Developing Pathways to Solutions to Wicked Water Problems

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Outline

- Motivation for this seminar
- Some context
- What are Wicked Water Problems?
- Exploring some Wicked Water Problems
- Developing pathways to solutions
- Bridging through water and the value to sharing lessons learned
- Concluding remarks
I am pleased to announce my sabbatical plans for the Spring 2020 semester and inquire if you might be interested in inviting me to give a hosted lecture. The goals of my sabbatical are (1) to share knowledge and perspectives I have gained through applied research, teaching, and Extension activities and programs and (2) to engage with more audiences than I can during a typical semester. I look forward to gathering feedback and gaining knowledge from my interactions with those with a strong interest in water policy and management. I am seeking funding for my travel and, when possible, I would appreciate a speaking honorarium. Below please find a list of seminar topics to give you an idea of the subjects on which I am prepared to speak. I can of course customize to your organization and audience. A short bio and full CV are attached.

### Arizona Water Management

Arizona is a leader in groundwater management in designated active management areas and in water banking and aquifer recharge and recovery. The state's statutory framework and approach can serve as a model for other regions.

### Groundwater Governance and Management

This presentation draws from an extensive body of work on groundwater governance and management at the local, regional, and national levels. It also draws from experience working with international partners.

### Transboundary Aquifer Assessment

I will draw upon over a decade of successful collaboration at the US-Mexico border that has produced binational and bilingual aquifer studies. The cooperative framework governing the Transboundary Aquifer Assessment Program can serve as a model for others interested in conducting transborder scientific assessments.

### Colorado River Basin Water Issues

Water Basin (Arizona, California, and Nevada) and including cooperation between the U.S. and Mexico. Colorado River management is unique and complex. This presentation will include discussion of drought planning and ways to address the gap between demand and supply in parts of the basin. This can include screening and discussion of regional Emmy-award-winning Beyond the Mirage Documentary (approximately 1-hour running length).

### Comparative Analysis of Water Policy Practices for Water-Scarce Regions

This presentation will include insights from working internationally on water issues of the Middle East region, particularly Israel, Jordan, and the West Bank. Along with exploring the range of solutions, this presentation will explore the feasibility of transferring solutions from one region of the world to another.

### Wicked Water Problems and Bridging Through Water

Water challenges exist in both water-rich and water-scarce areas. The presentation will include analysis of some of the challenging water issues and potential solutions to them and include discussion of how to bridge the academic community and the real world of water management.
Reflections: Singapore – A Model for Integrated Water Management

by Sharon B. Megdal
02/07/2020

wrrc.arizona.edu/reflections

Reflections: Being on Sabbatical During the COVID-19 Pandemic

by Sharon B. Megdal
03/20/2020

This is the second Reflections on my Spring Semester sabbatical activities. While a sabbatical
Water policy and management reflect many determining 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
Water Cycle Context

Source: The University of Arizona Water Resources Research Center, Water Map Poster (Version 2).
Colorado River Basin
and Border Geographic Context
Sovereign Tribal Nations
Complex Water Management Issues, Challenges, and Solutions

- Growth and the need for additional supplies (competition)
- Drought/climate variability
- Water-energy-food nexus
- Water quantity assessments, flooding
- Water quality
- Desalination
- Use of recycled water for potable and other water needs
- Access to and utilization of renewable supplies
- Transboundary water issues
- The surface water/groundwater interface
- Riparian areas and other environmental considerations
- Water rights
- Conservation programs
- Water recharge and recovery (water banking)
- Groundwater replenishment
- Water cost/pricing and financing
- Water Planning

Uncertainty!

S.B. Megdal, 6 May 2020
Lisa Beutler (2016)

• “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
• 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
• Interdisciplinary collaboration that captures a broader knowledge of science, economics, statistics, technology, psychology, politics, and more is necessary for effective change.
• Managing wicked problems is a new kind of work. It requires changing the questions, managing uncertainty, and creating resilience.
Some wicked water problems of Arizona and the Colorado River Basin

- Groundwater overdraft and the invisibility of groundwater
- Imbalance of water demand and supply in the Colorado River Basin
- Lack of attention to water for nature (environmental flows)
Some wicked water problems of the Middle East region of focus

- Lower Jordan River flows
- Dead Sea condition
- Wastewater treatment in some areas
- Water provision and sources for the West Bank and Gaza
- Water supplies in Jordan

Source: Mira Edelstein, November 2016
Searching for Pathways to Solutions

- Developing information collaboratively
- Developing partnerships
  - Within states and regions
  - Interstate
  - International
  - Tribal Nations
- Considering and implementing options
  - Desalination
  - Reuse
  - Conservation
  - Water banking
  - Voluntary transactions
  - Rainwater harvesting; grey water systems
  - New ways of designing the built environment

*State legislation and many agreements necessary for AZ to Execute the Lower Basin Drought Contingency Plan*

January 31, 2019
Wicked Water Problems

Lisa Beutler (2016)

• “Lately, more and more water problems seemingly defy standard solutions.”

• Four reasons – Keep in mind as I go through the following slides
  – incomplete or contradictory knowledge
  – the number of people and opinions involved
  – the large economic burden
  – the interconnected nature of these problems with other problems

• There are many connections between the regions I discuss. The pictures shown will indicate some of them.
Groundwater Challenges in Central Arizona (Pinal County)

1. Low priority of Central Arizona Project (CAP) deliveries of Colorado River water, coupled with over-allocation of Colorado River water compared to average flow conditions means a return to more use of groundwater

2. Reliance on fossil groundwater; localized drawdown and groundwater availability

3. Issues related to patterns of urban growth and how requirements of the Assured Water Supply Rules are met and will be met

4. Ongoing work to understand the modeling and identify options
Imbalance of Colorado River supply and demand – sharing the burden of shortage

1. The Drought Contingency Plans were approved in 2019
2. Next big step is developing the regulations to follow-on to the interim shortage sharing guidelines, which expire in 2026
3. Work is underway to assess the performance of the interim guidelines
4. Many entities and perspectives will be involved.
A goal of this conference is to "provide a discussion platform to share our lessons and learn from the experiences of others."

**Thirsty Rivers in Water-Scarce Regions: Experiences from the Colorado River**

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Rehabilitation of the Lower Jordan River
International Conference
21 October 2014

**Renewal – A Reborn Colorado River Once Again Finds Her Path to the Sea**

http://youtu.be/TODV7FW746s
Lower Jordan River and Dead Sea Conditions

Sea of Galilee at lowest level in a century

February was one of the driest months on record, with the northern Israeli lake receiving just 10 percent of average rainfall

By JTA | March 8, 2017, 2:08 pm |
West Bank
Wastewater Treatment
Water Supply - Jordan

Innovative Grey Water System in Jordan

November 22, 2016 high-level meeting in Amman, Jordan. From left to right, H.E. Minister of Water and Irrigation Dr. Hazim El-Nasser, His Royal Highness Prince El Hassan bin Talal, U.S. Ambassador to Jordan Alice Wells, Commissioner Edward Drusina and Commissioner Roberto Salmón.
COVID-19 Incidence on Navajo Nation and water accessibility

https://en.wikipedia.org/wiki/Navajo_Nation

https://www.youtube.com/watch?v=KAPpQA9SCwc&feature=youtu.be
Some Key Factors that Contribute to Mitigating Wicked Water Problems

• Functioning cooperative mechanism(s)
• Trust and mutual respect
• Involvement of key stakeholders
• Good communication
• Persistence
• Patience
• Sharing experiences and lessons learned

Traveled with the US-MX IBWC Commissioners, Nov 19-23, 2016

IBWC=International Boundary and Water Commission

Class Field Trip – March 2017
Value of Sharing Lessons Learned: Panelists from Three Countries at WATEC 2019 conference
The Project aims at producing 65 MCM/year of Desalinated Water and discharging 235 MCM/year of Mixed Water to the Dead Sea.

The 235 MCM/year discharge to the Dead Sea is a mix of Brine Water from the Desalination Plant with Red Sea Water.

Of the 65 MCM/year of Desalinated Water produced, 30 MCM/year is to be supplied to the Jordanian Delivery Point and 35 MCM/year to the Border Delivery Point.

Source: Document provided by Oded Fixler, Israel Ministry of Regional Cooperation

Plus exchange (sale) of other water to the north of Israel to Jordan; also water to be provided to the Palestinian Authority.
Question: What are the most important variables or factors that contribute to implementing technologies across borders?

Some suggestions based on RESPECT
R – Research
E – Education, Engagement
S – Science
P – Process
E – Engineering
C – Consultation, Cost
T – Trust
Take-aways: Panel on implementing technology in a binational setting

- “Eat with your partners.”
- Functioning relationships.
- Identify what is beneficial to both nations or parties in order to identify win-win opportunities, though identifying such opportunities can be difficult and that relationships can have peaks and lows.
- 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

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

• Technology is important, as is economics
• Process of working with and through stakeholders is key to making progress
• Continuing educational efforts at all levels

BUT

When will we be able to meet and eat with our partners?
WRRC Annual Conference Goes Virtual!

WRRC Annual Conference 2020
WATER AT THE CROSSROADS: The Next 40 Years

JUNE 18 AND 19, 2020
DAY ONE: 1 – 4:30 pm
(Followed by virtual happy hour 4:30 - 5:30 pm)
DAY TWO: 8 am – 12:30 pm

1980 GROUNDWATER MANAGEMENT ACT

Register at wrrc.arizona.edu
Thank you!

Questions??

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