Tackling Wicked Water Problems in the Transboundary Colorado River Basin

Note: This presentation was prerecorded for a conference that was postponed until 2022. I share this with others due to interest in the topic.

The Third International Congress on Desert Economy: Energy Economics
Prerecorded Talk for Day 1, 20 October 2021 (Dahkla Conference)
Sharon B. Megdal, Ph.D.
Director, University of Arizona Water Resources Research Center
smegdal@arizona.edu

wrrc.arizona.edu
GREATER DEPTH, BROADER PERSPECTIVE FOR A CLEAR WATER FUTURE

We tackle key water policy and management issues, empower informed decision-making, and enrich understanding through engagement, education, and applied research.

wrrc.arizona.edu

---

**Stay Informed**
Subscribe to keep up with our news and events.

wrrc.arizona.edu/subscribe

---

**Follow Us on Social Media**

- Instagram: instagram.com/uazwrcc
- Facebook: facebook.com/azwrrc
- Twitter: twitter.com/azwrrc
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
Colorado River Basin (CRB) Geographic Context (transboundary)
Wicked Water Problems Context

- Wicked water problems are big problems that do not have a simple pathway to resolving them.
- Some 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 [e.g., geopolitics, poverty]
- Wicked problems are not readily solved.
- Much collaboration is necessary for addressing wicked water problems.
- Addressing wicked problems is a new kind of work, which requires changing the questions, managing uncertainty, and creating resilience.
- Ongoing efforts/processes are required.

Importance of Process

https://awra.org/Members/Publications/IMPACT.aspx for free download
Colorado River Basin wicked water problems

- Imbalance of water demand and supply in the Colorado River Basin
- Groundwater overdraft and invisibility
- Lack of water for nature (environmental flows)
- Lack of water and water infrastructure
Colorado River is not in good health

Two large dams (hydropower) and storage reservoirs: Lake Powell for the Upper Basin and Lake Mead for the Lower Basin. The management of the two large reservoirs is connected per the 2007 Interim Shortage Sharing Guidelines.

Legend:
- Colorado River Basin hydrologic boundary
- Areas outside hydrologic basin affecting Colorado River water

Glen Canyon Dam and Lake Powell

Hoover Dam and Lake Mead

April 2021
Early June Drought Conditions in the West

2021

2020

2019

2018

2017

2016

2015

2014

2013

2012

2011

2010

2009

2008

2007

2006

2005

2004
'Red alert': Lake Mead falls to record-low level, a milestone in Colorado River's crisis

Ian James  Arizona Republic
Published 10:00 a.m. MT Jun. 10, 2021  Updated 1:53 p.m. MT Jun. 11, 2021

Lake Mead hits lowest water levels in history amid severe drought in the West

Hoover Dam reservoir hits record low, in sign of extreme western U.S. drought

"Red alert": Lake Mead falls to lowest water level since Hoover Dam's construction in 1930s

Lake Mead: largest US reservoir falls to historic low amid devastating drought

Boulder Basin (foreground) and the Narrows (center), May 11, 2021, in the Lake Mead National Recreation Area, on the Arizona/Nevada border. A high-water mark or bathtub ring is visible on the shoreline; Lake Mead is down 152 vertical feet.

Mark Henle/The Republic
Sharon B. Megdal, director of the Water Resources Research Center at the University of Arizona, said she thought the declaration’s focus on the dire state of the river would lead to more efforts in the region to use less water. “I think we’re going to see some adaptation,” she said. “But I don’t know if we can...avoid further cuts.”

With the various tier cuts that were negotiated, “We’re really only talking through 2025,” Dr. Megdal said. “If things continued to get worse and worse, I think there would be some interventions to do even more. We can’t let the river system fail.”
Colorado River Water Supply Report

System Contents: 21.43 MAF
As of August 23, 2021

<table>
<thead>
<tr>
<th>Reservoir</th>
<th>Current</th>
<th>Change</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lake Mead</td>
<td>9.04</td>
<td>+0.02</td>
<td>25.90</td>
</tr>
<tr>
<td>Lake Powell</td>
<td>7.63</td>
<td>-0.28</td>
<td>24.30</td>
</tr>
<tr>
<td>Flaming Gorge Reservoir</td>
<td>3.03</td>
<td>-0.07</td>
<td>3.75</td>
</tr>
<tr>
<td>Fontenelle Reservoir</td>
<td>0.24</td>
<td>-0.01</td>
<td>0.34</td>
</tr>
<tr>
<td>Navajo Reservoir</td>
<td>1.03</td>
<td>-0.04</td>
<td>1.70</td>
</tr>
<tr>
<td>Blue Mesa Reservoir</td>
<td>0.33</td>
<td>-0.03</td>
<td>0.83</td>
</tr>
<tr>
<td>Morrow Point Reservoir</td>
<td>0.11</td>
<td>0.00</td>
<td>0.12</td>
</tr>
<tr>
<td>Crystal Reservoir</td>
<td>0.02</td>
<td>0.00</td>
<td>0.03</td>
</tr>
</tbody>
</table>

* With respect to previous month’s report
Lake Mead levels determine the levels of curtailments of water deliveries to the Lower Colorado River Basin in times of shortage.

The 2007 Interim Shortage Sharing Guidelines were adopted by the US Secretary of the Interior after significant input from the states.
Addressing shortage conditions in Arizona and the Central Arizona Project service area
Environmental water not measured – natural systems are not a recognized water using sector

Most municipal water provision is by publicly operated water systems, though 15-18% of residents are supplied water by privately operated companies.

Regulation of water varies across the state, but there are rights to use the water that are difficult to change

Surface water and groundwater are not regulated in an integrated way
Central Arizona Project and Service Area

Largest user of electricity in state of Arizona

Central Arizona Project canal is 540 km long, pumps water to 730 m, and was designed to deliver ~1850 MCM annually. CAP is the largest consumer of electricity in Arizona.

Source: Central Arizona Project
Irrigators in Central Arizona are having to return to more groundwater use

Stakeholder group formed to develop common understanding of the situation and look at solutions
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 (managed aquifer recharge)
  - Voluntary transactions, marketing
  - Rainwater harvesting; grey water systems
  - New ways of designing the built environment

Process is important: Long-term efforts to INFORM, EDUCATE, COMMUNICATE, and work on SOLUTIONS

Contributing factors to developing solutions:
- Functioning cooperative mechanism(s)
- Trust and mutual respect
- Involvement of key stakeholders
- Good communication
- Persistence
- Patience
- Sharing experiences and lessons learned
- Eating with your partners
The frog does not drink up the pond in which he lives. – American Indian (Lakota) Proverb

And the work will (must) continue!! Thank you for listening!

smegdal@arizona.edu
wrcc.arizona.edu/director
Twitter @SBMWater