COLLEGE OF AGRICULTURE & LIFE SCIENCES
COOPERATIVE EXTENSION

WATER RESOURCES RESEARCH CENTER

Wicked Water Problems and Addressing Regional Water Stress

Conference on Climate Stress and Regional Risks:

The Jordan River Basin

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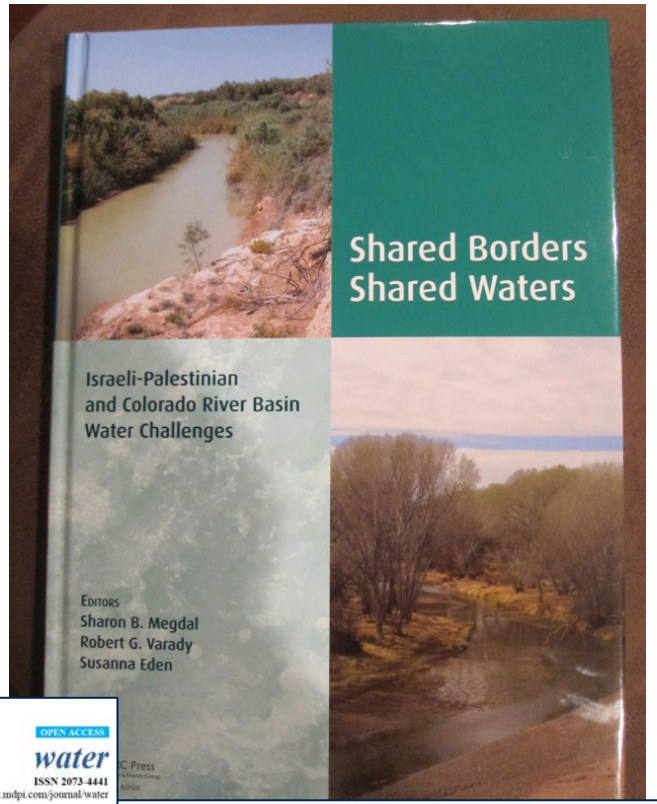
Premise and Abstract

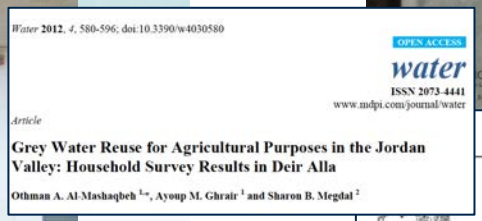
Premise: Given that climate change and stress influence water demand and supply, water can be considered a key indicator of climate stress.

Abstract: This presentation will focus on characterizing the "wicked water problems" of the Jordan River Basin, along with opportunities and obstacles to developing pathways to solutions. Attention will be given to the importance of functioning mechanisms for communication, cooperation, and involvement of a broad spectrum of stakeholders. Suggestions for approaches to improving collaboration will be based on personal knowledge of the region of focus and experience working across borders of the Colorado River Basin.

Some similarities across the regions

- Growing populations and economies
- Water scarcity
- Semi-arid to arid climate
- Climate change impacts
- Agricultural activities
- Shared borders



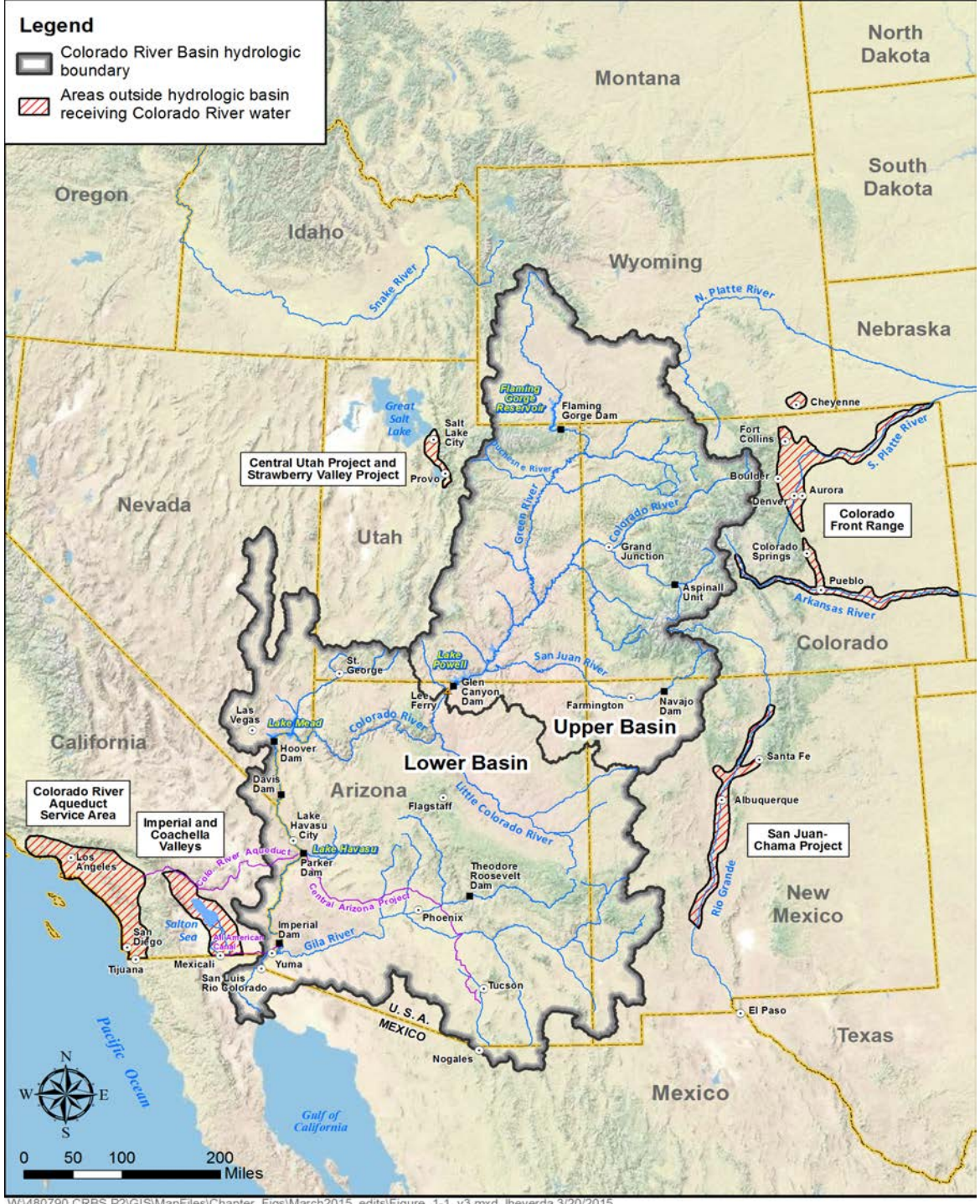


Water policy and management reflect many factors

- Resource Availability
- Location of water demands and supplies
- Economics
- Historic and Current Legal/Institutional Framework
- The nature of involvement of multiple governmental and non-governmental entities, including the extent of centralized versus decentralized decision making
- Politics of Area
- Public values and socio-cultural factors
- Historical context
- Information
- Etc…

Importance of Context, especially hydrologic cycle and geographic

Colorado River Basin and Border Geographic Context



Hydrologic-Climate Context

Photo credit: Rodolfo Peón 2015

SOURCE: http://travelquaz.com/jordan-map-free.html/political-map-of-israel-jordan-and-the-israeli-occupied

Wicked Water Problems

Lisa Beutler:

- Lately, more and more water problems seemingly defy standard solutions.
- Four reasons
  - incomplete or contradictory knowledge
  - the number of people and opinions involved
  - the large economic burden
  - **the interconnected nature of these problems with other problems**
- Managing wicked problems is a new kind of work. It requires changing the questions, managing uncertainty, and creating resilience.

Special Feature

What to Do about Wicked Water Problems

By Lisa Beutler, Public Affairs Specialist, MWH Global

It's a rare day when western water managers don't check the weather. A defining feature of this geographic region of the United States is a lack of precipitation. A second feature is great faith by its people in a technical solution to whatever problem a lack of rain creates.

Long before Europeans arrived, predecessors to the Hohokam people migrated from central Mexico to southern Arizona, bringing domesticated crops and their knowledge of irrigation with them. Their descendants constructed networks of diversion dikes to capture runoff rainwater and cultivate fields. Mission priests expanded and enhanced the historic systems, building new rock dams and small earthen reservoirs. In 1902, the U.S. Reclamation Service (later changed to Bureau of Reclamation) was created to advance a federal effort of "irrigation works for the storage, diversion and development of waters"— to irrigate arid and semiarid lands in 16 Western states and territories.

Lisa Beutler
Photo: Lynn Ketcham, University of Arizona College of Agriculture and Life Sciences

It worked. The West bloomed. Planners and engineers crisply defined, understood, and fixed problems through technical solutions. It was not simple, yet problems were solvable. Either solutions worked or they didn't.

Lately, more and more water problems seemingly defy standard solutions. This typically occurs for four reasons: incomplete or contradictory knowledge, the number of people and opinions involved, the large economic burden, and the interconnected nature of these problems with other problems. These are wicked problems. Wicked problems are often hot potatoes tossed back and forth among policy makers, and decried as too substantial for grand solutions.

Wicked problems are not solved—they can only be mitigated through an approach that emphasizes empathy, abductive reasoning, and rapid prototyping. It is not possible to present an elegant solution and be done.

Horst Rittel, one of the first to formalize a theory of wicked problems, cites ten characteristics of these complicated social issues

1. Wicked problems have no definitive formulation. The problem of poverty in Texas is grossly similar but discretely different from poverty in Nairobi, so no practical characteristics describe "poverty."
2. It is hard, maybe impossible, to measure or claim success with wicked problems because they bleed into one another, unlike the boundaries of traditional design problems that can be articulated or defined.
3. Solutions to wicked problems can be only good or bad, not true or false. There is no idealized end state to arrive at, and so approaches to wicked problems should be tractable ways to improve a situation rather than solve it.
4. There is no template to follow when tackling a wicked problem, although history may provide a guide. Teams that approach wicked problems must literally make things up as they go along.
5. There is always more than one explanation for a wicked problem, with the appropriateness of the explanation depending greatly on the individual perspective of the designer.
6. Every wicked problem is a symptom of another problem. The interconnected quality of socio-economic political systems illustrates how, for example, a change in education will cause new behavior in nutrition.
7. No mitigation strategy for a wicked problem has a definitive scientific test because humans invented wicked problems and science exists to understand natural phenomena.
8. Offering a "solution" to a wicked problem frequently is a "one shot" design effort because a significant intervention changes the design space enough to minimize the ability for trial and error.
9. Every wicked problem is unique.
10. Those addressing a wicked problem must have authority and responsibility for their actions.

Water planners and managers play a central role in mitigating the negative consequences of wicked problems. They will be required to position efforts in new and more desirable directions. This will not be easy, quick, or solitary. It requires methodical, rigorous iteration focused on the system qualities of the problem. Interdisciplinary collaboration that captures a broader knowledge of science, economics, statistics, technology, psychology, politics, and more is necessary for effective change.

Water managers and planners will also need to more actively utilize abductive reasoning in addition to deductive and inductive approaches.

Abductive reasoning begins with an incomplete set of observations and proceeds to the likeliest possible explanation for the set. This method yields the kind of daily decision-making that does its best with the information at hand, which often is incomplete. In court cases, judge and jury consider whether the prosecution or the defense has the best explanation to cover all the evidence. While reasonable, it is subjective.

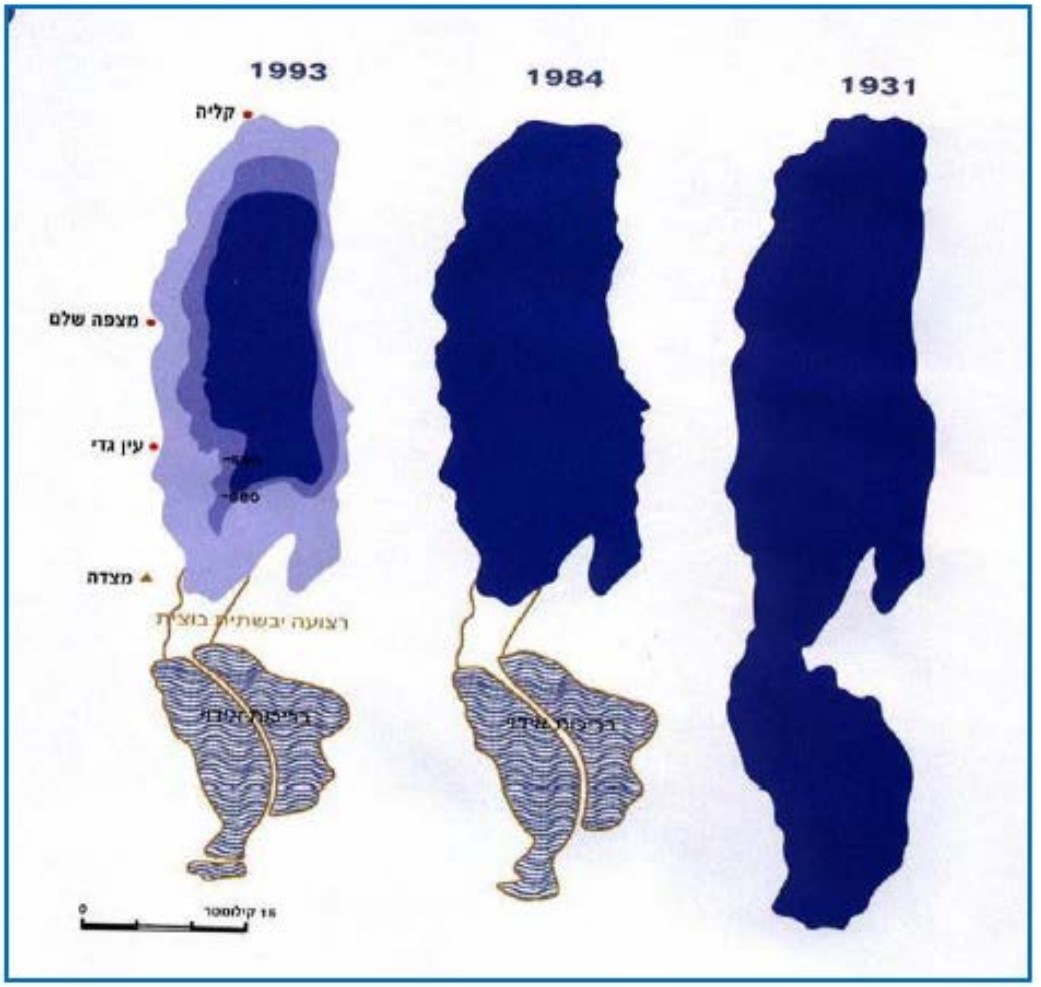
Whereas deductive reasoning creates certainty and inductive reasoning quantifies uncertainty, abductive reasoning attempts to create meaning when uncertainty exists.

Managing wicked problems is a new kind of work. It requires changing the questions, managing uncertainty, and

Wicked Problems continues on page 6

Some wicked water problems of the region

- Low Lower Jordan River flows
- Dead Sea condition
- Wastewater treatment
- Water availability
- Water reliability



Source for diagram: EcoPeace Middle East, November 2016

Making the most of what resources you have

Agricultural Water Use Efficiency

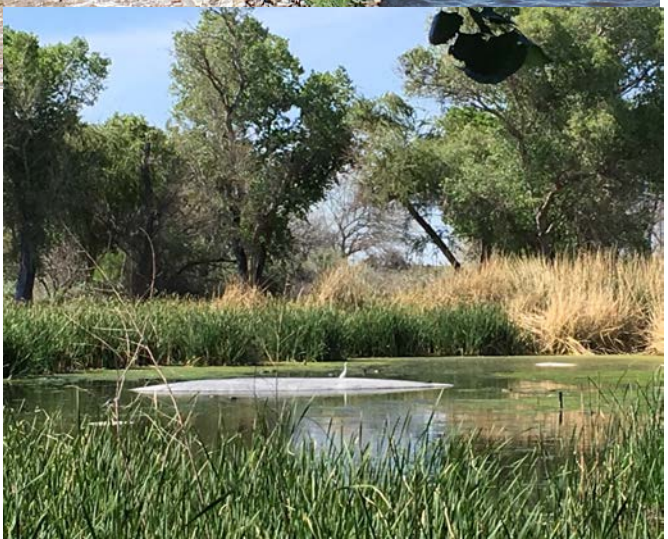
Jordan Valley, Jordan

Central Arizona

Water Reuse

<= Arizona

Jordan=>



Innovative Grey Water System in Jordan

Some Key Factors that Contribute to Identifying Pathways to Solutions

- Functioning cooperative mechanism(s)
- Trust and mutual respect
- Involvement of key stakeholders
- Good communication
- Persistence
- Patience
- Leadership
- Scientists and staff experts remain while government officials change

His Royal Highness Prince El Hassan bin Talal
April 2019 at the Hashemite University

Obstacles or Barriers to Identifying and Implementing Solutions: Basically the opposite of the previous list

Even if there is agreement on principles of cooperation, some key obstacles include:

- Inability to confer regularly
- Asymmetries in regulatory frameworks
- Asynchronous budget situations and cycles

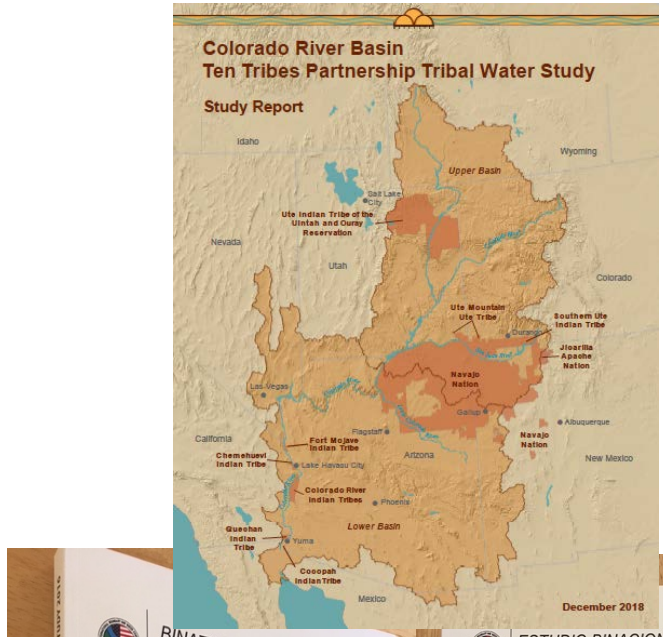
Take-aways from a recent panel on implementing desalination technology in a binational setting

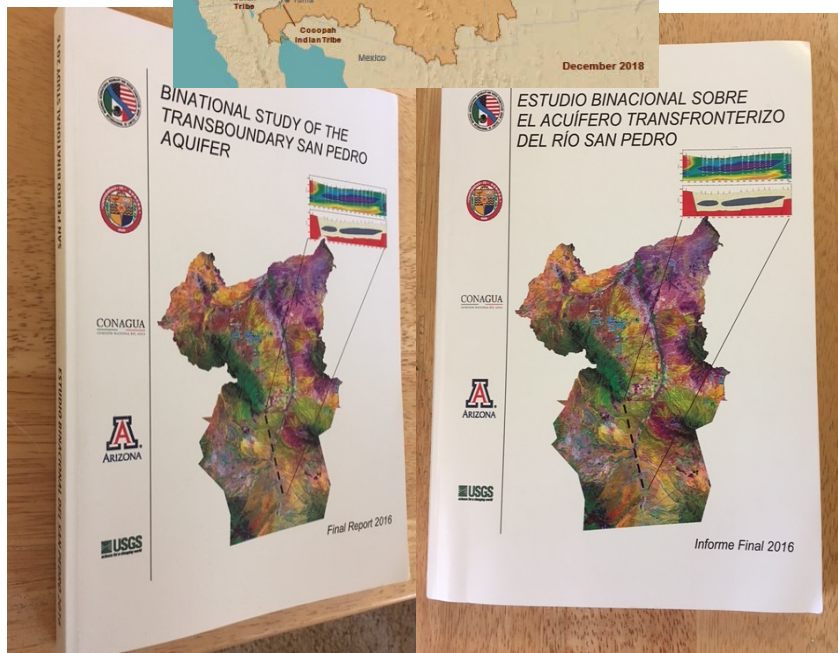
- “Eat with your partners.”
- Good functioning relationships
- Identify what is beneficial to both nations or parties in order to identify win-win opportunities
- Especially when working with neighbors with different cultures and languages, good communication, sincerity, and leadership will enable things to happen.
- Panelists came back to noting that eating together helps foster the friendships that then can facilitate the work required to forge formal agreements

Concluding Remarks

There are many challenges to mitigating wicked water problems, especially when they involve borders of sovereign entities.

In the United States, this includes borders with sovereign Tribal Nations. Partnering in the development of information can be foundational to identifying and implementing solutions. We can think of water as something we bridge through (not just over).





Thank you!

The frog does not drink up the pond in which he lives. – *American Indian (Lakota) Proverb*

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