International Food and Agribusiness Management Review
Volume 16, Issue 2, 2013

California Water Wars: Tough Choices at Woolf Farming

Gregory A. Baker[ⓘa], Alana N. Sampson[b] and Michael J. Harwood[c]

[a] *Professor of Management and Director of the Food and Agribusiness Institute, Leavey School of Business, Santa Clara University, California, USA*

[b] *Former Undergraduate Student, Leavey School of Business, Santa Clara University, California, USA*

[c] *Adjunct Professor, Leavey School of Business and Administration, Santa Clara University, California, USA*

Abstract

This case explores the challenges facing a large family farming operation in the fertile San Joaquin Valley of California. Woolf Farming and Processing, a diversified farming and processing operation, has faced reduced water allocations resulting in the removal of permanent crops and the fallowing of some of their land. The case challenges students to develop and analyze alternatives that will allow the company to continue to thrive under uncertain future water allocations.

Keywords: water policy, irrigated agriculture, farm management

ⓘ Contact Author: Tel: (408) 554-5172
Email: G. A. Baker: gbaker@scu.edu

IFAMA Agribusiness Case 16.2 A

Introduction

In August 2009, Stuart Woolf, President of Woolf Farming and Processing, watched as fruitful almond trees were fed into an industrial grinder that transformed them into woodchips in a matter of seconds. Woolf Farming, a privately held, diversified, family farming business, and one of the most productive farming operations in California's San Joaquin Valley, was pulling up their valuable almond trees, not because of low product prices or lack of productivity, but because they lacked sufficient water to keep the trees alive. Throughout the state of California, fields have been fallowed and orchards removed because water allocations to farmers have been cut.

The development of water resources, funded by the federal and state governments, was instrumental to the development of California's economy. Competition for scarce water resources has ebbed and flowed, but it has been especially intense over the last 40 or so years since the advent of landmark environmental legislation. Farmers have been pitted against environmentalists in a battle that has been dubbed "fish versus farms." In some cases farmers from the north have clashed with farmers from the south in an attempt to stop the export of water from north to south. In recent years, farmers have suffered severe cutbacks due to decreased water availability and the EPA's mandates to increase allocations to environmental uses to protect threatened and endangered species.

Woolf Farming responded to the water cuts by reducing some of their farmed acreage, but, as Stuart admits, this is a short-term solution to a long-term problem. Furthermore, it is not sustainable from a business perspective. The Woolf family has been in the business since 1974, growing their operation by focusing on crop diversification and investment in conservation technologies. In addition to almonds, Woolf Farming cultivates other crops including grains, garlic, onions, pistachios, tomatoes, wine grapes, and roses. They own several processing plants where they produce value-added products, primarily processed almonds and tomato paste. Woolf Farming's profitability is highly dependent upon a steady and reliable flow of water for crop irrigation and production purposes; lack of water compromises its ability to stay in business as a family farm. It is evident that the current water situation will necessitate some significant changes, but what is the best course of action for Woolf Farming to follow in the midst of uncertainty?

Farming in California

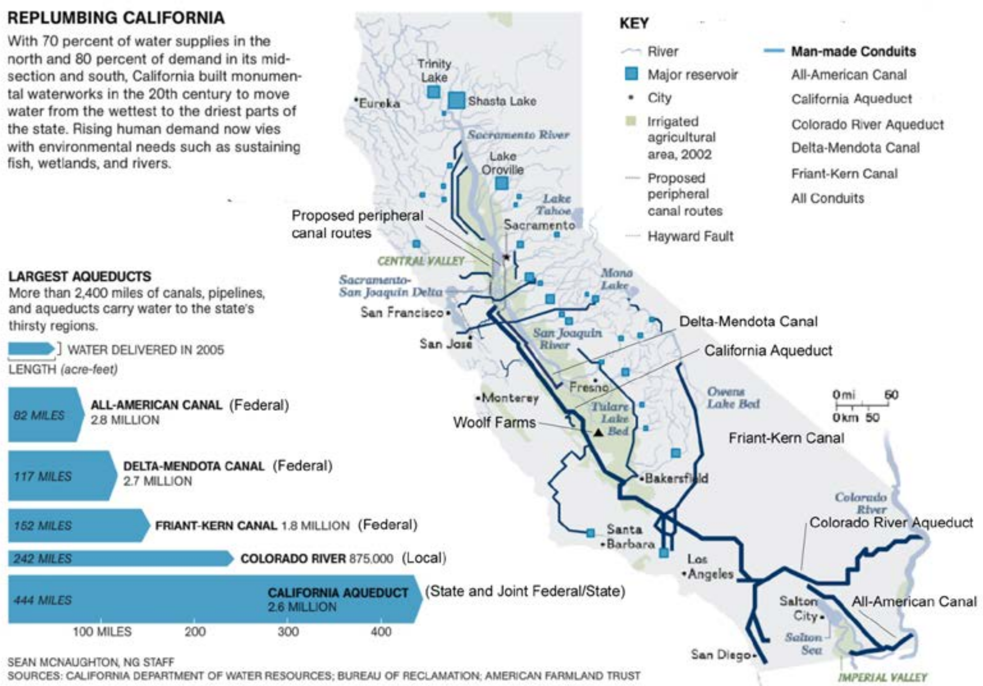
Agriculture makes a significant contribution to the California economy. Direct farm sales totaled approximately $37 billion in 2008 with exports totaling about $11 billion (California Department of Food and Agriculture 2009). California's 75,000 farms and ranches (which account for only 4% of the nation's farms), produced 12.8% of the nation's total agricultural value. Moreover, of the top ten most productive agriculture counties in the U.S., nine are located in California and more than 14 California counties record upwards of $1 billion in agricultural production (California Department of Food and Agriculture 2009). California products have a reputation for quality and are distributed throughout the U.S. and world.

California's agricultural prominence has been attributed to rich topsoil, an extended growing season, an abundance of sunshine… and, of course, water. Intensive farming began in the 1850's when miners drawn to California during the Gold Rush sought out alternative means of making a living through cattle ranching after the gold ran out. Gradually, farmers began dry land farming wheat and barley crops, eventually cultivating more water-intensive crops by drawing on ancient aquifers to meet the water demand. Subsequent large-scale agricultural production was made possible by investment in a complex water storage and delivery system, which allowed for the irrigation of the arid Central Valley.

The access to land, water, labor, and California's unique climate has provided California farmers with a comparative advantage in the agricultural marketplace. In 2007, California farmers produced over 400 crops and agricultural products, valued at $36 billion and representing more than half of all U.S. grown fruits, tree nuts, and vegetables, making the state a prominent producer of high-value agricultural products on a national and global scale (California Department of Food and Agriculture 2009). California is the nation's sole producer (99% or more) of a large array of specialty crops including almonds, artichokes, clingstone peaches, figs, almonds, pomegranates, raisins, and walnuts.

The Central Valley (Exhibit 1), a large flat valley that stretches over 450 miles from north to south and over 80 miles from east to west, is the state's most important agricultural region. Some crops, such as almonds, are grown almost exclusively in this region (California Department of Food and Agriculture 2009). The northern portion of the Central Valley is drained by the Sacramento River and is known as the Sacramento Valley. Likewise, the southern portion of the Central Valley, drained by the San Joaquin River, is known as the San Joaquin Valley.

Exhibit 1. Map of California and Major Water Storage and Delivery Systems



Note. Adapted from National Geographic, California's Pipe Dream (Bourne 2010). Used with permission.

Water Availability and Use in California

Approximately 70 percent of all available water falls in the form of rain or snow in the northern, less populated region of California. Much of the moisture occurs as snow in the Sierra Nevada mountain range (eastern portion of the state) and flows into rivers and reservoirs when the snow melts in the spring. The greatest demand, for both agriculture and urban uses, lies in the southern two-thirds of the state (which includes much of the farmland and the large population centers of Los Angeles and San Diego), which receives only about 12 inches (30.48 cm) of rain annually. By comparison, many other important agricultural states and regions, such as Florida, receive over four times the amount of rainfall annually (NOAA 2010). When local surface water and underground aquifers were no longer able to meet farmers' demand for water, the state and federal governments built an elaborate system of water storage and conveyance mechanisms to deliver water to urban and agricultural users (Exhibit 1). The 1930's saw the construction of the Central Valley Project (CVP), a federally funded venture that delivers water from the Sacramento-San Joaquin River Delta to the dry south through pumping stations in the Delta. The CVP provides water for over 3 million acres (over 10 percent of the U.S.'s irrigated farmland) and includes 22 dams and reservoirs, 11 hydroelectric power-plants and 500 miles of canals and aqueducts (Bourne 2010). In 1960 the State Water Project (SWP) was built. The principal conduit for this system is a 444-mile concrete-lined canal, the California Aqueduct, which runs the length of the Central Valley. The SWP delivers water to over 23 million residents and irrigates over 600,000 acres of cropland (Bourne 2010).

The Colorado River Aqueduct is an example of local and federal cooperation. The Metropolitan Water District, which serves several southern California counties and includes the cities of Los Angeles and San Diego, operates the aqueduct. The aqueduct carries Colorado River water from Parker Dam (constructed by the federal government) to residential and commercial users in a six-county area and serves almost 20 million people.

In recent years, approximately 41 percent of California's developed water supply has been allocated to agriculture with approximately 48 percent allocated to environmental uses, and 11 percent going to urban users (Department of Water Resources 2010a).

The Water Crisis: Changes in the Market for Water

In recent years, droughts and federal enforcement of environmental regulations have led to reduced water allocations to agriculture. Since 2007, California has experienced below average levels of rain and snowfall, which has contributed to lower water levels in both natural and man-made water reservoirs. Water allocations from the SWP are shown in Exhibit 2. See Bourne (2010) and Paul (2009) for more information on California's water system and the impact of the drought.

Population pressures are expected to further exacerbate the situation. Continued population growth and the consequent demand for water in urban areas are expected to increase. The state currently has 38 million residents and is expected to reach 50 to 60 million people by 2050. The water system was designed for a population of 16 million. Moreover, climate change predictions forecast more variable weather with intensified droughts and less water available to be captured in lakes and reservoirs in the coming years. The major water providers, including the state and federal governments, make allocations based on a complex set of rules and priorities. These include available supply, contractual obligations with farmers, cities, and other users, and legislative and judicial mandates. A reduced and more variable water supply coupled with the increased pressure on water demand from urban areas is expected to further exacerbate the conflict between urban and agricultural use of this limiting resource. While agricultural users have not yet seen their allocations reduced based on urban demand, agricultural water use is a frequent target for criticism given the high percentage of the developed water supply allocated to agriculture. Farmers have strong contractual and historical rights to their water allocations. However, it is not inconceivable that these allocations might be targeted by other groups through legislative action, judicial challenges, or California's ballot proposition process, which allows voters to make changes to the state's constitution and laws.

Year	Percent Allocation
2006	100
2007	60
2008	35
2009	40
2010	50
2011	80
2012	65

Exhibit 2. State Water Project Allocations, 2007-12
Source. Association of California Water Agencies 2012.

Endangered Species Act (ESA) & the Delta Smelt

Further confounding the issue, litigation regarding the 1973 Endangered Species Act (ESA) has limited the amount of water that is actually delivered to farmers via the SWP and the CVP. A decline in the delta smelt population, a threatened, three inch-long silver fish, indigenous to the Sacramento-San Joaquin River Delta has led U.S. district judges to limit the amount of water pumped out of the Delta for agricultural uses. Scientists have found that the smelt are threatened by fluctuating salinity levels resulting from the movement of fresh water through the Delta and are killed by being drawn directly into pumps that move the water. In 2007, a federal court order cut the amount of water pumped out of the Delta, increasing water allocations to the environment, in an effort to protect the fish. For farmers, this has meant lower water allocations. In 2009, many farmers received less than half of their historical, average contractual water allocations. While some in the agricultural community view this as a "fish versus farmers" debate, environmentalists and many scientists believe that the decline in smelt populations points to a larger problem of a collapsing delta ecosystem.

New Developments

In 2009, the state of California passed a comprehensive Water Package creating a "framework for water managers, legislators and the public to consider options and make decisions regarding California's water future" (Department of Water Resources 2010a). The primary goals of the package were to ensure "a reliable water supply for future generations" and to restore "the

Sacramento-San Joaquin Delta and other ecologically sensitive areas" (Department of Water Resources 2010b). The plan has set the stage for the possible development of an alternative conveyance system, sometimes known as the Peripheral Canal, which would reroute water around the Delta's winding waterways. While several proposals have been discussed, one alternative would provide 50 miles of canals at a 2012 cost of nearly $11-13 billion. Ultimately, the goal of the Peripheral Canal would be to provide greater water reliability and improve environmental conditions in the Delta by rerouting fresh water flows around the environmentally sensitive areas. Plans to build the Peripheral Canal, the so-called final link in California's water system, were defeated once before in 1982 when the state ran out of money to fund the project, the federal government relinquished its support, and political support diminished with increasing public attention on the mounting environmental toll of big water projects. While the state's current water problems have generated renewed support for the Peripheral Canal, the $11-13 billion price tag is a formidable obstacle in the context of the multi-billion dollar budget deficits the state has faced in recent years.

Woolf Farming

With over 35 years in business, Woolf Farming has established itself as a leader in California agriculture, employing over 75 full-time workers on the farm and 800 employees in processing operations. Woolf Farming prides itself in running a highly efficient operation. They plant a diversified array of crops selected to yield the highest returns and to provide the flexibility needed to address fluctuations in market prices and water supply. It has been a leader in pursuing water-saving technologies such as drip irrigation. Permanent crops include almonds and pistachios, while annual plantings include cotton, tomatoes, garlic, and onions. Their value-added operations include an almond processing plant where 40-50 million pounds of almonds are handled and distributed annually and a tomato processing plant that produces 3 million pounds of tomato paste per day. Additionally, Woolf Farming recently acquired two frozen vegetable processing companies that supply private label and industrial products. Exhibit 3 includes information on the major crops grown by Woolf Farming.

Additional information regarding water usage, cost, and returns for selected crops grown in the San Joaquin Valley is presented in Exhibit 4. This information is developed by the Cooperative Extension Service and includes most of the major crops grown by Woolf Farming as well as alternative crops grown in the San Joaquin Valley. The information provided by the Extension Service is generally consistent with the crop information for Woolf Farming. Taken together, Exhibits 3 and 4 present a fairly complete picture of the agricultural crop production opportunities for Woolf Farming. Although a crop budget is not available for garlic, water usage, cost, and returns are similar to that of onions.

Exhibit 3. Woolf Farming, Selected Information, 2009

Crop	Acres Planted (percent)[a]	Price Per Pound	Yield in Pounds Per Acre	Gross Revenue Per Acre	Gross Margin Per Acre
Almonds	19.0	$1.85	2,750	$5,088	$1,372
Pistachios	16.3	$2.25	3,500	$7,875	$5,715
Onions	2.6	$0.65	4,000	$2,600	$670
Tomatoes, processing	33.0	$0.33	96,000	$2,120	$405
Garlic	1.8	$0.13	20,000	$2,600	$770
Fallow	27.3	-	-	-	-

[a]Total acres planted is shown as a percent of Woolf Farming's principal crops, not total acres planted.

Exhibit 4. Selected Central Valley Crop Production Cost & Return Studies

Crop	Irrigation System	Unit Water Usage *acre-ft.*	Unit Water Cost[a] *acre-ft.*	Total Water Cost *per acre*	Total Operating Costs[b] *$/acre*	Net Returns Above Op. Cost *$/acre*
Almonds	Flood (canal)	4.25	$110	$468	$2,154	$1,847
Almonds	Micro-sprinkler	3.50	$110	$385	$2,391	$461
Pistachios	Drip (canal)	3.92	$110	$431	$1,593	$2,443
Wine grapes	Drip (well)	1.33	$110	$147	$3,069	($144)
Onions	Drip (canal)	3.33	$110	$367	$3,987	$1,213
Tomatoes, fresh	Furrow (canal)	3.00	$110	$330	$5,668	$1,092
Wheat	Surface (canal)	1.67	$110	$183	$579	$76
Cotton	Furrow (canal)	2.50	$110	$275	$796	$266
Corn[c]	Furrow (well/canal)	3.67	$110	$404	$1,204	($133)

Source. Agriculture and Resource Economics Various Years.

[a]The various water costs per acre-foot used in the studies are amended to reflect Westland Water District fees of $110/acre-foot. [b]Operating Cost figures exclude overhead and investment costs, which are higher for perennial crops (grapes, nut trees). [c]The corn study is amended to include a CA corn price of $6.00/bushel, instead of the low $4.20/bushel assumed in the study.

Note. Canal indicates that surface water is the source and well indicates that the water is pumped from underground wells. The method of application is indicated as: flood, where the whole field is flooded; furrow, where water flows through trenches in the field; micro-sprinkler, where small sprinklers attached to a hose spray water, and drip, where small emitters attached to a hose drip water. Surface irrigation for wheat is typically with either sprinkler, where sprinklers spray water over a wide area, or furrow.

Historically, Woolf Farming has relied on its water allocation through the Westlands Water District for water to irrigate its crops. The surface water allocation from the Westlands Water District, priced at $110 per acre-foot, is the least expensive source of water. In years when water is plentiful, a full allocation provides Woolf Farming with 2.65 acre-feet (an acre-foot equals 325,851 gallons) per acre to the entire farm.

To close the water gap, Woolf Farming uses groundwater pumped from their land to supplement surface water. Groundwater costs about $130 per acre-foot to pump and Woolf Farming has the capacity to pump approximately 1 acre-foot of water per acre across the entire ranch. However, water in the local wells contains levels of dissolved salts that are much higher than that of surface water from the delta, resulting in a toxic build up of salts in the soil. Moreover, removing too much groundwater without replacing it can result in land subsidence (sinking of the land resulting in a permanent loss of underground water storage capacity). Pumping ground water has provided short-term relief, but it ultimately compromises the health of crops and the soil quality. Any use of well water will increase the salt load. Therefore a greater reliance on well water will result in a larger impact on crop quality and yields, although some crops, such as cotton tend to tolerate higher concentrations of salt.

To fully utilize its farmland in the best of years, Woolf Farming needs to supplement its surface water and ground water sources by purchasing water from those entities that do not use their entire allocation. This has been the case in recent years as water allocations have been declining. Allocations from the Westlands Water District were 50 percent in 2007, 40 percent in 2008, and 10 percent in 2009. The company has also made supplemental water purchases in recent years directly from the district. Purchased water is used as a last resort, since the cost is about $260 per acre-foot.

Woolf Farming has managed its water by giving permanent plantings priority since no water means losing the trees and a loss of the investment in the plantings valued at thousands of dollars per acre. In short water years, the first step has been to reduce the land planted to annual crops. However, in recent years, the outlook for future allocations of water has been so dire, that Stuart made the decision to remove over 1,200 acres of mature almond trees.

Complicating matters further, agricultural users typically do not know what their allocations will be until after the planting decision is made. Preliminary allocations are made based on estimates of the available water supply, which in turn is based largely on estimates of the winter snowpack. These estimates are updated as the snowpack melts and better information becomes available. However, final allocations are not made until later in the spring. According to Stuart, the uncertainty surrounding how much water they will receive results in the inefficient use of resources and makes planning difficult. Moreover, Woolf Farming is a vertically integrated operation, with almonds and tomatoes being processed in their company-owned processing facilities. For most commodities, the price will not be known until close to harvest. In what has become a family mantra, Stuart says that they "plan for the worst and hope for the best."

The impact of reducing the number of acres farmed has been felt throughout the company. Total returns to the ranch have declined somewhat, but the decline in acres farmed has been offset by higher prices due to acreage reductions throughout the state. It has been particularly hard on the labor force as both the full-time and seasonal labor force has declined. However, Stuart has told his foremen and key managers that they will survive and prosper by focusing on the right crops with the best returns.

The Challenge

Stuart contemplated an uncertain future for Woolf Farming that revolved largely on the water situation in California. Climate change, increased urban pressures, and environmental restrictions all pointed to lower and more variable water supplies for agriculture than that which farmers had relied on in the past. He felt that all options should be on the table and he believed that the company may have to pursue unconventional strategies, including alternative investments outside of the Central Valley to strategically meet these new realities.

1. What do you see as the major issues for Woolf Farming regarding water and the long-term success of its farming operation? How would you approach the problem?

2. Conduct an analysis of Woolf Farming's enterprises and make a recommendation as to how they should proceed given the future water outlook.

3. What alternatives or programs should Woolf Farming support that have the potential to positively impact the availability of water and the continued profitability of farming in the San Joaquin Valley?

References

Agriculture and Resource Economics. Various Years. Cost and Return Studies. UC Davis. http://coststudies.ucdavis.edu/current.php (accessed 12 July 2012).

Bourne, J. 2010. California's Pipe Dream. *National Geographic* 4:132-148.

NOAA. 2010. Advanced Hydrologic Prediction Service. NOAA.gov. http://water.weather.gov/precip. (accessed 20 April 2010).

Department of Water Resources. 2010a. California Water Plan. dwr.water.ca.gov. http://www.waterplan.water.ca.gov. (accessed 20 April 2010).

Department of Water Resources. 2010b. Delta Initiatives. dwr.water.ca.gov. (accessed 20 April 2010).