

Collaborative Water Research in Phoenix, AZ: Insights from Science–Policy Interactions

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Decision Center for a Desert City

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ASU® GLOBAL INSTITUTE
of SUSTAINABILITY
ARIZONA STATE UNIVERSITY

DCDC's Mission

To advance knowledge about **decision making under uncertainty** for *water sustainability & urban climate adaptation*

I (2004-2009)

II (2010-2015)

III (2016-2020)

https://sustainability.asu.edu/docs/dcdc/website/documents/DCDC_SynthesisReport_Final.pdf



Advancing Science in Support of Water Policy and Urban Climate Change Adaptation at Arizona State University's Decision Center for a Desert City:

A Synthesis of Interdisciplinary Research on Climate, Water, and Decision-Making Under Uncertainty

A Technical Report by Decision Center for a Desert City



The Case of a Desert Metropolis: Phoenix, Arizona



Sonoran Desert at South Mountain



View of Central Phoenix



Research



Partnerships



Education



WaterSim

Decision Center for a Desert City

<https://sustainability.asu.edu/dcdc/>



Regional Climate and Land-Use Changes



Actors, Institutions, and Governance



Simulation Modeling, Visual Analytics, and Scenarios

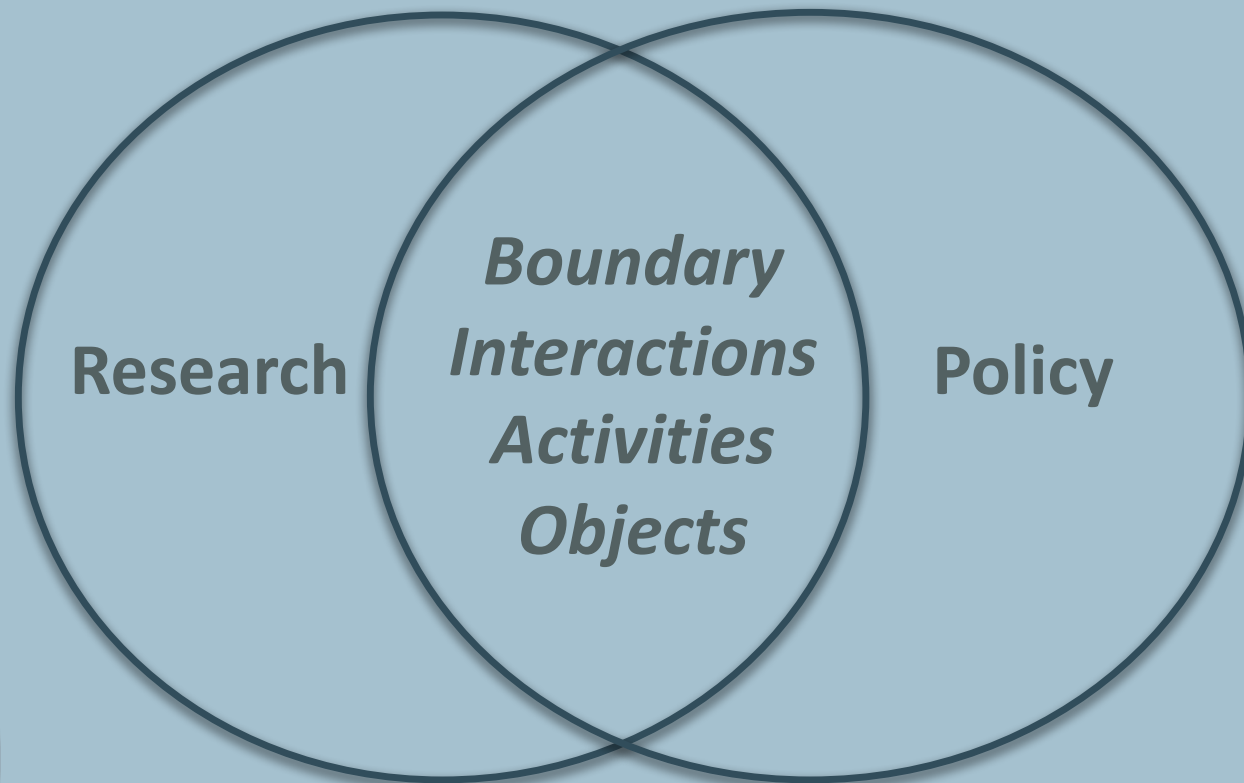


Evidence-Supported Transition Strategies

Transformational Solutions for Urban Water Sustainability Transitions

DCDC as a **Boundary Organization**

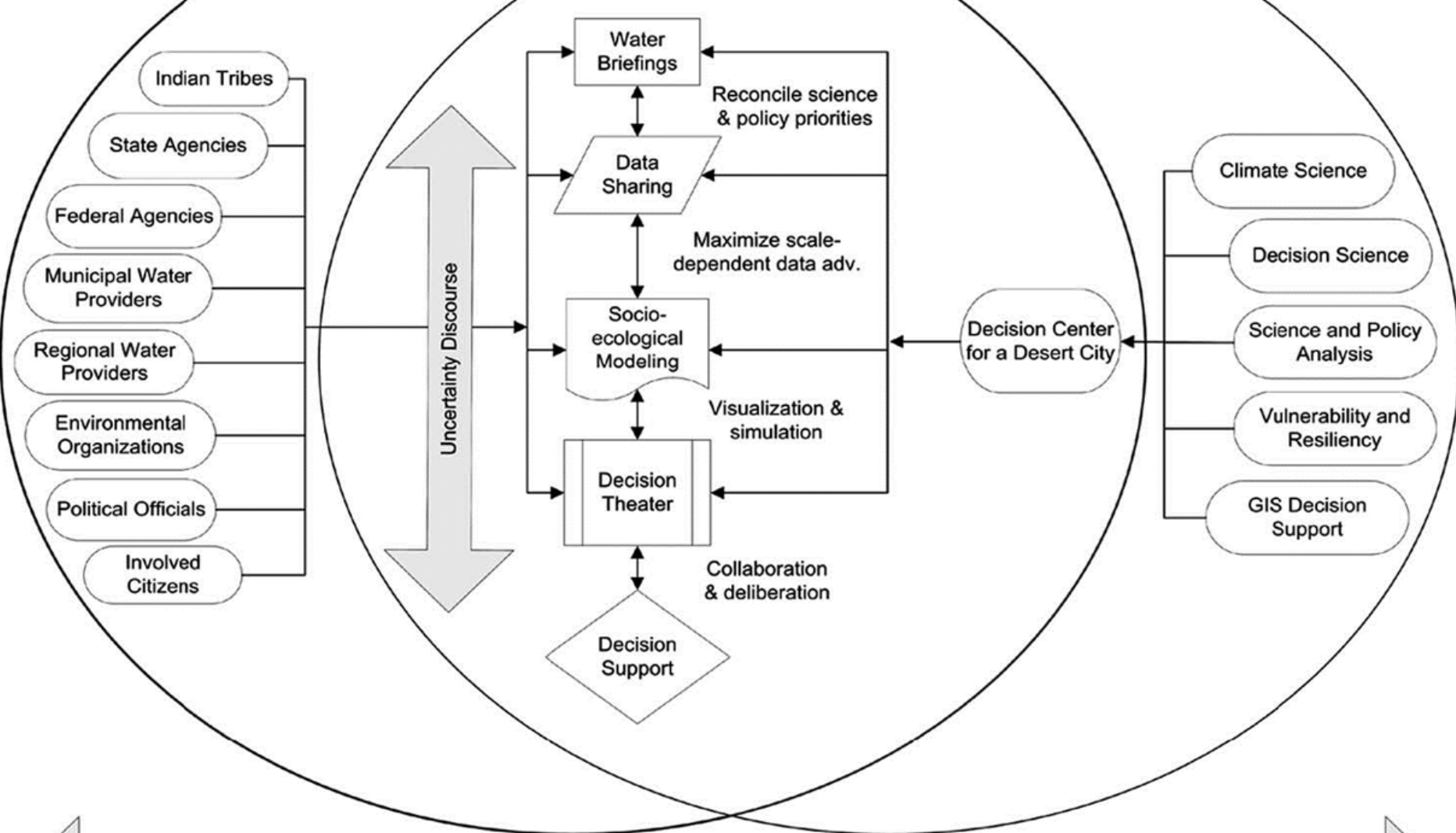
Boundary Organizations are institutional arrangements designed to help manage and negotiate the boundary between science and politics (Guston 1999).



Boundary Ordering Devices and Processes

Policy Sphere

Science Sphere



Political Pressures and Accountability

Scientific Pressures and Accountability

Boundary Object: WaterSim

A man in a dark suit and tie is pointing at a large screen displaying the WaterSim software interface. The interface is divided into several sections:

- Sustainability Indicators:** A section with a text box explaining that sustainability is measured by indicators of community values and tradeoffs. It includes five icons: Ground Water (28%), Environment (13%), Agriculture, Personal, and Population.
- Policy Choices:** A section with several sliders and controls for adjusting parameters like 'Effluent: reuse/return: 0%', 'Ag Transfer To Multi: 50%', 'Water for Environment: 0%', 'Personal Water Use: 100%', and 'Adjust Pop Growth Rate: 100%'. It also has tabs for 'Supply', 'Demand', and 'Sustainability'.
- Groundwater Credits:** A line graph showing 'Acres Feet (billions)' from 2010 to 2030 for four locations: Buckeye, Chandler, Gilbert, and another (likely Phoenix). The y-axis ranges from 0 to 7.5. The x-axis shows years 2010, 2015, 2020, 2025, and 2030.
- Other Elements:** A 'Regional' dropdown menu, a 'Category' dropdown, and a bar chart showing 'Acres Feet per Year' from 2010 to 2020. A legend indicates 'Groundwater Bank Used', 'Pumped Municipal', and 'Colorado Annual Deliveries'.

At the bottom right of the screen, there is a status message: 'Status: SORRY: Your browser does not support FullScreen'. The bottom left corner of the screen shows 'Arizona State University'.

WaterSim Online: <http://wsuied.watersim.org/>



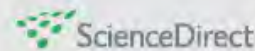
Credibility, salience, and legitimacy of boundary objects: water managers' assessment of a simulation model in an immersive decision theater

Dave D White, Amber Wutich, Kelli L Larson, Patricia Gober, Timothy Lant and Clea Senneville

ENVIRONMENTAL SCIENCE & POLICY 12 (2009) 1012–1023



available at www.sciencedirect.com



journal homepage: www.elsevier.com/locate/envsci



Divergent perspectives on water resource sustainability in a public–policy–science context

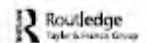
K.L. Larson^{a,*}, D.D. White^b, P. Gober^a, S. Harlan^c, A. Wutich^c

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The impact of visual information on perceptions of water resource problems and management alternatives

Kelli L. Larson^{a*} and Robert M. Edsall^b

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Decision-Making Needs

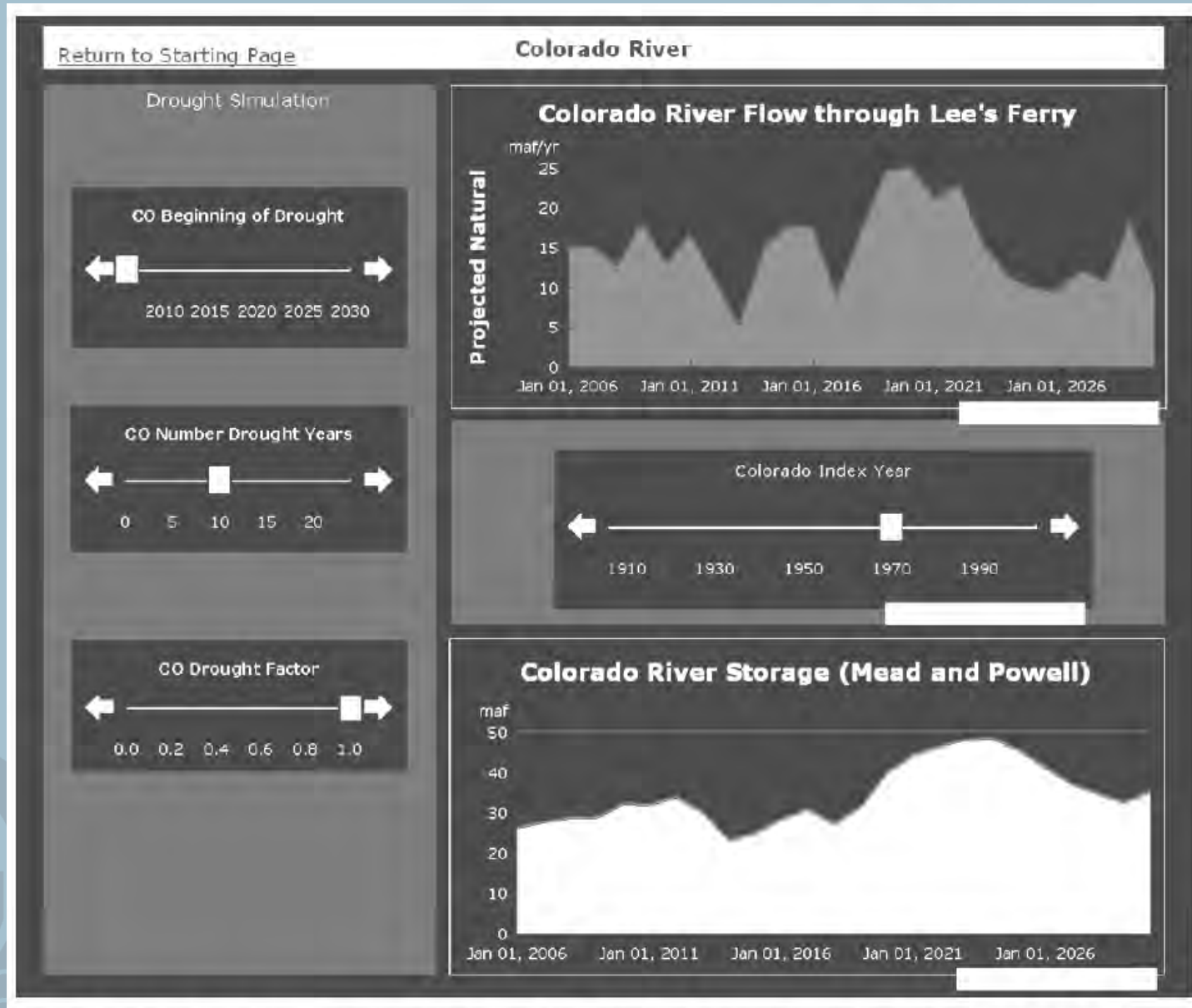
Knowledge & information must be seen as...

- ✓ ***Credible*** (reliable)
- ✓ ***Salient*** (relevant)
- ✓ ***Legitimate*** (respectful)

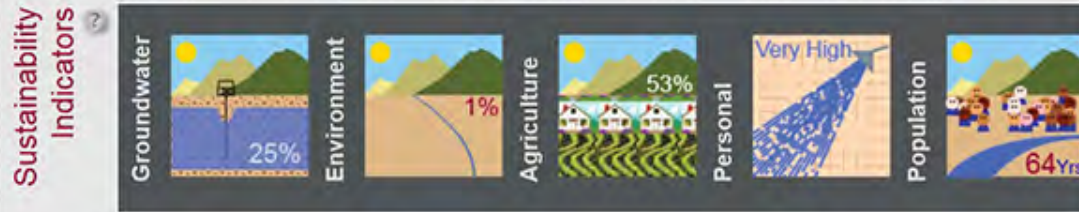
(Cash et al. 2003; White et al. 2008)



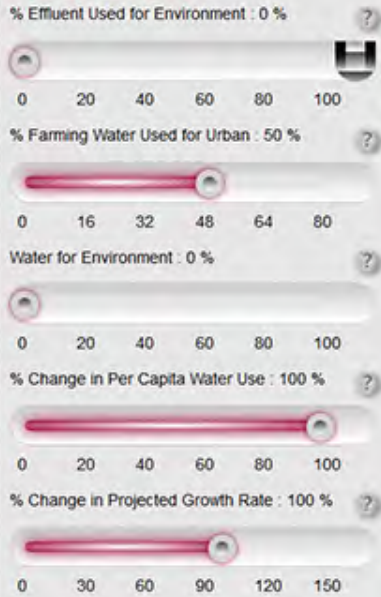
Early WaterSim Model



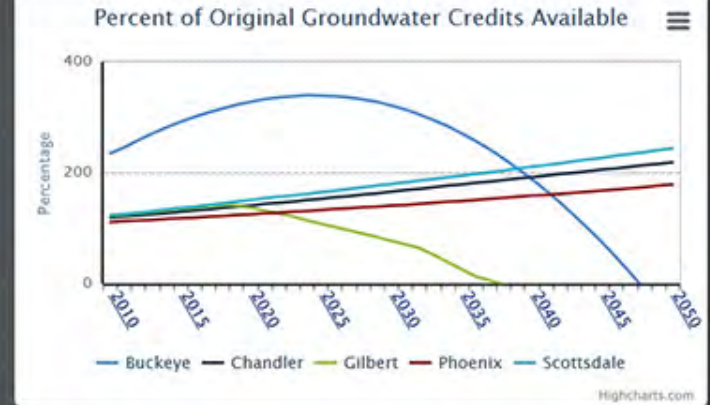
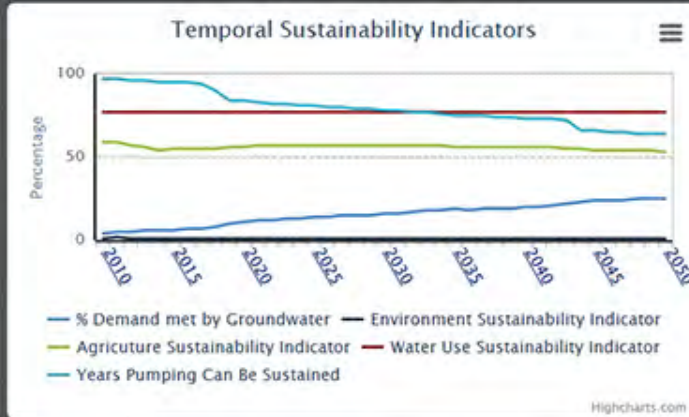
Current WaterSim Model



Policy Choices



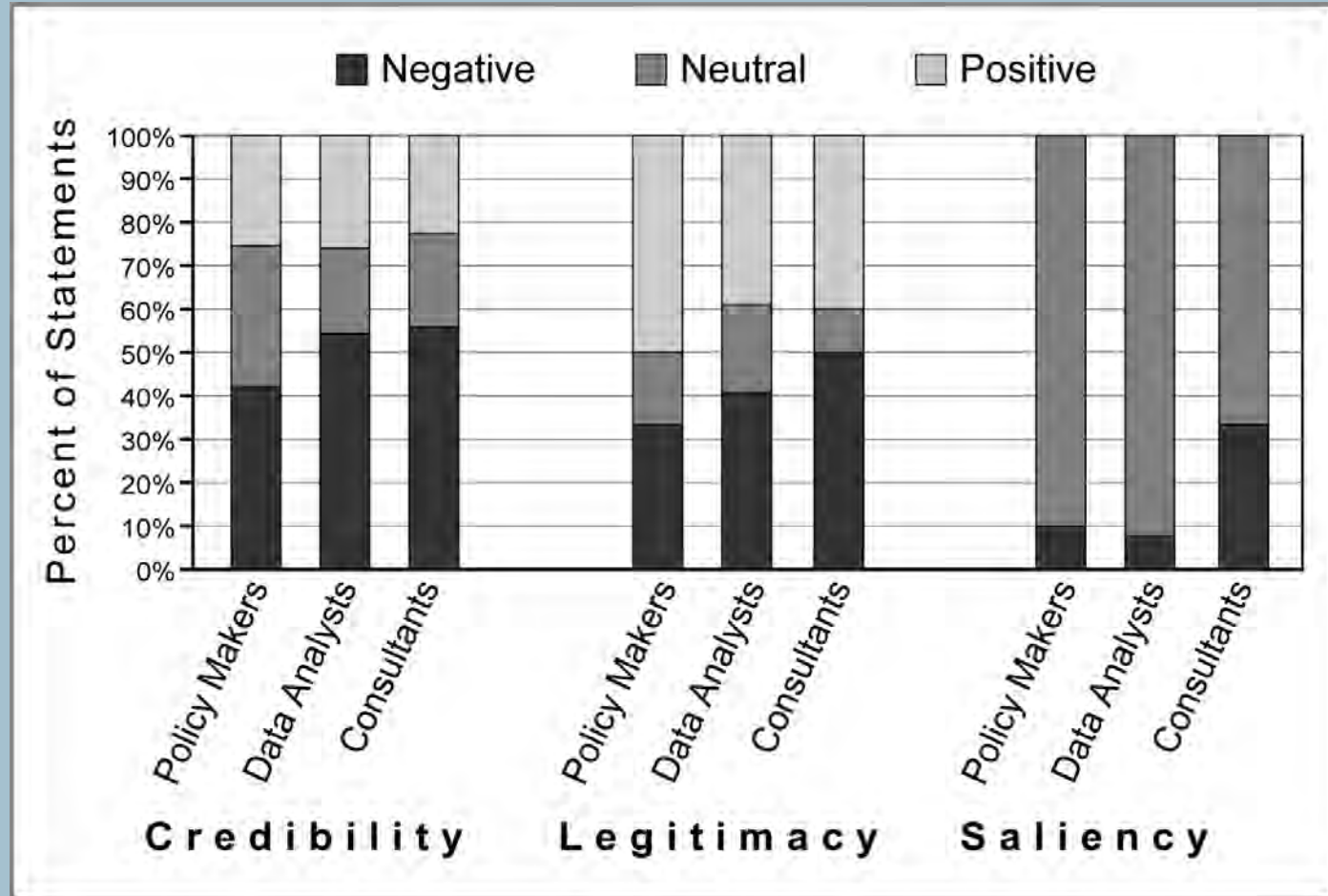
Supply Demand Reservoirs/Rivers Sustainability **Climate/River Flows**



All Indicators Groundwater

Decision Maker's Critiques

- **C:** Lack of new hydrologic data
- **L:** Exclusion of certain strategies & stakeholders
- **S:** Addresses only regional-scale

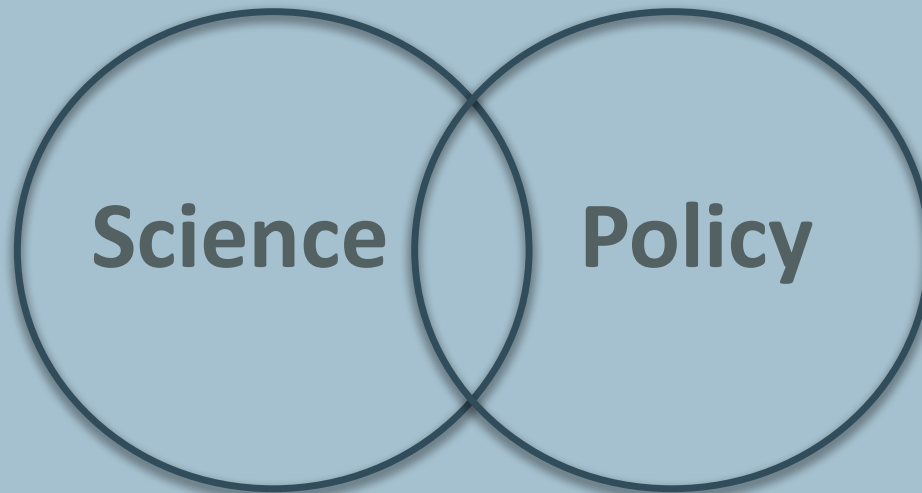


(White et al. 2008; Crona & Parker 2008)

The Importance of Understanding Varying Perspectives

“There is wisdom as well as error in public attitudes and **perceptions...each side, *expert* and *public***, has something valid to contribute.”

~ Paul Slovic (*Science* 1987: 236)



Implications of Findings

Diverging perspectives can lead to...

Disagreement

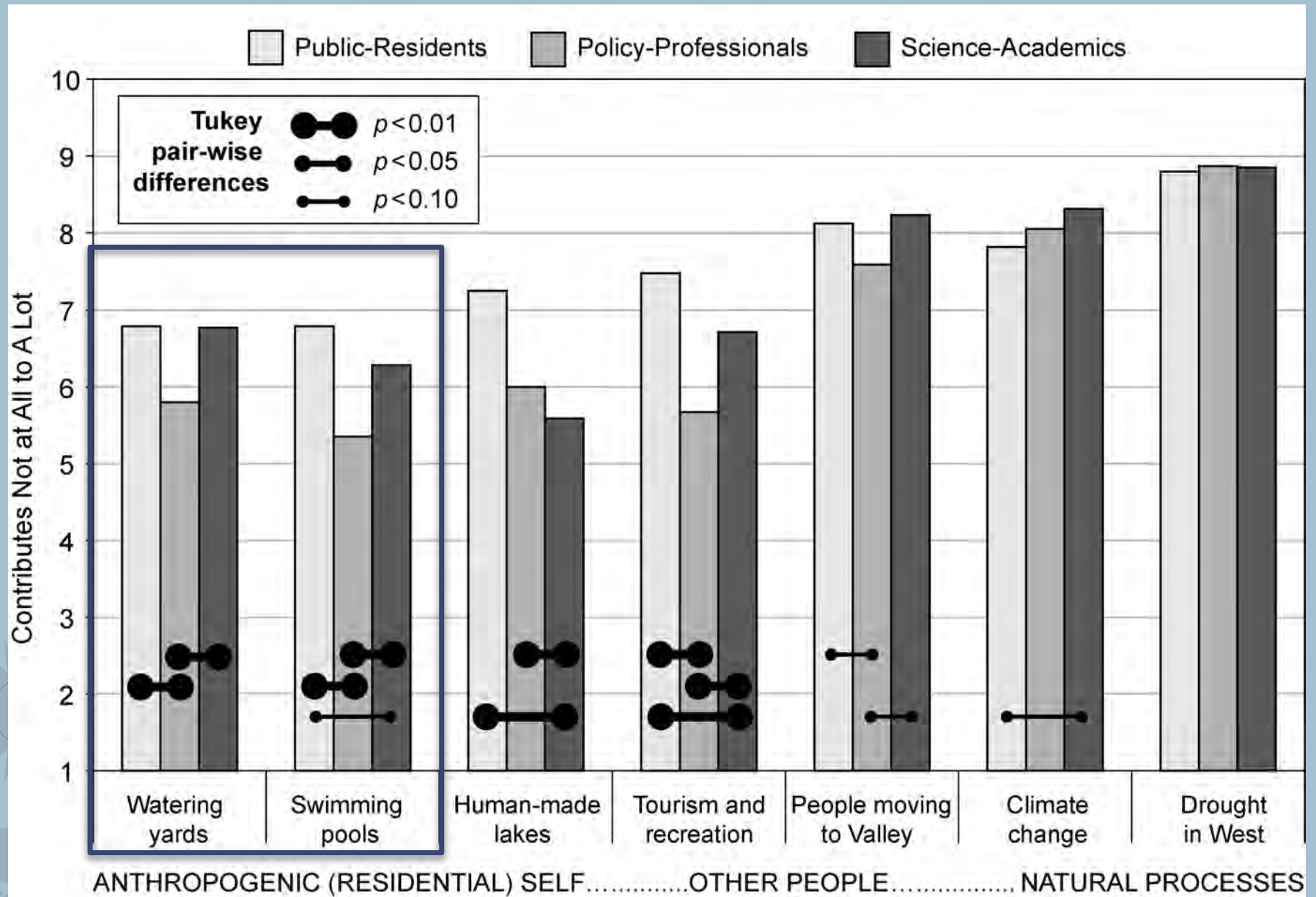
Conflict

Stalemate

Inaction



Perceived Causes of Water Shortages



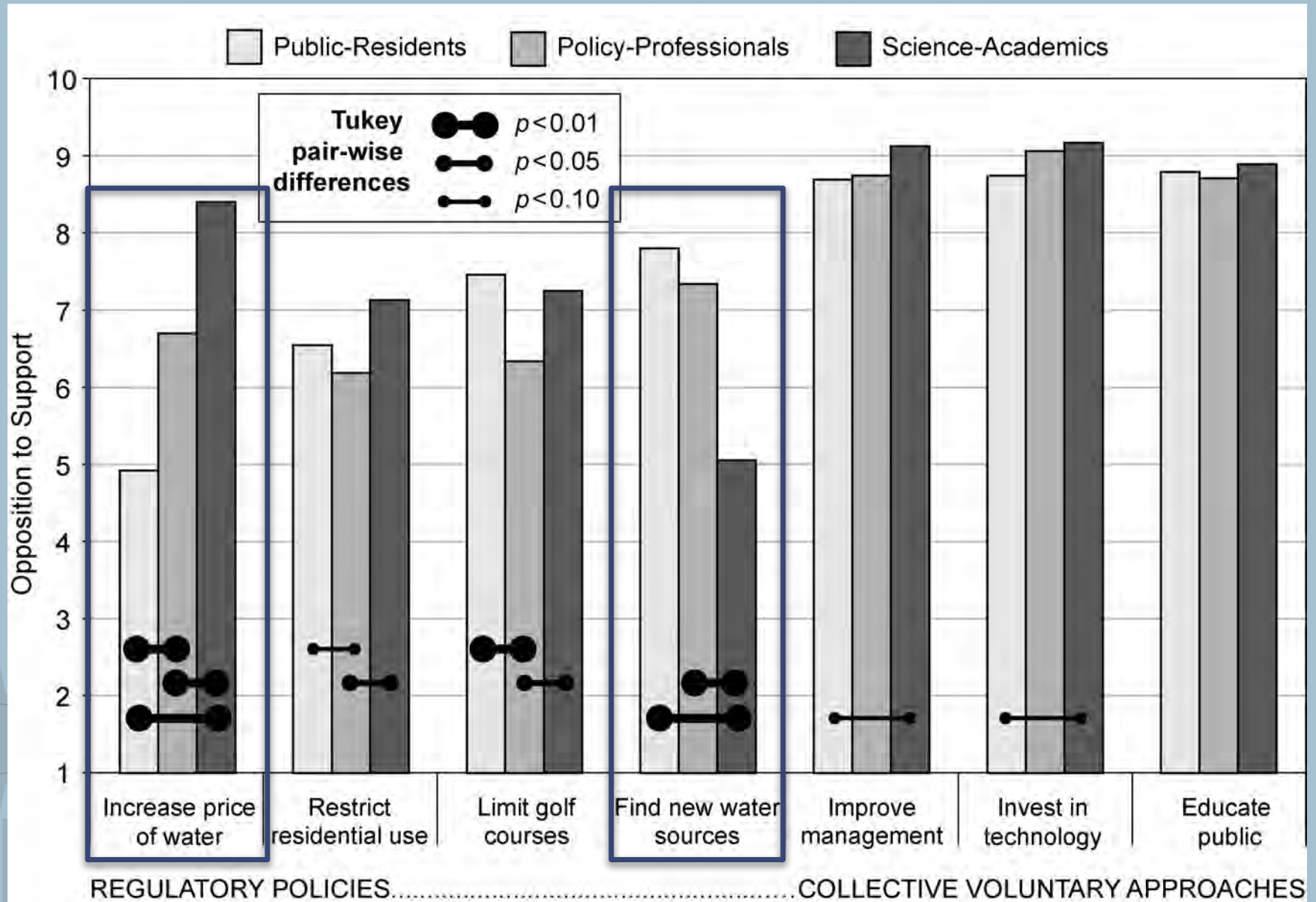
Discussion of Findings

Perceived Stressors Vary by Stakeholder

Water managers tend to:
Stress supply-augmentation.
Avoid regulating customers.



Attitudes toward Strategies

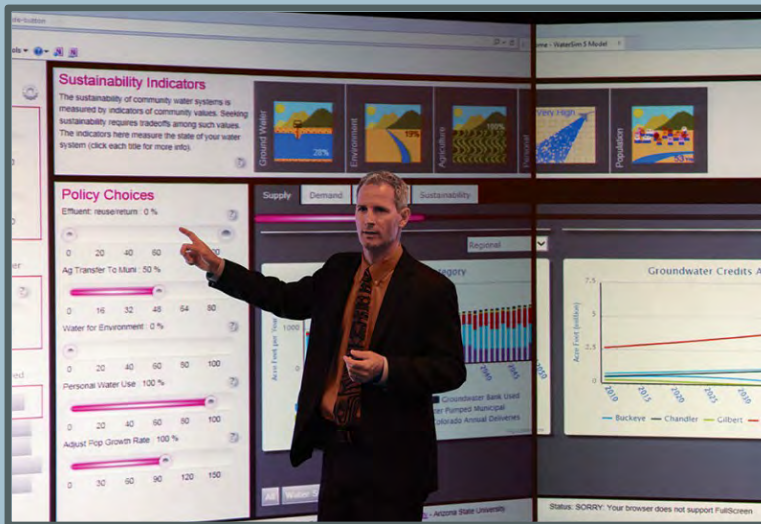


The Role of Visual Information

*Narrows
Attention*



*Fosters Mutual
Understanding*



<https://dt.asu.edu/>

(Larson & Edsall 2010; Hu et al. 2012)

Changes in Perceptions

Perceived Causes of Risks
more resistant to change

→ *Ideological Entrenchment*

Perceived Effectiveness of Solutions
more malleable

→ *Technological Optimism*



Conclusions

- Attitudes can constrain/facilitate interactions.
- Visual information can foster collaboration.
- Science-policy interactions build capacity.



Conclusions

Attitudes matters (to a point).

- Societal action
- Political feasibility
- Collaborative research

Visual information can help foster collaboration.

- Focusing effects
- Solutions-oriented
- Shared understanding

Boundary work is useful.

- Decision-oriented research
- Adaptive stakeholder engagement
- Collaborative research & decision making



Recommendations for Science-Policy Interactions

- ✓ Develop relationships & trusted paths to information exchange.
- ✓ Bridge gaps in research vs. policy needs & expectations.
- ✓ Engage in collaborations long before issues are acute.
- ✓ Negotiate the right mix of roles, resources & support.
- ✓ Develop data agreements and other contracts.

WATER RESOURCES
IMPACT

**ENHANCING WATER SUSTAINABILITY THROUGH UNIVERSITY POLICY
COLLABORATIONS: EXPERIENCES AND LESSONS FROM
RESEARCHERS AND DECISION MAKERS**

Ray Quay, Kelli L. Larson, and Dave D. White



Recommendations for Science-Policy Interactions

- ✓ Specific collaborations
- ✓ Neutral convening
- ✓ Mentored Interns

WATER RESOURCES
IMPACT

**ENHANCING WATER SUSTAINABILITY THROUGH UNIVERSITY POLICY
COLLABORATIONS: EXPERIENCES AND LESSONS FROM
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Conclusion

“The research and workshops associated with the center have served at least **two critical roles** for those involved in water planning. One is to operate as an **‘honest broker’ clearing house for data and concepts** related to water supplies and demands... Another role is to make people understand through scenario analysis that although predicting the future with great precision is difficult, **organizations can benefit greatly by preparing for a variety of likely outcomes** – especially when something as important as water is involved. These activities have influenced how we prepare water resource and water/wastewater infrastructure plans.”

~ water resource planner, Phoenix, AZ

