

Exporting Water: Almonds, Cattle, and California Agriculture in the Era of Climate Cataclysm

Bill Barclay

A Tale of Two Milkshakes

A few months ago, after a hike on a hot day, I decided to get a milk shake – at my local Ben and Jerry’s ice cream parlor. I asked the barista for an espresso caramel shake. She said, “We don’t have any milk.” At Ben & Jerry’s no less! But she said I could have one made with almond milk. I’d heard of almond milk, of course, but had never tried it in a shake. I said, “Go ahead.” I got the shake, drank it, and it was fine.

But then I looked up almonds. Living in California, I knew we were a big producer of almonds. Turns out we are the only commercial almond-producing state in the United States, and we produce over 80% of almonds globally.

Now, almonds are among the best foods you can eat: they are relatively low in calories; contain protein, fiber, vitamin E; are high in minerals; and may help control cholesterol. Some nutritionists have even suggested that if you could eat only one food, it should be almonds. And now, of course, almonds have made an appearance as substitute for cow’s milk, especially for the lactose-intolerant.

It is also the case that almonds are one of the most profitable crops to grow as well as California’s leading export crop by value. <https://88acres.com/blogs/news/water-footprint-of-seeds-vs-nuts>

But here’s the problem: Producing a pound of almonds requires over 900 gallons of water.

Almond production in California accounts for at least 10% of agricultural water usage in the state, more than the combined indoor water consumption of the Los Angeles and San Francisco metropolitan areas. <https://ecomotion.us/almond-farming-and-california-water/>

Well, OK. I’ll just get milk shakes using cow’s milk in the future. Since I’m not lactose intolerant, this sounds like a good option, right?

Or is it?

People may think of Wisconsin as “the dairy state,” but the value of California’s dairy production surpassed Wisconsin the early 1990s. Today one of every five dairy cows in the United States call California their home.

Now, the water demands of almonds, while high, do not top the water intensity table of major crops grown in the state. Alfalfa occupies that position, using less total water than almonds but

more per crop acre. Alfalfa is the favorite feed of dairy cattle producers because its high protein content increases the per animal annual milk output.

California, the Global Political Economy, and the Structure of Agrarian Production

Alta California, the Spanish territory that today includes the state of California and part of Nevada, was never a focus of the Spanish crown. It was also largely ignored by newly independent Mexico in the early decades of the nineteenth century. The population of Alta was small, and its economic output limited. Prior to the gold rush of 1848, there were fewer than 100,000 people counted in the California census (ignoring the estimated 100,000–200,000 indigenous population that was not counted).

Although the discovery of gold and the resulting rush of people to California led to it becoming a state in 1850, agriculture, not mining, structured California's incorporation into the global political economy as a commodity producer. The very success of that initial incorporation also drove its undoing and a fundamental reorganization of the social relations of California agriculture.

California Agriculture: Integration into the Global Political Economy

California's agricultural unit of production, aka farms and ranches, never resembled the family farm celebrated and mythologized by U.S. historians and politicians. Vast tracks of land had been granted to military leaders who had served the Spanish crown or, later, leaders in the Mexican war of independence. The earliest of these was the 1784 grant in today's Los Angeles County to Jose Maria Verdugo (Baker, p. 238). Unlike swaths of land in the Midwest and plains states, land in California was not readily available to the bulk of the population in the state, either during or after the period of Mexican control. Of equal importance, for much of the potential agricultural land in the state, access to water has always been a concern. Absent that access, the potential "bounty and blessing we call California Agriculture" remains locked away. (<https://www.cdfa.ca.gov/statistics/PDFs/2018-2019AgReportnass.pdf>)

During the eighteenth and much of the nineteenth century, the combination of huge estates and limited access to water made California agriculture primarily *extensive* in nature. The large land grants from Spain and later Mexico created an elite class of land owners known as Californios. On their huge ranchos, some more than 100,000 acres in size, the Californios raised cattle and other livestock that roamed over large, open spaces. Although the Spanish missions on the coast, using coerced labor, had constructed short canals to supply mission needs, including some fruit and vegetable production, irrigation was limited in scope and usage.

In the late 1700s and first half of the 1800s, the primary agricultural product was beef. But a series of droughts in the 1850s, dramatically reversed by the Great Flood of 1861–62, pushed the cattle-based economy to the brink of extinction. The Great Flood turned the Central Valley into

a giant lake. At least a quarter of the livestock died. The legislature fled Sacramento for San Francisco, and the state was forced into bankruptcy.

Although some of the Californios turned to sheep raising after the flood, the agricultural product that first integrated California into the global political economy was wheat, another extensive agricultural product that flourished on the large expanses of many ranchos. However, wheat production in California differed from that in the Midwest United States along three important dimensions.

- California wheat ranches were much larger than those in the Midwest;
- Labor rather than land was the scarce production input; and
- California wheat planting and harvesting was not constrained by cold winters.

Together these factors created a distinct agrarian political economy that integrated the state into the global trade in foodstuffs.

By the 1850s/60s, the beginning of significant wheat growing in California, much of the land granted to the Californios had passed, by hook or often by crook, into the hands of new settlers in the state. The huge scale of wheat ranches opened the possibility, and the relative scarcity of labor in the areas of the state that were conducive to wheat created the necessity, for application of labor-saving technology earlier than in the existing wheat-producing states. The world's first combined grain harvesters were pioneered in California in the 1880s, machines that were much larger than those that were later used in the Midwest. With its own machine shop capability, the Glenn Ranch, 66,000 acres in Colusa County (north of Sacramento), was perhaps the largest of these huge spreads.

Without ready access to new land for settlement and family farming, the labor input in California wheat production took the form of waged workers, foreshadowing the “factories in the fields” that characterized much of California’s agrarian economy in the twentieth century. Unlike the Midwest, the labor contribution of waged workers greatly exceeded that drawn from ranch family members.

California wheat growers did not have to worry about whether to plant winter or spring wheat, a decision driven by the extent of winter cold in the Midwest. With little or no rain for at least six months of the year, wheat harvesting and threshing faced few seasonal constraints. Machinery did not lie fallow for several months of the year, a further incentive to adopting labor-saving technology. The newly deployed agricultural machinery deployed by California wheat growers included a combined harvester/thresher that turned these distinct harvesting steps into a continuous flow process.

Almost from the beginning of the wheat-based agrarian economy, much of California wheat production was exported, primarily to European markets. The special hard, white California grain was actively traded on the Liverpool Corn Exchange. California was, in essence, an

agricultural commodity exporter, integrated into the global food economy through the wheat trade with Europe, especially the United Kingdom.

From Extensive to Intensive Agriculture

Wheat production dominated California agriculture, both domestically and in the global economy, until late in the nineteenth century. However, wheat growing in California exhibited all the problems of export-oriented, monocrop agriculture: failure to rotate crops, lack of adequate fertilizer, and no fallowing of fields. The result was predictable: soil productivity declined as it was drained of nutrients. Although wheat remained an important crop into the early twentieth century, by the mid-1890s, falling yields and increased competition from Canadian and Russian growers foretold the end to the wheat-led agrarian political economy. The very profitability of the wheat-led integration into the global foodstuff trade created a short-term time horizon among the big wheat growers, who, in pursuit of immediate profits, failed to adopt cultivating practices that would sustain the wheat economy over the long term.

But wheat was not the only crop to suit California's climate and soils. In the 1870s, the USDA began introducing navel oranges and other citrus into the state's agricultural economy. These new crops pointed to a remaking of California's agrarian economy, a shift from *extensive* to *intensive* agriculture as the dominant form of production in the sector.

Such a transition required a reorganization of the social relations of California's agrarian economy. It also required a rebalancing of the relative importance of production inputs: land, labor, and capital. In the period of extensive agriculture, land was the abundant input, labor was scarce, and capital was expensive, reinforcing the need to have very large production units to make the financial investment viable. Intensive agriculture, in contrast, requires a much higher level of labor input and also demands more capital per unit of output. The agricultural sector in California made this transition as a result of both push and pull factors.

The push came from declining profits in wheat growing. The pull came from at least five sources.

- Engineers created a network of canals and irrigation systems in the early twentieth century. In the first two decades of the century, as California's population doubled, the water from the Colorado River was delivered to the Imperial Valley east of Los Angeles, the Hetch Hetchy project was approved to provide water to San Francisco, and Los Angeles gained control over the Owens River Valley water east of the Sierras. Water conservation, defined by the newly created Bureau of Reclamation as "not allowing a drop of water to run, unused by humans, to the ocean," became the mantra of California agriculture. (<https://anderstomlinson.com/locations/watershed-2/california-water-timeline/california-water-timeline-1900-1949/>).
- Second, new varieties of fruit, and later, vegetables, tailored to California climate and long growing season were introduced. Many of these were created by Luther Burbank, who settled in the state in 1875. Burbank developed over 800 new strains of various

plants including the Russet Burbank potato, the product that soon became the basis for almost all French fries.

- Third, the creation of the refrigerated rail car gave California growers access to eastern markets, dramatically expanding the demand for the products of the reconfigured agrarian economy. The early “refrigerated” boxcars used blocks of ice with cooling of the car interior done by giant fans in turn driven by the car’s axels. The whole process required multiple ice making and ice loading facilities along the rail lines.
- Fourth, California began to free itself from the dominance of Eastern and European financial markets and their control of capital, essential to reducing the interest rate on the agricultural loans necessary to finance the new intensive agrarian economy. Unlike wheat, or later cotton, orchards and vineyards require several years to reach production, after which they can be profitable for many years, even decades. High interest agricultural loans – by one account with rates of over 50% or 75% annually – cannot be successfully serviced with the proceeds from a crop that takes several years to reach the first harvest. A lower cost of capital was essential for intensive agriculture such as fruit and tree orchards to replace the extensive crops. The pioneer in this financial revolution was A. P. Giannini’s Bank of Italy (after 1933, Bank of America) and the branch banks he established across much of the state. The new California-based financial institutions were able to profitably provide agricultural loans to growers of these intensive crops at interest rates of 10–15% or sometimes less (Olmstead and Rhode, p. 7; Nash, p. 322).
- Fifth, intensive agriculture not only requires more capital per unit of production than extensive, it also uses more labor per crop unit. California population density was low in the late 1800s, with the result that labor was a scarce factor of production – or at least labor from U.S. residents. The growers who led the shift to intensive agriculture responded by importing labor from low wage countries, first Asia, and then Central America, especially Mexico. Over time, labor from Mexico was the answer from the perspective of new class of agrarian capitalists who dominated California agriculture.

The Transition on the Oxnard Plain

The transition from extensive to intensive agriculture remade California’s agrarian political economy across the state. All of these forces were played out on the Oxnard Plain – as were the struggles between land owners and the growing Mexican origin labor force. Tracing the story of this transition through the reorganization of the agrarian economy of the Oxnard Plain provides a deeper understanding of the process.

The Oxnard Plain is over 60,000 acres of land in Ventura County and is the core agricultural district of the county. Located on the coast north of Los Angeles, the county ranks 6th in both the state and nationally in value of crop sales. Ventura’s agricultural output is primarily intensive crops, including vegetables, melons, fruits, tree nuts, berries, and nursery and greenhouse products. In all of these categories Ventura County is among the top 10 counties nationally by value of sales. Ventura Country – containing the coastal area now known as the Oxnard Plain –

is also where the best-known agricultural labor leader of the twentieth century, Cesar Chavez, first began his organizing career.



Ranchos in Ventura County were virtually eliminated by the 1880s because drought had decimated the cattle herds and wheat growing had never developed on the Plain. The American Sugar Beet Company (ASBC; today the America Crystal Sugar Company), founded by Henry Oxnard and his brothers, restructured agricultural production on the Plain, replacing less profitable crops with sugar beets. Between the Civil War and the end of the nineteenth century, sugar consumption per capita in the United States doubled, with much of the increased supply imported. Beginning in the late 1890s, ABSC, started to buy land on the

Oxnard Plain while also executing contracts with other land owners to supply sugar beets for processing. Both courses of action were designed to establish sugar beets as the leading crop on the Plain. In 1897, ABSC and other sugar producers successfully lobbied for the Dingley Act, which doubled the tariff on imported sugar. In 1899 ABSC built a huge factory for processing sugar beets in the area that became the city of Oxnard. The Plain itself was the core of ABSC's southern California sugar beet empire because the soil and access to water promised beets with high sugar content.

The missing production input was labor. Of course, there was a Mexican population in area before the transition to intensive agriculture, but their numbers were few. ABSC and the growers needed an adequate supply of labor for the new sugar beet economy. Sugar beet growers initially drew on Chinese and Japanese workers, many of whom had come in the decades after the Civil War. However, the combination of federal restrictions on Asian immigration, the often-hostile reaction by Anglos to these immigrants, and California's own Alien Land Law (1913) limited this source of labor. The answer, from the growers' perspective, was Mexico.

ABSC took the lead in seeking to expand the flow of labor from Mexico, the field workers known as *los betabeleros*. The company sent labor contractors to Mexican towns to recruit immigrants for sugar beet labor, promising good wages and, if they were dissatisfied, a return trip.

Work in the sugar beet fields was different from that in cattle raising or wheat growing. Sugar beets are a labor-intensive crop. They were among the first crops that required "stoop labor," which became a defining feature of the work process in the intensive California agrarian economy. After plowing and planting, workers – men, women, and children – stooped over each

row, acre by acre, to space out the new plants, using the short-handled hoe of California agriculture. Workers then stooped and thinned, stooped to weed, stooped to fertilize, and stooped again to remove the soil on the newly harvested beets. Cesar Chavez once said that sugar beet field work was “the worst kind of backbreaking job” that he and his family ever did. (Barajas, pp. 36-38).

The *betabeleros* early on started to contest the grower’s control over the work flow and working procedures. In 1903, Japanese and Mexican laborers formed the Japanese-Mexican Labor Association (JMLA), in essence the first agricultural laborers union in California, to challenge the power of the growers’ own Western Agricultural Contracting Company (WACC) and its control over labor recruitment, wages, and work. Timing their strike to coincide with a key stage in sugar beet harvesting, JMLA won! JMLA wrested some control over the labor recruitment process and ended the fees taken from the wages of WACC-recruited laborers. It would not be the last strike in the sugar beet and other crops on the Oxnard Plain. After the strike, the JMLA asked for recognition by Samuel Gompers’s American Federation of Labor under the name Sugar Beet and Farm Laborers’ Union of Oxnard. They were told that recognition would be contingent on excluding Japanese and Chinese workers from the union. They refused to do so but the union gradually declined. <https://densho.org/catalyst/japanese-mexican-americans-agricultural-allies-adversaries/>; Varna.

ABSC not only wanted a sufficient supply of labor, the company also wanted a stable supply. To this end, the company built adobe houses to replace the tent cities that sprang up at harvest time and then often folded up as workers went to the next crop to be harvested. Locating the houses on company land had a double benefit to ABSC. The *betabeleros* were separated from the longer established Mexican communities and from labor organizers. The *betabeleros* were economically integrated while being spatially segregated from the Anglo population.

Growers recruited entire families into the new intensive agricultural work. Oxnard, the largest town in Ventura County, segregated recreational facilities, theaters, and other public facilities. Oxnard schools were built for the children of the agricultural labor force but were spatially separated from those for Anglo children. In the 1920s, the Ventura County Board of Education cooperated with grower’s need for labor by designating holiday periods for harvesting beets, melons, and other crops.

At the other end of the Oxnard Plain, another crop was introduced: lemons. In 1903, a veteran of the Gold Rush and a cofounder of Union Oil formed the Limoneria Company. The founders also created The Farmers’ Irrigation Water Company, primarily to provide irrigation to the new almost 50,000 newly planted citrus trees, mostly lemons. The company was among the first to take advantage of the transportation revolution offered by the 1887 Southern Pacific completion of tracks connecting Santa Paula with markets to the east. Like ABSC, Limoneria created a company town, Santa Paula, at one time the citrus capital of the United States. And, while the company also built adobe houses for its workforce, the quality of the house was stratified by the color of the worker’s skin. (<https://www.semanticscholar.org/paper/Whitening-a-California->

[Citrus-Company-Town%3A-Racial-McBane/d4ceed0cee06a881aa2b69edf3bb2540ad7b809b](https://www.citruscompanytown.com/3A-Racial-McBane/d4ceed0cee06a881aa2b69edf3bb2540ad7b809b)
and Chess, pp.89 – 92.

Grower/agricultural worker conflicts continued in Ventura County in the 1930s and then during the *bracero* program (1942–62). The *bracero* program was negotiated in 1942 (Mexican Farm Labor Agreement) between the United States and Mexico. It allowed laborers from Mexico to enter the United States under short-term work contracts. Under Public Law 78, *braceros* were not supposed to be employed in off-farm operations such as canning, packing, and processing agricultural products. Growers responded by creating on-site processing facilities – literally “factories in the fields,” seeking to evade the efforts of the National Packing House Workers to organize these jobs.

The first *braceros* came to Ventura agriculture in late 1942. By the middle 1950s, the county had the largest number of *braceros* in California. In the late 1950s, prior to his move to the Central Valley area of Delano, Cesar Chavez emerged as a leader in creating a community-labor coalition that worked to change the social and economic structure of the Oxnard Plain agrarian economy. The primary organizational vehicle for Chavez’ work was the Oxnard Community Service Organization (OCSO). CSOs were organized in many migrant areas of California, but the Oxnard CSO went beyond community service work into political activity including registering voters. In 1958, Chavez led a successful effort to raise the wages for some Oxnard Plain workers, bypassing the growers’ Ventura County Farm Labor Association, which attempted to set wages across the county and control access to employment.

California’s Intensive Agriculture and the U.S. Food Economy

On both the Plain and the state as a whole, California’s shift to intensive crops was rapid and striking. In 1879, the share of intensive crops in California’s agrarian economy was less than 4%. By 1909 it had climbed to almost 50%, and by the time of the Great Depression intensive agriculture accounted for about 80% of total California’s agriculture production (Olmstead and Rhode, p. 6). Intensive agriculture laid the basis for California’s emergence in 1947 as the leading agricultural producer in the United States, a status that has continued even as the California economy moved away from dependence on agriculture.

Today California provides half or more of U.S. consumption of the following: almonds, pistachios, walnuts, cantaloupes, strawberries, oranges, lemons, avocados, apricots, artichokes, carrots, lettuce, celery, olives, peaches, tomatoes – the list goes on and on. In sum, more than half of all the fruits and vegetables produced in the United States are grown in the state. The state’s dominance in agricultural output has carried over into organic food products, with more than 40% of total organic food raised in the state, including over 70% of our organic fruits and vegetables.

But California agriculture is not just a key source of the daily food diet for us in the United States. California is also a major participant in the global food economy. Although the United

States has run a negative balance of trade for several decades, our agricultural balance of trade has been positive for more than half a century. California has been central to our positive agricultural balance of trade, accounting for more than twice the value of agricultural exports from any other state. Over half of all California agricultural production is exported.

And almonds, the second most water-intensive crop, are the leading export by value – more than 50% of almonds grown in the state are exported. We are exporting materialized water – in the midst of increasingly frequent droughts.

And this brings us back to water and California agriculture. It should be clear that the dynamics of water and agriculture in California is not just a California issue; it is central to the U.S. food economy and holds implications for the larger global food economy.

The Political Economy of Water in California’s Intensive Agriculture

The rise of intensive agriculture has created the California agriculture story of abundance: over 800 different crops are grown in the state and harvest time is year-round. Although the share of gross state product (GSP) that is attributable to agriculture today is only 3%, the total value of California’s agricultural output continues to grow and has almost doubled in the first two decades of the twenty-first century.

Moving Water – From Here to There

The Central Valley, which includes both the San Joaquin Valley to the south and the Sacramento Valley to the north, is the heart of California’s agricultural bounty. Stretching between mountain ranges, the Valley is 40–60 miles wide and about 450 miles from north to south. The nineteen counties in the Valley contain only one percent of U.S. farmland but account for one-quarter of total United States food production.

But it is water – its presence or absence – that makes the Central Valley (and much of the rest of California agriculture) so productive and profitable. Agriculture in the Central Valley and elsewhere in California draws water from three sources: precipitation, groundwater, and surface water. Surface water is that flowing in rivers, in the Central Valley primarily the



Kings, Sacramento, and San Joaquin rivers. The most important underground water source is the Central Valley aquifer, one of the largest aquifers in the United States. Precipitation in the Valley ranges from 6–15 inches annually, so irrigation is an essential component of Central Valley agriculture. Although containing only 1% of U.S. farmland, the Valley accounts for almost 20% of the total irrigated acres in U.S. agriculture.

(<https://ca.water.usgs.gov/projects/central-valley/about-central-valley.html>)



http://esrp.csustan.edu/gis/maps/cvp_swp_sjv.jpg

3/26/2009

The geographical economics of water in California agriculture are not difficult to understand. The bulk of California agriculture, as well as the majority of the state’s population, lies in the southern half of the state. Most of the state’s precipitation occurs in the northern half and the eastern mountain areas. From the perspective of the agrarian political economy, the water is in the wrong place. Thus, almost from the beginning of the transition to intensive agriculture, growers have sought to get the water from the surplus areas to the deficit areas to supplement the chronic shortfall of water in the centers of agricultural production.

And the growers have found allies at both the federal and state governmental level. The result is two massive water-moving infrastructures created in the last six

decades of the twentieth century.

The major federal water-moving infrastructure is the Central Valley Project (CVP). The CVP originated in the state of California’s 1933 approved plan for moving water from Lake Shasta in the north to Kern County in the southern part of the Central Valley. The state had to abandon the project because of financial problems from the Great Depression, but the federal government undertook the work and completed it in 1948.

The second massive water-moving infrastructure project is the Edmund G. Brown California Aqueduct, usually called the California Aqueduct. The Aqueduct stretches more than 400 miles

from north to south in the state. The water moved by the Aqueduct supports 5 million acres of agricultural production and provides water to areas containing over 25 million people.

Water is measured in acre-feet, the amount of water it takes to cover one acre one foot deep. The CVP supplies about 7 million acre-feet of water annually, with 5 million going to agriculture, spread over about 3.5 million acres of land, and the rest for industrial, municipal, and wildlife refuge uses. The California Aqueduct moves more than 5 million acre-feet annually. The single largest amount goes to the Kern County Water Agency, primarily for agricultural use, a necessity in a county that ranks second in the value of agricultural output in the state but averages only 9 inches of rain annually.

The Coastal Branch of the Aqueduct provides water to Kern County and then to Santa Barbara and San Luis Obispo counties. The Branch was completed in 1997. The Aqueduct made many things possible – including a huge expansion of almond growing in Kern County. In 2000, almond growers in the county planted 510,000 acres in almonds and received \$666 million in sales. In 2019, almond growers in the country planted almost 1.2 million acres in almonds with a sales value of \$5.6 billion. Almond growing consumes 4.5 feet of water per acre of trees, that is, enough to submerge an acre in four and one-half feet of water.

The history of almonds, pistachios, and other crops in California illustrates the overwhelming importance of water to the state's agriculture – but also poses the question of long-term sustainability of California's agrarian political economy. Almonds were grown in California as early as the nineteenth century, but without irrigation. Only in the 1930s did the irrigated acreage expand and then slowly, at least initially, but the enticement of increased yields and higher revenue/acre drove up the share of irrigation acreage over the following decades. More importantly, however, the expansion of irrigated acreage after the completion of the massive water-moving projects shifted the center of almond and pistachio production from the Sacramento Valley to the San Joaquin Valley, from an area with more water but less fertile soils, to one with less water but soils more conducive to these crops. More acreage was given over to almonds and other water intensive crops and, until very recently, more water/acre was used to increase the per acre yield of these crops.

All of this was made possible because the California Water Project began delivering more water to the San Joaquin Valley – and growers saw the potential for more profitable land usage. The competitive imperative to maximize profits generated a rational response at the micro-level of the individual grower but an irrational outcome from the perspective of the ecology of water usage.

The CVP and the California Aqueduct are marvels of agricultural engineering, transferring as much as 12 million acre-feet of water over 400 miles from north to south, a process that includes raising water over 2000 feet to go over the Tehachapi pass to get to LA. California has the most complex and largest water moving infrastructure in the world. The CVP alone has 20 dams and 11 reservoirs.

A lot of water – but not enough for some of California’s Central Valley growers.

Kern County, Lost Hills, and the Wonderful Company: Drought and Subsidence in California Agriculture

In 1978 Stewart and Lynda Resnick made their first investment in farmland, buying some citrus acreage in Kern County, California. They didn’t stop there. Over the next decade they continued to buy land in the county, benefitting from the depressed prices caused by droughts and the decision of Mobile and Texaco to sell land that was no longer producing significant amounts of oil and gas. (Oil production has declined in Kern County, in part because many of the wells are more than a century old. However, the county remains the largest producer in the state.)

The Resnicks are now the largest farmers in the United States, owning over 180,000 acres, 130,000 of which are in California, mostly in Kern County. Of course, they don’t – and never did – actually live in Kern County, preferring the 25,000 square foot Beverley Hills (where Lynda grew up) mansion that they built by tearing down two adjacent properties. But Kern County and the Resnicks can teach us a lot about the political economy of water and the future of California agriculture.

Kern County is located at the southern end of the Central Valley, just over one mountain range over from Ventura and one mountain range north of Los Angeles, and is the third largest in California. Because of low and variable annual precipitation that averages only 9 inches, the county is a major recipient of the water being moved from north to south. The Kern County Water Agency is the largest single customer of the Coastal Branch of the California Aqueduct and is entitled to 1 million acre-feet/year, primarily for agricultural use.

What do the Resnicks and other Kern growers do with all that water? They grow tree nuts: Kern is the largest producer of pistachios and the second largest producer of almonds, both in California and globally. The Resnick’s Wonderful Company is the largest single producer and processor of these nuts.

Excluding alfalfa, almonds and pistachios are the most water intensive of major California crops, requiring 4.5 acre-feet annually to achieve the high yields that make the crop so profitable to grow. These crops are quintessential intensive agriculture. Once planted, they require water

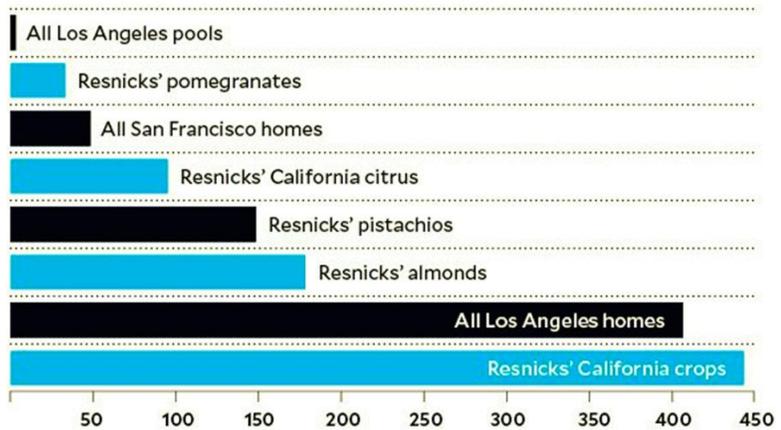
throughout the year; they cannot be allowed to fallow one year in anticipation that the rains will come the next year.

And that means using water, a lot of water. The Resnick’s pistachio acres alone use three times the amount of water as the residents of San Francisco and their almonds almost four times. In total, the Resnick’s California crop production absorbs more water than all the homes in the city of Los Angeles.

<https://www.watercalculator.org/news/articles/wonderful-nuts-water-farmer/>

THE THIRSTIEST CALIFORNIANS

Estimated annual water use, in millions of cubic meters



Sources: State of California, Peter Gleick/Pacific Institute, California Water Resources Control Board, UC-Davis. Numbers based on the Pacific Institute and UC Extension's per-acre usage estimates.



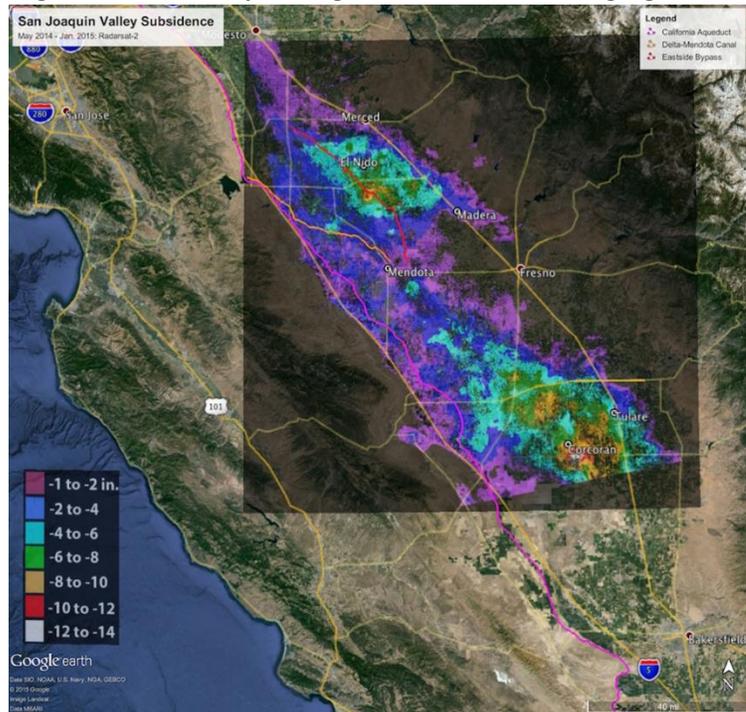
But the Resnicks are not just the biggest California farmers. They have also been astute marketers for their products. Remember POM Pomegranate Juice? That’s the Resnick’s brand. See those mandarin oranges in the produce aisle labeled “Cuties”? They were a Resnick product until a falling out with a partner forced the Resnicks to rebrand as “Halos.” And the “Pomtini”? Another Resnick product. The Wonderful Company claims that over half of all United States households buy one or more of their products.



And the Resnicks have chased water – not just for use in California agriculture but across the globe. In 2004 the Resnicks, then operating as the Roll International Corporation, bought the Fiji Water Company. The company takes water from an aquifer on the island, puts it in plastic bottles that are exported by the millions. A lot of water exported while many Fiji residents do not have

access to good drinking water. (In response to intense criticism, Fifi has developed some water sources for locals).

Early on, the Resnicks understood the essential role of water in their today more than \$4 billion agricultural empire, and they took actions to lock in water access, even a surplus for sale to others who might need it in times of drought. In 1995 they, along with a few other large growers in Kern County, cut a deal with state and local officials that resulted in the transfer of previously public lands over an aquifer into their hands. The Resnicks and their allies gave up some junior water rights, often referred to as “paper water” because there is very seldom enough rainfall in a water year to fulfill them. In return, they acquired a majority ownership in the Kern Water Bank, a “public-private” facility that can store up to 500 billion gallons of water. The facility had been developed at public expense as an additional water source for LA. Although the Resnicks deny it, the bank has been pumping more water than other users in the region. The water in the bank may be worth as much as one billion dollars in a drought year such as 2020–21. The water bank sells water, including back to the state at prices well above the cost in the 1995 deal.



The water stored in the Kern Water Bank and the water used on the Resnicks agricultural empire is taken from many places in California. One of those places from which the Resnicks obtain water is the area around the town of Corcoran, about 40 miles north of the Resnick’s empire and home to a large number of Latino agricultural laborers as well as a state prison. Corcoran is sinking – a foot or more annually in the past 15 years. In fact, the area is now called the “Corcoran Bowl” that stretches as much as 60 miles. The phenomenon is called “subsidence”. It happens as water is drawn from underground aquifers and not replaced. The largest agricultural operator in the Corcoran area is J. G. Boswell. During the 2020–21 water shortage, Boswell drilled deeper and deeper wells, drawing down the aquifer underneath Corcoran – and sold some of its surplus ground water to others, including the Wonderful Company.

<https://www.forbes.com/sites/chloesorvino/2015/11/04/americas-nuttier-billionaire-couple-amid-drought-stewart-and-lynda-resnick-are-richer-than-ever/?sh=73b4f57e3713>



Figure 1. Approximate location of maximum measured subsidence (9 m) in the San Joaquin Valley, California (1925–77) attributed to aquifer-system compaction caused by groundwater abstraction. Signs on pole (1925, 1955) are positioned at approximate former elevations of land surface. Pictured is Dr. J.F. Poland; photograph by R.L. Ireland, USGS, ca. 1977.

Corcoran is not alone. The major source of groundwater for Central Valley is the Central Valley Aquifer. Drawdowns from the aquifer, primarily for the 75–80% of the state’s water that goes to agriculture, have exceeded the annual recharging flow for decades. The resulting subsidence amounts is as much as thirty feet in parts of the San Joaquin Valley during the past century, with faster rates of subsidence in recent decades. And there lies a huge, hidden cost of the intensive agricultural political economy in California. Yes, the aquifer has been depleted but, more importantly, this not reversible, even in the very unlikely event that we were to get several years of above average precipitation. Land subsidence means that the aquifer has been compacted and can never contain the same amount of water as was the case prior to the droughts. There is less space.

We export water and alter nature – and not for the better.

The Sustainable Groundwater Management Act

Although California regulated access to surface water as early as 1914, the political power of the California agrarian sector made the state the last in the West to seek limits on pumping of groundwater. It was only in 2014, with passage of the Sustainable Groundwater Management Act (SGMA; pronounced “sigma”), that initial steps were taken to regulate the pumping of groundwater. SGMA redefined water as a social good and called for sustainability of

groundwater to be achieved – by 2040. Laudable goals. Of course, SGMA was strongly resisted by growers and their industry representatives, especially the California Farm Bureau which warned of “a huge long term economic impact.” Growers and their allies fought for and won a requirement that sustainability plans would be developed and administered at the local level. Thus, the Act mandated the creation of Groundwater Sustainability Agencies (GSAs) to develop and file plans that would take the 450 water sub-basins in the state to sustainability, again by 2040. At the same time, counties insisted on retaining the right to issue permits for new wells. Finally, it was not until 2020 that the newly created GSAs were to file plans that covered the sub-basins experiencing the greatest threat from over pumping. These “critically over-drafted” areas accounted for about 95% of total groundwater usage in the state.

Water Wars

California has suffered four droughts in the last half century, 1976–77, 1986–92, 2007–09, and 2012–2015, and we may be in the midst of yet another. Of course, almond growers and dairy cattle producers did not cause the droughts, but the droughts have put the state’s agricultural economy in a hole. The Texas radical Molly Ivins was fond of saying: “The first rule of holes is, if you are in one, stop digging.” However almond growers, dairy cattle producers, and much of the rest of the state’s agricultural sector have respond by – literally – continuing to dig, to dig deeper into the underground aquifers that were key to making California such a productive agriculture terrain for more than a century. During the 2012–2015 drought, many new wells were drilled 1000 feet or more. These depths were surpassed in the 2021–22 drought with Boswell drilling as deep as 2500 feet. (<https://www.npr.org/2021/07/22/1019483661/without-enough-water-to-go-around-farmers-in-california-are-exhausting-aquifers>).

Predictably, the long on-ramp for SGMA set off a frenzy of well drilling, especially in the San Joaquin Valley as growers sought to maximize their access water during the phase in years. Little precipitation and more, deeper wells escalated conflicts over access to water and over the plans developed by the local sustainability agencies.

The axes of conflict over water are multiple and sometimes crisscrossing, but two are central to the unfolding California water wars. First, growers can be divided between those who have relatively – and it is only relatively – secure access to water and those that don’t. Growers who are in an irrigation district have first draw on whatever water is available. Growers not part of an irrigation district depend on pumping the diminishing supply of water in the aquifers. Of course, water in the aquifers does not recognize property boundaries – it flows from one locale to another. And thus, growers with deeper wells and stronger pumps can draw water that may not actually be under their land.

The fluidity of underground water is the basis for a second axis of conflict over water access, that between the rulers of Central Valley agrarian economy and the inhabitants of the small towns in the Valley, inhabitants who are frequently Latino farm laborers. They and their families need water, but they also need the continued access to jobs in agriculture.

Drowning in Debt, Desperate for Water

Water years in California are calculated as the amount of precipitation that falls between October 1st of one year and September 30th of the next year. During the summer of the 2021 water year, several Central Valley towns, inhabited like Corcoran primarily by Latino farm workers, literally ran out of water as their wells went dry. Overpumping by the surrounding large farms, reliance on older, less powerful pumping systems, and shallower wells than those drilled by growers stranded towns such as Teviston, Cantua Creek, and El Porvenir either without access to water and dependent on shipments from other areas or with bills for water that threaten the future of these towns. One resident of Cantua Creek reported paying \$190/month for water, in a town where the median household income was less than \$30,000. In Fresno, 40 miles away, the cost for water was \$50/month. By September 2021, Cantua Creek's 500 residents had incurred a municipal water debt of almost \$250,000.

But maybe Cantua Creek was, relatively, lucky. In Teviston, a Valley town of over 700 residents, the last well that provided drinkable water went dry in early June 2021, when the days of triple digit heat were just at their beginning. The only remaining functioning well provides contaminated water that the residents cannot safely consume. Where does the contamination come from? The TCP used by growers in pesticides until a 2018 California law prohibiting its use went into effect. Although both DOW and Shell, the manufacturers of the TCP containing pesticides, insisted that their products were not to blame, Teviston did get a \$3 million settlement from the companies in mid-2021, enough to buy some drinkable water. In addition, distributors of these pesticides are being required to pay for a water treatment plant.

Sustainable Agriculture?

Water banks, the replacement of flood with drip irrigation, and other conservation measures can help. But the reality is there will never be the amount of water needed to support the intensive agriculture on the scale it is now practiced in California.

In the nineteenth century, the soil-fertility-depleting agricultural processes of California wheat growers drove the transition to intensive agriculture. Today, water-demanding intensive agriculture is undermining this model of capitalist agriculture.

That was the basic recognition embodied in SGMA. But what the new agrarian landscape will look like is yet to be determined, because a transition on the scale required under the Act will produce both winners and losers. The interests of residents from towns such as Cantua Creek and Teviston are supposed to be recognized in the new GSAs created by the Act. To date, however, the all-too-common reality is over-representation of growers and managers of existing irrigation districts in these new agencies and limited community input. Devolving the responsibility to develop sustainable groundwater plans to the local level leaves the process open to the existing hierarchy of power in the area. Thus, many GSA boards effectively represent

agricultural interests. This result, was, of course, a key goal of the Farm Bureau when they lobbied successfully for “local control” of water sustainability planning. There are some signs of constraints on grower power: in December 2021, California’s Department of Water Resources told six of the San Joaquin water plan agencies that their plans were deficient under SGMA terms. But, across the Central Valley, growers are posting signs saying “Food Grows Where Water Flows,” “Build More Dams,” and “Is Growing Food Wasting Water?”



In basins that were identified as critically over-drafted, GSAs had to create and file plans by late 2020. We can think of the plans as consisting of two related but distinct components: (i) the management of water supply and (ii) the allocation of water demanded by various interest

within the jurisdiction of a GSA. Not surprisingly, most of the plans reviewed to date by the state’s Department of Water Resources (DWR) have emphasized increasing the supply with limited and mostly speculative ideas on controlling demand. The favorite proposal for increasing supply is recharging underground water by establishing processes to capture unclaimed water and/or creating new basins for storing precipitation. The “new” water would then seep into depleted aquifers. (<https://www.ppic.org/publication/groundwater-and-urban-growth-in-the-san-joaquin-valley/>). The dominant narrative in these plans fails to situate the issue in an era of climate change and to understand the implications for the intensive agricultural capitalism that has defined the rural political economy of the state.

There is simply not enough new water to be found to rely on recharge to achieve sustainability, whether the goal is 2040 or any other future date. So, other mechanisms are also under being called in to play. A favorite of “water economists” is a market for trading water, which is already in operation in the state. Trading surface water began in the 1990s. More recently a trading market for underground water in adjacent basins has developed. While surface water trading could be accomplished by exchange of access to water transported by the Central Valley Project or the California Aqueduct, trading underground water requires new methods of water transport that do not result in too much loss through evaporation in the course of the exchange. A second hope of water economists is water banks. The largest one in operation is the Kern Water Bank – and who has a majority interest in the bank? The Resnicks, because they

surrendered the largest amount of paper rights. Stuart and Linda acquired majority control of the bank in the 1995 deal.

Neither these nor other methods, however, will result in the same agricultural abundance that has defined California's agriculture for the last century. In the end, the acreage in the state that produces those 800 different crops and ships much to the rest of the country or exported is going to shrink. In the San Joaquin Valley alone, as much as 1 million of the 8 million acres may well be permanently fallowed. The fight there and elsewhere in the Central Valley now is over whose acreage that will be.

I wouldn't bet against the Resnicks.

A resident of Ventura County, Bill Barclay is a member of the Chicago Political Economy Group.

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