

**American Water Resources Association
2015 SUMMER SPECIALTY CONFERENCE
Climate Change Adaptation
June 15 - 17, 2015
New Orleans, LA**

Tuesday, June 16

8:30 AM – 10:00 AM

SESSION 5: How do Data, Models, and Tools Aid in Adaptive Actions I

Developing Risk-Based Adaptation Plans - Michael Craghan, USEPA, Washington, D.C

When you have lots of climate change risks, how do you decide what to do if you don't have the resources to do everything you need to do?! EPA's Climate Ready Estuaries program has published "Being Prepared for Climate Change: A Workbook for Developing Risk-Based Adaptation Plans" to help users identify, analyze and prioritize climate change risks--and plan good responses. OPTION: Author is also willing to conduct a hands on workshop in which participants will use the workbook methodology to simulate the creation of a risk-based climate change vulnerability assessment for a place-based organization.

WMOST: A Tool for Assessing Cost-Benefits of Watershed Management Decisions Affecting Community Resilience Under Varying Climate Regimes - Naomi Detenbeck, US EPA Atlantic Ecology Division, Narragansett, RI (co-authors: V. Zoltay, A. Morrison, T. Garrigan, J. LeClair, R. Abele, M. Buchholtz ten Brink)

The Watershed Management Optimization Support Tool (WMOST v.1) was released by the US Environmental Protection Agency in December 2013 (<http://www2.epa.gov/exposure-assessment-models/wmost-10-download-page>). The objective of WMOST is to serve as a public-domain screening tool that is efficient and user-friendly for local water resources managers and planners. WMOST is intended to be used as part of an integrated watershed management process, considering both current and future land-use and climate scenarios. The tool allows users to screen a wide-range of potential water resources management options across their watershed or jurisdiction for cost-effectiveness as well as environmental and economic sustainability. Examples of options that can be evaluated with the tool include projects related to stormwater, water supply, wastewater and water-related resources such as low-impact development (LID) and land conservation. The tool is intended to aid in evaluating the environmental and economic costs, benefits, trade-offs and cobenefits of various management options under both current and future climate regimes. In addition, the tool can facilitate the evaluation of low impact development and green infrastructure as alternative or complementary management options. Version 1 of WMOST focused on balancing human and aquatic life needs for water during critical low-flow periods. Version 2 of WMOST, scheduled to be released in spring of 2015, will include new modules to automate import of regional hydrology data, pre-process inputs to evaluate potential effectiveness of green infrastructure

stormwater BMPs in moderating peak and low flows, evaluate flooding risks and costs, and assess the robustness of optimal management solutions across a range of climate scenarios.

Managing Future Flood Risk in Coastal Louisiana - Jordan R. Fischbach, RAND Corporation, Pittsburgh, PA (co-authors: D. R. Johnson, K. Kuhn, D. G. Groves)

Levee failures during Hurricane Katrina exposed tremendous shortcomings in the infrastructure designed to protect the Louisiana coast from storm surge flooding. Since the storm, over \$15 billion has been spent upgrading the New Orleans Hurricane and Storm Damage Risk Reduction System and building other flood protection projects to harden Louisiana's defenses against future storms. But recent experience has taught that structural protection alone is not sufficient to increase the resiliency of coastal residents, communities, and infrastructure, and can sometimes be counterproductive by encouraging new development in the floodplain. Instead, new approaches are needed that can better support long-term risk reduction through a combination of new protection structures, ecosystem restoration, green infrastructure, and changes to land use and building practice. The State of Louisiana's 2012 Comprehensive Master Plan for a Sustainable Coast, developed in response to the state's substantial and growing flood risk and ecosystem challenge, is a formative and groundbreaking example of an integrated coastal resilience plan that incorporates these new approaches. The master plan combines flood risk reduction structures with substantial coastal restoration and hazard mitigation investments and accounts for future coastal change and uncertainty from sea level rise, ongoing land subsidence and land loss, and other key drivers. The 50-year, \$50 billion plan is currently being updated for 2017, supported by a series of integrated systems models and a substantial decision analysis effort. Many different flood risk reduction approaches will again be considered for the plan, including a range of levee system designs and plans to elevate homes and harden commercial properties. To evaluate and compare the risk reduction impacts of the varied projects considered for inclusion in the 2012 Coastal Master Plan, we developed the Coastal Louisiana Risk Assessment model (CLARA), a state-of-the-art tool for estimating current and future flood risk. The model is designed to flexibly predict flood depths and damage under a range of climate, environmental, and economic uncertainties. In this oral presentation, Dr. Fischbach will discuss recent updates to the CLARA model intended to support development of the 2017 Coastal Master Plan, and describe preliminary estimates of current and future flood risk for New Orleans and the Louisiana coast. He will then describe how these new tools are being employed to support planning in Louisiana's Flood Risk and Resilience Program. Dr. Fischbach will also provide an overview of the RAND's Water and Climate Resilience Center and describe how our work to support Louisiana fits into the center's broader mission of supporting long-term coastal and climate resilience planning.

US Army Corps of Engineers Tools and Resources for Climate Change Planning - Chris Kurtz, CDM Smith, Denver, CO (co-authors: K. D. White, J. R. Arnold)

Climate change is impacting U.S. Army Corps of Engineers (USACE) missions, operations, programs, projects, and systems because it directly affects the hydrologic cycle and, through it, the quantity and quality of water resources. USACE staff are increasingly considering potential

climate change impacts when undertaking long-term planning, setting priorities, and making decisions that affect resources, programs, policies, and operations. This is consistent with the 2011 and 2014 policy statements on climate change adaptation by the Assistant Secretary of the Army for Civil Works, the USACE Climate Change Adaptation Plans, and agency policy and guidance. The USACE is undertaking its climate change preparedness and resilience planning and implementation in consultation with internal and external experts using the best available - and actionable - climate science and climate change information. Under the leadership of the Response to Climate Change Program, the USACE is providing context and linkage to other agency resources for climate resilience planning, such as sea level change calculation and coastal risk reduction resources, watershed vulnerability assessment tools, and regional syntheses of the current science on observed and projected climate variables with specific attention to USACE missions and operations. This presentation will provide insight into how the USACE utilizes climate information to support decision making across business lines, and will provide an overview of the tools and actionable climate summaries at the scale of 2-digit U.S. Geological Survey (USGS) Hydrologic Unit Codes (HUC) across the continental United States, Alaska, Hawaii, and Puerto Rico to support others in "asking the climate question" in their business activity. In total, twenty one 2-digit HUCs are included in this series of summary reports that synthesize recent findings of observed and projected climate and hydrological trends cited in reputable peer-reviewed literature and authoritative national and regional reports. In addition, each report characterizes climate threats to USACE business lines including navigation, flood risk management, water supply, ecosystem restoration, hydropower, recreation, emergency management, regulatory, and military programs.