

California's Fourth Climate Change Assessment – Technical Reports

TITLE

DROUGHT MANAGEMENT AND CLIMATE ADAPTATION OF SMALL, SELFSUFFICIENT DRINKING WATER SYSTEMS IN CALIFORNIA

CITATION

Ekstrom, Julia A., Meghan R. Klasic, Amanda Fencl, Mark Lubell, Ezekiel Baker, Frances Einterz. (University of California, Davis). 2018. Drought Management and Climate Adaptation among Small, Self-Sufficient Water Systems in California. California's Fourth Climate Change Assessment, California Natural Resources Agency. Publication number: CCCA4-CNRA-2018-004.

ABSTRACT

Examining human impacts, responses, and challenges to extreme climatic events can give insight into needed directions for climate adaptation to reduce future risks. This study focuses on the 2012-2016 Drought in California, documenting how small self-sufficient drinking water systems were affected and challenged by, and responded to the extreme event. The majority of small, self-sufficient water systems in the state serve rural, low income communities, and many have low technical, managerial, and financial capacity compared to larger systems. This increases the risk that these drinking water systems will be disproportionately impacted by droughts or other disruptions. To assess the impact of drought on small water systems, we employed an iterative approach to gathering perspectives and experiences from drinking water system managers across the state. The goal of employing these iterative methods is to better understand the breadth and scope of impacts, responses, and barriers to dealing with the 2012- 2016 Drought. The first stage of the data collection involved interviewing managers of drinking water systems, which were transcribed and analyzed using semi-grounded theory methods. To cross-check and advance findings from interviews in additional locations, we conducted three small regional workshops and then a larger policy forum. Multiple data collection methods allowed us to gather insights about experiences from nearly 200 water managers. This project uses local knowledge to document the social dimensions within drinking water systems during the 2012-2016 Drought and expresses the value of local knowledge in reflecting on future drinking water system needs in response to extreme events.

We found that drinking water systems, despite size or government project water reliance, experienced a similar set of drought impact, response, and barrier categories (e.g., water quantity and water quality). However, within these categories, the types of impacts, responses, and barriers differed based on both system size and water source portfolio. Common disadvantages that hinder drought resilience, and thus climate adaptation, of small self-sufficient drinking water systems include: staff capacity; financial burden of revenue loss during drought compounded with increased need for staff time for additional reporting; customer awareness and outreach challenges; and consolidation. We found that consolidation is valuable but in many case needs more

state support to implement and incentivize. From a long term perspective, the absence of expressed duty and lack of concern for risks of climate change among water managers indicates a major dearth in adaptation planning among these drinking water systems. Documentation of experiences from the 2012-2016 Drought can be used to inform future planning for droughts and more broadly climate change.

HIGHLIGHTS

- Many study participants agreed that existing and proposed regulatory efforts look good on paper, but contain two key flaws: 1) they target and are often developed with larger systems in mind; and, 2) they are often unfunded, potentially creating an additional burden on smaller systems. Extending sources and improving source resiliency were the top climate adaptation strategy types mentioned by both small and large drinking water system managers.
- Examples of anticipatory climate adaptation among small self-sufficient drinking water systems are largely absent; therefore, learning from drought and other extreme events is important for signaling systems' adaptation needs.
- Advancing equitable adaptation requires additional levels of assistance for local drinking water managers and systems with lower adaptive capacity.
- Small self-sufficient drinking water systems need training or other forms of support to start thinking about what climate change means for the operation, cost, and overall future of their water systems.
- Maintaining momentum created through State-supported education and outreach, partnership building, infrastructure investments, and efficiency incentives during the 2012-2016 Drought would support future drought preparedness.
- Small self-sufficient drinking water systems expressed similar overarching categories of drought impacts, responses, and barriers compared to other systems; but experienced differences within these categories, warranting continued focus on their specific needs, experiences, and perspectives.
- Three crosscutting themes arose throughout the interview and workshop-based documentation of the impacts, responses, and barriers to responding to the 2012-2016 Drought: (1) water supply resiliency and robustness; (2) funding mechanisms; and, (3) the role of communication.
- Small drinking water system managers identified common challenges resulting from the 2012-2016 Drought: conservation-driven revenue losses and related financial hardships, lack of staff capacity for meeting regulatory requirements and

securing additional funding, and distrust with other nearby water users and/or their own customers.

- Barriers to managing drought impacts and advancing in climate adaptation do not exist in isolation, and small systems tend to experience a domino effect of interacting burdens related to implementation, finance, capacity, and more. Existing efforts are not robust enough to comprehensively address barriers to small drinking water systems.
- Pre-drought advantages and inherited responses demonstrate the effectiveness of actions taken in between major drought events like ongoing water conservation outreach programs, rate restructuring, infrastructure updates, and maintaining working relationships among and between systems, non-governmental organizations, and the state government.

ACCESS

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