Climate Change and Water Initiatives

Kenan Ozekin
Senior Project Manager
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Outline

• Climate Change Impact on Water Resources
• Climate Change Initiatives
• AwwaRF’s Climate Change Research Program
• Climate Change Research Needs Workshop
• Conclusions
What is Awwa Research Foundation?

• Largest U.S. research organization focused on the needs of drinking water utilities
• International
• Nonprofit
• Supported mainly by subscriptions of about 900 member water utilities
Mission: Advance the science of water through research to improve the quality of life

- Centralized research program for drinking water utilities
  - Sponsor research
  - Develop knowledge and tools
  - Promote collaboration

- Agenda is planned and guided by drinking water utilities

- Research covers a broad range of topics including source water, treatment, infrastructure, and management for drinking water utilities
AwwaRF Research

- Total research value - > $412 million
- Annual research value - $24 million
- 710 completed projects
- 323 ongoing projects
- Average project cost is > $350,000
Climate Change Impact on Water Resources

• Cause and Effect Relationships

• Consequences of climate change relate to water resources
  o Warming air temperature
  o Changes in levels and distribution of rain and snow
  o Sea level rise
Warming Air Temperature

- Decreased snow pack
- Increased evaporation
- Increased water demand
- Increased water temperature
  - Increased algal blooms
  - Increased concentration of some pollutants
    - both chemical and microbial
Changes in Levels and Distribution of Rain and Snow

- **Drought**
  - Lower stream flow and limited groundwater recharge
  - Changes in land cover – Increased wildfire

- **Flood**
  - Increased storm water runoff will wash sediments and other contaminants – poor water quality and loss of reservoir storage
  - Stress on water infrastructure
Sea Level Rise

- Damage on infrastructure
- Increased salinity of both surface and ground water through salt water intrusion
  - Water treatment challenges
Climate Change Initiatives

• Climate change initiatives are “heating up”
• States/provinces, cities, and large utilities have been leaders
  - US Conference of Mayors (Kyoto Protocol, best practices)
  - California Global Warming Solutions Act of 2006
  - Western Climate Initiative
  - Water Utility Climate Alliance (WUCA)
  - Water Associations (AMWA, AWWA, WERF, AwwaRF…)
• US federal agencies coming up with initiatives
  - 2002 Climate Changes Science Program
  - USEPA Climate Leaders Program
  
  www.epa.gov/climateleaders
Climate Change Initiatives

• Significant university programs provide research and participate in regional collaborations:
  - Univ. of Alaska/Alaska Center for Climate Assessment and Policy (ACCAP)
  - Univ. of Arizona/Climate Assessment of the Southwest (CLIMAS)
  - Univ. of California @ SD/California Applications Project (CAP)
  - Univ. of Colorado/Western Water Assessment (WWA)
  - Univ. of So Carolina/Carolina Integrated Sciences and Assessments (CISA)
  - Univ. of Washington/Climate Impacts Group (CIG)
  - Florida State Univ./Southeastern Climate Consortium (SECC)
AwwaRF’s Climate Change Research Program

• Initiated by utility professionals who recognized need to respond to climate change in order to maintain adequate drinking water supplies
• Partnership with the National Center for Atmospheric Research (NCAR)
• Co-funding of climate change projects proposed by individual utilities
• Climate Change Strategic Initiative
AwwaRF’s Climate Change Research Program

Basic Questions

• What hydrological impacts of climate change will affect water utilities?

• How can we scale down global models of climate change processes to a watershed level?

• How can we plan for reliable water quality and supplies in the face of climate uncertainties?
Climate Change and Water Resources:  
A Primer for Municipal Water Providers  
AwwaRF publication 91120

- Current state of climate change research
- Assesses water supply vulnerabilities
- Case studies of water utilities planning for climate change.
- Lessons from extreme events such as wildfires; droughts; floods
- Develops range of adaptation strategies
Incorporating Climate Change Information in Water Utility Planning:
A Collaborative, Decision Analytic Approach
Project 3132

- Develops a structured process to identify a range of responses to multiple climate change scenarios
- Works with a set of utilities representing a range of environmental and institutional settings
Water Evaluation and Planning

A Decision Support System (DSS) Tool

Designed for planners to evaluate options for managing and developing reliable, adequate and sustainable water supplies for 50-100 years.

- Couples watershed hydrology and water planning models
- GIS-based computerized tool
- Physically simulates water demands and supplies.
- Permits additional user-created variables and modeling equations.
- Seamlessly meshes watershed hydrology, water quality and financial modules

PLATFORM for simulating climate change scenarios and planning responses.
AwwaRF On-going Research

- Project 4154 – Evaluating Effects of Climate Change on Water Utility Planning Criteria and Design Standards
- Project 4156 - Greenhouse Gas Emission Inventory
- Project 4009 – Mitigating Impacts of Changes of Watershed Vegetation on Source Water Quality and Quantity
Moving Forward

- AwwaRF has undertaken the Climate Change Strategic Initiative to establish a research program focused on impacts of climate change on water supplies.
- AwwaRF will commit up to $1 million in funding per year for the initiative
- The target timeframe for the initiative is 5-7 years.
Strategic Initiative

• Expert Panel provides guidance and oversight for the initiative.

• It will focus on
  - Enhancing and improving the awareness of climate change issue
  - Providing set of tools for adaptation and mitigation strategies
Climate Change Research Needs Workshop

- The objective was to
  - to develop a comprehensive, multi-year research agenda spanning water, wastewater, and urban stormwater.
- AwwaRF/ WERF/ UKWIR Workshop
  - Held in Denver, Colorado on January 8-9
  - 57 participants from the U.S., the U.K., Canada, and Australia
  - Five workgroups were created – Water Quality, Water Resources, Infrastructure, Energy and Environment, and Management and Communications
Workshop Outcome

- The workshop participants identified a total of 50 projects.
- The sum of all project budget estimates is $17,500,000.
- The research agenda included understanding climate change impacts at a local level, developing approaches and tools for adapting to local climate change, and developing approaches and tools for reducing greenhouse gas emissions from water management practices.
Highest Ranked Issues

- Impacts of underground CO$_2$ sequestration on groundwater supplies
- Interpretation of climate change models for water supply
- Designing infrastructure systems of the future
- Vulnerability assessment and risk management tools
- Wastewater processes: resource recovery and greenhouse gas reduction
First SI Project

- Will focus on enhancing and improving the awareness of climate change issue

- Will develop a central clearinghouse of information, tools, strategies, and best practices for the water industry

- Will develop guidance that will help utilities interpret, navigate and use climate change information and data to suit their specific needs
Conclusions

• Drinking water utilities are seeking answers to climate change issues.

• Utility management has always been about risk management; climate change is a new risk to incorporate into long term planning and decision making.

• Implementing adaptive strategies may be expensive but necessary to secure water supplies.

• Public communication is essential to educate water users and municipalities on changes necessary to ensure drinking water in the future.

• Research funding is sorely needed to develop timely information and tools needed by utilities.
Final Thoughts

Ask: How are your local water utilities including climate change in long-range planning?

Understand: Implementing adaptive strategies may be expensive but necessary.

Consider: What public communication and education will be essential for support for long-range infrastructure investment?
Thanks

For more information please check our website:

www.awwarf.org

or contact:

Kenan Ozekin
Senior Project Manager
(303) 347-3464
kozekin@awwarf.org