

# DATA NEEDS FOR MONITORING AND RESPONDING TO CLIMATE CHANGE IMPACTS ON WATER RESOURCES IN NEW ENGLAND

September 30, 2009

## Workshop Agenda

8:30+ **Registration and Light Breakfast** (Amherst Room 1009)

9:00 **Welcoming Remarks** (Amherst Room 1009)

**Paula Rees**, Director, Mass. Water Resources Research Center, UMass Amherst  
**Stephen Perkins**, Acting Deputy Regional Administrator, EPA New England  
**Ed Kunce**, Director, Environmental Response and Technical Support, Mass. DEP  
**Gary Foley**, Coordinator, EPA's Global Earth Observational System / Office of Science Advisor  
**Suzanne Orenstein**, Facilitator

9:20 **Setting the Stage: Background Presentations** (Amherst Room 1009)

*The Future of Water in New England – The Northeast Climate Impacts Assessment Report*  
**Ellen Douglas**, Assistant Professor, Environmental Earth and Ocean Sciences, UMass Boston

*Water Quality Climate Change Impacts Research Underway by EPA*  
**Joel Scheraga**, Director, EPA ORD's Climate Change Research Program

10:10 **Charge to Workshop Participants and Small Group Instructions** (Amherst Room 1009)

10:15 **Break** (Amherst Room 1009)

10:30 **Session 1: Data Availability of Key Indicators of Climate Change Impacts on Water Resources**  
(90 min)

**Goals:** The goal of this session is to reach a consensus on key impacts and data, including:

- *Key indicators of impacts*
- *Data currently available versus what is needed,*
- *Obstacles to collecting and sharing data*

Of particular interest is identification of monitoring data that are (i) critical for assessing pre- and post- impact conditions, (ii) useful for predicting future conditions, and (iii) necessary for management. Both spatial-temporal resolution of data and parameters themselves are of interest.

**Overview Presentation: Evidence of Changing Climate and Resulting Impacts**  
(Amherst Room 1009 - 15 min, including Q & A)

**Raymond Bradley**, Professor, Geosciences and Director, Climate Research System Center, UMass Amherst

**Three Concurrent Breakout Sessions** (75 min)

**Panel 1 – Water Quantity, Water Quality and Stormwater**

Current monitoring efforts are focused on assessing the quantity and quality of groundwater, river, estuary, and lake/pond water resources. These data, however, often do not directly provide information on the impacts in which we are ultimately interested. While emerging remote and networked sensing technologies offer the potential to enable collection of near real-time data on an increasing array of variable at spatial-temporal scales and locations previously not available, their potential is under utilized. The initial phase of this session will

identify indicators of climate change impacts. The focus of this breakout will be to “think outside the box” in order to identify true data needs, versus surrogate or affiliated data, and the obstacles to obtaining these data.

#### **Group A – Amherst Room 1009**

*Moderator/Facilitator:* Matt Schweisberg

*Technical Resource Person:* Don Pryor, Environmental Studies, Brown University

*WRRC/TEI Staff:* Marie-Francoise Walk

*Recorder:* Megan Nagel, MPP Student, Public Policy/Administration

#### **Group B – Room 804-08**

*Moderator/Facilitator:* Doug Thompson

*Technical Resource Person:* Steve Mabee, UMass Geosciences

*WRRC/TEI Staff:* TBD

*Recorder:* Katilyn Weider, PhD Student, UMass Geosciences

#### **Panel 2 – Biological Systems**

The impacts of climate change on the flowering times of plants, the spring arrival of birds, changes in species composition, and prevalence of vector harboring pests such as mosquitoes has been documented in New England. These changes have associated impacts on regional cycling of water and nutrients, aquatic and terrestrial ecosystem health and management, and regional water supplies. Regional policies and legislation may need to be adjusted to account for such changes. The focus of this breakout will be to identify monitoring needs for biological systems in order to better qualify, quantify, and predict ultimate water resources impacts.

#### **Room: 904-08**

*Moderator/Facilitator:* Margherita Pryor

*Technical Resource Person:* Diane Switzer, EPA Ecosystem Assessment

*WRRC/TEI Staff:* Sharon Tracey

*Recorder:* Diane Mas, Postdoctoral Associate, UMass Civil & Environmental Engineering

#### **Panel 3 – Water Supply, Demand and Management**

Climate and land use change, coupled with population growth, are anticipated to have significant implications for regional **groundwater** (e.g., loss of recharge zones, surfacewater-groundwater interactions), **infrastructure planning** (e.g., sizing of culverts; detention basins, and CSOs; alteration of the flood plain; changing water demands), **agriculture** (e.g., changing crops and irrigation demands), **recreational industries** (e.g., snow making at local ski resorts), **water treatment** (e.g., changes in raw water characteristics, increased microbial and pathogen presence), and **pest management** (e.g., spraying for mosquito control, plant disease management). It is unclear that current monitoring strategies and/or traditional design methods meet the broader needs for managing water supply, demand and management. The focus of this breakout will be to identify critical data availability and need for these “secondary” sectors.

#### **Room: 917**

*Moderator/Facilitator:* Joe Siegel

*Technical Resource Person:* David Boutt, Geosciences; Dan Cooley, Plant, Soil, and Insect Sciences, UMass

*WRRC/TEI Staff:* Beckie Finn

*Recorder:* Austin Polebitski, PhD Student, UMass Civil & Environmental Engineering

12:00 **Lunch** (Amherst Room 1009)

**Presentation: *Emerging Sensor Technologies and Computing Network Architectures***

(30 minutes, including Q&A)

**Prashant Shenoy**, Professor, Computer Science, UMass Amherst

1:00 **Session 2: Data Integration and Analysis – Utility of Data and Models to Inform Decisions in a**

*Invited Workshop on Monitoring and Responding to Impacts of Climate Change on Water Resources in New England*  
Mass Water Resources Research Center/TEI, University of Massachusetts Amherst

## Changing Environment (90 min)

**Goals:** While the first session focused on identifying monitoring data needed to support the assessment of impacts, this session will focus on implementation (e.g., assessment and prediction) and response. How can we position ourselves to have a reasonable understanding now of what future conditions will be? A key outcome will be reaching a consensus on the types of information end-users need to make informed decisions over a range of spatial-temporal scales and sectors. The use of data, models, and decision support tools to plan for the future will be discussed.

### **Overview Presentation: *Utilization of Climate Change Predictions for Water Resources Planning***

(Amherst Room 1009 - 15 min including Q & A)

**Rick Palmer**, Professor, Civil and Environmental Engineering, UMass Amherst

## Three Concurrent Breakout Sessions (75 min)

### **Panel 1 – Drinking Water, Wastewater and Stormwater Systems**

Changes in raw water characteristics, rainfall-runoff patterns, and downstream water quality/quantity issues (such as drawdown or emerging contaminants) impact the way we design, regulate, and manage our drinking water, wastewater, and stormwater systems. The characteristics of the future, however, are likely to diverge from those of the recent past, potentially requiring changes in design, regulation, and management. The focus of this breakout will be to compare and contrast the spatial-temporal scales at which data are monitored or predicted versus that at which decisions are made, to discuss methods to better align these scales, and to explore how current management, regulation and design practices may need to be updated to effectively address the impacts of a changing climate

**Room: 804-08**

*Moderator/Facilitator:* Matt Schweisberg

*Technical Resource Person:* Rebecca Weidman, NEIWPC

*WRR/TEI Staff:* Marie-Francoise Walk

*Recorder:* Kirsten Studer, PhD Student, UMass Civil & Environmental Engineering

### **Panel 2 – Other Infrastructure** (transportation, hydropower, economy, buildings and other structures):

Hydrologic data is critical for agencies, regulators, and the public to make informed decisions with regards to regional planning. Issues such as rising sea levels, non-stationarity of hydrologic data, and the water-energy nexus highlight the need to move beyond the status quo (e.g., utilizing historical data in planning and design) to utilization of predictive models, real-time data, and decision support systems to meet the dynamically changing needs of multiple stakeholders. The breakout will start with a discussion on potential modifications to current practices for infrastructure management, planning, and design due to climate change. The remainder of breakout session will focus on identifying knowledge gaps, technical, institutional, legal and other barriers associated with implementing suggested changes with respect to future infrastructure management, planning and design.

**Room: 917**

*Moderator/Facilitator:* Joe Siegel

*Technical Resource Person:* Casey Brown, UMass CEE; Norman Willard, EPA Climate Change, Energy Team

*WRR/TEI Staff:* Sharon Tracey

*Recorder:* Austin Polebitski, PhD Student, UMass Civil & Environmental Engineering

### **Panel 3 – Natural Resources Conservation**

It is generally accepted that changes in forested and aquatic ecosystems will impact regional water resources and industry. This understanding, however, is infrequently incorporated into local or regional water resources planning or infrastructure design. Conversely, local managers (e.g., such as Conservation Commissions) are often lacking the information they need to make informed decisions on the impacts of new development on ecosystems, particularly under changing conditions. The breakout will start with an identification of the ecosystem-water-infrastructure linkages that are most important to account for in future planning. The focus of this breakout

session will be to discuss how to incorporate these linkages through data analysis and modeling to ultimately facilitate more robust local to regional planning and management of aquatic and terrestrial ecosystems as well as the water resources they share.

**Group A – Amherst Room 1009**

*Moderator/Facilitator:* Margherita Pryor

*Technical Resource Person:* Keith Robinson, USGS; Francis Juanes, UMass Natural Resources Conservation

*WRRRC/TEI Staff:* Becki Finn

*Recorder:* Maili Page, MS Student, Natural Resources Conservation

**Group B – Room 904-08**

*Moderator/Facilitator:* Doug Thompson

*Technical Resource Person:* Andrew Guswa, Picker Engineering Program, Smith College; Tim Randhir, UMass Natural Resources Conservation

*WRRRC/TEI Staff:* TBD

*Recorder:* TBD

2:30 **Break** (Amherst Room 1009)

2:45 **Plenary Synthesis Session: Future Monitoring, Modeling, and Analysis Needs** (2 hours)

*Goal: How do we focus future efforts to collect, integrate, and provide the information end-users need?*

**Topic 1 – Reports Back from Sessions 1 and 2** (30 min)

**Topic 2 - Monitoring Priorities** (30 min)

**Topic 3 - Prediction Needs** (30 min)

**Topic 4 - Synthesis Needs** (30 min)

4:45 **Closing Remarks**

- Reflections on Day (**Ann Lowry**/Mass. DEP, **Mike Kenyon**/EPA New England, **Paula Rees**/Mass. WRRC)
- Outline of Next Steps and Opportunities for Continuing Discussion
  - **Workshop Report** (writing, reviewing)
  - **Database and Reference development** (NEIWPCC focus)
  - **Massachusetts Water Resources Center Annual Conference – April 8, 2010**

5:00 **Workshop Adjourns**