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# Water Security and Adaptive Capacity in a Transboundary Context

## Science-Policy Dialogues in the U.S.-Mexico Border Region

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*Presented at the*

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# Mileposts for today's talk



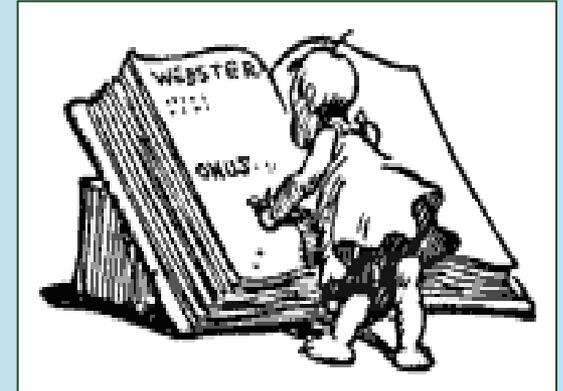
- What do we mean by “water security” and “adaptive capacity”?
- Enhancing adaptive capacity via science-policy dialogues in a transboundary context
- The U.S.-Mexico border region
- Transboundary asymmetries
- Mitigating and adapting to climate change via a water security network in the Americas

# “Water security”

## Working definitions

**Water security** = Availability of adequate quantities/qualities of water for societal needs & resilient ecosystems, in context of current & future global change.

*Scott, et al., 2013*



**Water security** involves a shift away from balancing human needs with available water . . . toward state intervention to "securitize properties that water can provide, including hydration of human populations, irrigation of food crops, local climate regulation, and energy production."

*Adapted from Staddon and James, 2014*





# “Adaptive capacity”

## Working definition

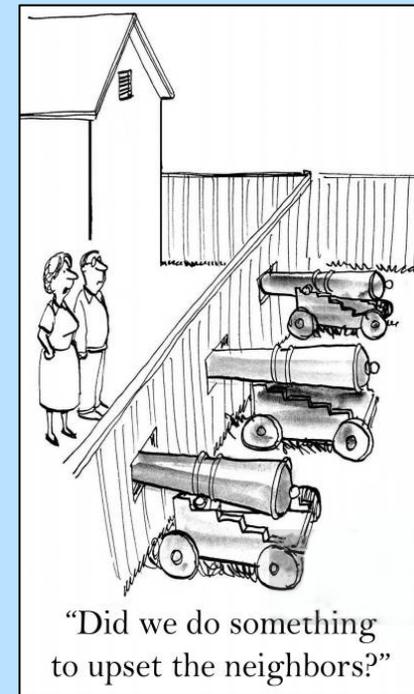
***Adaptive capacity*** = Ability of a social or environmental system to:

- Respond to or recover from internal/external demands of environmental change
- Cope with consequences
- Engage in “social learning” leading to a desirable system state & reduced vulnerability

*Wilder, et al., 2013*

# Ingredients of effective transboundary science-policy dialogues for climate mitigation & adaptation

- **Public participation** in decisionmaking by full range of stakeholders **from all Nexus sectors** (water, energy, food)
- Robust **communities of practice** that link policymakers, managers, scientists & social scientists from all bordering states
- Strong institutions, esp. **binational/multinational institutions**
- Recognition of interconnectedness & inseparability of **water management** and **climate mitigation & adaptation**
- **Trust** is needed for genuine transnational, transborder cooperation
- Access to **comparable data** & reliable **information flows**
- Significance of **governance** and **soft-path solutions**



# Building a water security network in the arid Americas



## Past and ongoing efforts, supported by



National Oceanic & Atmospheric Administration (NOAA)



National Science Foundation



Inter-American Institute for Global Change Research (IAI)

Water-climate-drought in U.S.-Mex. border area



AQUASEC: Ctr. of Excellence for Water Security



# Water Security in the Americas

## The International Water Security Network (IWSN)

### IWSN partners

- University of the West of England
- Monash University/South Africa
- University of Arizona, Udall Center
  - AQUASEC (partner institutions)

### Relationships & capacity-building

- Researcher-scientist networks
- Graduate (postgraduate) student involvement
- Stakeholder engagement & workshops
- Development of communities of practice

### Research

- Regional/local projects & transboundary settings
- Development of water-security index
- Identification of hotspots



# Background

## Conditions in the U.S.-Mexico Border Region



- Western part is monsoon-dependent & water-short; frequent drought, occasional heavy flooding
- Traditional economy: cattle ranching, copper mining, irrigated agriculture
- Fragile ecosystems (riparian areas, wetlands, river delta, wildlife corridors, bird flyways, rare plant species)
- Rising populations
- Growing urbanization, industrialization

# Background

## Transboundary asymmetries

- Culture/language
- Economy
- Human resources
- Physical infrastructure (esp. for water)
- Strength & vitality of Nexus sectors (water, energy, food)
- Legal systems: Napoleonic vs. British
- Administration: federal vs. decentralized
- Regulation & enforcement
- Revenue-raising capacity
- Robustness of institutions & civil society
- In Mexico, border region is considered relatively prosperous; in the U.S., it's among the nation's poorest areas



# Background of environmental research in the border region



## State of border environmental-policy research, c. 1980-90

- Few studies, mostly technical/engineering
- New attention following the La Paz Treaty of 1983
- Formation of binational, thematic working groups via EPA and SEDUE
- Rise of environmental NGOs in U.S.
- Interest in binational copper-smelter-related air quality in late 1980s
- Strong support for community-oriented research by private foundations in U.S.: e.g., Ford, Hewlett, Mott, Pew



# Background of environmental research in the border region (2)



## Simultaneous emergence of global climate change as an issue

- First IPCC report, 1990: new awareness of changing climate and its potential effects
- Creation of U.S. Global Change Research Program in 1990
- Interest in NASA, NOAA, other US agencies; special programs on “human dimensions of climate change”
- Establishment of Inter-American Institute for Global Change Research (IAI) in 1997



# Trajectory of water-climate research in the border region



## Impact of North American Free Trade Agreement (1994)

- New institutions created to harmonize regulations, and to evaluate and fund environmental-infrastructure projects, esp. water
- New vigor among existing institutions engaging binational issues: Mexican natl. water authority, US federal & state agencies, binational water commission
- New consciousness in environmental decisionmaking: public participation by stakeholders, sustainability, transparency
- Advent of Integrated Water Resources Management (IWRM) and its adoption internationally
- Incorporation of these concepts in environmental-policy research

## Influential new publications about border region

- On policy, governance, equity, conflict prevention & resolution, and “soft-path” approaches to development and water security



# Trajectory of water-climate research in the border region (2)

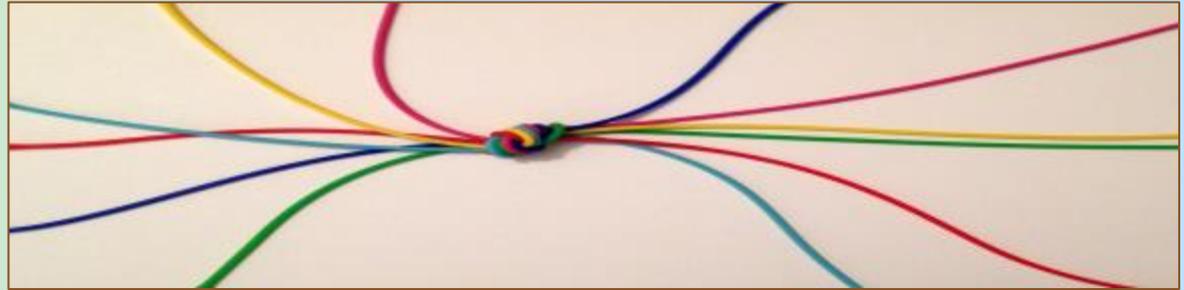


## Joining of two research agendas and action agendas: water policy and climate information has led to:

- Acknowledgment of inter-relatedness of two topics
- A new consensus emerged about *how to* conduct water-climate research in the border region—involve decision-makers and policy makers in the definition of research questions and helping to define answers and solutions
- Recognition of the need to understand and distinguish between risk, vulnerability, mitigation, and adaptation
- Funding made available by U.S. agencies and international organizations
- Major, multi-year projects undertaken in partnerships at universities in U.S. & Mexico



# What have been some common themes in research on water, climate, vulnerability, and adaptation?



- The essential role of institutions in water policy—esp. *binational* institutions, including the ones established as a result of the North American Free Trade Agreement and those that have been strengthened & energized since then.
- The importance of genuine binational, transborder cooperation built on *trust*
- The value of *public participation* by stakeholders in the decisionmaking process
- The vital significance of *information flows* and access to comparable data
- The critical role of *communities of practice* that include institutions on both sides of the border

# Common themes 2



- The fundamental interconnectedness and inseparability of the water-climate nexus with the environment, the energy and food-production sectors, economic and demographic development, politics, and social fabric
- The need to apply thinking from *as many disciplines and perspectives as possible*
- The *added degree of complexity* of dealing with already-difficult problems in a *transborder setting* that exhibits major differences and asymmetries in culture, law, administration
- The centrality of *human agency* in changing the environment and in managing the resulting change

# Changing institutions



- If regions and communities are to adapt to climate change and other environmental change, institutions also must be able to adapt
- Adaptive-capacity *measures* must therefore be able to *assess* whether, how, and at what rate institutional roles and practices are changing
  - Are these institutions using the best available data and research?
  - Are they well-connected to scientists and other researchers?
  - Are they employing current models, scenario-analysis technology?
  - Do they have necessary trained personnel?
  - Do they have sufficient flexibility and resilience in structure and management?
  - Do they seek and heed stakeholder input?

# Changing institutions (2)



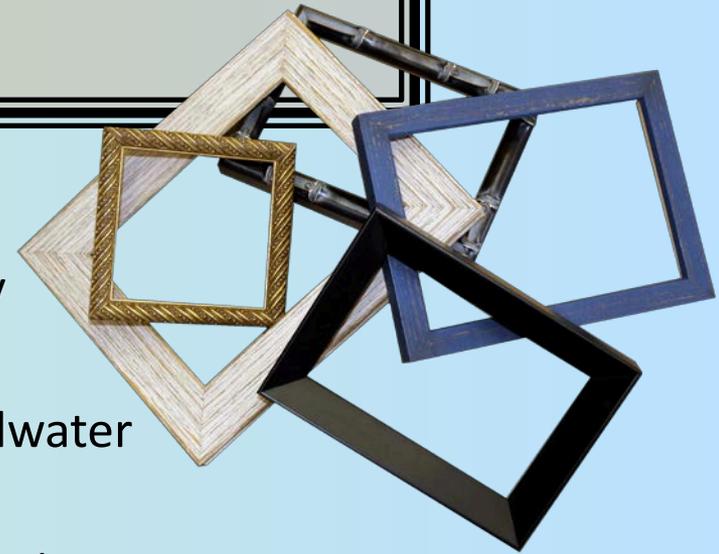
- Are they transparent?
- Are they financially viable?
- Are their procedures and policies sustainable?
- Are they backed by appropriate authority?
- Do they share best practices with other, related institutions?
- In short, are these institutions effective in adapting to climate change and other environmental forces?

# A strategy for enhancing water security via adaptive capacity

## *Framing the problem*

### Key elements

- Scarcity & social vulnerability
- Rate of urbanization
- Degree of reliance on groundwater
- Ecosystem resilience
- Water-energy-food (and larger) Nexus
- Transboundary considerations
- Ability to measure adaptive capacity
- Inclusiveness of decisionmaking process



# Some implications for Southern Africa from our Americas experience

- Ways to frame water security, adaptation, and adaptive capacity
- Techniques for identifying & engaging with key players (government, NGOs, private sector)
- Appreciation of complications of transjurisdictional & cross-border conditions
- Incorporating role of transboundary institutions
- Giving due consideration to resource-use dynamics and inter-connectedness of sectors
- Assessing, measuring, and enhancing security & capacity



# Water Security and Adaptive Capacity in a Transboundary Context

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