

## **Building capacity for adaptation to climate change in arid North America, at the nexus between water, energy and environment**

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Severe droughts, rapid population increases, extensive land use changes and drawdown of groundwater aquifers have increased water management challenges in North America's arid regions. Freshwater scarcity, shifting demographics, globalized markets, energy demands and climate change have become linked in ways that increase vulnerability and decrease ecosystem resilience. To address some of these issues, U.S. and Mexican researchers have engaged water managers in the border region between the two countries in case studies of climate-water issues and a series of climate-water management dialogues. Through these engagements, we identified common concerns about climate variability and change, which include: declines in water supplies, increased likelihood of drought, damage to infrastructure and threats to public safety, due to increases in intense precipitation, increases in water demand, due to increases in temperatures, and improved seasonal predictability of strong winds and frosts, both of which damage crops. In contrast to these common concerns, we found that vulnerabilities are more place-based. In Hermosillo, Sonora, water loss through crumbling infrastructure and short-term political appointments of water managers have led to a focus on short-term solutions, such as water rationing and contentious transfers of water from agricultural to urban uses. Information on decadal climate variations and climate change, which currently receives little consideration by managers, could shift the focus to long-term planning. However, such a shift will only occur if coordinated with strengthening of institutions, extension of information tailored to contexts, and enhanced extension capacity to ensure the delivery of information to target audiences. In contrast, Tucson, Arizona, which is similarly prone to drought and vulnerable water supplies, has a long-term planning process for anticipating needs over 50-year time frames, based on concerns about population growth. Tucson is moving to incorporate long-term drought and climate change into long-term plans. Critical assessment of the range of plausible future climates, information on extreme precipitation and heat events, and projections of potential shifts in precipitation seasonality can inform planning efforts. Through ongoing engagements between scientists and managers, we have begun to develop trust to build capacity for climate information use in resource management. We have developed a loosely structured binational community of practice, for exchange of information on management practices and the dissemination of relevant climate and vulnerability information for policy-makers. Simply connecting managers from the two countries has led to further exchanges regarding water utility governance, long-term planning, and the credibility and legitimacy of climate information. In a February 2011 workshop, convened by the Inter-American Institute for Global Change Research, we promulgated the community of practice model. Managers and researchers in the U.S.-Mexico process, in collaboration with South American partners took the next step toward collective capacity building in the Americas. The culmination of the workshop was an agreement to partner in the development of a center of excellence to address water security issues in the Americas, with an initial focus on the intersection between water resources, energy use, and the environment.