



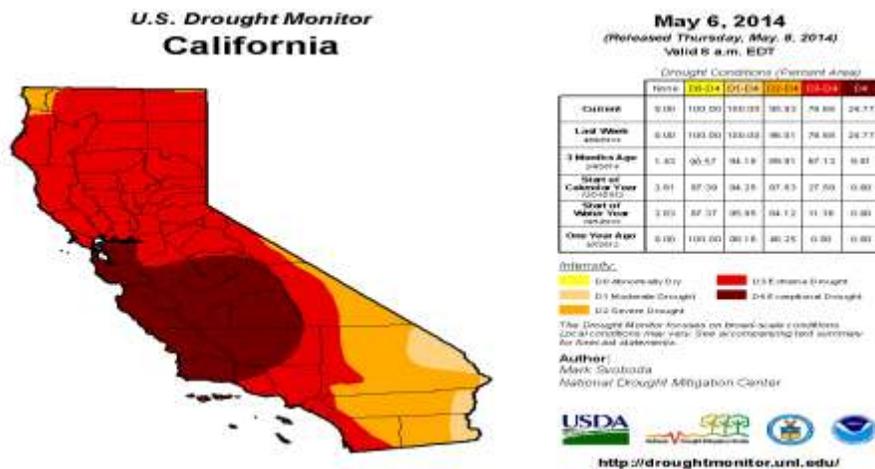
Field Notes:
Extreme Weather and Community Resilience

ADAPTING TO DROUGHT IS MORE COMPLICATED THAN IT LOOKS. DEEP INTO ITS FOURTH YEAR OF STATEWIDE DROUGHT, CALIFORNIA'S EVOLVING ACTIONS TO REDUCE URBAN WATER USE ILLUSTRATE THE CHALLENGES.

Steven Steinhour June 8, 2015

California's has just completed the [driest three-year period](#) in the record of statewide precipitation, with the end of drought uncertain.

By 2012 the southern-half of California was in long-term moderate to severe drought. The drought has continued to broaden and intensify, and as of May 6th of this year, the [U.S. Drought Monitor](#) shows that over 76% of the state is being hammered by “extreme”—or the even worse category of “exceptional”—drought.



According to the State of California's analysis, what has made the impacts so severe is the concurrence of both drought and new [climate records set in 2014](#) for statewide average temperatures. It is possible the 2012/15 drought may be a preliminary look at not only the present or near future, but beyond.

In light of recent research, the question arises whether California may be experiencing a trial run-up to multi-decadal mega-droughts after 2050.

A [report](#) this year by researchers from NASA, Columbia University and Cornell University has projected the likelihood of extreme, multi-decadal droughts in the Southwest after 2050. The

report emphasized that lack of precipitation and a hotter atmosphere, due to climatic heating, were the principal drivers of projected regional drought intensities that may exceed all droughts in the past 1,000 years.

The report concluded that both agriculture and urban areas will be stressed as water yields from underground aquifers decline, due to past excessive pumping, and increasing water demands from growing urban populations. The U.S. regions most obviously at risk are the Southwest (which includes California) and, to a lesser extent, other western states, the Great Plains and parts of the nation's Corn Belt.

The report's independent forecast of severe water stress due to the coupling of drought and hotter atmospheric temperatures was published in the same month as the State of California's analysis (above), which reached similar conclusions.

Every community in California and every level of government are feeling the brunt of dried up reservoirs, decline and failure of the 2012/15 Sierra Mountains snowpack, and the bleak prospect of yet another summer of bone-dry skies. At stake are the economic vitality of communities, survival of the astonishing abundance of Central Valley agriculture, and efforts to strengthen the California economy.

The only potential bright spot comes from a May 14th [report](#) from the National Oceanic and Atmospheric Administration that the prospect for drought-reducing rain from an El Nino in 2015 has improved to 80%, up from 50% in March. There are no guarantees of drought-busting rain, but there is increased possibility.

With 12% of the U.S. population and 13% of its economy, California provides a large-scale experiment in changing the water-use habits of urban residents. Other states facing drought may find useful insights into what has worked and what continues to be a challenge for adaptive behavior.

California residents and local agencies are working through a diversity of obstacles and a steep learning curve. They are also encountering resistance from a few communities and individuals who don't want to change their water-use habits. The experience offers some

insights into the limits of voluntary water cutbacks and barriers to implementing mandatory limits.



Photo [Credit](#): Mic.com

Across the U.S., weather extremes, such as drought, and adaptive responses will necessarily vary, in some cases widely, by geography, land uses, and population centers. California's extreme drought is grinding on: urban water conservation is still a work in progress. Political, governmental, cultural and economic disputes—not scientific issues—are generating the most divisive controversy.



Farmer rips out 1,000 acres of almond orchard lost to drought in California Central Valley.

Photo Credit: www.nbcnews.com



Homeowners, golf courses, and others reluctant to reduce irrigation of lawns and landscaping. For them, brown is not the new green.

Photo Credit: www.nbcnews.com

The broad outlines of drought response are well known. Two initial types of messages are worth noting: First, declarations by public leadership that an emergency exists are crucial for focusing public attention. Second, the public must be educated as to why the risks and adaptive responses may vary as conditions and goals change. Both risks and adaptive solutions may be moving targets.

Reducing water use is nearly always the first response to drought. It is faster and cheaper than the alternatives of building new reservoirs or desalination facilities. For urban areas, the earliest action priority is to motivate the public to conserve water by voluntary reductions in water use. Other fast and low-cost measures include promoting public efforts to increase the use of grey water, to capture stormwater, and to make recycled water available for certain purposes.

Water conservation can spread the responsibility for using less water among all economic levels if everyone participates. However, when higher-income households choose to pay increased water rates, instead of conserving, the burden of actual use reductions may be transferred to low and middle-income households.

Water conservation also reduces the over-draft of groundwater caused by pumping aquifers at rates that exceed their rainwater replenishment. This is an especially critical problem in California where water withdrawals from aquifers have caused widespread land subsidence in the Central Valley. Until the [Sustainable Groundwater Management Act](#) was signed into law by Governor Brown in September, 2014, California had not measured or regulated agricultural or drinking-water pumping from freshwater aquifers. The drought has caused increased pumping from those aquifers as a temporary emergency measure.

California's urban residents are very aware of local drought impacts. However, the increasing risks and statewide scale of the emergency have only recently been highlighted by public officials. It appears that residents have been more willing to cooperate in reducing their water use once they comprehend the huge loss of water supplies and the extent of the economic impact, especially in Central Valley crops. Building public understanding of drought impacts has focused public attention and has created public expectations that changes in daily habits are necessary.

Adaptation is a tough message.

California's Gov. Jerry Brown has used his popularity, prominence and his bully-pulpit to deliver the tough message: adaptation is necessary now. The message is all about making changes in everyday life.

Another part of the message is that extreme weather emergencies are almost always moving targets. Major weather hazards, such as regional drought, are chaotic and unstable—in location, scale and intensity. Early adaptive plans may change, sometimes drastically, as conditions evolve. It is helpful to residents that they understand the necessity for frequent re-assessments of both risks and action plans. Public discussion of adaptive changes, and the underlying reasons, helps both to promote understanding of needed changes and to sustain support for making those changes in daily life.

The gradual evolution of California's water-use reduction message illustrates both of the above necessities. Once Californians understood the need, most of them voluntarily reduced their water use, but the result was inadequate. California then adopted mandatory reductions. The shift from voluntary to mandatory signaled a dramatic shift in the severity of the emergency.

On December 17, 2013, Gov. Brown issued a statewide drought warning. He also ordered state agencies to create an interagency [Drought Task Force](#) to develop a plan for adaptation to drought that included the increasing likelihood of future droughts.

On January 17, 2014, he declared a [statewide water emergency](#) and issued guidelines, including voluntary water-conservation actions to achieve the goal of a 20% reduction in urban water use. The order also expanded the range of drought planning activities by state agencies. The final [California Water Action Plan](#) was released days later on January 22, 2014.

Since then, California drought conditions and water reserves have continued to worsen. As of this May, voluntary water-use cutbacks had achieved statewide average reductions of only 3.6%, too far below the 20% target set by Gov. Brown in 2014. In response, the Governor issued [Executive Order B-29-15](#) directing the State Water Resources Control Board (SWRCB) and others to implement mandatory water conservation by all residents.

Concurrently on May 5th, the SWRCB issued [restrictive rules](#) to ensure adequate urban water for drinking and other high-priority uses by restricting low priority uses. The rules will be implemented largely by local water districts and communities in ways they deem most effective.

To achieve a 25% statewide water use reduction, the SWRCB placed every major urban water supplier into one of eight tiers, each mandated to achieve a monthly target ranging from 8% to 36% reduction in residential water use compared with the same month in 2013. The SWRCB will monitor the suppliers. Each supplier that fails to meet its target may receive cease-and-desist orders that, if violated, may subject that supplier to fines up to \$10,000 per day. Local water districts and communities will enforce these rules for each property owner, often by tiered water rates (i.e., rates increase with amount of water used). Landowners continuing to violate the local rules may be subject to local fines of up to \$500 per day.

Adaptation—changing the patterns of everyday life—isn’t easy. Disagreements over how to reduce residential water use revolve largely around community values and habits, costs, loss of valued lawns and gardens, and willingness to share the burdens of drought.

Community actions to adapt to natural hazards, such as extreme drought, deal with practical issues such as impacts on family life, unemployment due to drought, changes in the local economy, and local politics. These are people issues, not scientific issues. Providing more scientific information may not help.

Adaptation requires practical changes that may be intrusive, disruptive and costly, within the culture, politics and economics of every-day life. In emergencies severe enough to require adaptation, “business as usual” is likely to fail with costly and damaging consequences. In California’s case, state regulations now require mandatory reductions in urban water use; “business as usual” may now also result in penalties.

Two weeks after the Governor mandated 25% reductions in urban water use, the Field Poll surveyed 1,664 California adults in 6 languages to assess responses to the Governor’s Executive Order.

The Field Poll [survey](#) revealed a broad statewide belief the current water shortage is serious (89%) or extremely serious (66%). Of those polled 65% supported the mandatory 25% reduction in urban water use. Surprisingly, support was bipartisan and roughly equal in northern and southern regions of the state and the Central Valley.

When asked about ease of compliance, 44% of homeowners said they would find it difficult to reduce their own water use. On the issues of water-use reduction, 41% (low income) to 44% (medium income) indicated it would be somewhat or very difficult. Among households with incomes over \$100,000—the largest per capita water users—48% indicated it would be somewhat/very difficult. The survey did not explore whether the loss of lawns, investments in landscaping, and swimming pools might be responsible for their greater difficulty in reducing water use. But there have been anecdotal media reports of California homeowners removing pools and converting lawns to landscapes needing less water.

Among homeowners, 70% indicated that increasing water bills by 15% to 25% would be a somewhat/very serious problem. Not surprisingly, low and medium-income households were more likely than higher-income households to indicate the increased rates would be a serious problem. Higher-income households expressed greater concern over water-use reductions. Overall, the survey indicated strong majority agreement on the seriousness of the drought and support for the mandated 25% water use reductions.

The business models of some water districts hamper compliance. In specific communities, opponents of reductions in use of urban water employ a variety of stalling tactics.

CalWatchdog, a non-profit and non-partisan journalism organization, [reported](#) that some water districts deliver water as a service and maintain the lowest uniform price possible. This policy conflicts with State goals for reducing water use by tiered pricing, which increases the per-gallon rate based on increased water use. Other districts view water as a commodity and some of them use mandated conservation as an opportunity to raise water rates disproportionately for greater profitability, not solely as a means to reduce water use. This latter approach feeds the belief of some consumers that tiered pricing (i.e., intended to increase conservation) is merely a smoke screen for increasing local water-district profits.

Residents of San Juan Capistrano went to court to challenge the City's use of tiered water rates. Their argument was that the City was restricted by California State Proposition 218 that required water fees to be based solely on the cost of the water service. As [reported](#) in The Los Angeles Times, the Fourth District Court of Appeals decision concurred with the residents' position. Gov. Brown spoke out strongly against the decision, arguing that it put "a straightjacket on local government at a time when maximum flexibility is needed." The city has since revised its tiered rate structure, but the Court's decision may cause other cities to review their rate structures and thus slow efforts to reduce water use.

In another community, residents have resorted to an unusual stalling tactic. The San Jose Mercury News [reported](#) that residents of the small, wealthy community of Morada in the Central Valley have used an obscure provision of the same California Proposition 218 to prevent any increase in their \$126 monthly water bills. Although residential water meters were installed five years ago, residents declined to have them activated, thus preventing the water district from recording their residential water-use levels. According to the Mercury News, the town, which has a large number of estate-style homes with extensive landscaping, uses eight times the county average for residential water. San Joaquin County may begin an aggressive public education campaign to change residents' practices and get the water meters operating.

Ancient peoples abandoned their campsites and villages and migrated when the climate worsened and caused increasing glaciers or crippling droughts. Today, we don't have that option. As of 2014, over 268 million people, 83% of the U.S. population, lived in urban areas. No, we are not migrating.

Modern America is densely urban, with jobs and lives solidly locked in place by homes, workplaces, and complex infrastructures for energy, transportation and communications. We've adapted our critical agricultural and water-delivery systems to support our urban areas. Of necessity, we will face the challenges of evolving climate within the context of the vast agricultural lands and urban areas we've worked so hard to create.

Connecting the dots:

- Drought in western states, where summer water supplies are dependent on winter snowpack in mountains, may become more frequent, intense and longer lasting.
- California's adaptations to drought and failure of the state's primary water source, Sierra Mountains snowpack, illustrate how plans and regulations may be revised in response to rapidly-changing drought conditions.
- It is critical that the most-influential officials publicly declare a serious drought condition or emergency. Remember that brief message from Apollo 13 astronauts on their deep space flight to the moon? "Houston we've had a problem here." It riveted the world's attention.
- Slow, creeping drought or drought primarily in agricultural areas doesn't set off alarms for urban residents. Official state-wide alerts ring the bell that a drought is serious. They focus the public's attention on changes to come. Describing the broad scale of the problems—geographic areas, degree of impacts, and duration—helps build public support for future changes.
- Initial plans and public involvement should outline potential responses and call for significant changes from business as usual.
- Government should set a priority on educating and involving the public to create understanding that drought can evolve in scale and intensity due to warmer air temperatures from climate disruption. Adapting to evolving drought may require changes in plans and actions that necessitate altering everyday life during the drought.
- Adaptation to drought may create community challenges that are personal, political and economic. The changes, such as drought-related unemployment, drinking water with an off-flavor, or limited water for landscaping, may well reach down to the household level.

Additional resources on the California drought:

- [California Drought Website](#) for access to Governor's orders and agency documents concerning drought actions by state government.
- California Department of Food and Agriculture [website](#) outlining federal/state resources to assist adaptation.
- State of California [reports](#) on drought conditions at both local water district and state levels.
- [Pacific Institute](#) for excellent articles and analysis of California water issues.

Editorial thanks to Nancy Graalman

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How to Get Involved

RRI would like to hear from you. If you have questions, comments, or concerns, please contact us at:

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