



Use and Effectiveness of Municipal Drought Restrictions: AWE's Final Study Results



Photo by Don Davis on [Flickr](#) (CC BY-NC-ND 2.0)



Photo by Patrick Standish on [Flickr](#) (CC BY 2.0)




Photo by Patrick Standish on [Flickr](#) (CC BY 2.0)

AWE: A Voice for Water Efficiency

- Our mission is to promote an efficient and sustainable water future
- 450+ member organizations in 200 watersheds delivering water to 50 million water users
- A unique network and forum for collaboration around research, policy, information sharing, education, and stakeholder engagement
- Water Efficiency Research is a big priority





“A main conservation priority has to be reducing outdoor water use, which remains poorly understood, largely unregulated, and ripe for innovation and improvement at the consumer, landscape contractor and designer levels.”

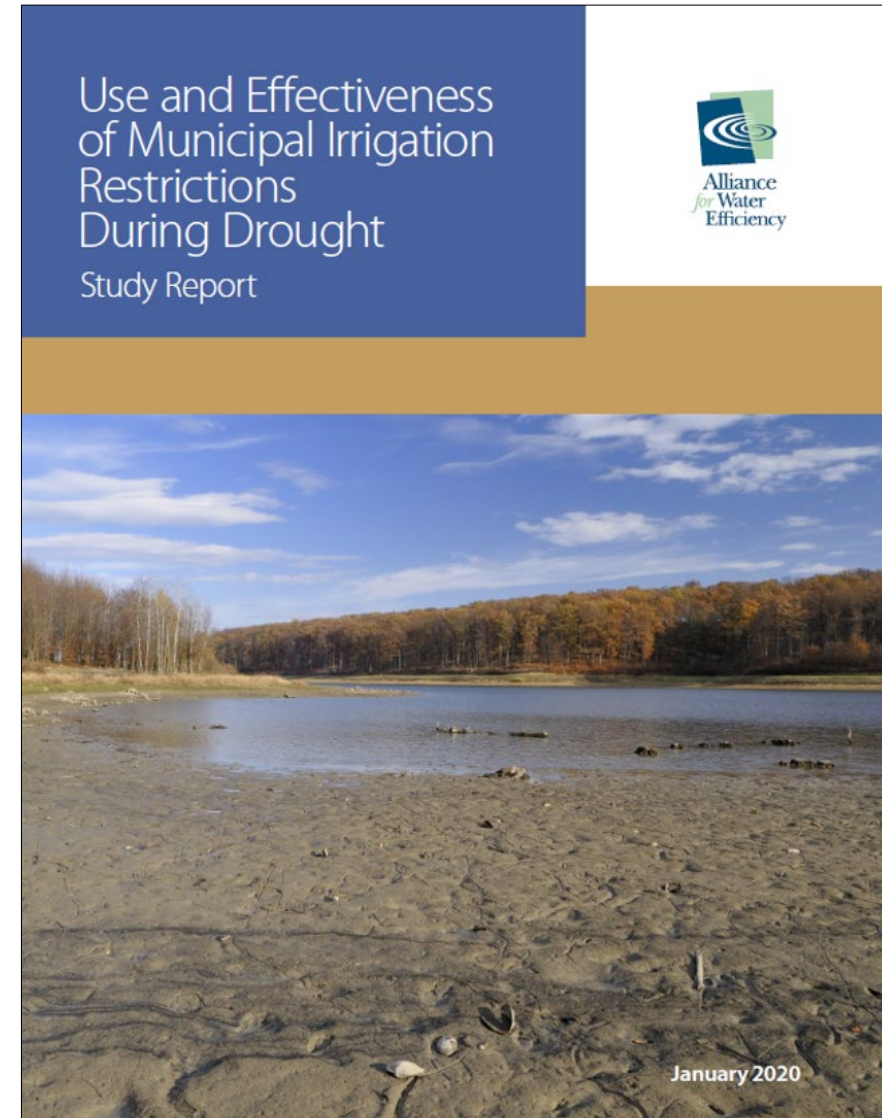
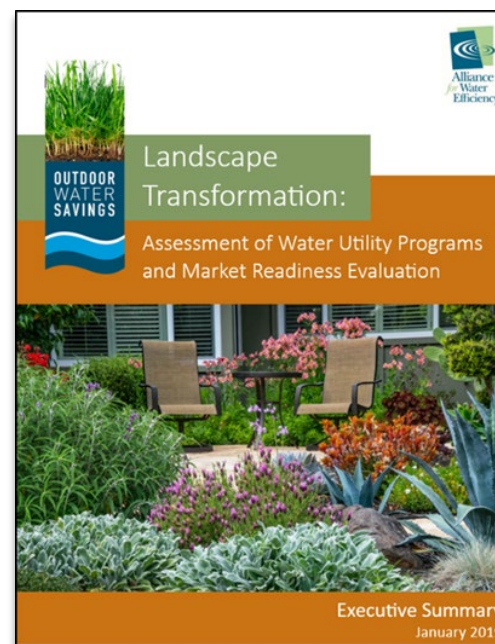
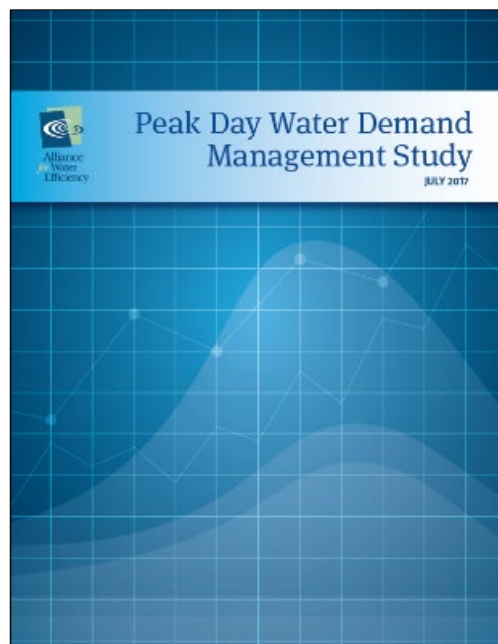
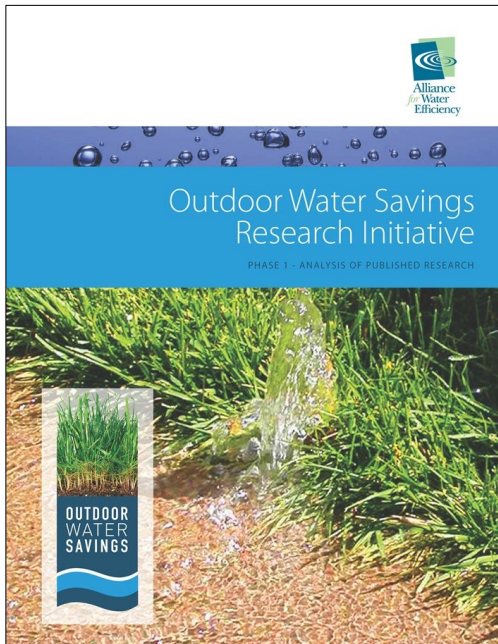
Outdoor Water Savings Studies

Phase 1

- Analyzed Published Research (2015)

Phase 2

- Peak Day Water Demand Management (2017)
- Landscape Transformation Study (2019)
- **Drought Restrictions Study (2020)**



Study Team



Mary Ann Dickinson
President & CEO
Alliance for Water Efficiency



Peter Mayer
Study Manager
WaterDM



Anil Bamezai
Co-PI
Western Policy Research

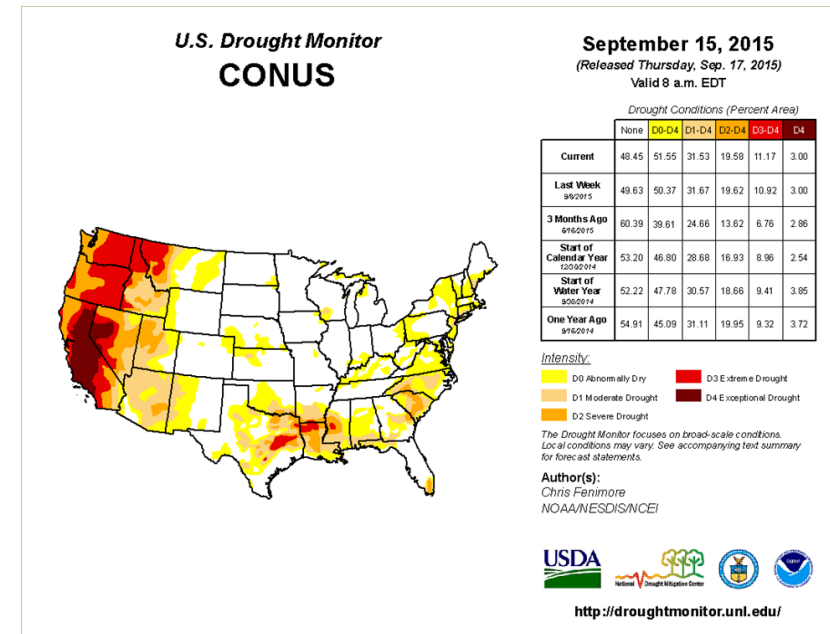


Lisa Maddaus
Co-PI
Maddaus Water Management



What Information Gap Does this Study Fill?

- Guidance documents to assist in design of drought response strategies are available:
 - AWWA Manual of Practice, M60 Drought Preparedness and Response, 2nd Edition (AWWA, 2019)
 - National Drought Mitigation Center
<https://drought.unl.edu/droughtplanning/PlanningHome.aspx>
- Historical accounts of past droughts are also available
- The *Use and Effectiveness of Municipal Irrigation Restrictions During Drought* report offers very detailed descriptions of each case study's experience
- This study includes results from quantified data analysis on how messaging, restrictions and enforcement actions achieved demand reductions





Drought Research Case Studies

Arizona

- AMWUA, Central AZ (19 of last 25 years in drought)
- By and large, drought restrictions have not been necessary

Nevada

- Southern Nevada Water Authority (Colorado Basin in drought last 19 years)
- Irrigation restrictions first instituted in 2003, made permanent in 2009 (SNWA)

Texas

- Many drought episodes (1950-57; 1999-2002; 2010-2015)
- Many utilities have had to deploy drought restrictions

California

- Many drought episodes (1976-77; 1987-1992; 2007-2009; 2012-2017)
- Many utilities have had to deploy drought restrictions

Project Partners

Retail Agencies

- Austin Water, TX
- Hayward, CA
- Los Angeles Department of Water & Power, CA
- Plano, TX
- Sacramento, CA
- Sacramento Suburban Water District, CA
- Santa Cruz, CA
- California Water Service/Visalia, CA

Regional Agencies and Organizations

- Arizona Municipal Water Users Association, AZ
- Bay Area Water Supply and Conservation Agency, CA
- California Urban Water Agencies, CA
- Lower Colorado River Authority, TX
- Metropolitan Water District of Southern California
- Regional Water Authority, CA
- Southern Nevada Water Authority, NV

Other Funding Support

- The Scotts Miracle-Gro Foundation



Use and Effectiveness of Municipal Drought Restrictions Study

1. What are the different forms of mandatory and voluntary irrigation restrictions typically implemented by North American water providers?
2. How do mandatory and voluntary irrigation restrictions vary across water providers?
3. What demand reduction impacts can be achieved through different levels of mandatory and voluntary irrigation restrictions?
4. During times of drought, what can water providers do to maximize outdoor irrigation demand reductions?
5. How does media coverage impact drought response, and what are the comparative impacts of local vs. state and regional drought messaging?
6. What is the longevity of demand reductions during and after a drought?

Research Team:

- Western Policy Research
- Maddaus Water Management

Project Manager:

- Peter Mayer, AWE Senior Technical Advisor and Principal, Water DM
- Additional support from AWE Staff and Project Advisory Committee

What demand reductions can be achieved through different levels of mandatory and voluntary usage restrictions?



None of the water providers in this study reached the maximum stage of their contingency plan when irrigation would be completely banned.

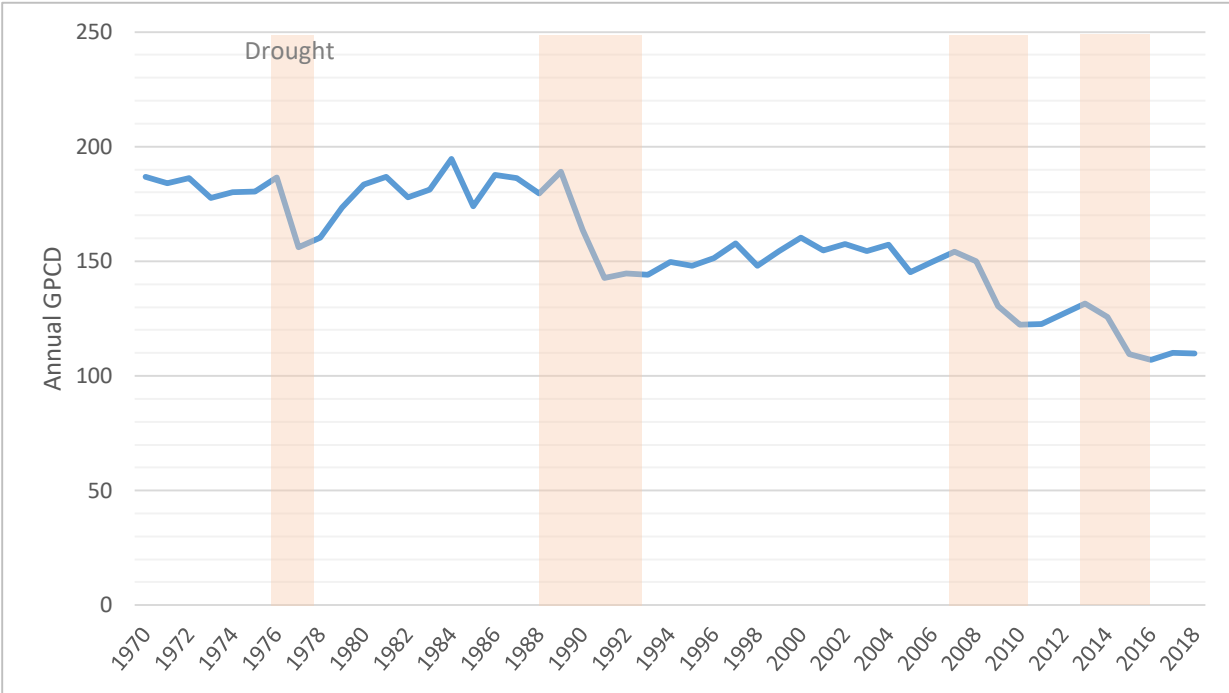


Case study participants successfully reduced annual demand by 18%-30% and peak monthly demand by 20%-42% through a combination of mandatory demand management measures.

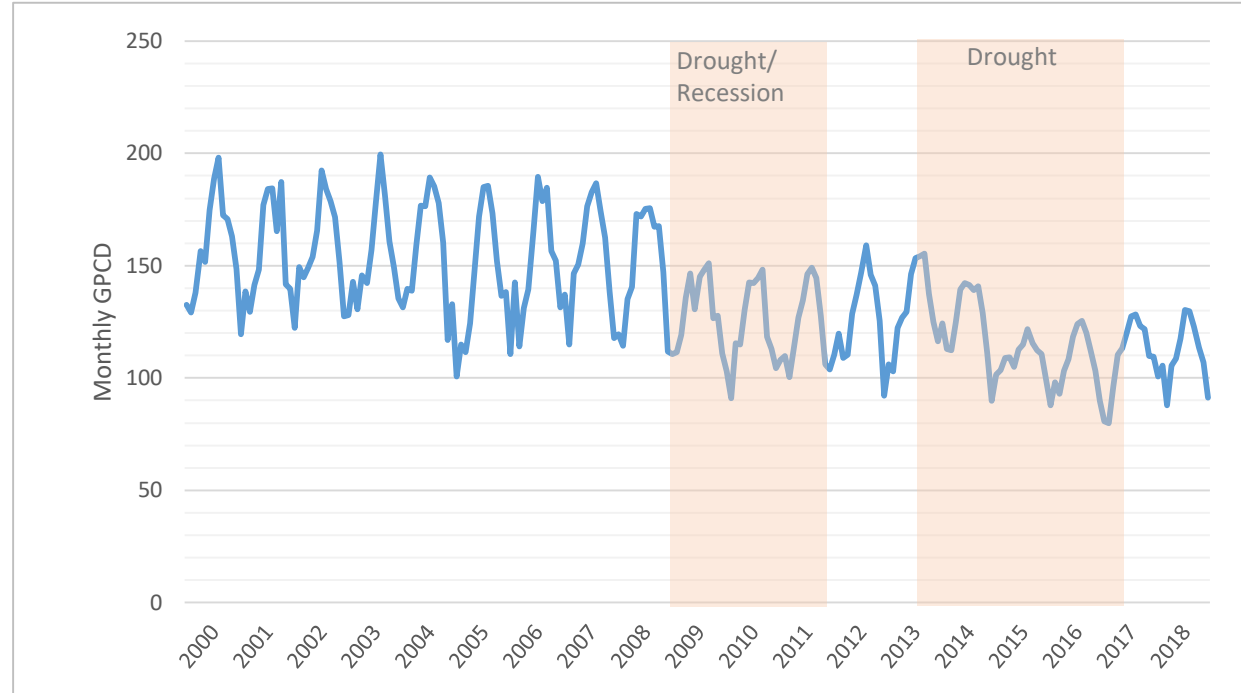


Within this study, voluntary conservation did not generate statistically significant savings (i.e., estimated savings are indistinguishable from zero).

Case Study Approach - LADWP



Los Angeles Department of Water & Power Annual GPCD Trend



Los Angeles Department of Water & Power Monthly GPCD Trend



What is the longevity of demand reductions after the end of a drought?



Per capita water use has declined across North America since the 1990s because of pricing, plumbing codes and standards, and investments in long-term efficiency.



Due to declining demand trends, demand rebounds after a drought toward a long-term declining trendline, not the pre-drought level.



In two case studies, demand reductions achieved during the drought were maintained with little rebound through the on-going implementation of restrictions.



Case Study Finding: Vital Role of Regional or Wholesale Agency

- *Regional Water Authority (RWA) Water Efficiency Program (WEP) in Sacramento implemented a cost efficient public outreach campaign that catered to two audiences: local water suppliers and the general public.*
 - *For local water suppliers, the regional program collaborated to develop a media tool kit, social media posts, weekly editorial calendars, and customer newsletter text, a photo gallery, “top ways to save” tips, sample bill inserts, and tabletop informational cards for restaurants.*
 - *For the general public, RWA served as a regional spokesperson to the media and maintains a website (www.bewatersmart.info) which includes an interactive drought map featuring outdoor watering guidelines, water waste hotlines, and rebates for all member water suppliers.*

How do messaging and enforcement programs influence effectiveness of restrictions?



Messaging and enforcement are viewed as best practices and essential components of a successful drought response.



WSCPs should include all of these components: messaging, enforcement, irrigation day-of-week and/or time-of-day restrictions, drought surcharges, and implementation strategies.



To be effective, WSCPs need codified rulemaking to include provisions that are enforceable on non-compliant customers.



The level of messaging and enforcement employed across the case studies was quite different.



In two case studies, drought surcharges linked with customer-specific water budgets were found to be highly effective in achieving desired demand reductions.

Case Study Finding: Plano, Texas

In the City of Plano cumulatively, between the latter half of 2012 and the fall of 2014, of 83,000 connections, roughly 19% received a violation letter and 2-3% were subject to irrigation lockouts by the City.





Recommendations: Before a Drought or Water Shortage

- Prepare or seek to update your water shortage contingency plan (consider multiple scenarios).
- Plan should include response stages with action to achieve targeted savings, messaging, and enforcement, and which reflects local conditions and values.
 - The design of day-of-week restrictions should be specific to the region.
 - The tighter the level of irrigation restrictions, the greater the savings, especially during summer months when irrigation is typically at its highest.
 - Mandatory conservation measures were found to generate statistically significant savings, where voluntary measures did not.
- Prepare and pass ordinances necessary to implement and enforce the plan when the time comes.
 - Actions enforceable on non-compliant customers need to target water waste, such as irrigation runoff and excessive use.
- Educate the community.
 - In this study, statistically significant savings were only detected in the presence of effective and persistent messaging and enforcement programs.



This Photo by Unknown Author is licensed under [CC BY-ND](#)

Recommendations: During a Drought or Water Shortage

- All shortage conditions are different.
 - Monitor conditions closely leading up to and during a drought.
 - Be prepared to respond to shortage emergencies (e.g., natural disaster).
- Effective outreach and messaging programs must be update and as real-time as possible to help educate residents about emerging drought conditions
- Design specific measures for reducing short-term demand, and provide residents the resources needed to help them reduce demand in a more direct and permanent manner.
- Adopt surcharges without delay.
 - Increasing rates is often the most effective tool for achieving water savings. In addition, it may be useful to be flexible regarding when and how drought surcharges are separately adopted as part of a multi-layered approach to drought-stage declaration.
- Adapt the response as necessary. Water providers should be prepared to respond as required to changes in conditions.



Recommendations: After a Drought or Water Shortage

- Publicly announce and clearly communicate to the public the end of the drought or shortage event and the lifting of restrictions.
- Lift any surcharges imposed promptly.
- Thank the community for participation and compliance.
- Monitor on-going demand trends
 - Watch overall total production, gallons per capita per day and also demand per sector (gpd/account)
 - Don't be surprised if demand doesn't fully rebound.
 - Because of ongoing long-term efficiency investments, demands can rebound toward a long-term downward trendline, not back to pre-shortage levels.

Use and Effectiveness
of Municipal Irrigation
Restrictions
During Drought
Study Report



Learn More!

- Press Release posted at:
www.allianceforwaterefficiency.org/news/alliance-water-efficiency-releases-major-new-research-study-drought-response-and-water-demands
- Executive Summary posted at:
www.allianceforwaterefficiency.org/impact/our-work/use-and-effectiveness-municipal-irrigation-restrictions-during-drought
- Full Study Report available to AWE members



January 2020