

American Water Resources Association
2009 SPRING SPECIALTY CONFERENCE
Managing Water Resources Development in a Changing Climate
May 4-6, 2009
Anchorage, AK

Wednesday, May 6

1:30 PM – 3:00 PM

Session 34: Changing Climate Impacts on Water Resources and People III

1. Developing a Framework to Assess Stream Flow from Global Climate Change Projections - William Samuels, SAIC, McLean, VA (co-authors: M. Elena Herrera, David E. Amstutz)

The Geospatial Stream Flow Model (GeoSFM) predicts river discharge based on global datasets that describe the Earth's surface (terrain, land use, soils) and satellite derived estimates of rainfall and evapotranspiration. The model has been widely used in Africa to support the Famine Early Warning System (FEWS) project. Recent applications of the model (Mindanao, Philippines) have made use of high resolution global terrain elevation data (Shuttle Radar Topography Mission) and derived products such as HydroSHEDS (Hydrological data and maps based on SHuttle Elevation Derivatives at multiple Scales). The Community Climate System Model (CCSM) developed at the National Center for Atmospheric Research (NCAR) generates monthly temperature and rainfall projections based on climate change scenarios. For example, in the U.S. Southwest, the business-as-usual (BAU) scenario produced 50% more winter precipitation than the policy-limited scenario, whereas in Maine the BAU scenario resulted in 30% less precipitation than the policy-limited case. In addition to the global climate projections, downscaled projections of monthly mean temperature and total precipitation are available for the continental United States. These downscaled projections lend themselves to use at local and regional scales. In this study, we developed a framework which uses GeoSFM to examine how the downscaled monthly CCSM rainfall projections for the US affect stream flow and water availability. A 5 by 5 degree region near the Texas Gulf Coast was used as a test case.

2. Addressing Climate Change in Long-Term Water Resource Plans - David Groves, RAND Corporation, Oakland, CA (co-author: Robert Lempert)

Water managers throughout the world are working to consider climate change in their long-term water planning processes. The best available information regarding plausible future hydrologic conditions is largely derived from global circulation models (GCMs) and paleoclimate studies. Although such data may provide better guidance about future hydrologic conditions than historical measurements, GCMs and paleoclimate records suggest a wide range of plausible future conditions. Furthermore, they must also be translated to projected hydrologic flows in order to be useful in many planning models. There is no single accepted approach for overcoming these challenges to utilize these data in water management planning tools and then evaluate the myriad of possible adaptation options over the wide range of plausible future management conditions. This talk will describe several on-going projects at RAND to incorporate global projections of climate change into local, regional, and state-wide long-term water planning. These projects all evaluate the performance of a wide range of climate change adaptation strategies against large ensembles of climate change scenarios. Data mining and other statistical tools are then used to identify strategies that appear to be robust and then characterize remaining vulnerabilities for further consideration. The presentation will describe new results from a climate change impacts study for the California Water Plan Update 2009 and describe how the approach is being implemented in several local-scale planning processes in the Western United States. Work to date suggests that climate information can be successfully assimilated into local water planning tools to help identify robust climate adaptation water management strategies.

3. Economic Demand for Irrigation Water and Climate Change - Bryce Contor, Idaho Water Resources Research Institute, Idaho Falls, ID

At the farm or district level, the economic demand for irrigation water is driven by commodity prices and the marginal value product (MVP) of water as a production input. The MVP is strongly controlled by evapotranspiration and effective precipitation, both of which are affected by changes in climate. Using an Irrigation Demand Calculator, potential changes in economic demand for irrigation water due to climate

change are compared with changes in demand associated with recent unprecedented changes in commodity prices.

4. Assessing Potential Impacts of and Prioritizing Response to Global Climate Change: A Methodology and Action Plan for Water, Wastewater, or Stormwater Utilities - Amy Carlson, CH2M HILL, Bellevue, WA

CH2M HILL initiated a collaborative effort amongst several utilities to address potential global climate change impacts to provided services of drinking water, wastewater, and stormwater. The objective of this effort was to develop a replicable method for addressing climate change impacts using the type of risk-based tools used in CIP prioritization. A work group comprised of CH2M HILL and several utilities developed a risk-based approach for assessing climate impacts on capital improvement projects (CIP), as well as an approach for developing prioritized and appropriate responses for CIP and operational decision-making. The effort included looking at the vulnerabilities (types of system risks related to climate change) and developing a decision tool and process that considers the likelihood of impacts and the potential consequences resulting from climate change. Application of the developed methodologies is anticipated, with follow-up assessment of successes and lessons learned.