

Social-Ecological Misalignments Threaten Mountain Water Tower Resilience in Utah, USA

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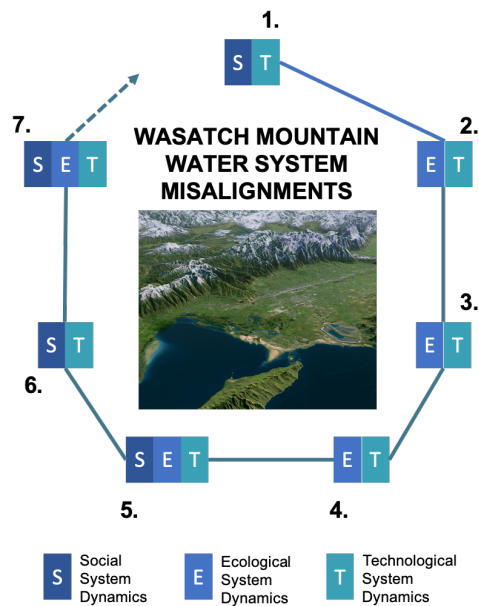
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Summary

The essential “water tower” role played by mountains is compromised by climate change and human development. Misalignments in various socio-ecological dimensions threaten adaptive capacity and resilience in mountain water-dependent regions. Interdisciplinary research in Utah’s Wasatch Mountains reveals a complex set of mid-elevation dynamics and stakeholder perspectives complicating water resource planning at local and state levels. A range of adaptation options are being considered and attempted at local, regional and state government scales, including water reuse, water transfers and pipelines, new reservoirs, water banking, and water conservation promotion.



1. Rapid population growth and urban development are increasing water demand.
2. Climate change decreases snowpack, snow-water equivalent, and runoff timing and drives precipitation change from snow to rain.
3. Evergreen conifers transpire in winter leading to additional mountain water system loss.
4. Groundwater-surface water dynamics complicate water availability and quality.
5. Dust, nitrogen deposition, wildfire, leaky septic/sewer infrastructure, and complex groundwater-surface water exchange threaten mountain water quality.
6. Social perceptions of water vary geographically and socially, presenting complex mosaic of water policy support and opposition.
7. Some state water strategies for infrastructural solutions (e.g. reservoirs and pipelines) are at odds with mountain water system dynamics.

Adapted from Markolf et al. 2018

Adaptation Essentials

1. Identify misalignments in complex socio-ecological-technological systems.
2. Avoid lock-in of past social and technological decisions that constrain system adaptation.
3. Incorporate transdisciplinary efforts and co-production of knowledge by democratically setting goals.
4. Match the scale of process with the scale of intervention
5. Design system changes for multiple cross-cutting benefits.
6. Build in multifunctionality and redundancies.
7. Emphasize learning and sharing knowledge at multiple levels,

