

Adapting to Climate Change and Variability in Western North America

Proposed actions based on binational Mexico – United States research and outreach

Our understanding of how scientific information flows from scientists and researchers to decision-makers and other users is inadequate. This is particularly the case for information about climate and water resources. The current ability to provide status reports and forecasts of climate change, weather events, and hydrologic conditions surpasses the capacity of governments and communities to assimilate and respond to this type of information. There is an urgent need, therefore, to improve the flow, communication, and use of such information.

Responding to this need, representatives of a binational collaboration of universities, government agencies, community groups, and the private sector have met periodically for the past two years to discuss and make recommendations about how to improve information flows related to climate change and variability in Northwest Mexico and the Southwest United States. The core team comprises researchers from The University of Arizona, Instituto Mexicano de Tecnología del Agua (IMTA), National Oceanic and Atmospheric Administration (NOAA), National Center for Atmospheric Research (NCAR), and Colegio de Sonora. This effort is supported by the Inter-American Institute for Global Change Research (IAI) and NOAA's Sectoral Applications Research Program (SARP). The results and products of this binational process have been reviewed in two interactive workshops—the first in Hermosillo, Sonora, in November 2008, and the second in Jiutepec, Morelos, in July 2009. These recommendations cluster into four topics: (1) forecasts and climate information products; (2) utilizing information; (3) programmatic responses; and (4) evaluation and follow-up for adaptive response actions.

Forecasts and climate information products

- **New binational collaborative initiatives require strengthening.** For example, in the northwest Mexico region, the Servicio Meteorológico Nacional (SMN) will collaborate with the NOAA Regional Integrated Science Assessment program through a formal agreement currently being negotiated between Comisión Nacional del Agua and NOAA's Office of Hydrology. This will provide value-added information, experimental forecasts, and new gridded datasets. Products including the Border Climate Summary and other print and web newsletters need wider distribution. One strategy is to organize Webinars (i.e., seminars and related exchanges held on the Internet), which would focus on topics of interest to forecasters and users. Joint, binational evaluation of stakeholder needs should identify new products that stakeholders value.
- **The Servicio Meteorológico Nacional's efforts to collaborate with Mexican scientists to conduct research leading to improved forecasts, services and products requires further strengthening.** This can be achieved through collaborating organizations that highlight SMN's climate forecast products at periodic topical workshops, such as the Border Governors Conference binational drought workshop, in order to further facilitate the flow of ideas and information between Mexican and U.S. scientists, and between scientists and decision-makers.

- **Water availability is a primary concern; as a result, applied hydrologic modeling needs strengthening with wider distribution of results.** There is an information gap on surface flows, soil moisture, evapotranspiration, and flooding, requiring studies on hydroclimatology, hydrometeorology, and climate impacts on water resources. The University of Washington's modeling effort currently being transferred to IMTA should provide additional value and be made more user-friendly to tailor components that make it easy for managers to use.
- **Societal vulnerability to climate extremes must be strengthened through improved data collection and monitoring of vulnerable populations and sectors facing flooding, water scarcity, and drought.** The data collection should be sustained over time from established baseline values, which may have to be initiated if they do not already exist, and the vulnerability assessments should be linked to physical data and modeling as just outlined. Methods currently being used by the team include ethnographic interviews and institutional analysis. Such assessments will require extensive interactions with stakeholders, including self-evaluation and joint planning for adaptive responses to climate change.

Utilizing information

- **Hydroclimatological monitoring networks have expanded in Mexico.** While installation of new monitoring equipment should continue, it is necessary to improve utilization of existing information through dissemination of bulletins, e.g., Border Climate Summary, websites, listservs, and software that permits users to generate products specific to their own needs and those of resource management sectors. At the same time, state and other data networks, e.g., Red Sonora, must be linked to national and binational networks.
- **Beyond the Internet, information users should be treated as region-specific clients and customers to be provided with information translated into specific response actions.** This can be transferred economically to self-sustaining over time, e.g., radio spots with commercial sponsors (similar to traffic bulletins), cell-phone text messages by user subscription (similar to sports headlines), and flood warning alert systems in the U.S.

Programmatic responses

- **Producers are vulnerable to regional, local, and seasonal climate effects and, in order to improve decisions, need information tailored to these conditions.** Local capacity building for information generation, dissemination, and follow up are crucial. As has been shown in other contexts, capacity building requires a long-term investment and iterative interaction between stakeholders and scientists. A fruitful avenue for investment is to develop a binational integrated science and assessment team to serve the binational border region.
- **Binational coordination of information-product generation and dissemination can be strengthened through binational institutions.** These include but are not limited to the International Boundary and Water Commission / Comisión Internacional de Límites y Aguas, the Border Governors Conference, the Arizona-Mexico Commission, and Border 2012 and its regional technical working groups.

Evaluation and follow-up for adaptive response actions

- **It is crucial to enforce existing rules and agreements.** Examples include groundwater pumping bans and established concessions in the Public Register of Water Rights.
- **State and national planning for climate change needs strengthening through the involvement of multiple stakeholders (agriculture, municipalities, energy sector, disaster response, among others).** When combined with binational coordination for information generation and utilization as well as responses and follow-up support, this will enhance a regional adaptation process specifically for Northwest Mexico and the Southwest U.S.
- **Robust decision making, that identifies no regrets solutions that are resilient to a range of plausible changes, is preferred by central water management and hydrology science leaders.**

For more information

Dr. Robert G. Varady
Udall Center for Studies in Public Policy
University of Arizona
rvarady@email.arizona.edu
Tel. (USA): 520-626-4393

Dr. Christopher A. Scott
Udall Center for Studies in Public Policy
University of Arizona
cascott@email.arizona.edu
Tel. (USA): 520-626-4393

Dr. Gregg Garfin
Institute of the Environment
University of Arizona
gmgarfin@email.arizona.edu
Tel. (USA): 520-626-4372

Dr. Margaret Wilder
Udall Center for Studies in Public Policy
University of Arizona
mwilder@email.arizona.edu
Tel. (USA): 520-626-4393

Dr. Javier Aparicio
Instituto Mexicano de Tecnología del Agua
japaricio@tlaloc.imta.mx
Tel. (México): 777-329-3600

Dr. Martín Montero
Instituto Mexicano de Tecnología del Agua
mmontero@tlaloc.imta.mx
Tel. (México): 777-329-3600

Dr. Nicolás Pineda
El Colegio de Sonora
npineda@colson.edu.mx
Tel. (México): 662-259-5300