Colorado River Conversations Project
WRRC Brown Bag | April 1, 2020

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Center for **Climate Adaptation Science** and **Solutions**

Context and Setting

2007 Interim Guidelines and 2020 Renegotiations

Guidelines discussions resulted from Secretary Norton's ultimatum in the face of declining reservoirs in 2005

Record of Decision 2007

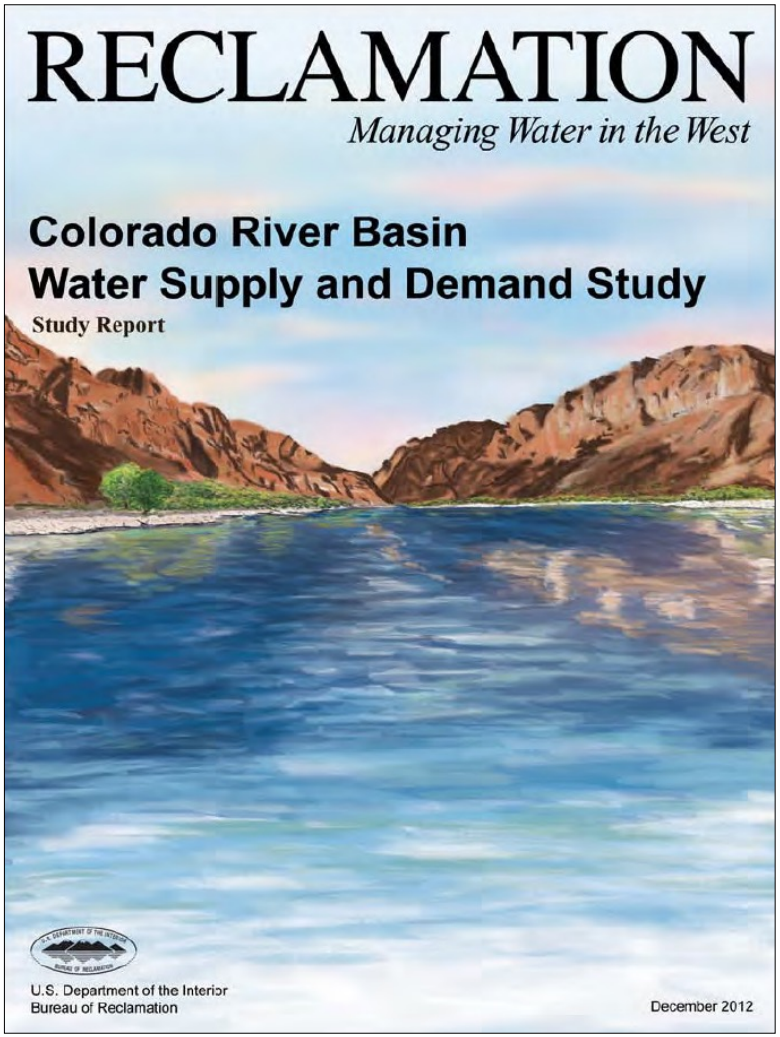
- In effect thru 2026
- Renegotiations to start no later than 12/31/2020
- Appendix U Document in EIS addressed climate issues
- Continued low flows have forced 'Drought Contingency Planning'
- Short-term solution to Long Term Problem

Context and Setting

2012 Colorado River
Basin Supply and Demand Study

2008 Secure Water Act called for an evaluation of the supply and demand implications of Climate Change on the Colorado River Basin and other basins in the west.

Response to the 2012 Basin Study: Additional science issues need attention



Context and Setting

1. Temperatures will continue to increase as long as ghg emissions continue;
2. Continued temperature increases will cause river flows to decline, ranging from 11% to as much as 55% by end of century under moderate to high emissions;
3. There is low confidence associated with the possibility of storms and precipitation in the Upper Basin increasing enough to even partially offset the temperature-driven declines in river flows;
4. The risk of multidecadal megadrought in the Basin is significant even in the absence of continued anthropogenic climate change
5. The likelihood of drought and megadrought means that there will likely be decades-long periods with anomalously low runoff even if there is an increase in precipitation relative to the historical mean

Context and Setting

AGU PUBLICATIONS

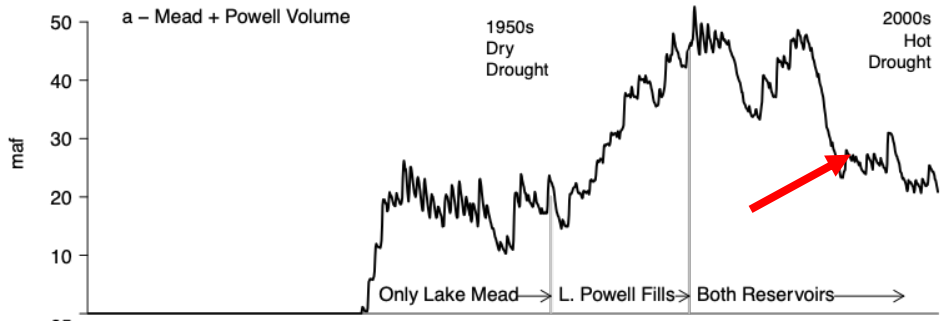
Water Resources Research

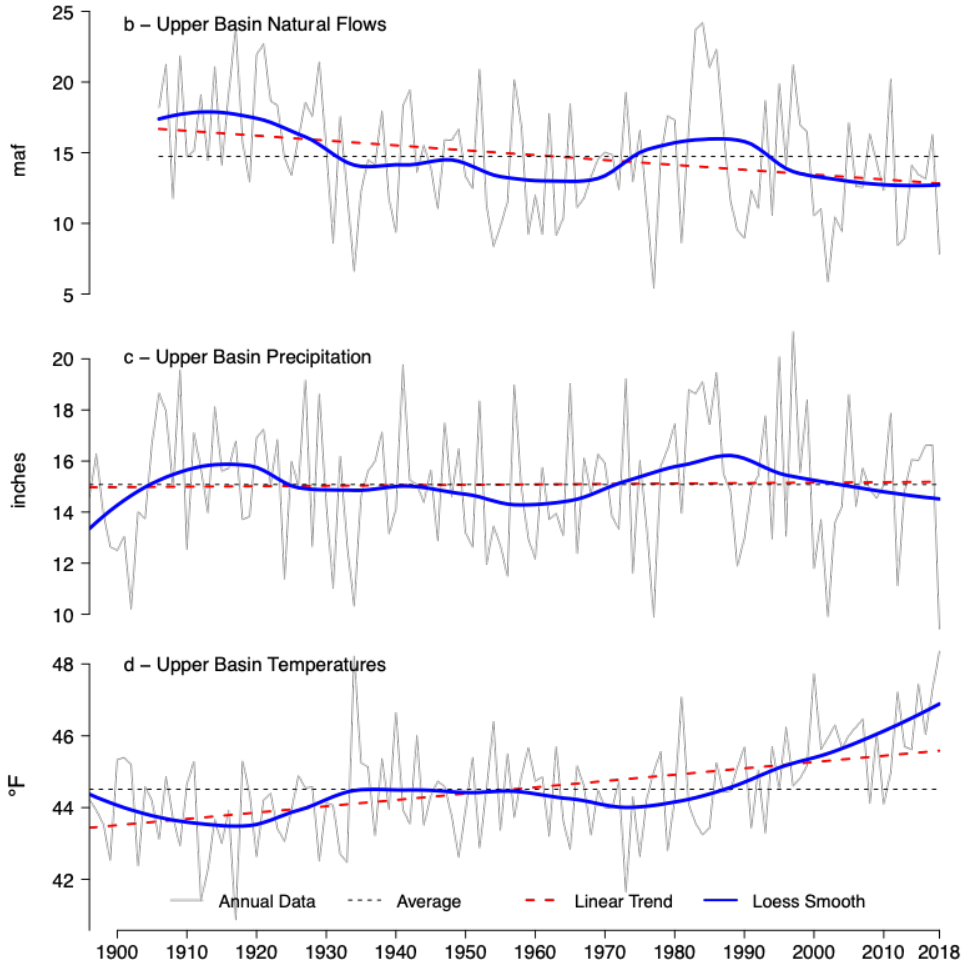
RESEARCH ARTICLE
10.1002/2016WR019638

The twenty-first century Colorado River hot drought and implications for the future

Bradley Udall[1,2] and Jonathan Overpeck[2,3]

Key Points:
- Record Colorado River flow





Background

The project began with two conferences to build a Science Agenda for managing the Colorado River in October, 2017 and April, 2018, funded by NSF and two family foundations.

The Colorado River Conversations project is supported by Walton Family Foundation. The overarching focus of the project is on preparing for extremes and highlighting science gaps and resources prior to Renegotiation of 2007 Guidelines, through:

- Science Conference October, 2019
- Scenarios Workshops June & Oct, 2019; Apr 2020

Photo Credit: Martin & McCoy

October, 2017
Colorado River Conference

In a more perfect world, a systems-based approach to management would be advisable that respects both ecological systems and social systems (cultures, institutions, etc.) and treats them in a more integrated way (for example, valuing the concepts of "ecosystem services", or "traditional knowledge"), in decision processes.

Photo Credit: CCASS

October, 2017
Colorado River Conference

Outcomes from the 2017 Conference:

Incremental changes are insufficient to address Basin challenges, and both institutionally and scientifically it is important to think outside the norms.

The Colorado River Basin can be considered a living laboratory for testing the effects of climate dynamics on land and water resources, with implications for other rivers in the U.S. West and internationally.

Photo Credit: Adobe Stock Photo

Climate Change and Water: An Opportunity to Rethink?

- In the context of renegotiating the 2007 Guidelines, can we broaden the conversation to lay the groundwork for solving multiple problems, including over-allocation, habitat, recreation?
- Can we link water and land use policies in a more meaningful way?
- What about the problems of managing the Salton Sea and the Delta, addressing tribal water issues, endangered species, recreation?
- Expanding the table to be more inclusive:

  is there a path forward?
- Who will represent the public interest?

Photo Credit: Martin & McCoy

Reframing our Relationship with Science

- To promote a better functioning river system in the future
- Considering implications of extreme, black swan events beyond climate extremes, including economic upheavals, governance resets, etc.
- And mechanisms to include a broader array of voices in river management
- How to engage science in operational decision-making? In renegotiations of the Guidelines?

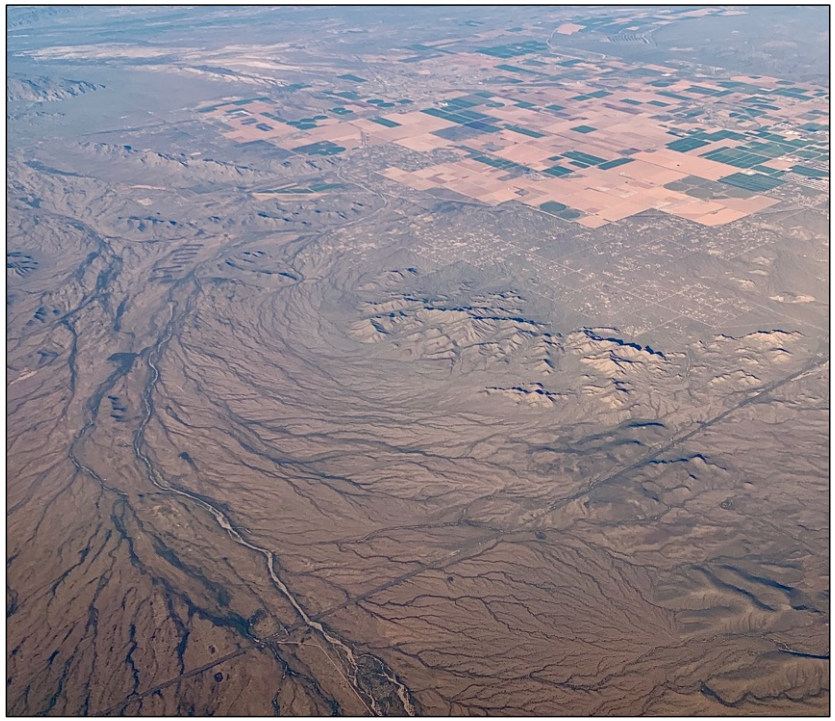


Photo Credit: Martin & McCoy

A Systems Approach to River Management

Photo Credit: CCASS

There is also a need to think about the drivers of change using a more system-wide perspective, at multiple scales, so that the implications of change can be better understood from the headwaters to the Delta, and to make sure there is a meaningful way to engage Mexico.

Times are a Changin'
Colorado River Conversations Project

Tribes emerging as major players in land and water use decisions

Value of agricultural contributions to rural economies and environmental outcomes – beyond the potential for ag-urban transfers

Ecosystem services need to be protected…water quality and supply, recreation, quality of life = economic implications

Increasing public awareness of the interconnectedness of the states and interests along the river and public support for solutions

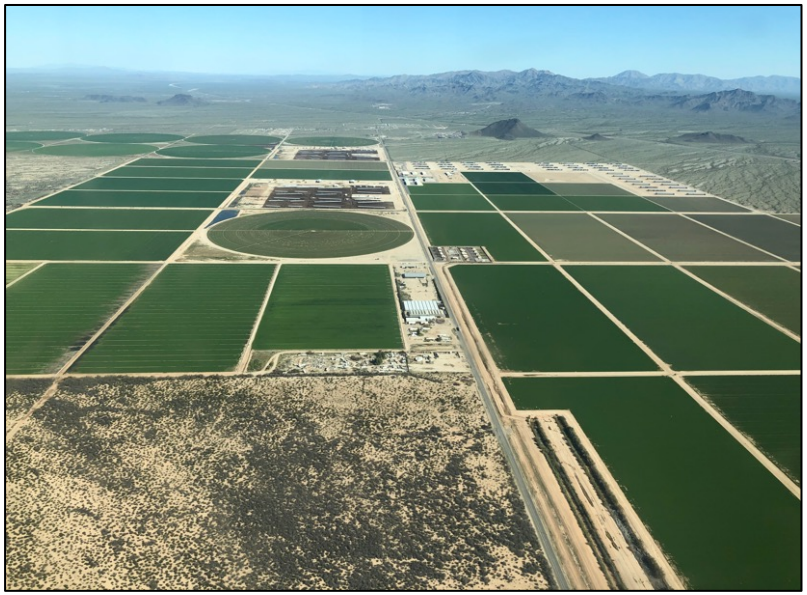


Photo Credit: Martin & McCoy

Colorado River Conversations Project
Scenario Planning Workshop Series

Scenario Planning: Implications of the Intersection of Extreme Events

Photo Credit: CCASS

The degree to which extreme events are devastating or manageable to people is largely related to our institutional capacity to prepare and respond.

Colorado River Conversations Project
Scenario Planning Workshop Series

What are the threshold events that might overwhelm human and natural systems in the Colorado Basin, and what are our options for anticipating, recognizing, and managing risk before it is too late?

Colorado River Conversations Project
Scenario Planning Workshop Series

Step 1: Setting the Context

Step 2: Identification of Drivers

Step 3: Ranking the Drivers

Step 4: Choose Scenarios

Step 5: Research and Write Scenarios

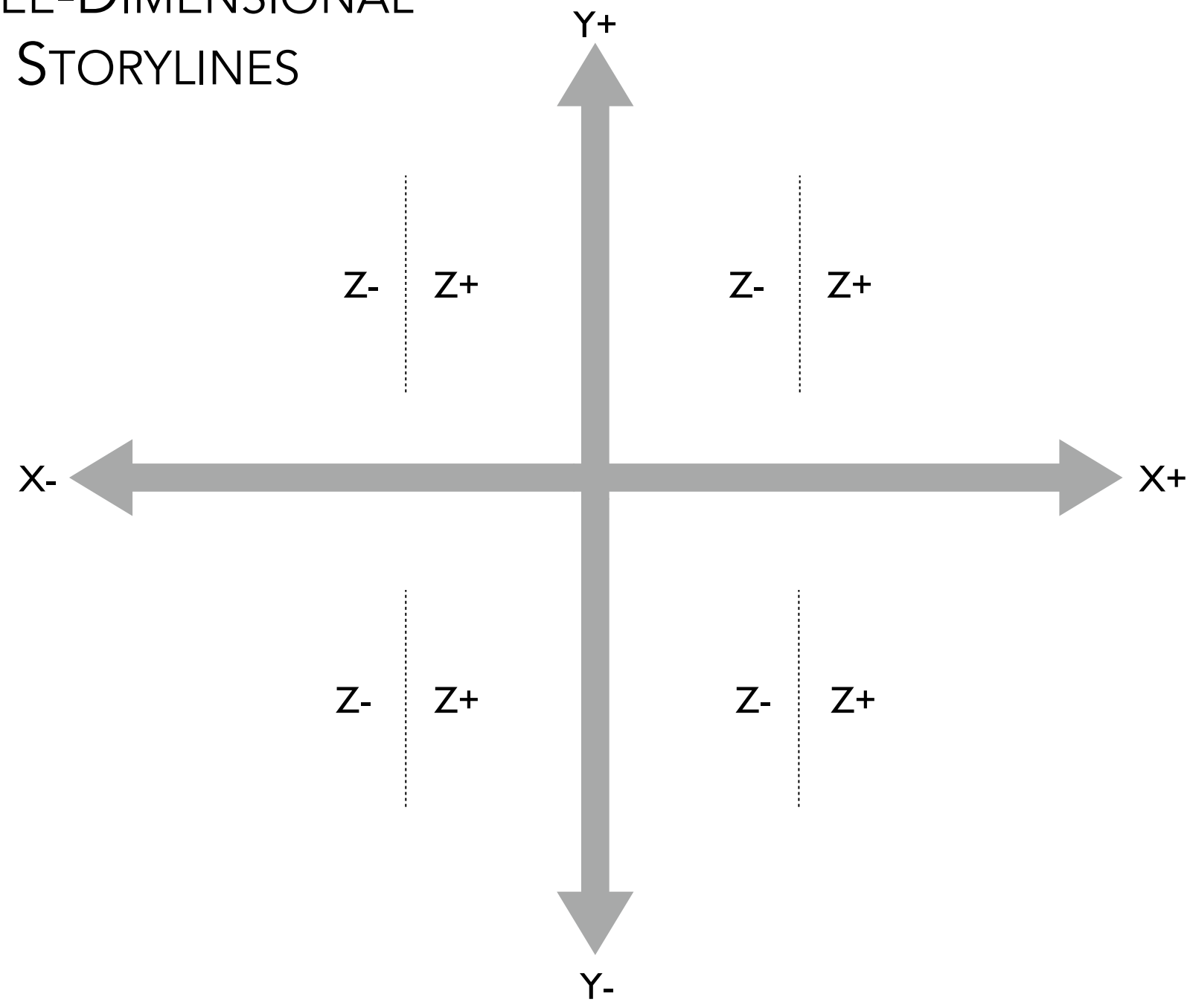
Step 6: Identify Impacts

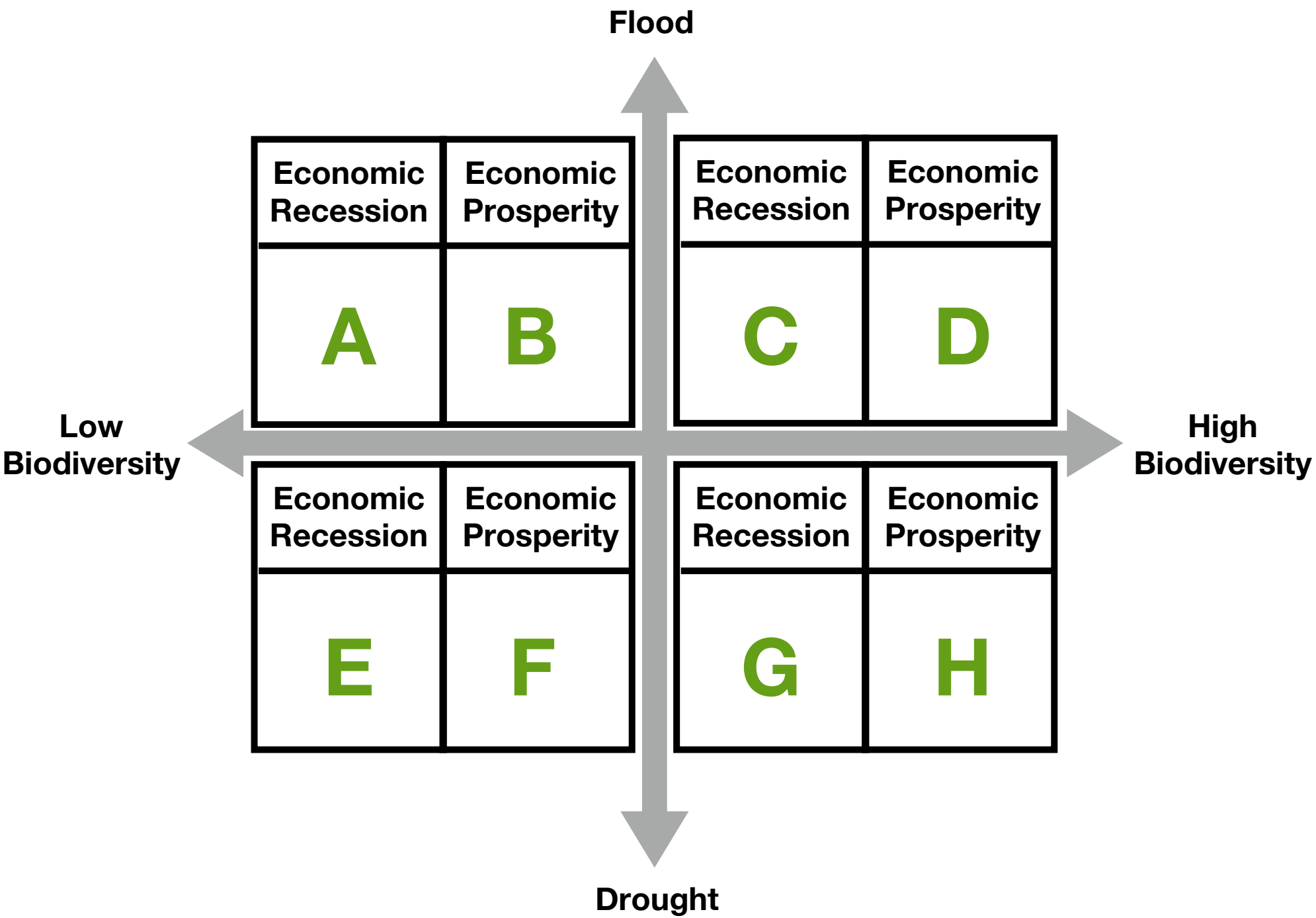
Step 7: Explore Common Solutions

Nightmare Drivers

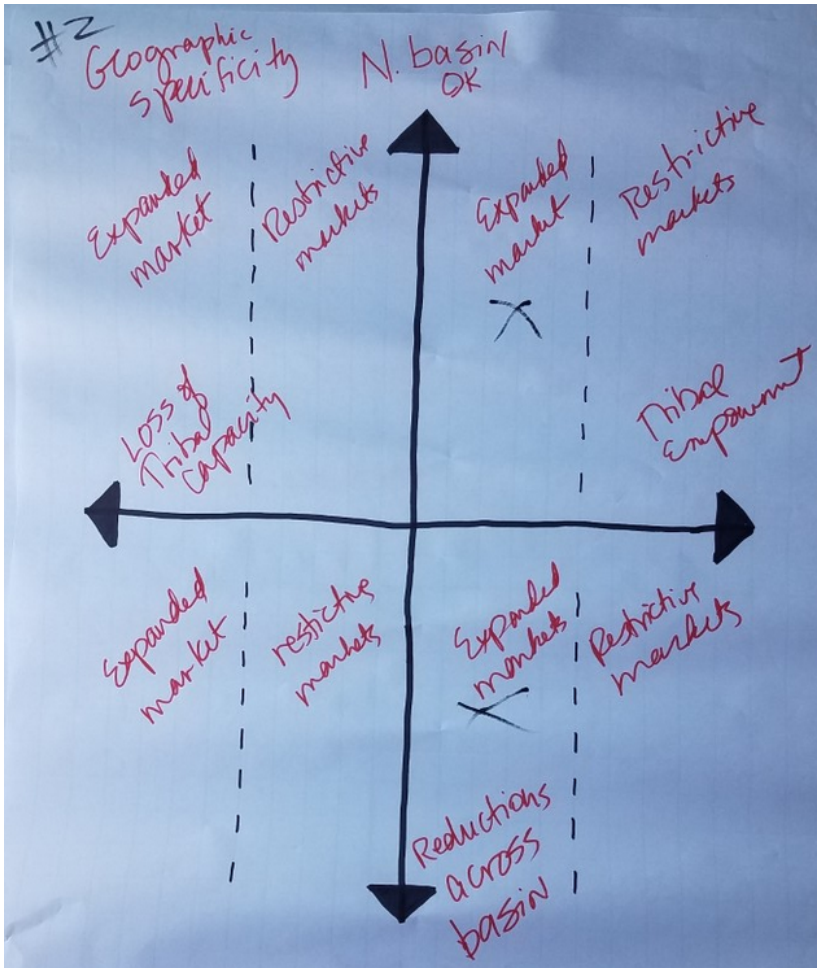
Economic	Cost of providing energy or water (based on availability or infrastructure)
	Budget for adaptation, mitigation, and monitoring projects
Political	Expertise in government
	Trustworthiness of government agency
Social	Changes in cultural values
	Demographic shifts and population growth
Technological	Augmentation technologies (e.g. desalination, importation, etc.)
Physical	Sediment flows
	Land use changes
Biological	Keystone species extinction
	Invasive plants and loss of key ecosystem functions
Infrastructure	Dam integrity
	Delivery infrastructure integrity

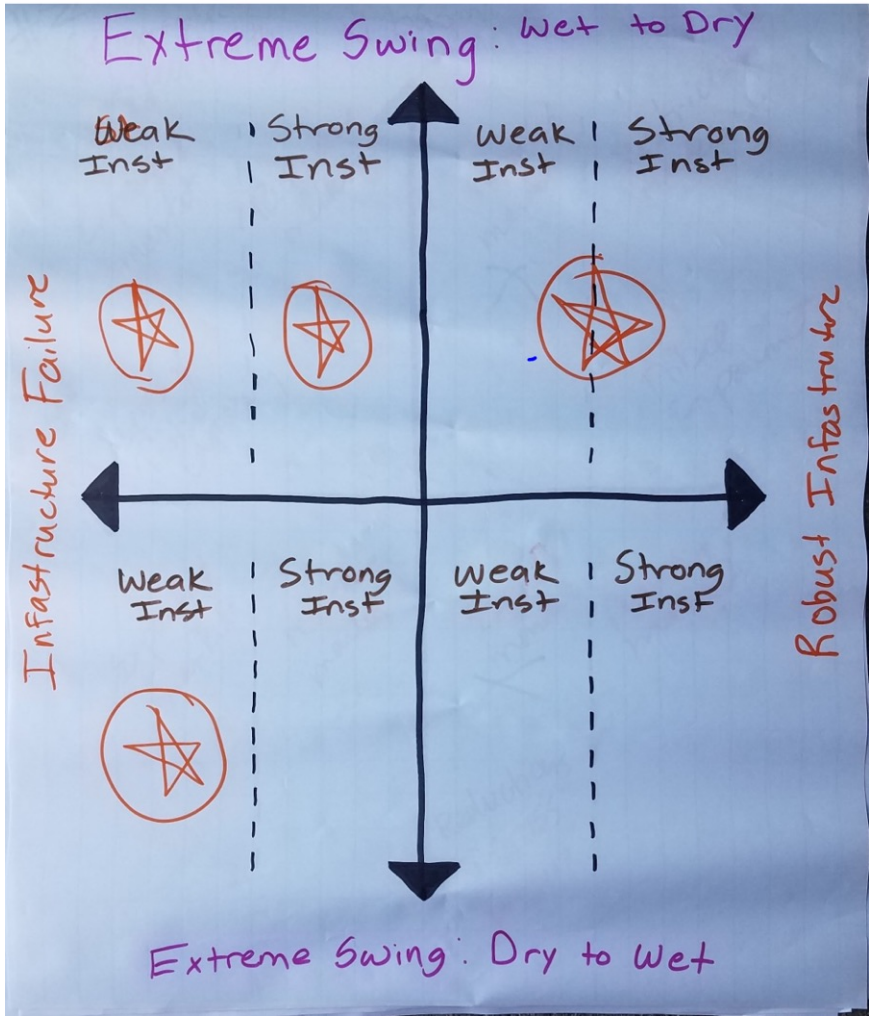
Three-Dimensional Storylines




Flood
Economic Recession
Economic Prosperity
A
B
C
D
Low Biodiversity
High Biodiversity
E
F
G
H
Drought

SELECTING STORYLINES





1 - Caught Off Guard

- Wet to Dry Swing
- Infrastructure Failure
- Governance Failure

3 - Arid and Unfair

- Long Duration Dry
- Increased Wealth Gap
- Decrease Inclusivity

5 - Sad Skiers

- Less Snow
- Low Environmental Values
- Decrease in Recreational Economy

7 - Dig It Deeper

- No Monsoon
- Aquifer Crash
- Increased Tribal Engagement in the Lower Basin

2 - Water on the Move

- Wet to Dry Swing
- Increase in Markets
- Increased Tribal Engagement in the Upper Basin

4 - Rural Revival

- Long Duration Dry
- Rural Agriculture Investment
- Transition from Global to Local Economies

6 - Disaster Strikes

- Short System Shock of Wet to Dry
- Collapse of California Water Systems
- Bad Economy

8 - Flood Gates

- Dry to Wet Swing
- Technological Advances
- US-Mexico Collaboration

Next Steps in Scenario Planning

A third workshop is planned to:

- *Identify common solutions that address multiple challenges*
- *Focus on pathways to building more robust systems*

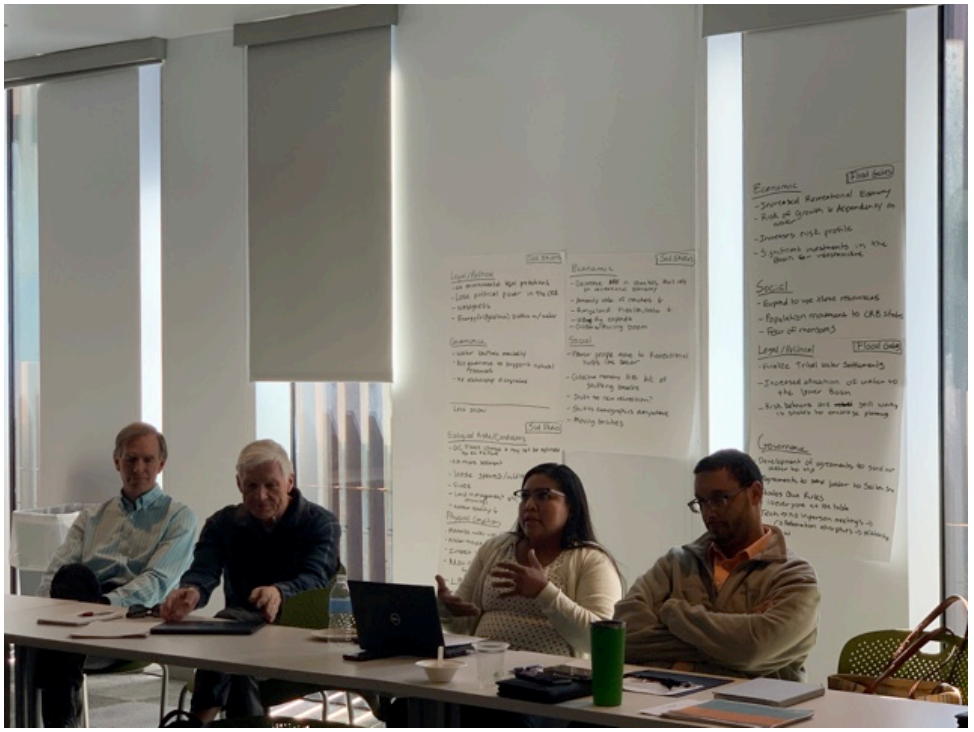


Photo Credit: Matin & McCoy

A Broader Array of Voices

"Many water users cannot currently engage effectively in river policy and management, and significant capacity-building is required in order to allow true engagement."

- When 40 million people depend on a river, they can't all have a voice.
- How to have a broader, inclusive process that's manageable? What will be the next generation of communication and engagement strategies that can be harnessed?

Reframing the Role of Science

Can we expand science capacity and relationships between water managers and climate science/adaptation professionals?

Can multiple sources of knowledge be usefully integrated?

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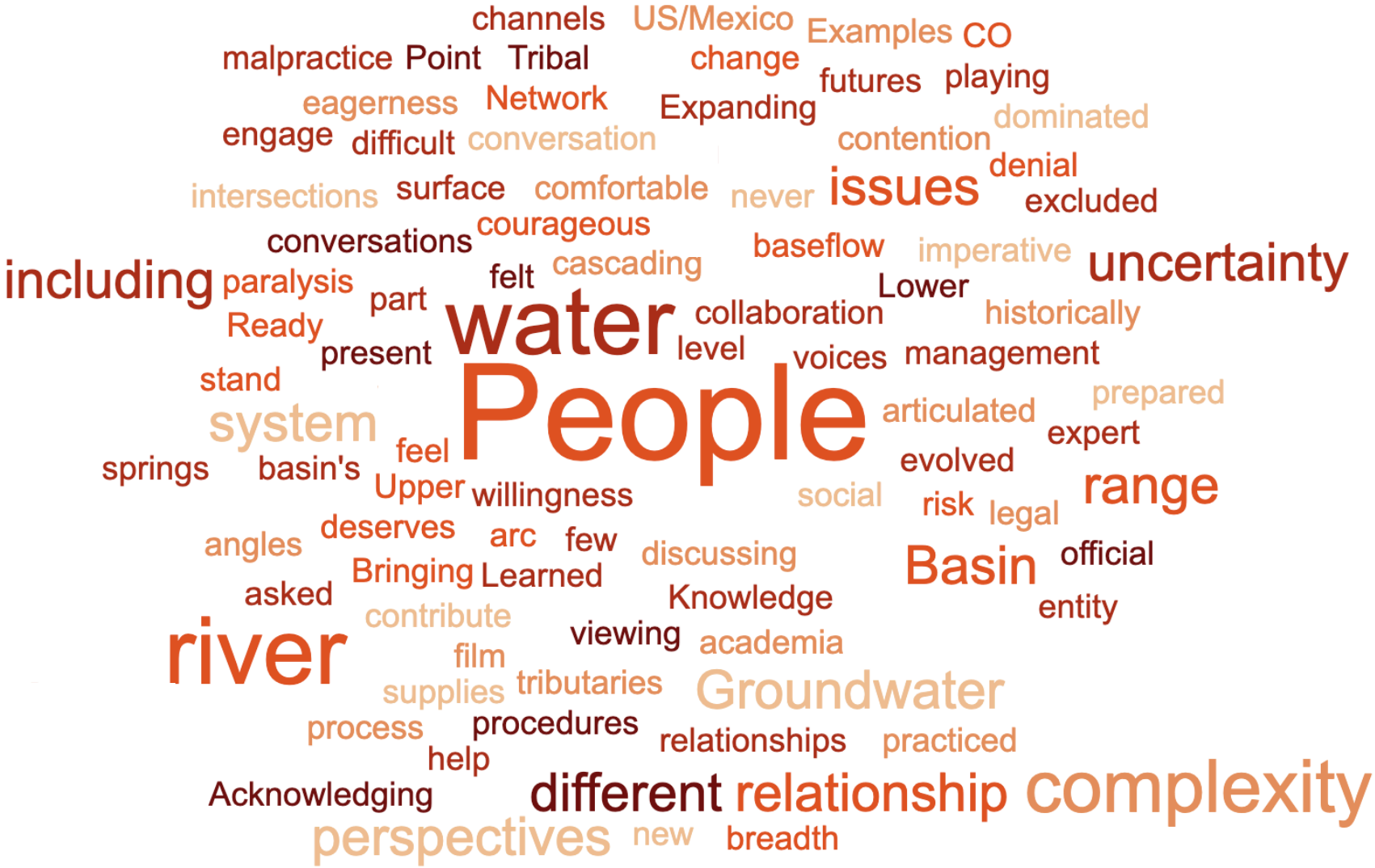
Insights and Observations



THANK YOU!

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