

## Climate Workshops in Wyoming and Colorado

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The WWA recently co-sponsored two meetings on climate issues in the Intermountain West. The first was "Water, Drought and Wyoming's Climate," on October 5th in Laramie, WY, and then a week later, WWA cosponsored a conference on "Climate Change and Variability in the San Juan Mountains" in Durango, CO. Below are summaries of the two workshops.

### Water, Drought and Wyoming's Climate

On October 5, 2006, the University of Wyoming (UW) hosted an all day workshop in Laramie, dedicated to understanding how climate variability and change impacts Wyoming's water resources. A followup to a WWA sponsored workshop in December 2005, this event included 75 participants representing a range of expertise and interests including the Wyoming Governor's and State Engineer's Offices, NOAA, the Family Farm Alliance, and the Laramie County Conservation District. The purpose of this workshop was to facilitate discussion between water managers, water users, and researchers to discuss current understanding of climate change as it relates to Wyoming's water, and to discuss areas of further research and future water management needs. Split into a morning and afternoon session, the workshop was set-up to maximize participation by attendees through morning and afternoon break-out discussion groups.

The workshop began with opening remarks by Dr. Harold Bergman, Director of the UW Haub School and Ruckelshaus Institute, and Dr. Mike Besson, Director of the Wyoming Water Development Commission. Then, Dr. Steven Gray, Wyoming State Climatologist and Director of the Water Resources Data System addressed why Wyoming's water resources are vulnerable to climate change, emphasizing that even the most conservative warming scenarios could constitute major impacts on Wyoming water. Dr. Gray identified two questions for the workshop participants to consider: first, how do current management practices and policies make us more or less vulnerable to climate change? And second, how will

changing land use, land cover, and climate interact to impact regional hydrology? Gray commented that we need a better understanding of current and potential future uses of water to better understand the future role of water as it relates to agriculture uses.

A four-member panel discussion included Kirk Miller from the USGS Chief Hydrologic Studies, Clint Bassett of the City of Cheyenne Board of Public Utilities, Pat O'Toole, Rancher and President of the Family Farm Alliance, and Harry LaBonde of the State Engineer's Office. Such needs identified by the panel presentations included additional long-term statewide monitoring of streamflows and groundwater levels, assessment of consumptive and unconsumptive water uses for Wyoming, additional water retention for agriculture and food production purposes, and the need for real-time data for use by the State Engineer's Office. Following presentations, participants were divided into six facilitated break-out groups that focused discussion on climate/water-related issues and concerns that were addressed in the morning's presentations. Mimicking many of the concerns of the morning speakers, the break-out groups additionally stated the need to link surface and groundwater law and policy, cited the need for a drought and water conservation public awareness campaign, and emphasized the need for increased monitoring of snowpack, water availability, and soil moisture parameters.

The afternoon session included a presentation on available climate products and resources and how they can be utilized was presented by Dr. Andrea Ray, a Research Scientist with WWA and NOAA. She described climate and water resource products including the Intermountain West Climate Summary, NOAA National Integrated Drought Information System, and the U.S. Drought Monitor. The break-out discussion groups reconvened in order to refine goals presented in the morning session into a list of immediate and long-term objectives and recommendations. Short-term and long-term priorities highlighted by the participants include assessment of current monitoring tools in terms of what is working and what isn't, baseline assessment of water consumption, linking of interagency information, i.e. Governor's Drought Task Force, NWS/NOAA, and Water Conservation Districts, public educational campaigns concerning climate and drought, and involvement by the public in data collection.

This workshop provided a forum for many fields of expertise to come together and identify common goals and gaps in current research with the intent of recognizing and mitigating the effects of climate change on Wyoming's water resources. Organizers and participants see a potential to address these concerns with follow-up meetings that focus on some of the topics identified. The Ruckelshaus Institute, in conjunction with federal, state, and local agencies is interested in playing a role in providing an information clearinghouse for climate, water, and drought related topics. For more information on the workshop, contact Dr. J.J. Shinker, UW Dept. of Geography, [jshinker@uwyo.edu](mailto:jshinker@uwyo.edu), or see the conference webpage at: <http://www.uwyo.edu/enr/Wyoming-Water.asp>. A report of the workshop is available online, as well as the workshop agenda and presentations.



**Figure 14a.** Diana Hulme, Assistant Director of the Ruckelshaus Institute leads a break-out discussion at the WY Water and Climate Workshop.



### Climate Change and Variability in the San Juan Mountains

On October 11th and 12th at Fort Lewis College in Durango, about 70 scientists from academia, government research institutions, and natural resource management agencies met to share research and initiate planning of the SJM Climate Initiative. The purpose of the conference was to facilitate information-sharing and interaction between scientists and local stakeholders regarding the implications and potential impacts of climate variability and change in the San Juan Mountain region. A second goal was to begin development of a San Juan Mountain (SJM) Climate Initiative, a stakeholder and scientist driven climate research and outreach program.

Topics on Oct 11th included measurements of global and local climate change, and associated impacts to hydrology, biodiversity, forests, and agriculture. After the presentations, scientists were asked to discuss what we don't know but really should about climate change in the San Juans. This discussion produced a list of "information gaps" and potential research topics that will help shape the SJM Climate Initiative. The evening keynote address by Dr. Jonathan Overpeck of the University of Arizona drew nearly 250 people including conference-goers, concerned community members, and FLC students. Overpeck discussed "Global Climate Change, the West, and What We Can Do about It." He reported that average temperatures in the West are anticipated to increase 4 or 5 degrees Fahrenheit by mid-century. These rising temperatures will have major implications for timing and length of snowmelt, stream flow levels throughout the summer season, evaporation from reservoirs, and water loss from vegetation and soils, among other concerns. Overpeck not only discussed climate change implications but also energy conservation strategies and alternative energy production, such as clean-coal technology.

The second day brought together scientists with natural resource managers, elected officials, community planners, energy industry representatives, conservationists, farmers and ranchers, recreation and tourism professionals, community leaders, concerned citizens, students, and others. Attendees heard presentations from stakeholders and scientists on the climate of the past present and future, and how climate affects water supply, snow, air quality, forest health, wildfire, recreation, tourism, agriculture, ranching, energy, biodiversity and more. After lunch, participants split into focus groups (i.e., water and community planning, agriculture and ranching, forestry, recreation and tourism, ecosystems and biodiversity, and energy) to identify how climate affects their interests and what information or tools would be most useful in mitigating and preparing for the future impacts climate change may bring. The dialogue provided a unique opportunity to collectively identify information and research needs in the region. MSI staff are currently synthesizing the reports from these focus groups along with the scientist "information gaps" to produce a draft SJM Climate Initiative Action Plan.

The final day of the conference took place at MSI facilities in Silverton. About 20 people attended a morning field tour to Swamp Angel Study Area in Senator Beck Basin. This instrumented watershed is managed by the Center for Snow and Avalanche Studies, a partner organization of MSI also based in Silverton. After lunch and a tour of MSI headquarters, there was a Renewable Energy Discussion and Public Reception, also at-



**Figure 14b. Participants in the San Juan workshop, (left-right) Rob Davis of Forest Energy Corporation, Congressman John Salazar, and Ellen Stein of MSI, one of the conference organizers.**

tended by Congressman John Salazar and Joe Colgan, candidate for State Representative, and representatives from the Forest Service, BLM, and local wood products industry.

The three days of collaborative and progressive discussion included not only the implications of climate change, but also alternatives and potential projects to help adapt to and curb the documented trends. Coincidentally, less than a week later, the Durango City Council voted to sign the U.S. Mayors Climate Protection Agreement, agreeing to "strive to meet or exceed Kyoto Protocol targets for reducing global warming pollution." Over 320 U.S. cities have signed the agreement to date; including Aspen, Basalt, Boulder, Denver, Durango, Gunnison, Frisco, and Telluride. A proceedings and synthesis of identified research and information gaps are being incorporated into the SJM Climate Initiative Action Plan. Initial project ideas resulting from the conference include:

- 1) Producing paleoclimatic (tree-ring) reconstructions of river flows in the San Juans for use in water management. These products are available for other locations in Colorado and have helped water managers understand flow variability for a time period extending beyond the instrumented record. This project would include training of water managers to use the data products.
- 2) Applying the Watershed Analysis Risk Management Framework (WARMF) developed for the San Juan Basin. WARMF can be used to model water quantity and quality and to develop and test management options. Potential applications could include water management strategies for climate change, growth, and diversions.
- 3) Producing accessible outreach materials for SJM climate stakeholders, including a website and a booklet.

For more information on the workshop, Ellen R. Stein, Executive Director, Mountain Studies Institute, [estein@mountainstudies.org](mailto:estein@mountainstudies.org), or see the conference webpage at: [www.mountainstudies.org](http://www.mountainstudies.org). A report of the workshop is will be available soon online.

