Identifying Policy and Governance Barriers Towards A Net Zero Urban Water Future in the Southwest US

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Principal Investigator: Prof Courtney Crosson, University of Arizona

Collaborators:

- University of California Los Angeles (UCLA)
- University of New Mexico (UNM)
- Colorado State University (CSU)
- Colorado School of Mines (CSM)
- Tucson Water
- Denver Water
- Los Angeles Dept of Water and Power
- Albuquerque Bernalillo County Water Authority
Colorado River Crisis

**CAUSES**
- Climate change
- Over allocation of water
- ‘Law of River’ - water laws, policies, compact obligations

**IMPACTS**
- Dead pool in Lakes
- Large water cuts imposed by Reclamation
- Threatening supply to 40 million people

Figure 1. Colorado River Basin in Drought over the years
Net Zero Urban Water (NZUW) Approach
For Water Self-Sufficient Cities

• “NZUW meets the needs of a given community with a locally available and sustainable water supply, without detriment to interconnected systems”.

• Integrative approach with progressive targets.

• Quantitative framework.

• Adapts to challenges across Natural, Built and Social Systems.

Figure 2. NZUW is a progressive target across three scopes and natural, built and social Systems (Crosson, 2020).
### Table 1. Characteristics of the case study cities

<table>
<thead>
<tr>
<th>Case Study Cities</th>
<th>Albuquerque</th>
<th>Denver</th>
<th>Los Angeles</th>
<th>Tucson</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Population</strong></td>
<td>0.56 millions</td>
<td>0.72 million</td>
<td>3.9 million</td>
<td>0.54 millions</td>
</tr>
<tr>
<td><strong>Area</strong></td>
<td>189 sq. miles</td>
<td>154 sq. miles</td>
<td>502 sq. miles</td>
<td>241 sq. miles</td>
</tr>
<tr>
<td><strong>Annual Rainfall</strong></td>
<td>9.5 inches (Jun - Sept)</td>
<td>15 inches (Mar-Sept)</td>
<td>15 inches (Nov-April)</td>
<td>10.5 inches (Jun - Sept)</td>
</tr>
<tr>
<td><strong>Imported Water Source</strong></td>
<td>Colorado River via the San Juan Chama Project</td>
<td>Colorado River</td>
<td>LA Aqueduct, State Water Project, Colorado River</td>
<td>Colorado River via Central Arizona Project</td>
</tr>
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<td><strong>Annual water use</strong></td>
<td>27 billion gallons (Water Authority)</td>
<td>30 billion gallons (Denver Water)</td>
<td>160 billion gallons (LADWP)</td>
<td>28 billion gallons (Tucson Water)</td>
</tr>
<tr>
<td><strong>% Imported water</strong></td>
<td>80%</td>
<td>46%</td>
<td>89%</td>
<td>84%</td>
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<tr>
<td><strong>% Dependence on Colorado river</strong></td>
<td>80%</td>
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<td><strong>Per Capita water use</strong></td>
<td>128 gpcd</td>
<td>150 gpcd</td>
<td>112 gpcd</td>
<td>80 gpcd</td>
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Figure 3. Map of Colorado River Basin (USGS)
5 Key Areas of Policy and Governance Challenges

1. Incorporating and accounting for diversified water sources and sinks
   - Rainwater
   - Greywater
   - Stormwater
   - Reclaimed Water
   - Surface and groundwater
   - Challenge: Direct Potable Reuse (treatment, public acceptance)

2. Planning, design and operations
   - Integrated Decision-support tools
   - Understanding Climate Change Impacts

3. Monitoring and enforcement of new policies
   - Cost of monitoring efforts
   - Precise and comprehensive metering
     (Automated metering, real-time monitoring, remote sensing)

4. Coordination between multiple agencies and sectors
   - Local, state and national agencies
   - Water supply, wastewater and stormwater agencies

5. Addressing equity and justice in the NZUW transition
   - Ensure consistent water quality, and affordability
   - Equitable Investments in New Systems, Green Infrastructure
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<td>• Accounting for diverse water sources.</td>
<td>• High outdoor water use due to non-native plants.</td>
<td>• Strict water rights laws and enforcement.</td>
<td>• Non-metered private wells.</td>
</tr>
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<td>• Funding for expansion of water infrastructure.</td>
<td>• 88 different water agencies.</td>
<td>• Challenge for policies on alternative water use.</td>
<td>• Return flow requirements.</td>
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<td>• Rigid water pricing policies.</td>
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<td>• Water rights need to be acquired.</td>
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### Policy Challenges
To Transition To NZUW Future

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<td>• Consistent implementation and monitoring of diversified water sources.</td>
<td>• Increase investment in demand reductions.</td>
<td>• Enable accounting for water.</td>
<td>• Make Aquifer Storage and Recovery projects easier to implement, and cheaper.</td>
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<td>• Expand water accounting system for new sources.</td>
<td>• Increase collaboration between water agencies</td>
<td>• Integrate augmentation plans to enable use of alternative water sources</td>
<td></td>
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<td>• Establish progressive water pricing: Change Prop 26 to allow lowering water prices.</td>
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Conclusion

• Over 40 million people rely on Colorado River, which is facing a severe crisis.

• A NZUW approach allows the transition of cities toward sustainable water futures by meeting its water needs using local and sustainable supply sources, without detriment to interconnected systems.

• Policy and governance barriers exist in NZUW implementation, across natural, built and social systems.