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
8:30 AM – 10:00 AM
Session 28: Changing Climate Impacts on Water Resources and People I

1. Climate Change, Water Impacts, and Indigenous Peoples: Engaging Native Knowledge in Cross-Regional Comparison between Alaska, the Pacific Islands, and the American Southwest - Sarah Trainor, Alaska Center for Climate Assessment and Policy, University of Alaska, Fairbanks, AK (co-authors: Jolene Tallsalt-Robertson, Cheryl Anderson, Dan Ferguson, Gregg Garfin)

Climate related impacts on water resources are among the primary concerns of natural resource managers and Indigenous communities throughout North America and the Pacific Islands. The seasonality, timing, and intensity of drought can initiate a cascade of effects on water supplies, water quality, human health, transportation, and food production and harvest. With continued climate change, drought and water related impacts on ecosystems and human communities are expected to rise. Furthermore, there is an increasing recognition of the value of local and indigenous knowledge in climate change adaptation and decisive endorsement from Native leaders for the necessity of applying traditional knowledge to solve contemporary environmental problems. In this panel participants will present results of a cross-regional, cross-cultural project exploring the partnership of Native and Western knowledge and comparing water related climate impacts and response in Indigenous communities. Utilizing state-of-the-art video conference technology, the NOAA supported Regional Integrated Sciences and Assessment Programs (http://www.climate.noaa.gov/cpo_pa/risa/) in Alaska, the Pacific Islands, and the American Southwest have created a series of cross-regional dialogs to document climate and drought impacts and explore cross-cultural avenues for information exchange, adaptation, and response. We will discuss impacts of water stress on Native and Indigenous communities in these regions, strategies for adaptation, identified information and communication needs, and related water management issues. Panelists: Jolene Tallsalt-Robertson Senior Hydrologist, Water Resources Department, Navajo Nation Sarah Trainor Research Assistant Professor and Coordinator, Alaska Center for Climate Assessment and Policy, University of Alaska Cheryl Anderson Program Director, Hawaii Hazard Mitigation, University of Hawaii Social Science Research Institute

2. Coastal Erosion in Alaska: Planning for the Future - Bruce Sexauer, Alaska District, U.S. Army Corps of Engineers, Elmendorf AFB, AK

Alaska has 6,640 miles of coastline compared to 5,743 for the rest of the United States. A 2003 report by the US General Accounting Office states that “Flooding and erosion affects 184 out of 213, or 86%, of Alaska Native villages…” Three communities considering relocation face combined costs over a half billion dollars to relocate less than 1500 people. Who pays for this? Who has the lead? Can it be done? These issues and several others like it are being faced by Corps planners as erosion is being confronted. The Alaska District has been involved in erosion issues for many years. Fueled partially by the heightened sensitivity towards climate change, recently the Corps has been tasked with several studies and projects to address erosion throughout Alaska. This presentation will explore various Corps activities addressing coastal erosion and provide insight into technical, policy, and social issues being faced. One study in particular will be highlighted, the Alaska Baseline Erosion Assessment (BEA) The BEA was funded and authorized by Congress in 2005 to coordinate, plan, and prioritize appropriate responses to erosion throughout Alaska. Through this study, 181 communities were identified as having some sort of erosion problem that needed to be assessed. This presentation will detail how the BEA was accomplished and give insight into various findings including some surprising results of analysis. Included in the presentation will be an explanation of the 167 communities interviewed, the 12 communities visited, and the creation of a risk and uncertainty based assessment of the overall risk of serious erosion damages in each of the communities. The BEA products are being developed to be web accessible, therefore the presentation will also contain a brief demonstration of the study web site, how to access information, and plans to keep information current. In addition, the Corps will discuss recommendations for next steps, its role in interagency collaboration, and how a Federal agency is building strong plans for the future of erosion risk management.

3. Forecasting Resilience in Arctic Societies: Agent-Based Modeling Tools for Assessing Human-Hydrological Systems - Lilian Alessa, University of Alaska Anchorage, Anchorage, AK (co-authors: Andy Kliskey, Mark Altaweel)

Arctic communities are increasingly faced with social-ecological changes that act at variable speeds and spatial scales. Such changes are beginning to affect vital resources, particularly water supplies. Currently, there are few computational tools that integrate multiple social and environmental processes in order to aid communities' adaptation to change. We propose a modeling and simulation approach that can integrate such processes at different spatiotemporal scales in order to address issues affecting community water supplies. Demonstrating the proposed approach, an agent-based modeling tool is developed and applied to a community on Seward Peninsula. Results show patterns of water use and perceptions of water availability, enabling forecasting trends for this resource to be made based on current understanding. More broadly, we demonstrate the need for constructing tools that address issues at the community level for better understanding human and hydrological interactions and policy decisions affecting water supplies.

4. Climate Change Impacts and Adaptation of the Péribonka River Water Resources System (Quebec, Canada). - Francois Brissette, Ecole de technologie supérieure, U.niversity of Quebec, Montreal, QC, Canada (co-authors: Marie Minville, Stephane Krau, Robert Leconte)

This research project investigated the future behaviour and uncertainty of the Péribonka River water resources system in a rapidly evolving climate. Impacts of climate change on reservoirs operation and hydropower production were assessed by employing operating rules optimised for future hydrological regimes. To ascertain uncertainty, 30 climate change projections from 5 GCMs, 2 GHG scenarios and 3 temporal horizons, were downscaled using the change factor method and coupled to a stochastic weather generator to account for some of the natural variability of local climate. Future hydrological regimes were simulated using a lumped hydrological model fed by the downscaled climate change projections. Optimal reservoir operating rules for each time series of future river flows were generated using a stochastic dynamic programming approach. These rules were then employed along with a customised river system simulator to establish reservoir performance and hydroelectric production under climate change. As expected, the annual reservoir level trajectories were impacted because of climate change. Reservoir filling and subsequent drawdown were shifted back and seasonality was also affected. An increase in hydroelectric production was obtained for most of climate change projection analysed, reaching 22% for the more favourable scenarios. On the other hand, non productive spillage was also increased, in some cases of up to 300%, which may be attributed, at least in part, to increased climate variability and resulting hydrologic regime. Moreover, reservoir reliability was made more vulnerable for half of the climate projections analysed. Finally, a transient climate change projection from the Canadian Regional Climate Model was also used to assess the impacts of climate change on hydroelectric production, further confirming a general trend toward an increase in energy produced and in non productive spillage.