

# California's Drought Could Upend America's Entire Food System

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On April 1, California Governor Jerry Brown stood in a field in the Sierra Nevada Mountains, beige grass stretching out across an area that should have been covered with five feet of snow. The Sierra's snowpack — the frozen well that feeds California's reservoirs and supplies a third of its water — was just eight percent of its yearly average. That's [a historic low](#) for a state that has become accustomed to [breaking drought records](#).



In the middle of the snowless field, Brown took an unprecedented step, [mandating](#) that urban agencies curtail their water use by 25 percent, a move that would save some 500 billion gallons of water by February of 2016 — a

seemingly huge amount, until you consider that California's almond industry, for example, [uses more than twice](#) that much water annually. Yet Brown's mandatory cuts did not touch the state's agriculture industry.

Agriculture requires water, and large-scale agriculture, like that in California, requires large amounts of water. So when Governor Brown came under fire for exempting farmers from the mandatory cuts — farmers use 80 percent of the state's available water — he was unmoved.

"They're not watering their lawn or taking long showers," he told ABC's "The Week" the Sunday after he announced the restrictions. "They're providing most of the fruits and vegetables of America to a significant part of the world."

Almonds get a lot of the attention when it comes to California's agriculture and water, but the state is responsible for a [dizzying diversity](#) of produce. Eaten a [salad](#) recently? Odds are the lettuce, carrots, and celery came from California. Have a soft spot for [stone fruit](#)? California produces 84 percent of the country's fresh peaches and 94 percent of the country's fresh plums. It produces 99 percent of the artichokes grown in the United States, and 94 percent of the broccoli. As spring begins to creep in, almost half of asparagus will come from California.

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"California is running through its water supply because, for complicated historical and climatological reasons, it has taken on the burden of feeding the rest of the country," Steven Johnson [wrote](#) in Medium, pointing out that California's water problems are actually a national problem — for better or for worse, the trillions of gallons of water California agriculture uses annually is the price we all pay for supermarket produce aisles stocked with fruits and vegetables.

Up to this point, feats of engineering and underground aquifers have made the drought somewhat bearable for California's farmers. But if dry conditions become the [new normal](#), how much longer can — and should — California's fields feed the country? And if they can no longer do so, what should the rest of the country do?

### **"It's Not Just A California Drought Problem, It's A Problem With Our Whole Food System"**

In 2014, some [500,000 acres](#) of farmland lay fallow in California, costing the state's agriculture industry [\\$1.5 billion in revenue](#) and 17,000 seasonal and part time jobs. Experts believe the total acreage of fallowed farmland [could double in 2015](#) — and that news has people across the country thinking about food security.

"When you look at the California drought maps, it's a scary thing," Craig Chase, who leads the Leopold Center for Sustainable Agriculture's Marketing and Food Systems Initiative at Iowa State University, told ThinkProgress. "We're all wondering where the food that we want to eat is going to come from. Is it going to come from another state inside the U.S.? Is it going to come from abroad? Or are we going to grow it ourselves? That's the question that we need to start asking ourselves."

The California Central Valley, which stretches 450 miles between the Sierra Nevadas and the California Coast Range, might be the [single most productive](#) tract of land in the world. From its soil springs [230 varieties](#) of crops so diverse that their places of botanical origin range from Southeast Asia to Mexico. It produces two thirds of the nation's produce, and, like Atlas with an almond on his back, [80 percent](#) of the world's almonds. If you've eaten anything made with canned tomatoes, there's a [94 percent chance](#) that they were planted and picked in the Central Valley.

Some crops will always be grown in California. The Napa Valley, where a history of earthquakes has resulted in 14 different microclimates perfect for wine, is a [truly unique place](#) for growing grapes. The [maligned almond](#) is a [great crop for California](#) — it needs brief, cold winters and long, dry summers, and produces more value than it uses water, something [rare](#) for crops. Realistically, there aren't many places in the world better suited to growing almonds than California.

But a lot of the things that California produces in such stunning numbers — tomatoes, lettuce, celery, carrots — can be grown elsewhere. Before the 20th century, the majority of produce consumed in the United States came from small

farms that grew a relatively diverse number of crops. Fruit and vegetable production was [regional](#), and varieties were dictated by the climate of those areas.

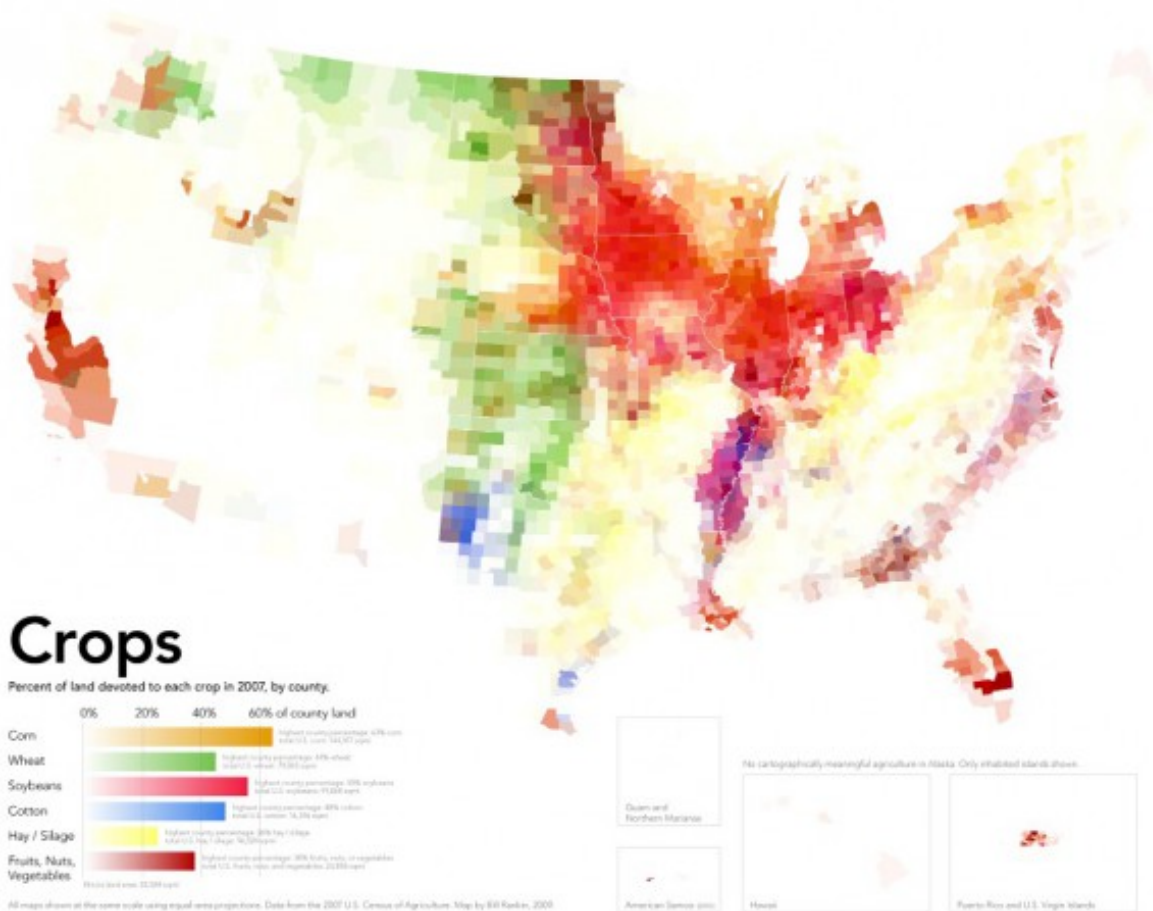
“There may be reason for the citrus and some of the nuts that are uniquely suited to the Mediterranean climate, but there’s no real reason that you have to produce all the fruits and vegetables. Those were grown other places before California came in,” John Ikerd, professor emeritus of Agricultural & Applied Economics University of Missouri Columbia, told ThinkProgress.

Ikerd, who taught agricultural economics before becoming an advocate for sustainable farming, grew up in rural Missouri, where he estimates that the majority of the food he ate came from within 50 miles of his home. At that time, the Midwest was still covered with small and mid-sized farms growing a diverse portfolio of crops. Ikerd described a tomato cannery in the town where he grew up, built to process the tomatoes grown in the farms from the surrounding area. Orchards, too, were once plentiful throughout the Midwest, growing apples and fruit for markets both local and national.

But the tomato canneries and the orchards that Ikerd remembers have largely disappeared, replaced by fields upon fields of corn and soybeans, commodity crops that government subsidies help make the quickest, fastest way to profit in the Midwest. From 1996 until the most recent version of the Farm Bill, farmers that grew commodity crops like corn and soil were actually prohibited from also growing specialty crops like fruits and vegetables on their land. Anyone who grew a specialty crop on land meant for subsidized commodity crops would have to [forfeit their subsidy and pay a penalty](#) equal to the market value of whatever specialty crop they grew, a policy that did little to discourage farmers in the Midwest from becoming large producers of one or two commodity crops. The U.S. government spent almost \$84.5 trillion dollars subsidizing corn between 1995 and 2012, and a good portion of corn crops does not make it to a plate, instead used as ethanol or feed for livestock.

Of the corn that is intended for consumption, much of it ends up as high fructose corn syrup, which is now so ubiquitous it encourages maximizing the yield of corn at the expense of agricultural diversity. From 2002 to 2012, the amount of land dedicated to growing the nation’s top 25 vegetables [fell from 1.9 million acres to 1.8 million](#). In the same amount of time, corn production grew from 79 million acres to 97 million.

“The deeper people look at it, they’ll see it’s a deeper part of the whole,” Ikerd says. “It’s not just a California drought problem, it’s a problem with our whole food system.”



A map showing where various crops are grown across the U.S.

CREDIT: [Bill Rankin](#)

In 2010, the Leopold Center at Iowa State University [ran some numbers](#) to figure out what would happen if a small stretch of Midwestern farmland — just 270,000 acres — was used to grow vegetables instead of corn or soybeans. They found that diversifying even that small amount of land — basically the amount of cropland in an average Iowa county — across six Midwestern states would yield almost enough produce to supply all the residents of Indiana, Illinois, Iowa, Wisconsin, Michigan, and Minnesota for the entire year.

But that conversion is easier said than done, according to Chase. Farming corn requires a completely different infrastructure than farming produce, and he doesn't see farmers jumping to replace their crops and machinery with California still capable of producing fruits and vegetables. Equipment for corn or soy farming can cost upwards of \$100,000, a financial commitment that encourages farmers to grow crops that are easy to plant and harvest with the machinery.

"It's not a land issue and it's not a soil quality issue," Chase said. "A lot of it is an infrastructure issue or a labor issue, particularly with those products that are so extremely labor intensive."

Matt Kroul, co-owner of [Kroul Farms](#) in Mt. Vernon, Iowa, explains that for farmers — stereotypically a stubborn bunch — changing what's grown can be difficult. Kroul farms 1,200 acres that have been in his family since the 1800s; for decades, his grandfather and grandmother farmed corn and soy, but the farm crisis of 1980 forced Kroul's father to diversify their enterprise. Today, the farm produces a mix of commodity crops and seasonal produce, which it sells both directly to consumers via markets and a farmstand, and to local restaurants. Kroul feels fortunate that the farm

was both small enough to be able to adapt to new crops and well-connected enough within the community to find a consumer base, but he acknowledges that in Iowa, this isn't the case for everyone.

"You'd love to see it change, you'd love to see consumers drive that market to push more local foods," Kroul said, but he worries that large-scale commodity farmers won't want to change what they've always done. "Farmers are going to continue to grow what they've always grown. It's a slippery slope in their mind to turn some acres over to vegetable and other growth."

But Ikerd believes that the system can — and must — adapt to changing conditions. He remembers a time when fruit trees dotted the Midwest, and he also remembers watching as they were steadily replaced by large operations growing corn or soy or both. The system we have now, Ikerd says, was all built in the last 50 years. And he thinks a more sustainable system could be put in place just as quickly.

## **"This System Was A Fantasy"**

Why do we grow so much of our produce in one place? And why California?

"There's plenty of good soil elsewhere," Richard Walker, professor emeritus of geography at the University of California, Berkeley, told ThinkProgress. "But it's the ability to put water on [that soil] over a long, dry summer that allows you to get very quick results."

When it comes to irrigation, California is a powerhouse. Some [9 million acres](#) of farmland are irrigated each year, making California the state with the [second-largest](#) amount of irrigated land (behind Nebraska).

But it wasn't always like that. Back in the early days before California's modern agriculture — during the mining boom of the mid-1800s — the state's primary crops were [wheat and corn](#). Farmers grew the grain without irrigation, finding that California's short, rainy winters, long, hot summers, and nutrient-rich soil created the perfect growing conditions without the need for extra water. By the 1890s, however, the intense grain industry had depleted the soil, and California's farmers were forced to find another crop.

With a Mediterranean climate, California has always been particularly well-suited to growing produce. Toward the turn of the 20th century, fruit and vegetable production in the state exploded in growth, helped along by the transcontinental railroad, which could carry California's produce — fresh, frozen, or canned — to East Coast markets where it fetched a handsome price. Between the 1880s and the 1930s, the amount of cropland dedicated to fruits and vegetables increased ten times over — and most of that depended on irrigation.

At first, irrigation projects were small, created by organizations of farmers banding together to build small local dams on small local rivers. By the 1930s, Walker says, all the best, most naturally fertile land had been developed — but demand for [dependable year-round produce](#) was only increasing, thanks to the rise of supermarkets and [shrewd advertising](#) from California agribusiness. So, farmers turned their eyes to something bigger.

"A water system grew with the rise of the state to economic prominence, from individual projects to irrigation districts and colonies to state-engineered projects," Steven Stoll, associate professor of history at Fordham University, told ThinkProgress. "Their rising political power ensured that they would get the water they needed — no matter what."

These big projects — sponsored by both the state and federal government — brought water to unexpected places, like the [Westlands](#), a barren area southwest of Fresno that has historically received around eight inches of rain annually. By most accounts, the Westlands could be classified as a [desert](#). It was instead transformed into farmland by funneling water in from San Joaquin-Sacramento River Delta to meet the demands of industry.

"But here is the point — the water existed. It flowed out of the Sierra up and down the Central Valley. It only needed to be captured, stored, and directed," Stoll says. The [Westlands became farmland](#) at a certain point in the history of California agriculture where massive engineering projects were the solution to any problem. As long as water

continued to flow from the Sierras, human ingenuity — and water from the Sacramento and Colorado Rivers — was all that was needed to bring that water to the fields.

“Human societies for the last 10,000 years have arisen on that same assumption — climatic stability, the continuation of certain trends indefinitely,” Stoll says. “No one could have known, or only few did, that fossil fuels had the capacity of changing those conditions.”

As Walker sees it, California agribusiness, for a long time, has dealt with problems through engineering. But now — after a century of diverting rivers — there’s simply [less surface water](#) to work with.

“It turns out that you can’t overcome all the problems with engineering,” Walker says. “You don’t even need climate change to know that this system was a fantasy.”

Alongside surface water, farmers can access [groundwater](#), natural aquifers that have been soaking up water that falls in California — as rain or as snow — for thousands of years. Within the complicated web of water rules in California, groundwater is a complete free-for-all — anyone who taps it can use it.

In an average year, water from underground aquifers supplies California with 30 to 40 percent of the state’s water supply — in drought years, that number jumps to 60 percent. This year, that number [could be as high as 75 percent](#).

But groundwater takes thousands of years to fill up, and California farmers are being forced to drill deeper and deeper — sometimes thousands of feet into the Earth — to find groundwater for their farms. That deep drilling is [beginning to mar the California landscape](#), lowering water tables and causing the ground to sink. Shallow wells are being sucked dry by those with the resources to drill deeper, and communities are being deprived of their groundwater safety nets. [According to](#) the New York Times, the depletion of groundwater has terminally damaged California’s soil, lessening its ability to reabsorb and store water in the future.

Last fall, the California legislature addressed the problem of overpumping groundwater, passing a bill that forces communities to regulate the extraction of water from underground aquifers. It was [a big moment](#), the first time in the state’s history that anyone had dared to place restrictions on groundwater use. But it was also a bill that, in a lot of ways, fell short of actually fixing the problem: communities are given years, decades even, to formulate their plans for replenishing and conserving groundwater, meaning that many of the effects of the bill won’t be felt until 2040.

“There’s no more water in the system,” Walker says. “That’s what they have to realize. Where’s the water you’re going to pump this year? It’s not there.”

## **Taking Pressure Off California With A Regionalized Food System**

In 2013, the USDA published a report looking at the impact of climate change on the United State’s agriculture — a comprehensive overview of available literature meant to serve as an input to the National Climate Assessment. Climate change, the report concluded, would fundamentally alter the way that crops and livestock are raised in this country. Crops that depend on irrigation would be especially vulnerable as both increasing temperatures and changing precipitation patterns place stress on water resources.

“Some U.S. agricultural systems, such as those currently operating at their southern marginal limit or those that currently depend on irrigation, will have to undergo more transformative changes to remain productive and profitable,” the report read.

California has a finite amount of water to split between a seemingly infinite number of needs: from drinking water to residential lawns, swimming pools to protected streams, almond trees to alfalfa sprouts. For decades, irrigation and ground water have been enough to transform otherwise unsuitable areas into productive farmland. The Midwest could specialize in commodity crops because specialty crops could be — and were — grown easier elsewhere.

Climate change is altering that balance. Though evidence connecting the current drought to climate change is the subject of debate, studies show that man-made climate change certainly won't help the situation. A [recent study](#) out of Stanford found that human emissions increase the probability of the low-precipitation, high-temperature conditions that have made this drought so tough. Another study from NASA also found that if emissions continue to increase, the American Southwest has an 80 percent chance of facing a [multi-decade megadrought](#) from 2050 through the end of the century.

Mike Hamm, director of the Michigan State University Center for Regional Food Systems, hopes that those projections — of more frequent and longer-lasting droughts — don't come true. He hopes that California can still produce as many fruits and vegetables in 30 years as it does now — but he also thinks that, to safeguard our food system, we need to move toward a more regionalized system of production.

“We need California production as long as and as much as it can be contained, and we need to regionalize production of fruit and vegetables as much as we can, in part to take water pressure off of California and in part to take pressure off of developing countries where we get fruits and vegetables from,” Hamm told ThinkProgress. Michigan, Hamm says, is already fairly well-situated for regional, diverse produce. Places like Iowa, that have seen their land consumed by large commodity farms, would face a more difficult transition.

“They neither have the land that is producing it, nor do they have the human capital,” Hamm says. “On the other hand, historically, in a place like Iowa, they had a very diverse agriculture with a lot of fruits and vegetables, which says that they have the climatic and environmental capacity to do it.”

To switch from a single crop to a diverse portfolio might seem daunting, but it's change that has already begun to happen elsewhere. Thirty years ago, late spring would have signaled the beginning of the growing season for the most predominant crop in western North Carolina: tobacco, which had been grown in the region since the [late 1600s](#). Federal quotas [instated](#) as part of the New Deal assured farmers a minimum price for their product in exchange for a set yield, a program that gave small farmers a measure of security for growing a high-value but labor-intensive crop. In 2002, the tobacco industry in North Carolina [accounted for \\$800 million](#) — roughly 12 percent of the state's agricultural revenue.

That all changed in 2004, when quotas were [phased out](#) as part of a President George W. Bush's American Jobs Creation Act.

“It was a big change, like a hurricane coming through,” Charlie Jackson, executive director of the Appalachian Sustainable Agriculture Project (ASAP), told ThinkProgress, explaining that three decades ago, western North Carolina had some 7,000 tobacco farms — according to the 2012 census, that number is down to 94.

But farming didn't disappear in western North Carolina — instead, it transitioned, diversifying to produce fruits and vegetables for local markets with the help of ASAP. From 2002 to 2012, the number of farms in the area fell from 12,212 to 10,912, but the number of farms selling produce directly to the local community increased from 740 farms to 1,190. Instead of sales dropping with the decline of the tobacco industry, sales to consumers actually grew over \$5,000 during that time. According to an ASAP report, by switching from tobacco to produce, farmers in the southern Appalachia's could provide local communities with [almost 40 percent](#) of their yearly fruit and vegetable needs.

If the tobacco quotas had remained in place, Jackson says, the switch to regional produce farming might have been slower. “My guess is that there would still be a lot of farms growing tobacco,” he said.

Western North Carolina, in a way, was already primed for the transition to supplying diverse produce to the region. Because of the area's mountainous geography, farms were already small, and they occupied different climatic regions, from 1,000 to 5,000 feet in altitude. Farmers in North Carolina hadn't invested hundreds of thousands of dollars in specialized farming infrastructure, so they were more free, in a sense, to adapt to the changes ushered in by the end of tobacco quotas.

“It’s really an interesting thing, where something that could have been disastrous ends up being transformative,” Jackson said.

So will the California drought be disastrous, or transformative? Ask John Ikerd what he thinks, and he leans toward transformation.

“I’m not really pessimistic. If we decide we want to change agriculture, I think it’s quite conceivable that we can recreate this whole food system,” he said. “We just need to wake up to the fact that we’ve got a problem and start working on it. Once we do that, the solutions are there.”

**Tags:**