

CLIMAS Update

NEWSLETTER OF THE CLIMATE ASSESSMENT FOR THE SOUTHWEST *integrating science, policy, and community*

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A Note from the Editor

As you can see, we are expanding our format to provide you with more information and commentary about climate in the Southwest. We hope you find the new improved newsletter informative. Send us your comments and suggestions for an even better publication!

Winter 1999-2000 Forecast

We will be issuing a climate forecast update in each newsletter, beginning with this issue. The summary will be relatively brief. For more information, visit the official NOAA CPC forecast site at <http://www.cpc.ncep.noaa.gov>. For a more extended climate forecast discussion for the Southwest, see http://www.ispe.arizona.edu/swclimate/Southwest_Climate_Outlook.

NOAA's Climate Prediction Center (CPC) began predicting a dry winter for the Southwest, similar to that which we experienced last year, some months ago, and they are holding to this outlook over the entire winter season. La Niña is behind the dry conditions. So far, the prediction has been accurate, for the only appreciable precipitation we have experienced since October occurred over the New Year's weekend. A potential for some easing of dry conditions after the first of the year has been suggested, but the CPC expects generally dry conditions to persist until spring.

Meetings

Two meetings, part of a planned semi-annual climate update process, were held this fall in conjunction with the winter 1999-2000 La Niña forecast.

The first, organized by the Climate Diagnostic Center in Boulder, Colorado and the

Western Regional Climate Center in Reno, Nevada, took place in Albuquerque in October. Participants included stakeholders from natural resource agencies in New Mexico, as well as media representatives, staff from a major New Mexico utility, and others. The meeting was hosted by Dave Gutzler, faculty member of the University of New Mexico's Earth & Planetary Sciences Department. An explanation about ENSO processes was provided, followed by a discussion of the winter 1999-2000 forecast. Presentations were provided by Dr. Kelly Redmond of the Western Climate Research Center in Reno Nevada, Klaus Wolter of the CDC, and Dave Gutzler. Mark Svoboda discussed the drought monitoring and forecast program being conducted out of the University of Nebraska. Barbara Morehouse gave a short presentation on CLIMAS Very interesting presentations were also given by several participants, including (among others) Chuck Caruso on New Mexico's drought plan, John Fleck on reporting in print media on climate news, and Dionne Shirley of the NM Rural Water Users Association on drought impacts on her constituents. The meeting also featured a day-long open discussions about climate impacts, and use of/need for climate-related information. The meeting was very productive, and set the stage well for ongoing interactions and cooperation.

CLIMAS hosted a similar meeting at Tucson on November 22. Kelly Redmond gave talks on ENSO and on the winter 1999-2000 forecast; Paul Sheppard gave a talk on tree ring data for paleo climatic conditions, and Andy Bryant of the Tucson National Weather Service Office discussed the new weather threats

forecasts developed at the local office and available on their web site at (<http://nimbo.wrh.noaa.gov/Tucson/twc.html>).

Barbara Morehouse gave a presentation on CLIMAS. The afternoon was devoted to discussion of participants' concerns about climate impacts, the kinds of information they use now, and their information needs. This very successful meeting was attended by natural resource managers, a representative of a large utility, media representatives, and members of the CLIMAS team.

Climate forecast workshops will be presented again in the Spring, covering the summer half-year forecast for the Southwest.

Conferences

Among the many conferences CLIMAS members attended this past year, two stand out for having occurred within the region. CLIMAS was well represented at both conferences, both of which were held in Arizona in early November.

The Climate Diagnostic Workshop, an annual event featuring paper sessions and poster presentations on current climate research, attracted 165 participants from around the nation and abroad. Dr. William Sprigg, now ISPE deputy director, initiated the annual workshops in 1976 to encourage development of climate prediction methods through the study of climate processes. This year's workshop was coordinated by the Institute for the Study of Planet Earth (ISPE). ISPE and CLIMAS graduate research assistants provided valuable assistance throughout the conference. A proceedings volume summarizing the conference presentations will be published shortly.

A special transboundary conference, "Divided Waters-Common Ground," in Cananea, Sonora Mexico and Bisbee, Arizona gathered some 200 participants from both sides of the border. The conference was headed up by Dr. David Goodrich of the USDA Agricultural Research Service in Tucson, in collaboration with the EPA, BLM, and representatives from ASU, UA, and other affiliates of the SALSA

(SemiArid Land Surface-Atmosphere) program. Focused on the San Pedro River and watershed in southeastern Arizona, the conference provided an opportunity for SALSA researchers and others, such as CLIMAS team members, to share research results, discuss issues, and generally network with area residents and staff from various resource management agencies.

CLIMAS team members who participated included Barbara Morehouse, who represented CLIMAS on the conference organizing committee and gave a talk on the CLIMAS project at the Bisbee session. Diana Liverman gave a talk on the importance of taking into account recent devolution of power to the states in Mexico, as well as changes in institutional arrangements associated with sectors such as water resource management and land tenure. Diana Hadley provided input to the conference organization, gave a talk on the environmental history of the San Pedro watershed, and presented a poster on the same topic. Petra Tschakert, Holly Hartmann, Colin West, and Paul Whitaker presented posters reflecting CLIMAS research activities and results. This very successful conference sets the foundation for carrying out further research and outreach in the San Pedro area. CLIMAS will be participating in this ongoing effort, through working to help identify and address climate information needs in the area. A proceedings volume summarizing the conference will be published in early 2000.

Research Update

It has been a busy year, one that has seen the production of our first series of working papers. The climate variability working paper is already on our web site; the forecasting paper is ready for loading on the web—watch for it, as well as the urban water and ranching papers, soon. "Advances in seasonal forecasting for water management in Arizona: A Case Study of the 1997-98 El Niño," by Thomas Pagano, Holly Hartmann, Soroosh Sorooshian, and Roger Bales is now available. The report, HWR No. 99-040,

is available through UA's Department of Hydrology and Water Resources. A draft of the community analysis of the Middle San Pedro Valley has been completed and is currently under review.

Research has continued apace over the past Fall, with significant progress made on evaluation of seasonal forecasts produced by the Climate Prediction Center, modeling of monsoon dynamics, interpolation and downscaling of historical and paleo climate data to fit local needs, and analysis of snowpack. Interviews with urban water providers in Phoenix, Tucson, Sierra Vista, and Nogales are underway to identify the particular climate vulnerabilities of large providers. Likewise, a survey of ranchers continues, as does an initiative to collect oral histories of climate experiences in the Sulphur Springs Valley.

Connections have been made with Native Americans in the region, for the purpose of identifying and pursuing activities of particular interest to the tribes. Scoping activities geared toward identifying useful approaches to climate vulnerability studies in the U.S.-Mexico borderlands have also been initiated.

CLIMAS Research Reports

Beginning with this issue of the newsletter, we will be providing an in-depth look at one of the CLIMAS research projects. This month, we focus on the results and implications of the urban water sensitivity analysis.

The Urban Water Study

The first phase of the urban water study focused on evaluating the sensitivity of urban water systems to droughts of magnitudes comparable to the most severe one-, five-, and ten-year droughts in the historical record. Areas analyzed in the study were all located in Arizona and included the Phoenix, Tucson, Santa Cruz Active Management Areas (AMAs) as well as Sierra Vista and the Middle San Pedro River Valley. The analysis used baseline data derived from the supply and demand water budget for

each study area to develop an assessment of the effects of the three drought periods. For the Phoenix, Tucson, and Santa Cruz AMAs, the baseline figures represented supply and demand levels calculated by the Arizona Department of Water Resources (ADWR) for the year 1995 and ADWR supply and demand estimates for the year 2025. For Sierra Vista and the Middle San Pedro River Valley, water budgets were constructed using 1990 data, the most recent year for which such data was available at the time the analysis was run. A water budget for the year 2025 was also constructed for each study area.

The proportional decrease in winter precipitation in the deepest one-, five-, and ten-year drought period for each location (annual precipitation data were used for the Santa Cruz AMA) was applied to the water budget to derive an estimate of the extent to which such drought would change the baseline balance between supply and demand. The impacts of drought on each community were calculated several times, using different assumptions (for example, eliminating agricultural demand).

For the Phoenix and Tucson AMAs, separate calculations were used based on loss of Central Arizona Project water supplies; for the Santa Cruz AMA, loss of 2/3 of the effluent flows from Mexico was included. Refinement of the initial calculations was conducted in consultation with key water managers in the study areas. In a nutshell, the results of the analysis reveal that the Santa Cruz AMA, located on the Arizona-Sonora Mexico border, would be most vulnerable to all three droughts—one-year, five-year, and ten-year. This is largely due to the fact that the AMA lacks sufficient alternative water resources upon which to draw, key well fields are located in shallow aquifers where the water tables are highly sensitive to both precipitation events and pumping, and continued flow of effluent supplies from Mexico remains insecure under existing treaty arrangements.

Water systems in the Phoenix AMA were found to be less sensitive to drought because much of the area has access to more than one

water source, and extensive infrastructure exists to move water from where it is available to where it is needed. However, a deep ten-year drought, especially if it involved loss of CAP supplies would pose a serious challenge to water resource management. For areas of the AMA dependent solely on groundwater, serious conservation efforts would have to be initiated much sooner, perhaps even during a deep one-year drought.

In Tucson, availability of CAP water would be essential to managing water supplies under extended drought conditions. However, as in the Phoenix AMA case, areas of the Tucson AMA that lack direct access to CAP water might be especially vulnerable to deep drought, particularly multi-year events. Loss of CAP water supplies would necessitate very stringent conservation enforcement.

For Sierra Vista, lack of readily available alternative supplies poses similar challenges. Here, a deep multi-year drought could trigger tensions over maintaining flows in the San Pedro River, an internationally recognized and nationally protected riparian ecosystem versus supplying water for urban and agricultural use. The Middle San Pedro Valley, centered on the town of Benson, would be affected least severely by droughts of a magnitude used in the analysis, largely because demand generated by the existing and projected population is not expected to place undue stress on supply systems. Agriculture would be likely to experience the largest impact, perhaps resulting in land

fallowing or a shift to crops other than the customarily planted grains.

The findings of the sensitivity analysis will soon be posted on the CLIMAS web site, along with a 'slide show' summarizing the key findings. In the meantime, analysis continues of the impacts of climate on the laws, rules, policies, procedures and practices associated with water management in the study areas. Also, as mentioned earlier in this newsletter, a survey of water providers has been initiated. The aim here is to characterize the various types of operations that exist within the study areas, identify the ways in which climate affects various providers who operate in different parts of the study areas, and identify their specific climate and hydrologic information and forecast needs.

NATIONAL CLIMATE ASSESSMENT

News From The Southwest Region

The Southwest Regional Assessment is a component of the National Assessment project. The Southwest Assessment is being directed from the office of the ISPE deputy director, Dr. William Sprigg. Funded jointly by NOAA and Department of Interior, the Southwest Assessment is designed to provide basic insights into the implications of climate change for the Southwest. The National Assessment process is a response to a mandate by Congress, and is intended to provide a sketch of climate and its impacts nationwide. A series of regional and sectoral reports are in various stages of preparation, and will serve as supplements to the summarized National Report.

A draft of the Southwest Regional Assessment has been completed and is currently under critical review by outside experts. Topics covered in the report include climate and the electric power industry, climate and water resources, urban water demand, ranching, rangelands, mining, human health (with an emphasis on Valley Fever and Hantavirus Pulmonary Syndrome), and potential movement of sand dunes. The final report will be available early in 2000.

TO CONTACT US...

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