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Climate California
Stories from the front lines in the battle against climate change.

In this past year, drought parched the state, wildfire ripped through massive swaths of forest, and crops in the Central Valley suffered in a warmer winter.

All the while, the sea continues to rise, compromising California's iconic coastlines.

For California in all its natural diversity, this past year has been a portent of the effects of climate change.

Often spoken of in the future tense, climate change is happening now, according to the 2014 National Climate Assessment released by the federal government in May. The report links global warming over the last 50 years with human activities, including the burning of fossil fuels and the greenhouse gas emissions they produce.

Ironically, California leads the nation with its environmental standards and emissions regulations, but stands to lose in the short term. Combating greenhouse gases will require a level of international cooperation that is probably a long ways away.

In the meantime, scientists, scholars and government officials up and down the state are starting to take measures that reduce the impacts of climate change at local levels. Adaptation doesn't require large-scale governmental support, and can serve as a test case for larger projects that build a more resilient California.

"California is setting the agenda for the rest of the country to follow," said Norman Miller, a UC Berkeley climate scientist and member of the Intergovernmental Panel on Climate Change. "These things take time to propagate across the country."

This story is about those efforts – stretching already thin water resources, breeding plants that thrive in warmer weather, allowing smaller fires to prevent catastrophic wildfires and building natural barriers against surging seas.

Source list

2014 National Climate Assessment report
Katie Arkema, Stanford University
Dennise Baldocchi, UC Berkeley
Carolyn Ballard, USFS
Katharyn Boyer, San Francisco State
David Carle – Introduction to Fire in California
Leith Gardiner, Zaiger's Genetics
Mark Gold, UCLA
Kamyar Guivetchi, California Department of Water Resources
Lynn Ingram, UC Berkeley
Marilyn Latta, State Coastal Conservancy
Jeremy Lowe, ESA Associates
Norman Miller, UC Berkeley
Malcolm North, USDA/UC Davis
Randall Osterhuber, Central Sierra Snow Lab/UC Berkeley
Katherine Pope, UC Davis postdoc
Denise Tolmie, USFS
Simon Wang, Utah State University
Anthony Westerling, UC Merced
Minghua Zhang, UC Davis

CLIMATE CALIFORNIA



Stories from the front lines in the battle against climate change.

"If you try to pick anything out in nature you find it hitched to everything else in the universe."

—John Muir



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As California experiences its worst drought on record, the state takes a new look at conservation.

California may have grown up on a faulty assumption: the water we expect every year will always come.

About 35 percent of California's water comes from the snowpack in the Sierra Nevada mountains. In the winter a blanket of snow accumulates then gradually melts in the spring and summer, supplying the Central Valley and the rest of the state with water.

But in 2013, one of California's driest years on record, the warm winter meant more of that snow fell as rain in the mountains. With a snowpack level below 20 percent of normal statewide, the mountains didn't store that water – it ran right through to the streams.

"So you can kind of look at the snowpack as a temporary reservoir," said Randall Osterhuber, a researcher at the Central Sierra Snow Lab, a unit of UC Berkeley.

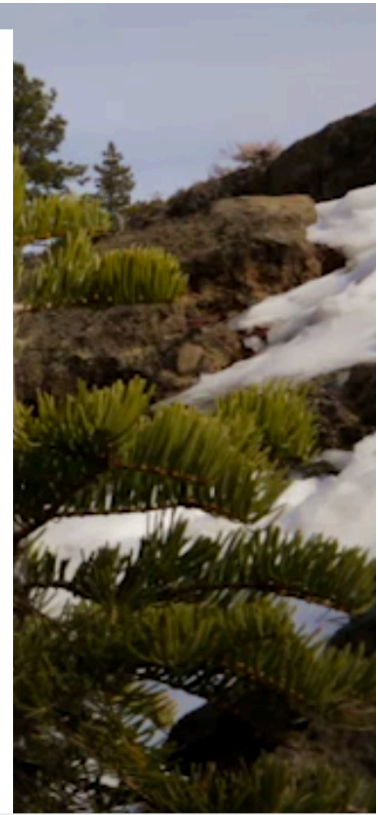
Scientists expect droughts will become more common as the planet warms. That raises the risk for wildfire and drying out the state's biggest industry: agriculture.

Both this year's drought and climate change has put a renewed focus on the frailty of California's water supply system – and on finding ways to conserve, capture and recycle water.

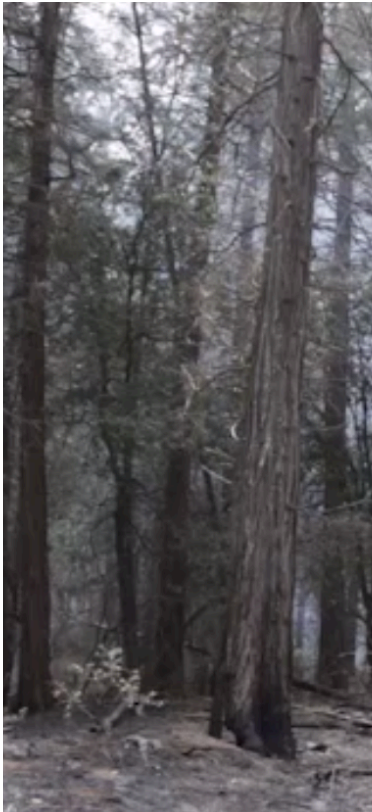
"It really comes down to using the water more wisely wherever it lands," Osterhuber said. "In a state like California, conservation should be the rule all the time. Some areas of the state get a lot of precipitation, but two-thirds of the state is very dry."

Osterhuber, who keeps tabs on the snowpack from his lab west of Lake Tahoe, said the mountain snow forms the basis of California's water delivery system.

The state relies on runoff from snowpack for water during its hot summers. From April through July, 15 million acre feet of water runs down from the mountains, delivering



RETURNING FIRE TO THE SIERRA



In the Southern Sierra, a group works to prevent a disaster like the Rim Fire in their forest. Using fire.

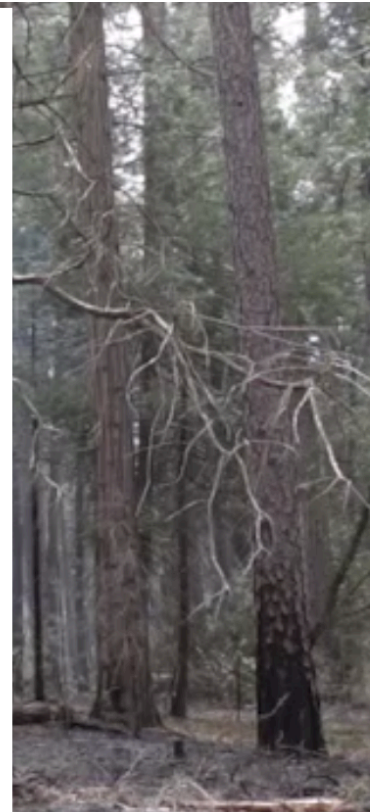
There's a serene silence in the forest, interrupted only by the occasional crackle of a burning tree. A gentle gust of wind catches the smoldering trunk and it erupts in flames. Carolyn Ballard, a United States Forest Service firefighter stands by, watching without alarm as smoke fills the canyon.

In the Sierra National Forest, this is a restorative process.



Carolyn Ballard walks through a cleared meadow in Dinkey Creek.

Over the course of her 30-year career, Ballard has seen the changes pile up in her



PRESERVING FRUIT IN A WARMING VALLEY

OYSTERS AND THE LIVING SHORELINE

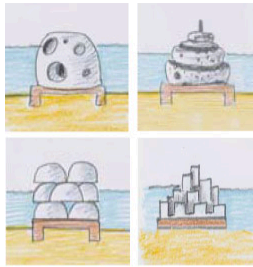
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mentary substitute for using pure cement, Latta said.

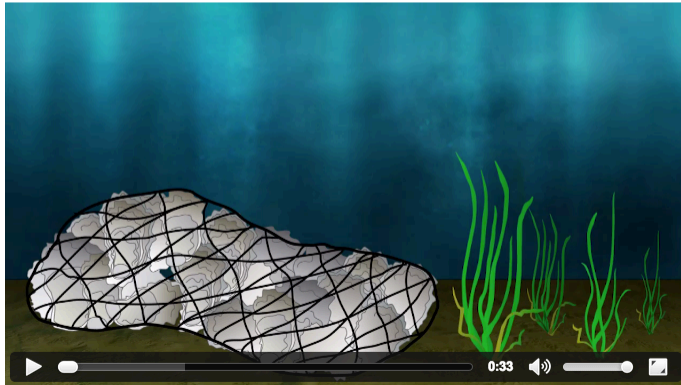


Sketches of the different artificial reefs by the Coastal Conservancy.

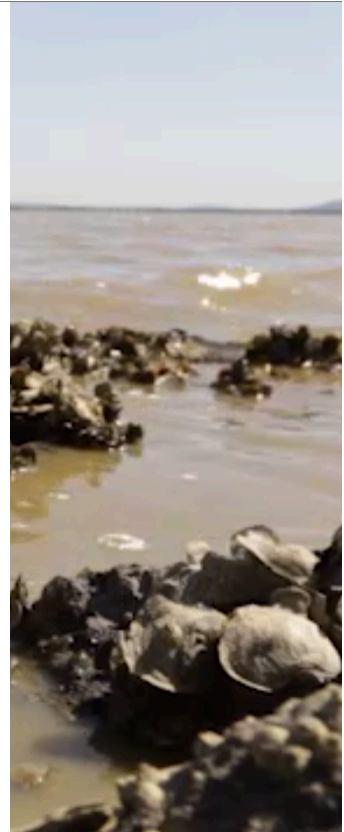
Scientists fashioned baycrete reefs shaped like domes, stacks of domes, “layer cakes” (cross-sectioned domes, stacked on top of each other), and “oyster blocks” – basically castles for oysters. Each configuration has a different surface area, horizontal and vertical spaces and varying amounts of hiding places for fish and invertebrates.

In San Rafael, plots of eelgrass are interspersed with oyster reefs. One goal of the project is to see how reefs and eelgrass beds combined can help protect the shoreline from erosion, Boyer said.

Eelgrass has roots that help stabilize the sediments on the bottom of the Bay. And filter-feeding oysters can improve water clarity, helping the eelgrass to grow, Boyer said.



See how oysters and eelgrass work together to help the San Francisco Bay ecosystem. (Art: Tracey Saxby)



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