



# How Arizona cotton is fueling the West's water crisis

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State Route 87, the thin band of pavement that approaches the mostly shuttered town of Coolidge, cuts through some of the least hospitable land in the country. The valley of red and brown sand is interrupted occasionally by rock and saguaro cactus. It's not unusual for summer temperatures to top 116 degrees. And there is almost no water; this part of Arizona receives less than nine inches of rainfall each year.

Then Route 87 tacks left and the dead landscape springs to life. Barren roadside is replaced by thousands of acres of cotton fields, their bright, leafy green stalks and white, puffy bolls in neat rows that unravel for miles. It's a vision of bounty where it would be least expected. Step into the hip-high cotton shrubs, with the soft, water-soaked dirt giving way beneath your boot soles, the bees buzzing in your ears, the pungent odor of the plants in your nostrils, and you might as well be in Georgia.

Getting plants to grow in the Sonoran Desert is made possible by importing billions of gallons of water each year. Cotton is one of the thirstiest crops in existence, and each acre cultivated here demands six times as much water as lettuce, 60 percent more than wheat. That precious liquid is pulled from a nearby federal reservoir, siphoned from beleaguered underground aquifers and pumped in from the Colorado River hundreds of miles away. Greg Wuertz has been farming cotton on these fields since 1981, and before him, his father and grandfather did the same. His family is part of Arizona's agricultural royalty. His father was a board member of the Central Arizona Water Conservation District for nearly two decades. Wuertz has served as president of several of the most important cotton organizations in the state.

But what was once a breathtaking accomplishment — raising cotton in a desert — has become something that Wuertz pursues with a twinge of doubt chipping at his conscience. Demand and prices for cotton have plummeted, and he knows no one really needs what he supplies. More

importantly, he understands that cotton comes at enormous environmental expense, a price the American West may no longer be able to afford.

Wuertz could plant any number of crops that use far less water than cotton and fill grocery store shelves from Maine to Minnesota. But along with hundreds of farmers across Arizona, he has kept planting his fields with cotton instead. He says he has done it out of habit, pride, practicality, and even a self-deprecating sense that he wouldn't be good at anything else. But in truth, one reason outweighs all the others: The federal government has long offered him so many financial incentives to do it that he can't afford not to.

“Some years all of what you made came from the government,” Wuertz said. “Your bank would finance your farming operation ... because they knew the support was guaranteed. They wouldn't finance wheat, or alfalfa. Cotton was always dependable, it would always work.”

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The water shortages that have brought California, Arizona and other Western states to the edge of an environmental cliff have been attributed to a historic climate event — a dry spell that experts worry could be the worst in 1,000 years. But an examination by ProPublica shows that the scarcity of water is as much a man-made crisis as a natural one, the result of decades of missteps and misapprehensions by governments and businesses as they have faced surging demand driven by a booming population.

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The federal subsidies that prop up cotton farming in Arizona are just one of myriad ways that policymakers have refused, or been slow to reshape laws to reflect the West's changing circumstances. Provisions in early-20th-century water-use laws that not only permit but also compel farmers and others to use more water than they need are another. “Use It or Lose It” is the cynical catch phrase for one of those policies.

Western leaders also have flinched repeatedly when staring down the insatiable, unstoppable force of urban sprawl. Las Vegas authorities have spent billions of dollars inventing new ways to bring water to their ever-expanding city, yet could not cite a single development permit they had ever denied because of concerns about water.

Instead, when faced with a dwindling water supply, state and federal officials have again and again relied on human ingenuity to engineer a way out of making hard choices about using less water. But the engineering that made settling the West possible may have reached the bounds of its potential. Dams and their reservoirs leak or lose billions of gallons of water to evaporation. The colossal Navajo Generating Station, which burns 22,000 tons of coal a day in large part to push water hundreds of miles across Arizona, is among the nation's biggest greenhouse gas polluters, contributing to the very climate change that is exacerbating the drought.

Few crises have been more emphatically and presciently predicted. Almost 150 years ago, John Wesley Powell, the geologist and explorer, traveled the Colorado River in an effort to gauge America's chances for developing its arid western half. His report to Congress reached a chastening conclusion: There wasn't enough water to support significant settlement.

For more than a century, Americans have defied Powell's words, constructing 20 of the nation's largest cities and a vibrant economy that, among other bounties, provides an astonishing proportion of the country's fruit and vegetables.

For almost as long, the policies that shaped the West have struggled to match the region's ambitions — endless growth, new industry, fertile farming and plentiful power — to its water supply.

Today, as the Colorado River enters its 15th year of drought, the nation's largest reservoirs have been diminished to relative puddles. Power plants that depend on dams along the river face shortages and shutdowns that could send water and electricity prices skyrocketing. Many of the region's farmers have been forced to fallow fields.

The still-blooming cotton farms of Arizona are emblematic of the reluctance to make choices that seem obvious. The Wuertz family has received government checks just for putting cottonseeds in the ground and more checks when the price of cotton fell. They have benefited from cheap loans for cotton production that don't have to be fully repaid if the market slumps. Most recently, the government has covered almost the entire premium on their cotton crop insurance, guaranteeing they'll be financially protected even when natural conditions — like drought — keep them from producing a good harvest.

The payments, part of the U.S. Farm Bill, are a legacy of Dust Bowl-era programs that live on today at the urging of the national cotton lobby and the insurance industry. Similar subsidies support corn, rice, wheat and, indirectly, alfalfa — all of which also use lots of water. But in Arizona one of the driest states in the nation, it's cotton that has received the most federal aid, tipping the balance on farmers' decisions about what to plant. Over the last 20 years, Arizona's farmers have collected more than \$1.1 billion in cotton subsidies, nine times more than the amount paid out for the next highest subsidized crop. In California, where cotton also gets more support than most other crops, farmers received more than \$3 billion in cotton aid.

Cotton growers say the subsidies don't make them rich but help bridge the worst years of losses and keep their businesses going. And because the money is such a sure thing, they have little choice but to keep planting.

"If you're sitting on land and thinking of shifting, cotton is safer," said Daniel Pearson, a senior fellow of trade policy studies at the Cato Institute.

Growing cotton in the desert, long term, may be doomed. In Arizona, the price for cotton has been in decline, and with it the overall planting of the crop. But when the price spikes, as it did dramatically in 2010, the growers get busy. One thing has yet to change: the government's willingness to back and protect those still wanting to be cotton farmers.

For years, the federal support came through subsidies and price protection cash put directly in the farmer's pocket. In Arizona, those payments could total tens of millions of dollars a year. Today, the government's aid comes chiefly in the form of insurance subsidies — reliable and robust protections against losses that many farmers and their lobbyists hoped would be every bit as effective as cold cash. And so every year more than 100,000 acres of cotton still get planted, making the crop the second-most popular in the state.

Thus, at a time when farmers in Arizona, California and other Western states might otherwise adapt to a water-short world, federal farm subsidies are helping preserve a system in which the thirstiest crops are grown in some of the driest places.

“The subsidies are distorting water usage throughout the West and providing an incentive to use more water than would be used in an open market,” said Bruce Babbitt, Arizona's former governor and a former U.S. Secretary of the Interior.

One night last October, in the weary twilight of the cotton harvest, Greg Wuertz nestled his white Chevy pickup by the mailboxes at the head of his street. Opening a small aluminum door, he removed an envelope containing a \$30,000 insurance payment on a policy paid for by the U.S. Department of Agriculture. Easy money, to be sure, but it left Wuertz uncertain.

“This kind of way of life in the West, it's got to be different,” he said. “Water is going to be the oil of the 21st century and it should go to the best use. Right now, I don't know if we're doing that.”

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Cotton might never have been grown in Arizona without some form of government enticement. During the Civil War, a Union blockade impounded the Southern states' global exports. As Europe turned to new strains of cotton grown in Egypt, Arizona's settlers, knowing the Pima Indians had long planted cotton there, thought they could replicate hot and dry North African conditions and compete. Townships reportedly offered cash to farmers willing to pioneer commercial-scale crops, according to a local historical account. Arizona's first cotton mogul was said to be a blacksmith who abandoned his trade to take the subsidies and try farming.

Arizona, at the time, was short on people and long on land. It was also rich in freshwater aquifers, groundwater that then seemed ample enough to irrigate vast fields and turn the desert into an oasis.

When the United States first went to war in Europe, the demand for cotton surged. The fibers were used to reinforce truck tires and canvas airplane wings. The Goodyear Tire and Rubber Company bought thousands of farm acres and built a factory west of Phoenix, where a city by the name of Goodyear still stands. Farmers flocked to the state in search of opportunity.

In 1929, Wuertz's grandfather packed the family's belongings into their old Buick and drove down from South Dakota. He strung up tents on 160 acres, six miles outside Coolidge, and planted his first rows of cotton in the months before the Great Depression. By the 1950s, cotton

farming had been woven into the state's identity; Arizona schoolchildren learned about the "Five C's": cattle, copper, citrus, climate and cotton.

Draw a sagging line today from San Francisco to Washington, D.C., and every state below it grows cotton. The United States is the world's largest exporter, with 17 states producing some eight billion pounds of cotton each year, most of which gets shipped off to Asia and Europe.

California and Arizona are able to produce more than twice as much cotton on each acre they plant as can cotton powerhouses like Texas and Georgia because they irrigate their fields more often. But that also means that they use two to four times as much water per acre.

From almost the beginning, Arizona's cotton farmers understood they were withdrawing from a finite account. "There was a sense the water would run out," said Wuertz's father, Howard, now 89. "You could tell there was going to be an end to it, even in the 1950s."

They've made it last, in large part, because as the aquifers beneath their feet were depleted, the state brought in new supplies, mainly from the Colorado River.

Today, Wuertz's irrigated cotton plants grow to about 4 feet tall, and are planted in even rows, about 3 feet center to center, extending for miles across furrowed fields. Every August, the bolls — pregnant pods just smaller than a golf ball — burst open, allowing their white cellulosic fiber to spring outward from hearty, splayed leaves and a small seed. Modern tractors, called cotton pickers, drive a comb through the fields, plucking the drying bolls from their stems and shooting them through a mechanical snorkel into a large basket being towed behind. Another basket, or "boll buggy," dumps the load into a compressor, which packs the cotton into a brick 8 feet tall and 32 feet long.

The brick is hauled through Coolidge to a local gin, where computerized modern machines roll it through a whirring conveyor, separating the seeds and fibers from their leaves and chaff. The seeds are collected for animal feed or crushed for cooking oil. The lint, cleaned and dried, is strapped into 500-pound bales and shipped off through distributors who either sell the cotton or store it in vast warehouses, waiting for prices to rise and the commodity markets to buoy the crop.

Between land costs, labor, equipment, shipping and other expenses, Wuertz said he spends about \$1,200 for every acre of cotton he harvests. His cotton has garnered about 62 cents per pound lately, so even if Wuertz gets four bales from each acre — a blockbuster harvest — he brings in about \$1,240 and barely breaks even.

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Cotton farmers can cut corners to try to eke out a profit, stretching their water, cutting back on fertilizer and making fewer laps with their tractors to save on diesel. But in years when the price is lower, water is short or demand plummets, they'll lose money. This is when they count on federal subsidies and the crop insurance programs. If Wuertz needs an advance until his cotton is bought, the government lends it to him. If he can't sell his cotton at a profit, the government

never asks for its money back. If the price falls below a base of around 52 cents, Wuertz is insured for much of the decrease in value. If his fields produce a light yield — perhaps because he couldn't give them enough water — he's covered for the difference in weight, too. Other crops get subsidized insurance and loans, but none, Wuertz said, are covered as thoroughly as cotton. Add it all up, and the message from the Farm Bill is clear: Grow cotton and you will not be harmed.

“If they didn't have insurance, it would be ugly around here,” Wuertz said. “It'd be the rope and chair. There'd be people killing themselves. It's that bad.”

Standing in his field last fall, Wuertz cupped a tuft of cotton about the size of a softball and mused over its miraculous origins.

He gets about one-quarter of his water from the Central Arizona Project, or CAP, the system of canals that brings water from the Colorado River, some 230 miles away. The rest comes from a federally built reservoir nearby called San Carlos Lake, which, with the drought, has been diminished to little more than a bed of mud.

“There comes a time when you have to leave some to keep the fish alive,” Wuertz said wryly.

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Wuertz loves to farm cotton. Fingering the plant's thorny, rose-like leaves, he explains the difference between hirsutum, what Arizonans call Upland, or short staple cotton used for everyday clothes, and barbadense, the long-fiber Pima cotton used in high-end sheets and expensive textiles. He is stocky, wearing jeans, cowhide boots, a blue-striped button-down shirt and a broad-rimmed white cowboy hat that shields his face from view as he talks. Every 10 days, he explains, he releases his ditch gates and floods the furrows, using an irrigation technique hundreds of years old, until the roots of his plants are submerged ankle deep. If he were to do it all at once, the water Wuertz spends to produce one acre of cotton would stand 4 feet deep. The ditches flow with hundreds of millions of gallons of water every year.

For the last third of a century, Wuertz was supplied prodigious amounts of water, largely because Arizona was pushing its farmers to use as much as they could. The state's run on water began in the 1970s, when Arizona planned its mega canal in order to lay claim to its full share of water from the Colorado River. The canal would bring more water than the state needed at the time, ultimately supplying future urban expansion as its cities and economy grew. But in the short term, Arizona had to justify the canal's \$4.4 billion federally subsidized construction cost by demonstrating to Congress that it had a plan to put all that water to use right away.

The state's aquifers had been drawn down so much that, in places, the land had begun to settle above them. The canal project looked like a way to wean Arizona's farmers off ground water, using river water to replace it. It looked good on paper until 1993, when the Central Arizona Project canal was completed. The cost of construction plus the cost of the power needed to pump

the water made CAP water more expensive than what farmers could pump cheaply from underground. In a bind, state and federal officials slashed the price — subsidizing nearly half the true cost of the water and charging farmers just a fraction of its value to get them to use more of it.

For a while, the plan worked. Farmers made the switch, using government-subsidized canals and inexpensive power to nourish their farms for another generation. But the farms were little more than a place holder in the state's grand plans. It was understood that as cities grew, farming in Arizona would have to change. Much of the cotton, alfalfa, wheat and citrus would eventually need to be grown somewhere else as the water from CAP was switched to supply urban areas.

“That was the deal that was struck to induce agriculture to go out of business,” said Jon Kyl, the former three-term senator and four-term congressman from Arizona.

But the transition hasn't been completed, in part owing to the farm subsidies that have delayed change. And now the state's intricate water supply plan is beginning to crumble.

Drought has diminished the Colorado's flow so much that federal officials — who control water deliveries on the southern half of the Colorado — now predict they will have to cut the state's water deliveries through the CAP canal as soon as next year, potentially eliminating much of the farmers' share. Meanwhile, loopholes in laws designed to conserve aquifers for exactly this situation have allowed housing developers and others to draw down resources that were supposed to be protected.

The water needs of Arizona's cities are surging. The state's population — less than two million in 1970 — has ballooned to more than three times that and is expected to reach 11 million within the next 30 years, turning the state into what the Morrison Institute for Public Policy at Arizona State University has described as a “megalopolis.”

Last year Arizona officials forecast the state could run out of water within a few decades.

“The shortages projected hitting municipal customers are really in the 2026 time frame,” said Thomas Buschatzke, the director of Arizona's Department of Water Resources, as if a 10-year cushion was supposed to be reassuring.

Land use statistics show that acres of irrigated farmland in Arizona have decreased over the past few decades, and since 1985 they've dropped by more than half in the area around Phoenix. The Wuertz family sold a chunk of its fields to home developers in 2009.

But the patterns of agricultural water use make clear that it's not just how many acres of land are planted there, but what is grown on them.

Cotton's domestic benefits are questionable. After a price spike in 2010, production of cotton surged while global demand — and prices along with it — plummeted. Today, China, the world's largest cotton producer, has enough cotton in warehouses to stop farming for a year. And Texas, the U.S.'s largest producer, harvests enough to cover more than one third of U.S. exports

alone, relying largely on natural rainfall, not irrigation, to do it. Wuertz's cotton — produced with Arizona's precious water — is likely to get stacked in cavernous warehouses until the marketing cooperative he uses finds new customers. If Arizona stopped farming cotton tomorrow, Wuertz said, he's not sure anyone would notice.

This underscores questions about whether continuing to grow these water-hogging crops at their current levels is in the public interest, and whether such an important pillar of U.S. economic policy as the Farm Bill should continue to champion them.

“The basic question is how are you going to manage your water supply? And we have managed it in a way that has subsidized agriculture,” said John Bredehoeft the former manager of the western water program for the U.S. Geological Survey, referring not just to subsidies for crops like cotton, but also the support for crops like alfalfa that are grown as feed. “If you look at the fact that half of the water use in the West is to raise cows — can you say, 'Hey, we've got a water shortage in the West?'”

First established as a New Deal program to rescue farmers during the Great Depression, today's unwieldy version of the U.S. Farm Bill wraps everything from food stamps to sugar imports into one 357-page, nearly \$1 trillion law.

The measure allots about \$130 billion over 10 years to protect farmers against price drops, bad weather and bad luck and to insure them against virtually any scenario that gets in the way of turning a profit.

No American law has more influence on what, where and when farmers decide to plant. And by extension, no federal policy has a greater ability to directly influence how water resources are consumed in the American West.

Until this year, the bill doled out direct subsidies for a full menu of crops. Every farmer planting commodities, including those planting cotton, got \$40,000 just for signing up.

Then there are the steeply discounted business loans, which have a measurable impact on what farmers decide to plant. In many cases, to be eligible for these subsidies one year, a farmer has to have previously planted the crop — a basic component of the bill's architecture that gives farmers an incentive to maintain “base” levels of acreage. In an analysis, the Congressional Budget Office found that the subsidies don't just maintain the status quo, they also foster more planting, and more water use. The USDA's marketing loans alone, for example, led to a 10 percent increase in the amount of cotton farmers planted — compared to 2.5 percent increase in the amount of wheat, and a 1.5 percent increase in the amount of soybeans produced — in part because the subsidies not only make cotton a safer bet, they also make it more competitive against alternative crops. Banks lend cotton growers money they wouldn't lend for other crops, largely because they know the government will stand behind them.

All told, Wuertz estimates that nearly one-fifth of his income is derived from Farm Bill aid, and cotton has almost always been his largest and most important crop. According to USDA statistics compiled by the Environmental Working Group, the Wuertz family — including his brother's



and father's farms — has received more than \$5.3 million in farm bill subsidies since 1995, a portion of which may have been targeted for efficient irrigation equipment, Wuertz said.

The Farm Bill has been used in the past to steer environmental policy. It provides for withholding money, for example, from farms that would contribute to soil erosion or the destruction of wetlands. In North Dakota, where farmers were tearing out grasslands to plant corn for ethanol production, the law contains “sodbuster” provisions withholding insurance benefits from those who rip up lands the government wants to conserve.

The Farm Bill contains \$56 billion for conservation, funding an effort to encourage farmers to reduce their water consumption by using more-modern equipment as well as measures meant to conserve land. Another section of the bill is aimed at saving energy. But the law's farming incentives run counter to its far more modest water conservation initiatives.

“There is a real disconnect between that and what the commodity and crop insurance program are promoting, and that's a basic conflict,” said Ferd Hoefner, the policy director at National Sustainable Agriculture Coalition, based in Washington, D.C.

The Farm Bill's authors have sometimes factored in environmental concerns in specific places and tailored incentives to affect them, Hoefner said. But when it comes to cotton, the bill does not consider the related water use, and it does not distinguish between the places where it is grown. Instead, the money corresponds roughly to the amount of cotton harvested; Arizona, which ranks in the middle in terms of its cotton production, also ranks 10th among the 17 states that receive cotton aid. California, which ranked third for overall cotton production in 2013, also ranks third in subsidies over the last 20 years according to data collected by the Environmental Working Group. It's in those places that the incentives created by the subsidies are most in conflict with the government's aid to conserve water.

“Trying to get USDA to break down the silos is difficult,” Hoefner noted.

The Congressional Budget Office attacked this disconnect in 2006, urging the USDA to stop supporting agricultural products that act to “impede the transfer of water resources to higher value uses,” and “encourage the use of water.” Analysts advised the USDA to enhance its conservation programs, align its subsidies with those conservation efforts, and stop paying for infrastructure that makes water artificially cheap.

Every six years or so Congress has the opportunity to revisit its Farm Bill policies and update the bill. When Congress reauthorized it in 2014, however, lawmakers changed, but did not retreat in their support for cotton farming in the Southwest, despite growing awareness of the persistent water crisis in the Colorado River basin.

Instead, legislators allowed the cotton industry to write its own future. Faced with international trade pressures and allegations that subsidies — like payments triggered by price drops — were distorting the market, U.S. cotton trade associations lobbied to ramp up the USDA's insurance program.

Rather than paying direct subsidies to cotton farmers, starting this year the USDA will use taxpayer dollars to buy farmers additional crop insurance. Policies that once covered up to around 70 percent of farmers' losses can now be supplemented with new coverage covering up to 90 percent, cushioning the shallowest of losses. The lucrative marketing loan program that serves as a sort of price guarantee also remains in place.

Right now, though, the stubbornly low price of cotton is making Wuertz nervous that the new, enhanced insurance program won't deliver the same revenues as the old direct subsidies. He's temporarily cut back, then, planting less cotton this year and only the most valuable strains.

Still, the more than 161,000 acres of cotton that were planted in Arizona in 2013 accounted for almost one out of every five acres of the state's irrigated farmland. Many believe the insurance program is likely to keep the practice going because it limits most — if not all — downsides, encouraging farmers to take big chances with limited resources.

“If I knew my 401k was guaranteed to not fall below 85 percent of its current level and there was no limit on the upside,” said Craig Cox a senior vice president at the Environmental Working Group, who was a former staff member for the Senate committee on Agriculture, Nutrition and Forestry, “my portfolio would be a lot riskier than it is.”

If the Farm Bill reshuffled its incentives, water policy experts say, farmers in states that draw on the Colorado River could reduce their water usage substantially, adding large amounts back into the region's budget.

According to research by the Pacific Institute, simply irrigating alfalfa fields less frequently, stressing the plant and slightly reducing its yield, could decrease the amount of water needed across the seven Colorado River basin states by roughly 10 percent. If Arizona's cotton farmers switched to wheat but didn't fallow a single field, it would save some 207,000 acre-feet of water — enough to supply as many as 1.4 million people for a year.

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“There is enough water in the West. There isn't any pressing need for more water, period,” Babbitt said. “There are all kinds of agriculture efficiencies that have not been put into place.”

Today Wuertz lives with the deep uncertainty that comes with a transition he can no longer control. He told his son, Thomas, 24, that there is no future in cotton farming. He says that if Arizona farmers keep planting cotton, farming itself may be in jeopardy. But knowing that and acting on it have so far been different beasts, and Wuertz finds himself resistant to change. He tried growing more cantaloupe but had difficulty finding buyers who would take the time-sensitive crop before it rotted. He's planting some acres he used to plant with cotton with alfalfa instead, but that uses even more water, though it commands a premium price.

In the end, Wuertz said he doesn't know how to grow other plants as well as he knows cotton. He's been a gin director, president of the Arizona Cotton Growers Association, head of the

Arizona Cotton Research and Protection Council. His identity is wrapped up in those prickly bolls out in his fields.

“When I quit cotton all of that goes away. Ninety percent of my life is gone. It doesn’t mean a damn thing,” he said. “I’m just not ready to do that yet. And it’s not to say I won’t get there.”