



University of California | Agriculture and Natural Resources  
**California Institute for Water Resources**  
 Developing solutions to California's water-related challenges

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**Announcing our new research projects**

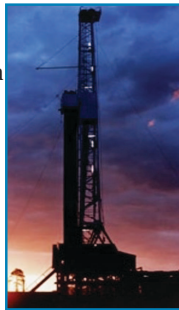
In collaboration with the California Institute for Water Resources, California academics provide solutions to address water-related issues in California. The Institute leverages federal investment to focus its attention on the most critical water issues in the state.

This year, the Institute supported several new projects on a range of timely topics ranging from hydraulic fracturing to biofouling of groundwater wells. Please read more about these projects below, and visit us at [ciwr.ucanr.edu](http://ciwr.ucanr.edu) for further details on these and our ongoing projects.

*Doug Parker, Director, California Institute for Water Resources*

**Trends in Limiting High-Volume Hydraulic Fracturing**

High-volume hydraulic fracturing is a relatively new and controversial form of natural gas and oil drilling poised for a boom in California. This type of fracking is water-intensive and could exacerbate water stress. Establishing local restrictions may be a way to protect California water resources, so it is important to understand the conditions that facilitate or inhibit such restrictions. The research results will provide actionable information to local government officials and to pro- and anti-fracking groups seeking to influence local decision-making. *Investigator: Gwen Arnold, UC Davis.* [READ MORE](#)



Department of Energy

**Impact of Salton Sea Water Management on Air Quality**

The Salton Sea provides critical wildlife habitat. While once part of a vast inland sea, more recently water in the lake has come largely from irrigation runoff and leaching. Efforts to conserve and recycle water, along with water transfers, have decreased flow into the lake. As a result, water is receding and exposing the dry lakebed, or playa, underneath. The playa releases dust, creating an air quality issue important to human health. The research results will provide baseline emissions characteristics, and be valuable in understanding the impact of water management practices on air quality. *Investigator: Roya Bahreini, UC Riverside.* [READ MORE](#)

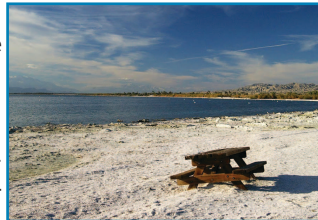


Photo by Faith Kearns

The mission of the California Institute for Water Resources is to integrate California's research, extension, and higher education programs to develop solutions to water resource challenges.

Web: [ciwr.ucanr.edu](http://ciwr.ucanr.edu) | Blog: [ucanr.edu/blogs/confluence](http://ucanr.edu/blogs/confluence)  
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**Tree Survival in Street-side Stormwater Facilities**

Street-side stormwater management facilities are increasingly common as cities try to find ways to increase local water recharge. These facilities are often planted with vegetation that includes ornamental trees. However, little is known about the survival, growth, and health of the trees. This is particularly true in northern California, where the success of ornamental trees planted has not been evaluated. Using sites throughout the San Francisco Bay Area, researchers will evaluate tree survival, growth, and condition. The study will result in a standardized tree monitoring protocol. *Investigator: Igor Lacan, UC Agriculture and Natural Resources.*



Photo by Igor Lacan

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**Quantifying Methylmercury Loads from California Rice Fields**

Methylmercury is found in low or no oxygen environments and can be toxic to wildlife at low levels. Recent studies from the Yolo Bypass in the Sacramento-San Joaquin Delta suggest that rice systems may be a significant source of methylmercury in the Delta. The objectives of this study are to quantify methylmercury loads from rice fields and determine at what time of year loads are greatest. This research will provide critical data on the types of methylmercury loads we can expect from rice fields and when methylmercury loads may be of concern. *Investigator: Bruce Linquist, UC Davis.* [READ MORE](#)



Photo by Bruce Linquist

**Metagenomic Analysis of Biofilms in Groundwater Wells**

California uses approximately 15 billion gallons of groundwater per day, more than any other state in the United States. Biofilms formed in groundwater wells pose two potentially serious hazards to drinking water. First, biofilms may produce toxins that can directly affect human health. Second, biofilms could overgrow, leading to biofouling, which can reduce well production or cause complete well loss. Both issues are directly related to the composition of microbes in groundwater well biofilms. This project will analyze well biofilm metagenomes to look for enriched gene clusters that may affect water resources. Results will be used to develop a risk assessment approach and targeted intervention strategies to ensure safe and reliable water supplies. *Investigator: Clarissa Noble, UC Merced.* [READ MORE](#)



Photo by Clarissa Noble



Photo by Faith Kearns

## Responding to California Drought

In the midst of historic drought, California’s academic institutions serve as a tremendous resource in offering everything from near-term management advice to farmers and ranchers to the innovative work being carried out by researchers on a vast array of issues from drought resistant crops to snow sensors to climate change.

The California academic community has responded quickly with workshops, research, and expertise, and we have developed a web portal to bring the resources of our universities and colleges to a broad range of communities.

For up-to-the-minute drought resources and expertise, please visit us at [ucanr.edu/drought](http://ucanr.edu/drought) and follow us on Twitter [@ucanrwater](https://twitter.com/ucanrwater).

## Insights: Our Online Water & Drought Seminar Series

Our online seminar series, supported in part by the California Department of Water Resources, brings timely, relevant expertise on water and drought from around the UC system and beyond directly to interested communities.

At this time, over 35 talks are available. The topics are arranged into five subcategories ranging from agriculture to urban landscapes. Individual talks cover everything from groundwater to the impacts of drought on forest health and wildfires to rangelands and drip irrigation. New presentations continue to be added.

Explore the series at: [ucanr.edu/insights](http://ucanr.edu/insights)

*“As California faces its worst drought in decades, water supply and quality for agricultural, urban, and environmental systems has become one of our biggest challenges. UC’s California Institute for Water Resources is vital to integrating California’s research, extension, and education programs to help mitigate the current problem and develop practical long-term solutions.”*

Secretary Karen Ross, California Dept. of Food & Agriculture  
Secretary John Laird, California Natural Resources Agency

## The Confluence: Our New Blog

We have a new blog focused on California water issues. You can follow the blog at: [ucanr.edu/blogs/confluence](http://ucanr.edu/blogs/confluence). Read a few of our posts at the links below.

### 5 Key Facts about the California Drought—and 5 Ways We’re Responding to It *from Faith Kearns*

Drought has gripped much of the western U.S. this year, with a particular stranglehold in California. In 2014, the majority of the state was classified as experiencing “extreme” to “exceptional” drought. Even recent large storms, while welcome, have not made much of a dent in the state’s water deficit after several hot, dry years. This drought presents several complex, important issues... [READ MORE](#)

### California’s majestic trees are declining — a harbinger of future forests *guest post from Maggi Kelly, UC Berkeley*

Scientists in my native state of California were handed a gift: a trove of detailed information about the state’s forests taken during the 1920s and 1930s and digitized over the past 15 years.



Photo by Shufei Lei

When we compared this historical data – covering an area bigger than Great Britain – to current forests surveys, we found that California’s famed giant trees are suffering due to drier and warmer conditions.

This change to the forest landscape is important not only to the people of California. Large trees are huge sinks of carbon dioxide, provide habitat for many creatures and play a vital role in the water supply by, for example, providing catchment areas for snow. Forests that are denser with smaller trees are also more likely to burn...[READ MORE](#)

### The Art and Science of Waiting (for Rain) *from Faith Kearns*

California rancher Dan Macon knows firsthand that waiting can be an excruciating experience. As a small-scale sheep rancher in the foothills of the Sierra Nevada



Photo by Justin Wages

mountains, he has spent a lot of time waiting for rain during the state’s ongoing drought. Macon’s livelihood is tied to the land and particularly to water: a vital ingredient in creating the unique grasslands his animals depend on. Good-natured and thoughtful, he waits for rain and tries to get through with, as he puts it, a mix of “humor and commiseration.”

Kate Sweeny, an associate professor of psychology at University of California, Riverside, studies the kind of waiting that Macon is faced with—that is, waiting for uncertain news. As Sweeny writes, waiting for things that we can generally depend on like getting a table at a restaurant is vastly different from waiting for uncertain and unchangeable news such as a medical diagnosis...[READ MORE](#)