \* Planning & coordination forum for discussion
- \* Helping States & Federal agencies work together
- \* Evaluating policies, programs, and laws
- \* Building consensus among the States
- \* Promoting the States' interests

The Association is not involved in regulation or land management, construction or operation of facilities or in scientific research.

## Trends and Challenges on the Mississippi: Water Quality



*Tale of Two Watersheds*

- **Lake Pepin TMDL:** The 1<sup>st</sup> attempt at a large scale TMDL on the UMR—nutrients and turbidity
- **Gulf Hypoxia:** Exemplifies the challenges of addressing watershed issues in a basin of this scale.
- **Mississippi River Basin Initiative:** USDA's targeted, nutrients-focused initiative offers an important new direction

Barb then explained many of the trends and challenges on the Mississippi:

Navigation

- \* Existing Infrastructure: Funds needed to maintain current capacity
- \* NESP: Vision for the future—new locks, small scale measures, & ecosystem restoration

Ecosystem Management

- \* Powerful combination: Ecosystem restoration + monitoring & research

- \* Reach Planning: major, program-neutral look at management objectives on multiple scales
- \* Environmental Management Program: 25 years of investment & success

#### Water Supply and Allocation

- \* Minnesota: Between 1995 and 2005, water use grew 50 percent faster than population
- \* Illinois: Chicago's regional population projected to increase by 2.8 million by 2040 (c. 30%)
- \* Aging Systems: Recapitalization is a major issue throughout the region, as it is nationally

#### Energy Water Nexus

- \* Hydrokinetics: Proposals pose important compatibility & cumulative effects questions
- \* Ethanol Production: Production levels & feedstock choice have important implications

#### Other Issues

- \* Flood Risk Management: Repeated record precipitation & flood events are giving rise to fundamental questions about our data, models, & policies
- \* Invasive Species: How should the public invest in prevention, control, & adaptation?
- \* Hazardous Spills: What will the BP spill's implications be for planning & prevention on the inland rivers?
- \* Missouri River Authorized Purposes Study: Highlights the interconnectedness of our inland river system

Barb says the Association advocates that the best opportunities to move forward to improve the conditions of the Upper Mississippi Basin are to invest in information, coordinate and integrate activities and institutions, and to establish a vision.

**The Mississippi in a Great Rivers Context:** Gretchen Benjamin, Large Rivers Program Lead, Great Rivers Partnership, the Nature Conservancy

Gretchen Benjamin explains that the Great Rivers Partnership connects science, policy and people to sustain the great river systems of the world. The definition of a great river is adapted from R.L. Welcomme's criterion for major river-floodplains: that the flood stage is sufficiently long lasting, predictable, and extensive that organisms have evolved life history strategies to exploit it. Great rivers are highly productive "working rivers" vital to cultural heritage and economic prosperity in their regions. Clearly the Mississippi is one of those great rivers. Others include the Danube, Tigris, Nile, Mekong, Ganges, Parana, Amazon, Magdalena, Apure, Oueme, Senegal, Chari, Zambezi, Yangtze, Paraguay-Parana, Magdalena and the Chao-Phrya.

The Great Rivers Partnership aims to sustain great river systems around the world for people and nature using the Mississippi River as a case study. We can think about the Mississippi River in sophisticated ways because of unequalled investments in knowledge made over two centuries by many organizations and individuals from Lewis and Clark to the USGS Long-Term Resource Monitoring Program and a variety of universities.

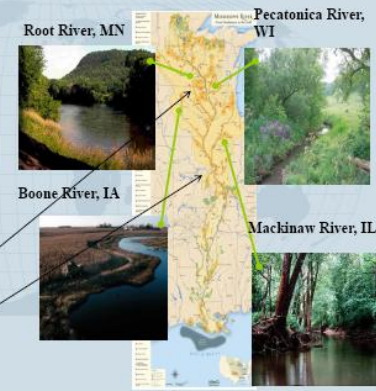



The Great Rivers Partnership has been acknowledged for:

- \* calling attention to the plight of the world's great rivers
- \* leveraging the Mississippi River as a global case study
- \* advancing a systems approach to river management –Integrated River Basin Management and
- \* engaging diverse partners – including governmental and non-governmental organizations, and various business sectors –in a sustainability agenda

The Great Rivers Partnership now is undertaking some system scale projects:

- \* Coastal Restoration: In 2010 the GRP will sponsor a process to establish joint federal-state priorities for river and coastal management in Louisiana
- \* Mississippi River Vision: Since 2008 the GRP has provided leadership in the development of a collaborative vision and integrated river basin management for the Mississippi River including support of America's Inner Coast Summit in June 2010.

\* Field to Market: Since 2007 the GRP has participated in an alliance of agricultural leaders facilitated by Keystone Center to define sustainability measures for agricultural landscapes

Nutrient and Sediment Management	Floodplain Restoration and Connectivity
<p>For more than a decade TNC and partners have demonstrated a targeted and adaptive management approach to agricultural watershed management</p> <p>Recent additions:</p> <ul style="list-style-type: none"> <li>• Cedar River, IA.</li> <li>• Meramac River, MO</li> </ul>  <p>Great Rivers Partnership   The Nature Conservancy</p>	<p>Since 2000 more than 40 leading scientists have provided advice and research on economic and ecological aspects of floodplain function at the Emiquon Preserve, Spunky Bottoms, and Molliey Farm</p>    <p>Great Rivers Partnership   The Nature Conservancy</p>

Besides work on integrated floodplain management and ecosystem services Barb says that diverse partners have come together to promote navigation and ecosystem sustainability and the USDA Mississippi River Basin Initiative. With regard to the Lower Mississippi River system, that has not been restored to the degree of the Upper Mississippi. Since the approval of the Reconnaissance Report of the Lower Mississippi River Resource Assessment on 5 March 2010, multiple partners have been working to begin the next phase, the watershed study. This work should lead to a restoration plan for the Lower Mississippi River.

In summary, sustainability of global great rivers benefits from:

1. Partnerships that create a base to work toward balance of the uses of the river water and supply
2. Science that establishes relationships and shares knowledge
3. Government that makes water policy with the understanding that implementation will be customized at each location whether it is in country or globally
4. Balance in which decision makers understand the cultural and social attributes of a geographic area that can support the mission of Integrated River Basin Management

**Planning for River System Sustainability:** Thomas Crump, Upper Mississippi Regional Planning Coordinator, U.S. Army Corps of Engineers

Thomas Crump began his presentation with a review of the US Army Corp of Engineers national efforts such as the Environmental Operating Principals which encourage the Corps to achieve environmental sustainability. Thomas went on to summarize regional efforts like the 200 year vision for the Mississippi River, the “America’s Inner Coast Summit”, and the Navigation and Ecosystem Sustainability Program.

Thomas said “America’s Watershed” is a 200-year vision and intergenerational commitment that our people:

- \* Enjoy a quality of life unmatched in the world.
- \* Lead secure lives along any river or tributary in the basin.
- \* Enjoy fresh air and the surrounding fauna, flora, and forests while hunting, fishing, and recreating along any river or tributary in the basin.
- \* Travel easily, safely, and affordably to various destinations in the watershed.
- \* Drink from and use the abundant waters of any river, stream, or aquifer in the basin.
- \* Choose from an abundance of affordable basic goods and essential supplies that are grown, manufactured, and transported along the river to local and world markets



The meeting about the Mississippi held in St. Louis, Missouri, June 22-24, 2010 called “America’s Inner Coast Summit” gathered over one hundred partners and stakeholders including NGOs, tribes, landowners, states, industry, academia, communities. The participants discussed and developed a vision for the multi-use “America’s Inner Coast” the Mississippi River. It also developed high-level recommendations for a sustainable Mississippi River that the USACE will consider. The Upper Mississippi River Restoration Program of the Corps includes three Corps Districts: St. Louis, Rock Island and St. Paul. The work entails habitat rehabilitation and enhancement projects of which 39 are completed and 21 others are underway as of the date of the SWRR meeting. Projects might focus on backwater dredging, island creation or side channel water levels for example.

Another focus of the work is long term resource monitoring for which twenty four indicators of ecological condition have been grouped into seven categories:

- \* Hydrology
- \* Land cover
- \* sedimentation
- \* aquatic vegetation
- \* water quality
- \* fish

Thomas concluded by presenting the Environmental Operating Principles of the USACE:



*Environmental Operating Principles*

1. **Strive to achieve Environmental Sustainability. An environment maintained in a healthy, diverse, and sustainable condition is necessary to support life.**
2. Recognize the interdependence of life and the physical environment, and consider environmental consequences of Corps programs and activities in all appropriate circumstances.
3. Seek balance and synergy among human development activities and natural systems by designing economic and environmental solutions that support and reinforce one another.
4. Continue to accept corporate responsibility and accountability under the law for activities and decisions under our control that impact human health and welfare and the continued viability of natural systems.

*Environmental Operating Principles*

5. Seek ways and means to assess and mitigate cumulative impacts to the environment; bring systems approaches to the full life cycle of our processes and work.
6. Build and share an integrated scientific, economic & social knowledge base that supports a greater understanding of the environment and impacts of our work.
7. Respect the views of individuals and groups interested in Corps activities; listen to them actively and learn from their perspective in the search to find win-win solutions to the Nation’s problems that also protect & enhance the environment.

**River Sustainability Issues and Initiatives: Plotting a Foundation’s Course on the Mississippi River:**  
Aimee Witteman, Program Officer, Environment Program, McKnight Foundation

Aimee Witteman began with an overview of the McKnight Foundation which was established 1953 by William and Maude McKnight. The Foundation invests more in Minnesota than any private family foundation or corporation based in the state. It has assets of \$1.6 billion and had given grants totaling \$1.7 billion with \$99 million granted in 2009. The staff increased from 1 in 1973, to 40 today.

**Funding by Program Area      Funding by Geographic Area**

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>• 27% Environment</li> <li>• 20% Region &amp; Communities</li> <li>• 20% Children &amp; Families</li> <li>• 10% Arts</li> <li>• 9% Minnesota Initiative Foundations</li> <li>• 8 % International</li> <li>• 5% Neuroscience</li> </ul> | <ul style="list-style-type: none"> <li>• 22% Twin Cities Metro</li> <li>• 17% Greater Minnesota</li> <li>• 8% Minnesota Statewide</li> <li>• 26% U.S., Outside MN</li> <li>• 13% Global</li> </ul> |
|---|--|

The largest funding area for the Foundation is the Environment Program which has had a Mississippi River Focus since 1992. The Mississippi provides drinking water for over 18 million people in 50 cities. It is iconic, yet had no previous philanthropic champion. The headwaters are in the Foundation's home state. The programs for the Mississippi are multi-faceted and have a 10-state corridor focus.

Since 1992 has granted 100 million through its Mississippi River programs an average of 100 grants per year to local, regional, and national groups. A main focus has been on government policies. A 10-year evaluation to refine strategies was finalized in late 2009. The evaluation was informed by a survey of river program grantees, a detailed report by an independent evaluator and by the 2008 NAS report: Mississippi River: Water Quality and the Clean Water Act. In November, 2009, the board reaffirmed overall goal to restore the water quality and resilience of the Mississippi River and also approved refined strategies to:

- \* Protect and expand floodplains and wetlands
- \* Reduce agricultural pollution in 4 upper basin states
- \* Achieve cross-boundary and interagency coordination among government entities

In May 2010, the board approved an evaluation framework to include numeric metrics and public policy metrics including metrics on water quality in main stem of the Mississippi and key tributaries and in the dead zone in the Gulf of Mexico

# Mississippi River Program

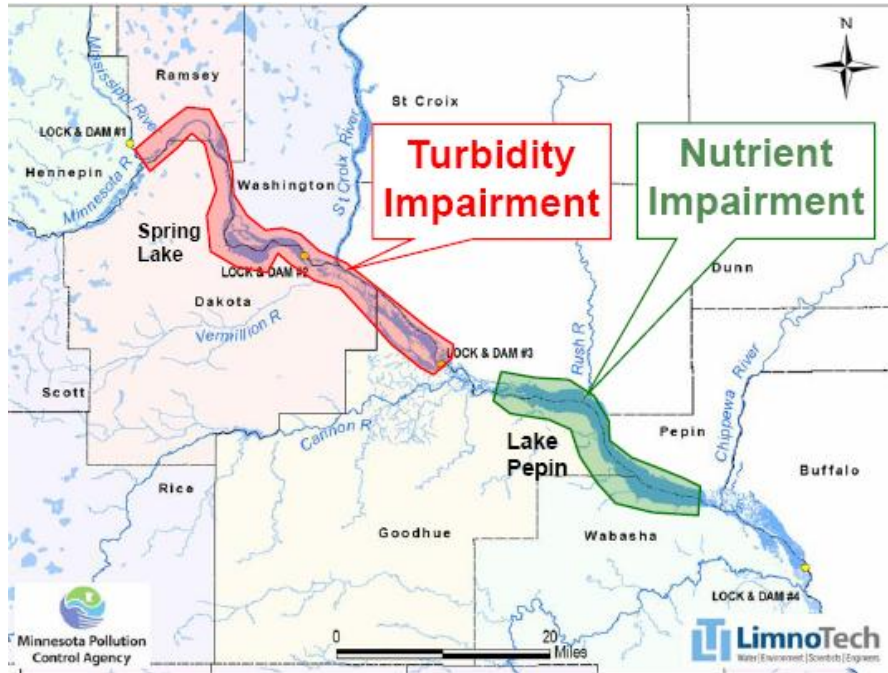
**Goal: To restore the water quality and resilience of the Mississippi River**

<p><b>Strategy 1: Protect and expand floodplains &amp; wetlands in the 10-state Mississippi River corridor.</b></p> <ol style="list-style-type: none"> <li>1. Protect and restore wetlands along the Mississippi River and its major tributaries.</li> <li>2. Maintain large riverside wetlands, reforest areas that were logged along the southern half of the river, and restore coastal wetlands in Louisiana.</li> <li>3. Prevent damage to ecologically important wetlands and rectify past damage to wetland areas.</li> <li>4. Give top priority to non-structural, natural approaches to reduce flooding from storms and manage the river for multiple uses.</li> <li>5. Address related policies.</li> </ol>	<p><b>Strategy 2: Reduce agricultural pollution in four states along the northern half of the river (Minnesota, Wisconsin, Iowa, and Illinois), focusing on farmland and operations with high nitrogen and phosphorus runoff.</b></p> <ol style="list-style-type: none"> <li>1. Encourage participation in government agricultural conservation programs that reduce water pollution.</li> <li>2. Increase production of crops grown with reduced amounts of fertilizers and pesticides.</li> <li>3. Encourage farmers and farmland owners to prepare and implement conservation plans to reduce pollution.</li> <li>4. Prevent or reduce the impact of environmentally damaging projects.</li> <li>5. Address related policies.</li> </ol>	<p><b>Strategy 3: In the 10-state Mississippi River corridor, achieve cross-boundary and interagency coordination (among government entities) that improves the river's water quality and resilience.</b></p> <ol style="list-style-type: none"> <li>1. Advocate for coordination among federal government agencies and other relevant organizations that affect management, protection, and restoration of the river and its landscape.</li> <li>2. Strengthen advocates' capacity to improve government policies affecting the river and to improve the performance of the government agencies whose policies and operations affect the river.</li> <li>3. Address related policies.</li> </ol>
---	---	---

THE MCKNIGHT FOUNDATION

The McKnight Foundation also includes climate issues in its Environment Program. In 1998 it committed \$1million per year to the Energy Foundation with a principle focus on wind, energy efficiency, and coal in the mid-western states. In 2008, a new commitment of \$100 million over five years for carbon reduction work of three organizations: ClimateWorks, the Energy Foundation and RE-AMP

**Applying the Clean Water Act to the Mississippi River:** Norman Senjem, Minnesota Pollution Control Agency



Norman Senjem used the examples of Turbidity Impairment in the section of the Mississippi between the Twin Cities and the Cannon River and Nutrient Impairment of the Lake Pepin section of the river as examples of applications of the Clean Water Act to the Mississippi. Sets of proposed site-specific standards have been developed:

For Mississippi River aquatic life:

- \* Increased frequency of vegetation
- \* Medium-High Flow Critical Condition
- \* 1-2 meter water depth


and for Lake Pepin recreation:

- \* 100 ppb Total Phosphorus
- \* 32 ppb Chlorophyll a
- \* 0.8 m Secchi transparency
- \* Low Flow Critical Condition

Norman talked about a series of 21 reduction scenarios ranging from 20 to 90 % reductions in TSS and TP that were modeled to determine how to meet site specific standards. Scenario 17 was the best fit:

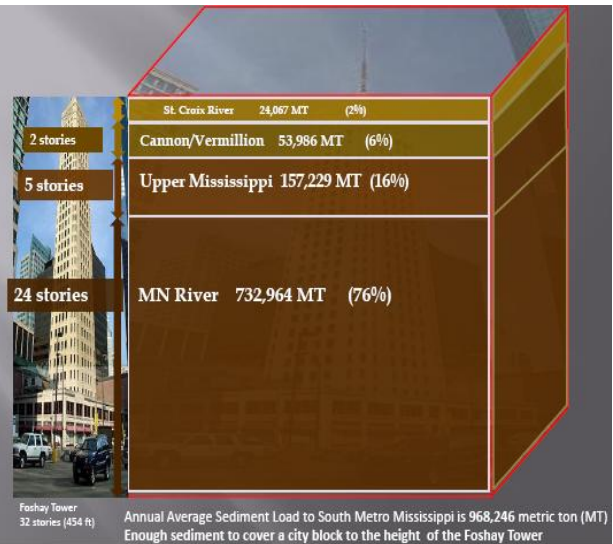
- \* 50% reductions from MN, Cannon Watersheds
- \* 20% reductions in UM and SC Basins
- \* Graduated reductions in Mega, Large, Intermediate wastewater facilities permitted loads
- \* 25% reduction in urban stormwater (MS4) runoff

## The Mississippi River's Nemesis -- The Minnesota River



"From St Croix to St. Peter's (Minnesota River)...The water is clear as crystal, and its bosom is generally covered with water-fowl, from the graceful snow-white swan to the mallard and wood duck."

-- Charles Lanman, July 1846



Norman said providing “reasonable assurance” of non point source implementation involves:

- \* Developing Basin & Watershed Strategies to meet Sediment Load Reduction Goals
- \* Evaluating existing programmatic, funding, and technical capacity to implement strategies.
- \* Identify gaps in programs, funding and local capacity to achieve needed controls.
- \* Committing to fill gaps and build program capacity and agreeing to meet specific, iterative, short term (1-2 year) milestones.
- \* Demonstrating increased implementation and/or pollutant reductions.
- \* Committing to track/monitor/assess and report progress at set regular times –adaptive management.
- \* Accepting contingency requirements if milestones are not met after a previously agreed time, or after specific actions have been taken.

### Mississippi Makeover Chosen Indicators

- ✓ Sedimentation
- ✓ Water clarity
- ✓ Vegetation
- ✓ Invertebrates
- ✓ Fish
- ✓ Waterfowl



Several indicators have been selected to track progress of the implementation and quantifiable targets will be set for each indicator.

**Reception and dinner:** An important and useful aspect of the SWRR is networking and finding collaborative partners for work related to water. The Freshwater Society kindly hosted a reception featuring the debut of a good local wine. Later out-of-towners and others interested in continuing the conversations had dinner together at a restaurant on the shores of one of Minnesota's 10,000 lakes.

**Day 2: Friday October 22, 2010**

**Recap and review of goals for the day:** David Berry summarized work of the previous day and the agenda for the morning's session. He reminded the participants that only part of the Water Roundtable activities are presented in the meetings and in the discussions here. He said many opportunities come from the ongoing connections among the participants and invited people to stay connected.

**Great Lakes Initiatives:** The Friday morning panel moderated by SWRR Co-chair John Wells of the Minnesota Environmental Quality Board, included discussions of how indicator systems help us understand what's needed for managing the Great Lakes on a long term, sustainable basis. Presenters were asked to consider the following questions: What are the SOLEC and GLII indicators telling us about whether we're making progress toward that goal? What did the process of building a set of indicators teach us? What do we hope the federal restoration initiative will be able to accomplish? Long term, will we learn how to avoid problems in the future or will we always be reacting to the issues of climate change, land use, ecosystem degradation and energy use, etc.?

**State of the Lakes Ecosystem Conference:** Elizabeth Hinchey Malloy, U.S. EPA,  
Great Lakes National Program Office

Elizabeth Hinchey Malloy explained that SOLEC is the State of the Lakes Ecosystem Conference and that her presentation would report on progress toward meeting goals of the Great Lakes Water Quality Agreement. SOLEC is co-organized by US EPA and Environment Canada and includes multiple stakeholders. To support better environmental management and decision making SOLEC established a framework for Great Lakes indicators-based monitoring, assessment and reporting.

SOLEC seeks to provide science-based information on the Great Lakes basin ecosystem, to strengthen environmental decision making and management, to inform decision makers and stakeholders of Great Lakes environmental issues, and to provide a communication and networking forum for stakeholders. SOLEC's audience is environmental managers, local decision makers, administrators, and the public.

The image is a blue rectangular graphic with white text and a central circular logo. The logo depicts a map of the Great Lakes region in white and blue, with a silhouette of two people walking on a shore in the foreground. A rainbow arc is positioned above the map. To the right of the logo is a bulleted list of activities. At the bottom left of the graphic is the website address [www.epa.gov/glnpo/solec](http://www.epa.gov/glnpo/solec).

State of the Lakes  
Ecosystem Conference  
(SOLEC)

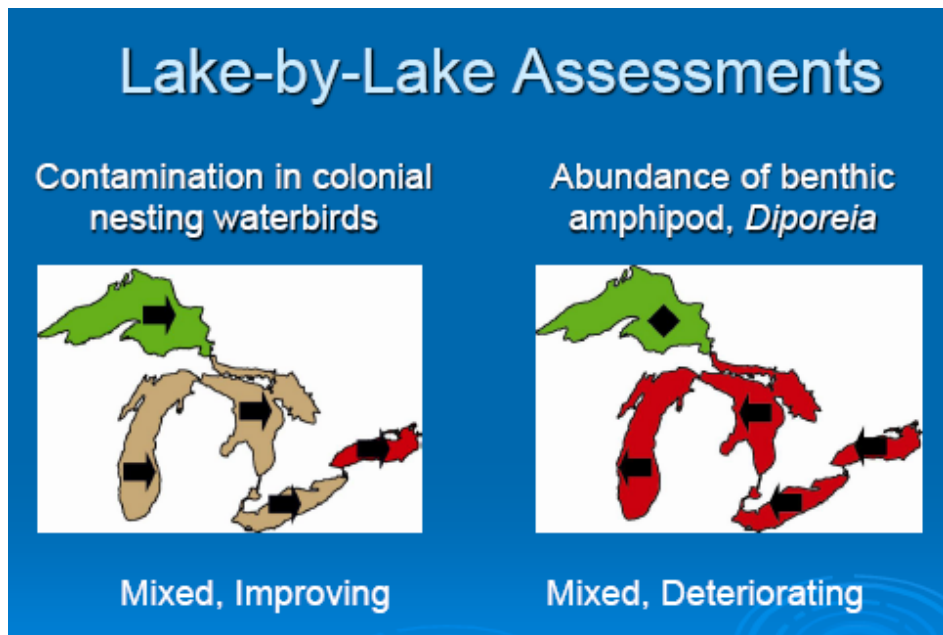
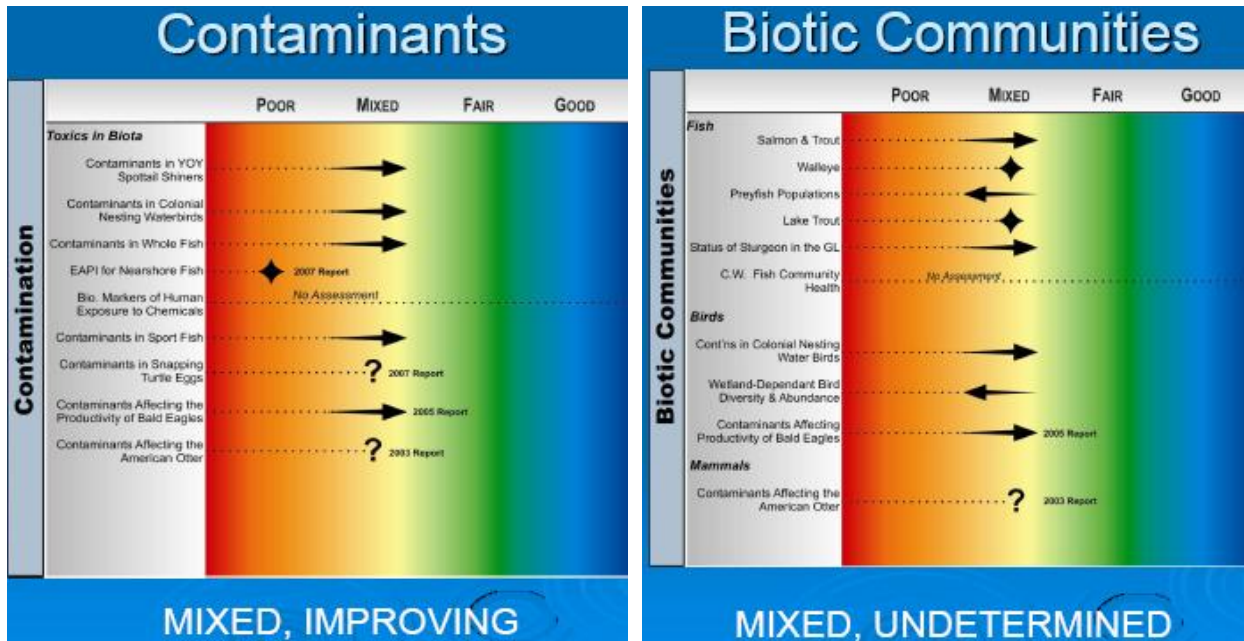
- 3-year Cycle:
  - Monitoring & Assessments
  - Indicator Reports
  - Workshops
  - Background Papers
  - Conference
- *State of the Great Lakes Reports*
  - Technical Report
  - Highlights Report
  - Fact Sheets
- Future: web-based reporting

[www.epa.gov/glnpo/solec](http://www.epa.gov/glnpo/solec)

In 2008 SOLEC made a selection of indicator categories. The indicator categories included:

- \* Human Health
- \* Invasive Species
- \* Contamination
- \* Coastal Zones & Aquatic Habitats
- \* Resource Utilization
- \* Land Use-Land Cover
- \* Biotic Communities
- \* Climate Change

Experts authored 62 indicator reports on many trends. Here are some examples:



Elizabeth presented the work of the Great Lakes Restoration Initiative (GLRI) which includes the identification of land use and agriculture practice indicators for Great Lakes and identification of land use tipping points in the Great Lakes ecosystem to be undertaken by NOAA and the development of near shore indicators and endpoints which is a GLEI project.

The major themes for the GLRI for 2011 are to target the most significant Great Lakes issues, to be results-and action-oriented, to fully engage the Great Lakes community and to strive for transparency and accountability.

Elizabeth announced that SOLEC 2011 will take place in October 26-27, 2011 in Erie, Pennsylvania and have the theme: Linking Land to the Lakes. For more information Elizabeth suggested we visit the SOLEC websites: [www.on.ec.gc.ca/solec](http://www.on.ec.gc.ca/solec) and [www.epa.gov/glnpo/solec](http://www.epa.gov/glnpo/solec)

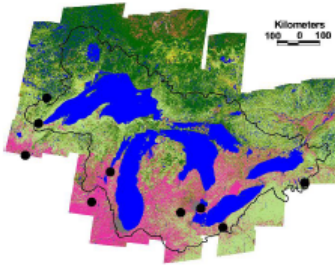
**Great Lakes Indicators Initiative:** Lucinda B. Johnson, Director, Center for Water and the Environment, Natural Resources Research Institute, University of Minnesota, Duluth

Lucinda Johnson began by mentioning that 29 individuals from 10 institutions were co-principal investigators of the initiative. She also acknowledged support of the research through a grant from the US EPA's Science to Achieve Results Program.

### Project Emphasis

- **Develop indicators that assess the ecological condition of the US Great Lakes coastal region AND point to causes of impairment**
- **Indicators examined**
  - Birds & Amphibians
  - Diatoms
  - Contaminants
  - Fish & Macroinvertebrates
  - Wetland Vegetation
  - Land use and landscapes (\$ NASA)
- **Basic questions – how are these biological communities related to human disturbances across the Great Lakes coastal region?**

### Great Lakes Environmental Indicators



The main environmental stressors impacting the large geographic extent of the Great Lakes are many important human disturbances –overlapping in space and time:

- \* Human population growth
- \* Nutrients
- \* Atmospheric deposition
- \* Toxic contaminants
- \* Exotic species
- \* Shoreline modification
- \* Land use

### Stress Data Used

### Great Lakes Environmental Indicators

**GLEI Stress Categories: (212 georeferenced variables)**



Land cover



Agriculture



Population density



Atmospheric deposition

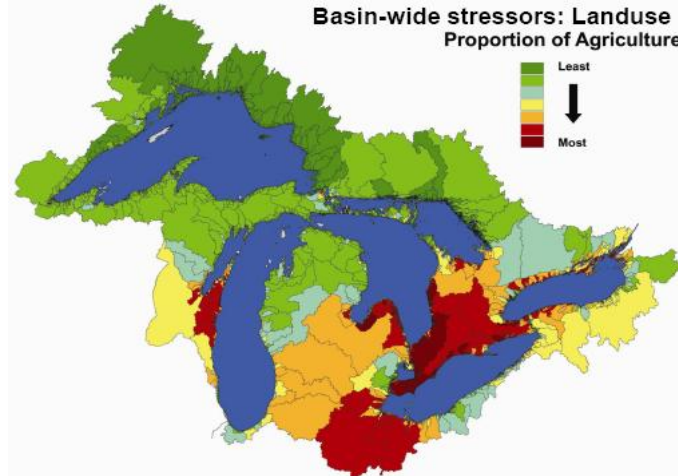


Point source discharge



Shoreline modification

The initiative developed 14 to 20 groups of environmental indicators and found that measures of amphibians (frogs) were not useful whereas measures of breeding birds were very useful in wetlands and upland areas. Measures of polycyclic aromatic hydrocarbons (PAH's), combining transmission and quantities in sediment helped estimate toxicity to larval fish. Measuring diatoms proved useful to measure water quality and provides a historical record. Fish and macroinvertebrates were very useful to measure as were invasive plant species. Measuring land use and land cover is essential Lucinda said.

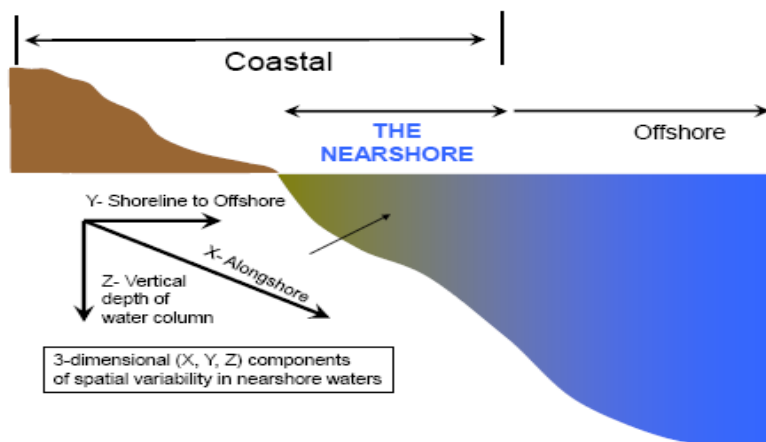


In summary, Lucinda said human disturbance provides a framework for sampling in the Great Lakes coastal region and that stressors include agricultural activity, population density, and point sources (primarily in industrial areas). What can we do about it? The initiative recommends best management practices like maintaining effective riparian areas, reducing erosion, reducing use of fertilizers, etc.

**The Role of Ecological Research in Great Lakes Water Sustainability, a large-scale example: “Development of a Great Lakes integrated coastal observing system”, Jack Kelly, EPA Mid-Continent Ecology Division, Duluth**

Jack Kelly told the participants that Great Lakes water quality sampling has traditionally been done in deep water and does not capture the probably higher concentrations of contaminants near the shore where people flock for recreation, fishing, drinking water and where the most important habitats are in the Great Lakes ecosystems. He said there are two motivations to conduct near shore monitoring: to enable full lake wide assessments and to create a sentinel system to note incoming stressors from watersheds.

It's tough to capture the “qualities” of a very dynamic coastal environment which is shaped by land and lake processes and exposed to multiple stressors





Jack reviewed some of the technologies being applied to near shore monitoring in both deep and near surface waters. He said that approaches begin with the development of ideas some of which are identified as promising. In the trial phase, prototypes are tested and applications explored. In the preliminary application the approach is benched to local and meso-scale field studies and research uses are further explored. In the calibration and validation phases, decisions are made regarding what scales, what utility, and what application limits to use and how to relate the measures to previous and “traditional” measures.

In the demonstration phase through testing there is confirmation of reliability, consistency, and continuity then in pilot applications, technology is transferred to users and models and further applications are built. Finally in the monitoring and assessment phase the work becomes a confident practice and conditions and trends are reported.



**Great Lakes Energy & Water Initiatives:** Victoria Pebbles, Program Director, Great Lakes Commission

Victoria Pebbles told the participants her presentation would cover three initiatives of the Great Lakes Commission: the Great Lakes Energy-Water Initiative, the Value of Great Lakes Water Initiative and the Great Lakes Rivermouth Collaboratory. Quoting Sandral Postal she said “When it comes to water, the past is no longer a reliable guide to the future.”

The Great Lakes-St. Lawrence River Basin Water Resources Compact and Agreement provide:

- \* A ban on new diversions –Limited exceptions could be allowed, such as for public water supply purposes in communities near the Basin
- \* A consistent standard to review proposed uses of Great Lakes water
- \* Strengthened technical data collection
- \* States and Provinces must develop and implement a water conservation and efficiency program

States and Provinces must also report on cumulative impacts:

By Dec. 8, 2008, states must:

- \* Be ready to review proposed exceptions for diversions
- \* Create Compact Council and begin organization

Within one year, states must:

- \* Submit progress report on programs and list of baseline volumes

Within two years, states must:

- \* Develop conservation and efficiency goals, implement a program, and promote conservation measures

Within five years, states must:

- \* Develop a water management program for new or increased in-basin withdrawals and consumptive uses
- \* Give states and provinces notice of consumptive use proposals of 5 mgd or greater
- \* Maintain a water resources inventory
- \* Create a registration program for persons who withdraw 100,000 gpd or more, or divert water of any amount
- \* Collectively conduct an assessment of cumulative impacts of water uses

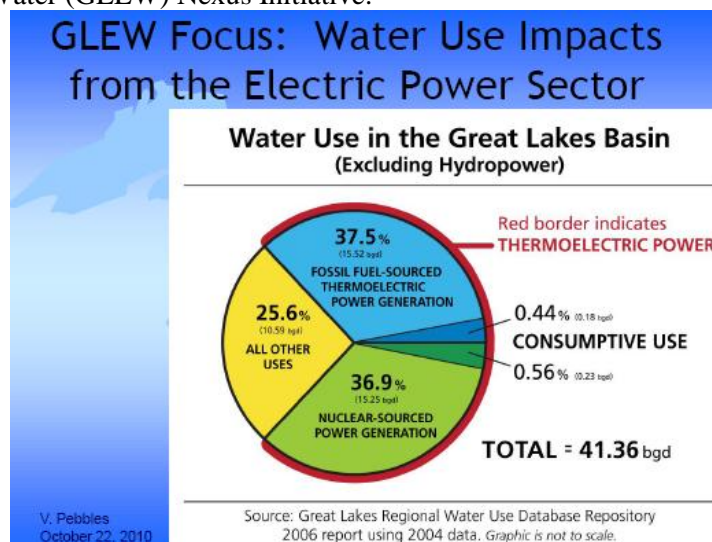
The resource standard that states are expected to follow includes:

- \* Return of water to source watershed and move to less consumptive use
- \* No significant individual or cumulative adverse resource impacts
- \* Incorporation of environmentally sound & economically feasible water conservation measures
- \* Compliance with all applicable laws
- \* Reasonable use which balances efficiency; economic, social, and environmental effects; the supply potential of source; avoidance/mitigation of impacts; and restoration plan for any impacts.

Water Management Challenges and Opportunities

- \* New Mandates/No staff
- \* New Tools (ex: Michigan Water Assessment screening tool)
- \* New Policies (ex: Minn. Conservation Pricing Law)
- \* Leveraging water conservation in sensitive watersheds.
- \* Measuring Cumulative Impacts
  - What metrics do you use?
  - Consistent, comparable data needed!

Great Lakes Energy Water (GLEW) Nexus Initiative:



### Great Lakes Energy Water Nexus Initiative: Goals

- \* Arm regulators and the energy industry with new information to improve their ability to assess and measure current and potential future impacts from different energy mixes
- \* Enable regulators to target specific decision points, either in the planning or operations phases that achieve specific public policy goals

### Great Lakes Energy Water Nexus Initiative: Objectives

- \* Aim to better integrate water resource impacts into energy planning
- \* Look at “what if” future electric power scenarios
- \* Look at ways to improve policy drivers

### Why?

- \* Smarter energy planning –Identify new conservation opportunities for the power sector
- \* Better Protection of Great Lakes water resources –Energy mixes that minimize aquatic resource impairments to the Great Lakes basin from the power sector
- \* Comply with the Great Lakes-St. Lawrence River Basin Water Resources Compact and Agreement –water conservation –assess cumulative impacts of water withdrawals

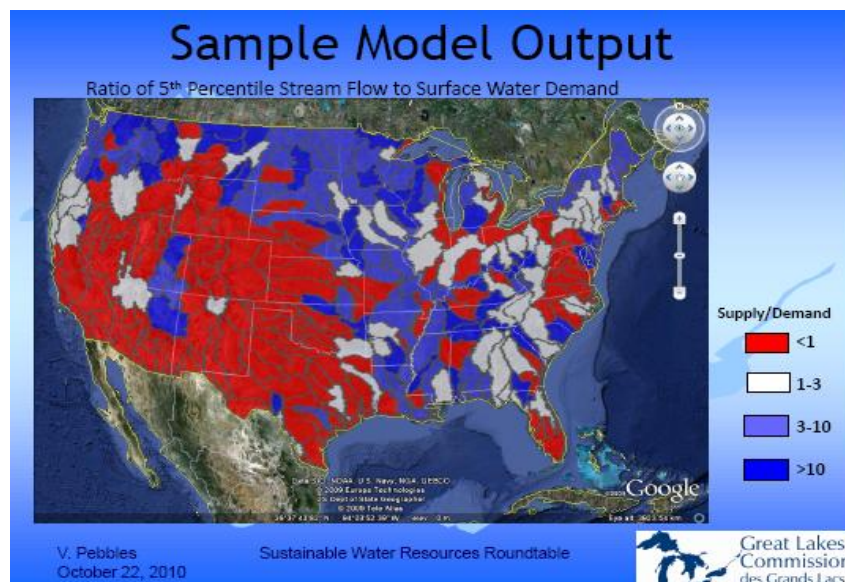
### Who will use the information/products GLEW develops?

1. Regulators –state energy and environmental managers and regulators  
–relevant federal agencies (e.g., Federal Energy Regulatory Commission)
2. Industry i. energy utilities ii. system operators iii. independent power producers

Victoria said the core team developing the products is made up of the Great Lakes Commission, Cornell University, Sandia National Laboratories, the Great Lakes Environmental Law Center, and the Environmental Law and Policy Center. There are many advising organizations in government and the private sector in the US and Canada.

### The planned deliverables for the project include:

1. Great Lakes Energy and Aquatic Resources Nexus Maps
2. A Great Lakes Energy and Aquatic Resources Nexus Model
3. A report on the Regional Energy and Aquatic Resource Nexus
4. A policy analysis document
5. A plan for a follow-on pilot project



Victoria said the policy analysis part of the work will be to examine policies related to:

- \* Power markets and energy planning
- \* System operating practices (e.g., dispatch)
- \* Energy facility siting

The design follow-on project will develop a plan for phase II that will be readily modifiable into a funding proposal. The options include subregional application of the model and further exploration of outliers.

#### Value of Great Lakes Water Initiative

- \* How is public water priced in the basin now?
- \* What are the socio-economic, political and Institution barriers to water pricing?
- \* What are the sensitive watersheds in basin that would most benefit?

The project tasks are to identify sub-watersheds in the GL basin that reflect a spectrum of hydrologic conditions and are under land development pressures, to survey and analyze financial drivers for rate setting and to conduct 2-3 workshops for local officials across the basin. The main deliverable will be a list of candidate sub-watershed areas for future pilot demonstrations.

Victoria concluded with a summary of the Great Lakes Rivermouth Collaboratory which brings together regional experts to develop an integrated, multi-agency approach for research, monitoring, restoration, and protection of rivermouth ecosystems. The project will develop a rivermouth science agenda and implementation framework. USGS is partnering with the Great Lakes Commission to provide a critical missing linkage among the science disciplines historically focused on distinct ecosystem components (watershed, coastal, near shore or deepwater ecologies) to institutionalize collaboration among science and management communities, to strengthen the foundation for future research, and to ensure that restoration goals are met for heavily used and impacted ecosystems.

The tasks and objectives of the Great Lakes Rivermouth Collaboratory from 2010 to September, 2011 are to conduct a series of workshops and webinars that will improve scientific knowledge and understanding of rivermouth ecosystems and their restoration and sustainability needs and to apply that knowledge in the development of a common rivermouth science agenda and an institutional framework to guide and support restoration and management of these vital ecosystems.

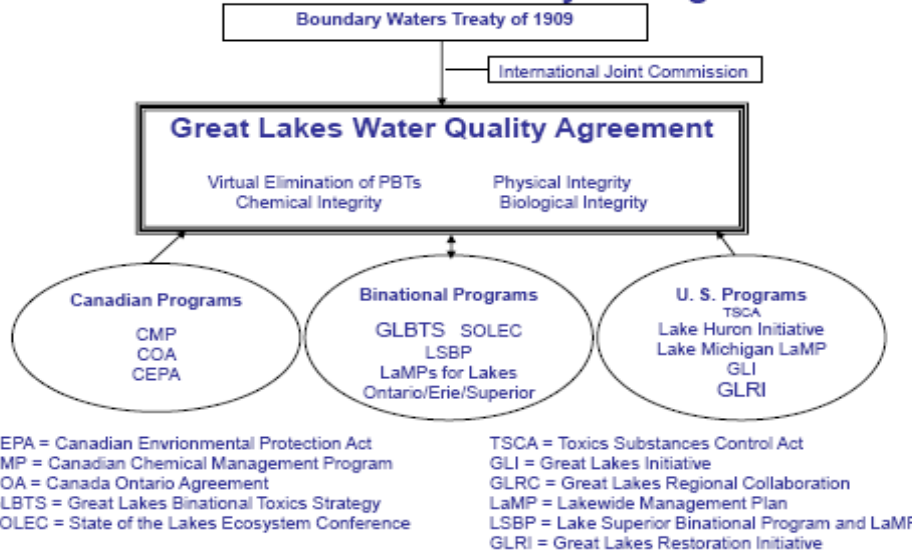
#### **Water Sustainability in the Great Lakes: An Industrial Stakeholder View:** Dale Phenicie, Council of Great Lakes Industries

Dale Phenicie explained that the Council of Great Lakes Industries (CGLI) is a bi-national multi-sector organization pursuing Regional policy development supportive of attracting capital investment, competing in world markets, responsible use of Great Lakes water and a healthy and vibrant ecosystem. The CGLI Mission is to promote the economic vitality of the region in harmony with its human and natural resources.

#### Key statistics of the Great Lakes Basin:

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>* Governments           <ul style="list-style-type: none"> <li>–Two Federal Governments</li> <li>–Two Provincial Governments</li> <li>–Eight State Governments</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>* Watershed area           <ul style="list-style-type: none"> <li>–Land drainage area 201,460 square miles</li> <li>–Water area 94,250 square miles</li> <li>–Shoreline length 10,210 miles</li> <li>–System water volume 5,439 cubic miles<br/>(6 quadrillion gallons)</li> </ul> </li> </ul> |
|--|---|

## Great Lakes Sustainability Linkages



### Great Lakes - St. Lawrence River Compact and Agreement – Water Quantity Directives

Dale told the participants that pursuing sustainability –Great Lakes Style involves stakeholder based processes, collaborative engagement and a desire for achieving consensus. The industry view of the path to sustainability is that it should include a mix of water quality and water quantity elements, should be built upon a base of strong thoroughly vetted science, and should support each of the pillars of sustainability: Environment, Social and Economic. Dale said industry’s Role is to provide products and services that people want to buy, provide good jobs and the creation of wealth and to bring important perspectives, expertise, and experience to the public policy table.

#### What Can Industry Bring to the Table?

- \* Industry must BE at the table
  - Requires company commitment and resources
  - Requires presence of a seat at the table
- \* Industry can contribute science and assist in interpretation of the science
- \* Industry can contribute social and economic information that guides decision making
- \* Industry is the party that must implement sustainability measures of choice and can help define the most effective way to do so
- \* Industry can also be a facilitator of or contributor to successful multi-stakeholder processes
- \* Supply key individuals to participate in sustainability processes –get the right people to the table
- \* Supply data and information that advances scientific study
- \* Supply or identify specific data and information needed for risk based assessments
- \* Supply or identify data and information that facilitates comparative or relative risk analysis studies
- \* Facilitate and/or participate in peer review panel assessments

# Great Lakes Regional Examples

- **Great Lakes Binational Toxics Strategy**
  - Industry has supported and participated in GLBTS multi-stakeholder workgroups
    - Brought important industry sectors to the table
    - Coordinated industry stakeholder group kept the efforts moving, always seeking closure by bringing relevant science and information to the table
- **State of the Lakes Ecosystem Conference (SOLEC)**
  - Industry participation in indicator development and assessment
    - Supplied data, sought endpoints, provided performance reports
    - Coordinated societal and economic indicator development and use
- **Addressing Areas of Concern (AOCs)**
  - Worked to obtain full funding of Great Lakes Legacy Act to expedite AOC remediation
  - Established partnerships with agencies and communities to enable for utilization of Legacy Act provisions
- **Lakewide Management Plans (LaMPs)**
  - Companies, working individually with state agencies and local officials address specific localized needs

Dale said there are many topics to consider looking forward:

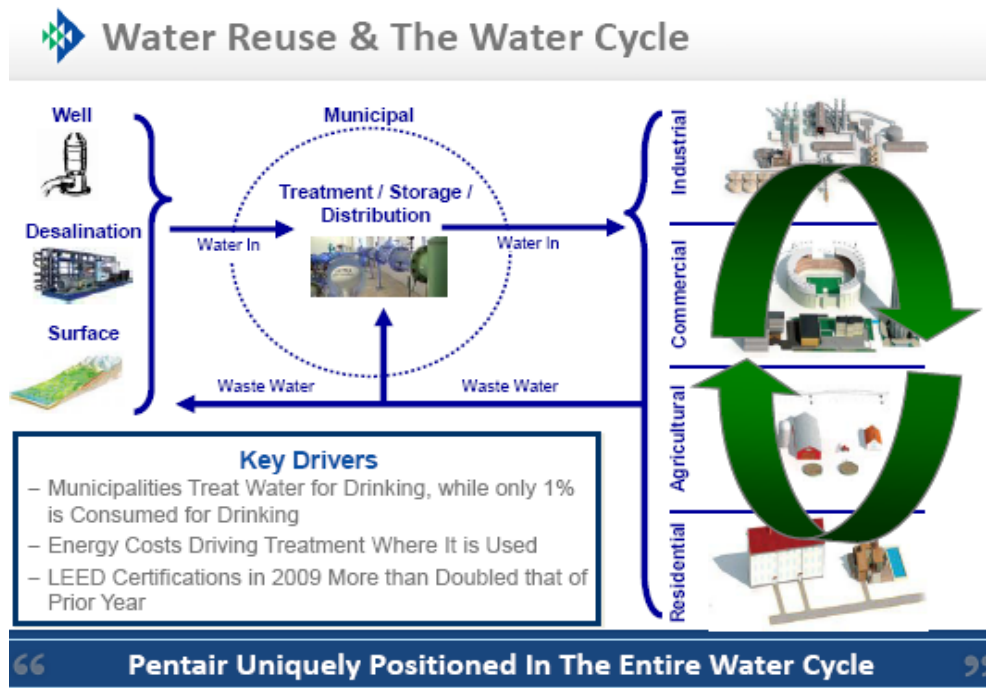
- \* A revised Great Lakes Water Quality Agreement (GLWQA) –Industry’s recommendation
  - Maintain Agreement as a guiding “North Star” document repositioned towards a multi-stressor focus
  - Codify coordination structure for bi-national resource management agency efforts
  - Recognize/build from ecosystem focused regulatory structure now in both countries.
  - Firmly locks multi-stakeholder elements into Basin ecosystem management programs/approaches
- \* Renewed Great Lakes Bi-national Toxics Strategy
  - “New chemicals” management program rooted in risk based processes now available in both countries that address specific Great Lakes Basin needs
- \* Enhanced SOLEC
  - A manageable State of the Lakes assessment program covering each of the sustainability elements
  - A web-based reporting system for efficient and timely distribution of SOLEC indicator information
  - Enhanced use of remote sensing and real-time data reporting technologies

- \* Viable Great Lakes St. Lawrence Sustainable Water Resources Compact/Agreement
  - Implementation within State/Provincial governments through provisions consistent with sustainable development objectives
  - Continuation of stakeholder engagement as Compact/Agreement implementation and administration moves forward

Dale concluded by sharing some concerns that industry has. It is generally felt that U.S. Federal Oceans Policy Strategy must maintain the critical balance between Federal recognition of the national importance of the Great Lakes Region vs. the need to manage the resource from within the Region. Improved coordination of agency activities is always welcomed, but there is a need for recognition of the coordination provisions that have been in place in the Great Lakes Basin since 1909. Industry agrees that the stakeholder based management model firmly established within the Basin over the past two decades must be maintained.

**Target Field, the nation’s most sustainable ballpark:** Todd Gleason, Vice President, Pentair, Inc.

Todd Gleason began his presentation by giving an outline of Pentair, the company that designed and installed the rainwater recycling system at Target Field the major league stadium with the best environmental performance. The company does about \$3 Billion in annual sales in its flow technologies, filtration, technical products and residential leisure units. 65% of its business is in the US, 20% in developed countries and about 15% in fast growth emerging markets. About 40% of Pentair’s business is in the industrial sector, 39% residential, 11% commercial and 10% municipal.



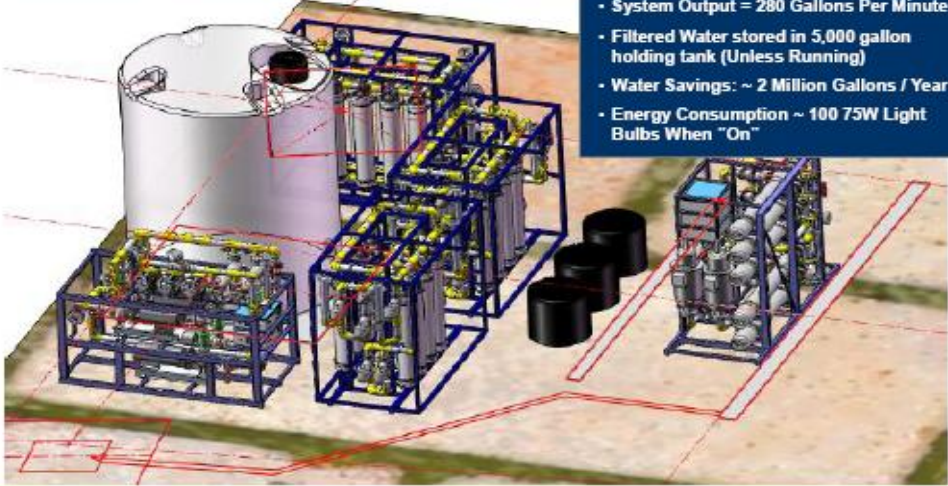
Todd then illustrated the opportunities for water recycling. A key opportunity is that municipalities treat Water for Drinking, while only 1% is consumed for drinking.

In the case of the Minnesota Twins’ Target Field, the stadium was seeking LEED certification but did not have a “Water Solution”. Pentair and the Twins reviewed the opportunities and agreed upon a Pentair

designed revolutionary water reuse system. They held a joint press conference in January, 2010 and additional public awareness campaigns followed. There is a sophisticated water reuse system for Target Field and Pentair also supplied the fire pumps, booster pumps, waste water pumps, drinking water systems, food service systems and irrigation pumps.

## Rain Water Reuse System

*From Concept ... Thru Design ... Build ... To Installation ...*



- Cleaning Water from 200,000 Gallon Cistern
- System Output = 280 Gallons Per Minute
- Filtered Water stored in 5,000 gallon holding tank (Unless Running)
- Water Savings: ~ 2 Million Gallons / Year
- Energy Consumption ~ 100 75W Light Bulbs When "On"

**“ Sophisticated System For Target Field ”**

The rain water reuse system captures water and protects the environment. In the first step, captured rainwater flows into the system from the buried outfield tank. In step two a 100 micron filtration removes larger particles and ultraviolet light and the addition of a low level of chlorine disinfects the water. In step three, 0.01 micron ultrafiltration super cleans the water. In step four a 5,000 gallon tank stores recycled water which recirculates through a UV and chlorination process to keep water safe and clean. In the final step, the recycled water is used for irrigating the field and cleaning the seats.

The Twins rainwater reuse system has created a huge “buzz”

- \* Hundreds of news articles and numerous TV spots about system & sponsorship
- \* Well over 100 million impressions made regarding reuse system
- \* Dozens of commercial opportunities / leads worth pursuing

Todd said vision and leadership can drive great business. Pentair has begun to tackle the problem of bottled water. There is a time a place for bottled water but overall, it is hugely wasteful. Typical water bottle is 25% oil and uses 2,000 times more energy than tap water. Globally about 100M barrels of oil are consumed in the bottled water industry and over 60,000 tons of bottles waste is generated each year.

Pentair seeks to help reduce bottled water waste through reliable, sustainable water treatment systems to deliver clean, safe water to residents such as with their “Project Safe Water” in the Honduras where now over 200,000 residents have access to safe water in over 80 communities. The Center for Disease Control is now validating the impacts.



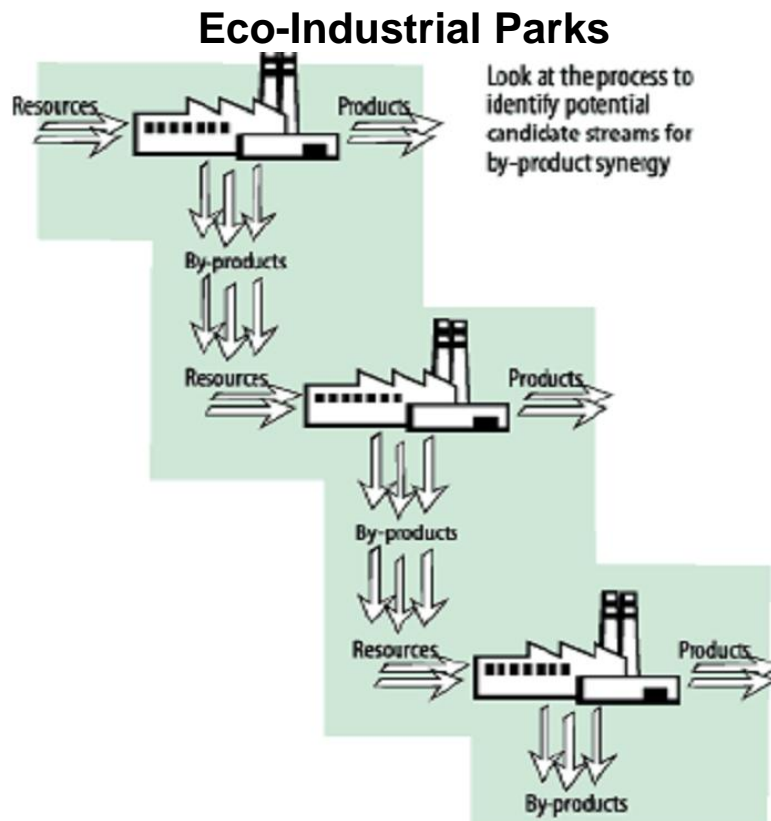
## A Virtual Innovation Ecosystem, Marianna Grossman, Sustainable Silicon Valley

Marianna Grossman was invited to make a presentation on the work to create an EcoCloud – a first-of-a-kind virtual industrial ecosystem in Silicon Valley.

Marianna described EcoCloud as an innovation network to facilitate collaboration on improving sustainability of regional business operations. It would include a new kind of intelligent virtual supply chain for waste and reuse.

The launch of the EcoCloud is part of Sustainable Silicon Valley's evolution from a focus on measurement and reporting to becoming a platform for changing behavior. That is also a role change from trusted advisor to being a member of a collaborative network.

The EcoCloud is a web-based platform for collaboration and acceleration of innovation around sustainable resources where members will share knowledge, best practices, case studies, governance, benchmarks, metrics, POCs, tools, etc.. Sustainable Silicon Valley expects this will provide a compelling showcase for demonstrating 'what's possible' whether in Eco-industrial parks or other collaborations.



The initial focus is to bring innovation and smart management to water ecosystems, to promote and leverage use of recycled water, to understand regional water resources projections (urban water balance), to facilitate and promote best practices for urban water use. An early example is the partnership with the City of San Jose and SB Water Recycling

Marianna will keep SWRR informed at the EcoCloud becomes a forum for discussion, applications, challenges and solutions for recycled water use.

**ecoCloud – Features & Capabilities / What we heard from members**  
*“A platform for cross-industry collaboration”*

**Materials/Resource Exchange**  
 •Lots of links to relevant sites

**Metrics**  
 Benchmarks

**Guidance**  
 •Regulations  
 •Compliance

**Email**  
 •Subscribe to topics

**Best Practices**  
 •Case Studies  
 •What works!

**Templates**  
 •How to do it

**Videos / webinars**

**Consulting**

**Outreach**  
 •Builders / Architects  
 •Project Managers  
 •Company Execs

**Technology & Tools**

**Profiles**  
 Blogs / Wikis  
 Discussion Groups

**ROI Calculators**  
 •Environmental  
 •Financial

**Collaborative Spaces**  
 •Water trading / xchnge  
 •Smart metering / footprinting

Source: ecoCloud Workshop held at SJSU

15

© Copyright IBM Corporation 2009

**Water Sustainability: Open discussion of the transformational challenges and next steps for SWRR**

After the morning coffee break David Berry opened what has become a SWRR tradition, an informal conversation about what insights the participants in the meeting have had and what steps they suggest for organizations including SWRR to make progress toward sustainability.

The following notes give a sense of the conversation which was by agreement not for attribution to the individual speaker.

A participant suggested that valuation of water is major hurdle. Water is underpriced in much of the country with short supply and environmental impacts not included in the prices which are often significantly subsidized. The low prices do not encourage conservation but implementation of true pricing is difficult; industry and agriculture use water so if the costs of their operations go up, they are concerned about reduced returns on investment and possible loss of jobs.

Another participant said that the drivers of water use and the supplies relative to demands in Minnesota are local. There is not a statewide solution. There is a perception is that there is no shortage of water in the state. Cities are using Mississippi water, selling water and trying to make a profit which is leading them to increase rates, not to conserve water but to increase revenue to balance budgets.

On this point there was a comment that willingness needs to be developed to pay the real costs of water. To generate this willingness there is a great need for public education and informed leadership. The choice is to conserve and safeguard water quality now and pay the costs that entails or pay much higher costs of water shortages and quality problems in the future. But it is a significant open question to determine how to go from the current pricing and policy structures to a new system that prices water at its true cost and value.

There is a view that water is a human right, that everyone deserves free and clean water for domestic, agricultural and industrial uses as well as supplies for fire safety. We should therefore only pay for distribution. How can we best address this common citizens' perspective? The solution said another participant, is education!

Regarding citizen engagement, a participant suggested SWRR and participants use social media to send alerts about indicator levels, especially when translated to impacts that people can relate to or understand. This can be done when real time data is available, or periodically after data has been analyzed.

It was also recommended that we engage local news media (radio, TV, print, bloggers) to report indicators regularly (daily, weekly, monthly, quarterly, yearly) and to link case examples of new policies and actions and expected effects, or conversely, examples of actions that cause deleterious effects (animal cesspool spills; discharge of warm water into lakes and rivers; discharge of chemicals to air/soil/water, etc.)

Making data public is not the same as helping people understand data. Scientists look at data differently than the public. How to bridge that?

Story-telling was seen by some participants as a way to make the case and educate the public. Stories could include linking pictures or impact descriptions to indicator data. The Great Lakes Indicators project has developed color coded and directional labels which give a quick view of the indicator levels and trends. This is great to show the "What is so", but for the public and for decision-makers, they also need to know the "so what?" For example: show pictures of dead fish or algal blooms or other impacts of the factors that are being measured. Pictures could be child swimming in or drinking the water, if the indicators are showing healthy/safe levels.

"Before, during and after" pictures can also illustrate a time series of data points, with photos of sustainable development, wetlands, swales, sustainable agriculture or landscaping measures, or other means of appreciating indicator data.

We are challenged to show the connection between policy, action and impact on people and the environment. For example, we have seen new community landscaping policies that require using native plants or food crops and limit turf to parks and other designated areas. Some roads projects build swales for storm water capture and channeling, and the green roof campaigns reduce the urban heat island effect and decrease runoff from rain. Roofs also provide habitat for native birds and insects. With a critical mass of new projects, the indicators will begin to show a change in the region.

Smart meters may provide a way to give users a signal about how much water each company or family is using. A key is to get everyone involved and bring industry and agricultural interests to the table.

One suggestion was to examine how we have been managing water in the past and taking a good look with everyone involved to figure out how we can do this better. Changing from old ways of thinking about pollution problems only at the end of pipe to a more systemic, holistic view of planning will be helpful. For example, what happens on the land has an effect on water quality and quantity.

A participant said those concerned with sustainability should “take on” the big sources of pollution such as the coal, oil and chemical-intensive industries. We need to explore the question ‘How can we transition to green chemistry, sustainable farming methods, non-fossil energy sources and other solutions that are less harmful to the environment and to human health?’

One participant acknowledged the tremendous work in the region with the Great Lakes and the Mississippi River initiatives. The Great Lakes Initiative has joined with other regions, the Chesapeake Bay Delta and others to make the case for regional ecosystem management. He suggested that the organizations involved find a way to take these stories to Washington to bring to the attention of the federal agencies.

We need to create ways for the general public to access information. SWRR has a water wiki said one participant, why not post a best practices guide, especially on indicators and actions. Another person suggested that regions could coalesce around investment in indicators and in so doing they would be validating the efforts of agencies like USGS and EPA that gather the data. For the indicators to exist, the collection of data needs to be supported. Elected officials should hear from constituents that indicator work has value.

We need to create collaborative initiatives that have a real impact on a regional basis. One participant said we should not be concerned when in some gatherings of those committed to sustainability it seems we are preaching to the choir. Those times we are in choir practice have value because we enhance each other’s capacity to go out to do our work more effectively.

How good this meeting is depends on what we each do with what we learn here. Don’t give up because you don’t think that you are being heard. Be persistent and learn how to communicate as you go. Participants were promised that both SWRR and the Freshwater Society would post the PowerPoints from the meeting.

Thanks to the Freshwater Society and to John Wells for organizing this meeting.