



Water & Agriculture

in the San Joaquin Valley

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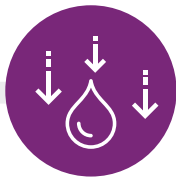
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KEY POINTS

- Over the past 60 years, the level of groundwater in the San Joaquin Valley has dropped 60 feet on average as aquifers have been drawn down for agricultural irrigation and public water supplies.
- The San Joaquin Valley's water system infrastructure is currently being stressed by aging facilities, climate change, and the Sustainable Groundwater Management Act (SGMA).
- It is estimated that SGMA compliance, without alternative water supply sources, will result in a water deficit that will remove 20% of the Valley's agricultural land (1 million acres) from production and result in \$6 billion in lost farm revenue.
- Fresno State researchers have been working with stakeholders in the San Joaquin Valley to identify alternative financing strategies for a regionally coordinated, local funding source to finance the repair, expansion, and modernization of the water system infrastructure and propose a Water Resilience Investment Special Tax.

For the most recently reported farm year (2017-18), total value of agricultural production for the eight-county San Joaquin Valley was \$34.9 billion. For comparison purposes, the No. 2 state in agricultural production in the U.S. is Iowa, which generated \$27 billion during the same period. Through previous visionary and unprecedented public and private past investment in water system infrastructure, the San Joaquin Valley is the most productive agricultural region in the world. Maintaining and growing this strong, resilient, and healthy agricultural economy requires maintaining a strong, resilient, and healthy water

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system. Today, the water system infrastructure the Valley's agricultural industry relies on is being stressed by several factors – aging facilities, climate change, and the Sustainable Groundwater Management Act (SGMA). A discussion of the current water situation was presented in the 2019 *Central California Business Review*. This article provides an update.

Aging Infrastructure

The initial planning for the water supply storage, conveyance, and distribution facilities that currently serve the San Joaquin Valley started over 100 years ago. The majority of those facilities are now over 50 years old. Consequently, the State's water system is exhibiting signs of age, wear, and deterioration, as illustrated by the failure of the Oroville Dam Spillway, and subsidence failures in the Friant-Kern Canal, Delta Mendota Canal, and California Aqueduct. Perhaps even more challenging for the

Valley water agencies (GSAs) will file groundwater management plans in early 2020. Reduced groundwater pumping and land fallowing are two programs expected to be included in most plans.

State's water system infrastructure is the need to satisfy today's competing social, environmental, and economic demands for water – which are much different than they were 100 years ago.

Climate Change

An additional consideration in the evaluation of the State's water infrastructure is the impact of climate change. Currently, the San Joaquin Valley relies on snowfall in the Sierras to accumulate as a snowpack, which serves as a natural form of water supply storage. As the snowpack gradually melts from March to August, the slow release of water fills local streams, creeks, rivers, and storage reservoirs, and the water is diverted to beneficial uses throughout the San Joaquin Valley. This gradual release of water forms the basis of design for the State's existing water system infrastructure.

The State has made significant investment in climate-change research. Their current climate-change forecast indicates that the San Joaquin Valley will continue to

receive approximately the same amount of total annual precipitation, but more will fall as rain and less as snow, and the rainfall will come earlier in the year over a shorter duration, potentially creating flash-flood conditions. The storage capacity of existing infrastructure is insufficient to accommodate such conditions and will result in millions of acre-feet of water flowing out to the Pacific Ocean through the San Francisco Bay. This will be lost water, unavailable for food production in the San Joaquin Valley.

Sustainable Groundwater Management Act

On September 14, 2014, Governor Brown signed into law three bills collectively referred to as the Sustainable Groundwater Management Act (SGMA). The purpose of the SGMA is to address undesirable results caused by excessive groundwater extractions (the use of water from wells). In addition to surface water, Valley farmers have consistently relied on drilling wells to extract groundwater for irrigation. In addition, many

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Valley water agencies have utilized groundwater to provide for public needs. Over the past sixty years, the level of groundwater has decreased on average across the Valley by about 60 feet as the region's aquifers have been tapped and their millions of acre-feet of water permanently extracted. Figure 1 illustrates the increasing depth at which wells are being drilled in the San Joaquin Valley.

All eight counties have groundwater basins that the State has designated "critically overdrafted" due to the presence of undesirable results. Undesirable results include: (a) chronic lowering of groundwater levels, (b) significant and unreasonable reduction of groundwater storage, (c) significant and unreasonable land subsidence, (d) depletion of surface water and groundwater interconnections,

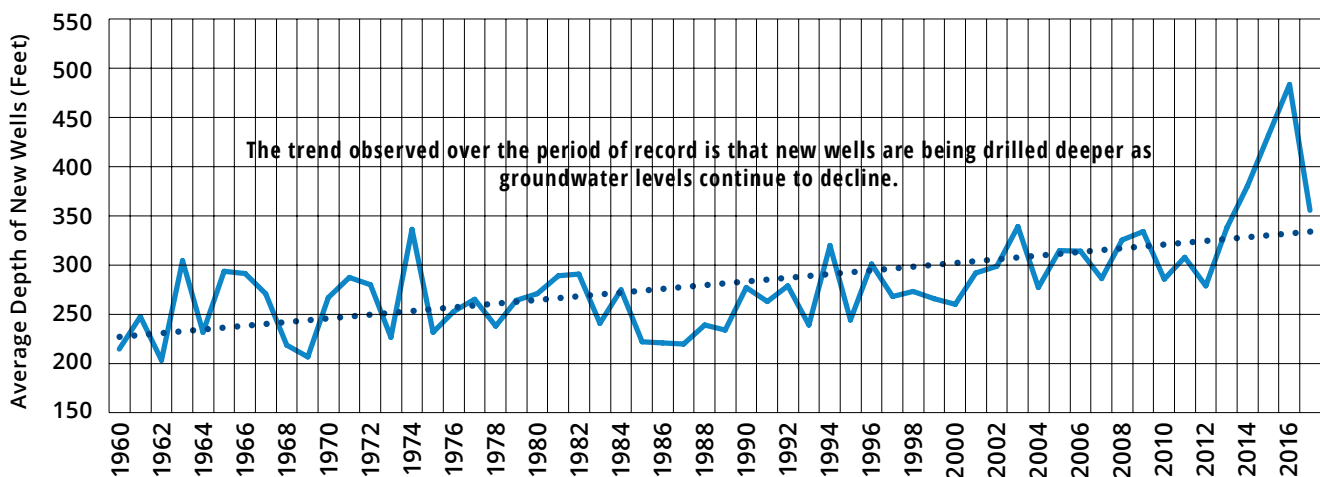
(e) significant and unreasonable degradation of water quality, and (f) significant and unreasonable saltwater intrusion.

Groundwater Sustainability Agencies (GSAs) in critically overdrafted groundwater basins (most of the Valley) are required to submit their Groundwater Sustainability Plans (GSPs) by Jan 31, 2020. For most GSAs, the information and data available to determine sustainable yield, minimum thresholds, and water budgets was limited in terms of quantity of data and quality of data. Most will adjust and improve recommendations using the first five years of the SGMA compliance period (from 2020 to 2025) during which they will collect more and higher quality data to validate their initial GSP assumptions and adjust sustainable yield, minimum

thresholds, and water budgets as necessary. This process results in GSPs that are fairly fluid in nature.

GSPs are required to include language about projects, programs, and initiatives that each GSA will pursue to achieve groundwater balance. Reduced groundwater pumping and land fallowing are two programs expected to be included in most GSP's. There will be limits on the amount of water growers can pump beginning February 1, 2020. For example, there are about a million acres scattered throughout the Valley that have historically pumped 2.5 to 4 feet of water each year for crop production (feet of water per acre of crop), and the new restrictions will limit pumping to less than 1 foot. Under this scenario, if a grower has 100 acres

Figure 1
Average Depth of New Wells Drilled in the San Joaquin Valley (8 counties)



Data Source: California Department of Water Resources, Well Completion Reports



of a crop that requires 4 ft of water per acre, and they can only pump 1 ft per acre, the grower will farm only 25 acres.

In February 2019, the Public Policy Institute of California (PPIC) reviewed water supply data for the San Joaquin Valley and forecasts that, without alternative water supply sources, SGMA compliance will result in water supply reductions for the San Joaquin Valley of approximately 2.4 million acre-feet per year, which will require following approximately 1 million acres of productive farmland. Since the total number of acres currently dedicated to agricultural production in the Valley is approximately 5 million, 1 million acres represents a 20% reduction in the world's most productive farmland.

To understand the economic impacts of removing 1 million acres of farmland from production, Fresno State's California Water Institute has been working with several professors, including Dr. Sunding, Chair of the Natural Resource Economics Department at UC Berkeley, who conducted an economic impact analysis for SGMA implementation. In January 2020, Dr. David Sunding presented the findings of the assessment and estimates farm revenue losses associated with the 2.4 million acre-foot water supply deficit resulting from SGMA at \$5.9 billion or 16.3% of farm revenue annually. (For the most recent 2017-18 crop year, the Valley produced \$34.9 billion in total farm revenue.)

Water supply losses related to aging infrastructure, climate change conditions, and other environmental factors will add to the currently forecasted deficit of 2.4 million acre-feet per year associated with SGMA implementation.

The Future of Water Systems

Water supply losses related to aging infrastructure, climate change conditions, and other environmental factors will add to the currently forecasted deficit of 2.4 million acre-feet per year associated with SGMA implementation. The additional water supply losses will translate into additional economic and job losses in the San Joaquin Valley. The existing high rates of poverty in the Valley, the forecasted adverse economic impacts associated with SGMA and climate change, create significant concern regarding the economic future of the San Joaquin Valley.

There are opportunities to make strategic capital investments in water system infrastructure which will result in an improved ability to capture, store, convey and distribute water, and which will reduce the financial losses in agricultural production associated with SGMA implementation and climate change. The needed infrastructure improvements should include, but not be limited to, groundwater recharge and banking facilities,

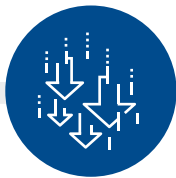
ecosystem enhancement and restoration, conveyance facilities, surface storage facilities, drinking water facilities, and wastewater recycling facilities. Overall, the estimated capital cost required is approximately \$6 billion. Thus, a critical need for the San Joaquin Valley is a reliable source of local revenue to pool together with state, federal, and private funds to cover the costs to repair, expand and modernize the existing water system infrastructure.

What local revenue options are available to combine with state and federal investments, to repair, expand, and modernize the water system infrastructure serving the San Joaquin Valley? Unfortunately, there is no regionally coordinated, local-funding mechanism to finance the repair, expansion, and modernization of water system infrastructure.

While the SGMA legislation gave broad authorities to GSAs, including the assessment of rates, fees, and charges to administer the program, purchase land, purchase water, build infrastructure, etc., the San

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Joaquin Valley has 8 counties, 21 groundwater basins, and 108 Groundwater Sustainability Agencies. The scale of these GSAs is simply too small to generate sufficient revenue to finance meaningful infrastructure. GSA boundaries were determined by water rights, not financial planning, so there is a need for a model that allows for pooled resources across eight counties. If the economy in the San Joaquin Valley is going to survive, some form of broad, equitable, and sustainable funding mechanism and governance structure needs to be developed. One such solution is the Water Resilience Investment Special Tax.

Water Resilience Investment Special Tax (WRIST)

Fresno State researchers have been working with stakeholders in the San Joaquin Valley to identify alternative financing strategies for a regionally coordinated, local funding source to finance the repair, expansion, and modernization of the water

system infrastructure. To generate the funding necessary, Fresno State proposes the adoption of a voter-approved Water Resilience Investment Special Tax (WRIST) in each of the eight counties in the San Joaquin Valley. The implementation of this proposed financing plan will first require approval by two-thirds of the voters in each county, no small task.

Currently, the minimum sales tax in California is 7.25%. The State allows local governments to add additional sales tax increments with voter approval, and many cities and counties in the San Joaquin Valley have done so. Consequently, sales tax rates vary from county to county, and city to city, as shown in Table 1.

The proposed WRIST would add to other general and special taxes that have previously been approved by voters. For example, if the voters in Tulare County approve the WRIST at

one-half percent, then the total sales tax rate in Tulare County's jurisdiction will increase from 7.75% to 8.25%.

As a voter-approved special tax, the WRIST will be applicable to all taxable transactions in all eight counties. It is recommended that the same incremental increase be placed on the appropriate ballots for all counties.

Increasing the sales tax would result in significant additional revenue for water infrastructure. Between 1997 and 2018 the combined taxable sales of the eight counties averaged \$46.9 billion. While using this average is conservative, sales tax increases of .25% on the low side and .75% on the high side, would result in additional revenue of \$117 million and \$351 million respectively. In 2018, taxable sales transactions equaled \$67.2 billion, so those same tax rates would result in revenue of \$168 million (.25%) and \$504 million (.75%).

**Table 1
Municipal and County Tax Rates, San Joaquin Valley**

County	County Tax Rate	Highest Municipal Sales Tax Rate	
		Municipality	Rate
San Joaquin	7.750%	Stockton	9.000%
Stanislaus	7.875%	Oakdale	8.375%
Merced	7.750%	Los Banos	8.750%
Madera	7.750%	Chowchilla	8.750%
Fresno	7.975%	Kerman	8.975%
Kings	7.250%	Corcoran	8.250%
Tulare	7.750%	Porterville	9.250%
Kern	7.250%	Bakersfield	8.250%

Data Source: <https://www.cdtfa.ca.gov/legal/legislative-research.htm#overview>



The implementation of a special sales tax would be regressive in nature, creating an additional financial burden for low-income residents on the purchase of basic food, personal care, and household items. This is an unfortunate situation for low-income residents in the San Joaquin Valley. However, to compensate for the cost burden placed on low-income residents, Fresno State authors recommend the JPA Board of Directors target specific allocations of WRIST revenues to projects that provide safe and affordable drinking solutions for low-income communities served by small public water systems and low-income communities served by individual, onsite domestic wells. Such an allocation will reduce the cost of service for low-income communities, while improving the level and quality of service. Additionally, the expectation is that the residential economic benefits resulting from the special sales tax will be multiple times greater than the cost of the special tax. A significant benefit to this approach is that it would attract monies from other state, federal and private investments that would be matched one-for-one and thus could double the positive impact of the WRIST.

For example, if the sales tax generates \$2 billion over 10 years, and the tax dollars are matched one-for-one, a total \$4 billion will be available for water system investment. The objective will be to invest the \$4 billion in specific water

system projects that will reduce the forecasted economic losses resulting from SGMA and climate change to something less than \$6 billion annually. If, for example, the one-time investment of \$4 billion in tax revenue and matched funds reduced annual agricultural economic losses from \$6 billion to \$4 billion (\$2 billion per year), the payback period would be short. Avoiding the loss of \$2 billion in agricultural revenue per year by spending \$4 billion once is a two-year payback period. While this calculation ignores the net profit aspect of revenue, it is a simple illustration of the benefits of raising \$2 billion in tax revenue that could be matched.

The revenue generated by the WRIST would fund water system infrastructure projects using debt financing and Pay-Go financing. The funding priority would be public agency projects that have already qualified to receive funding from a state, federal, or private agency, but lack the local match dollars required by the funding agency as a condition of funding approval. These types of investments are low-risk because the funding agency and regulatory agency have already vetted the project merits and deemed the project investment worthy. All that is missing is the local match. The additional benefit of co-investing in projects with other public and private partners is that each partner brings another level of transparency and accountability requirements, which is beneficial for the public.

Governance and Project Management

To manage revenue associated with the WRIST, a model must be created to govern and manage the funds so they are optimized for water infrastructure. While there is no perfect governance model for the WRIST, this analysis considered two legal structures for the management and administration: Enhanced Infrastructure Financing Districts (EIFDs) and Joint Powers Authorities (JPAs). The design and selection of the optimum organizational model would need to consider equity, accountability, transparency, efficiency, and effectiveness. For the purposes of this analysis, the management and administration of the WRIST, as well as the planning, permitting, design, and construction of water system infrastructure funded by the WRIST, would be through an eight-county Joint Powers Authority (JPA). However, EIFDs remain a viable organizational model that may prove to be more financially beneficial for WRIST management and administration, and there is a need for additional research on this legal structure.

The core function of the JPA Board of Directors would be to consider water-related projects in the San Joaquin Valley for WRIST funding. As a condition of funding, the WRIST JPA would participate in all phases of project delivery from initial feasibility and planning studies to construction, startup, and commissioning. The JPA Board of Directors would receive funding recommendations, and

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generally operate, function, and conduct the business of the WRIST JPA through three committees: Planning Committee, Finance Committee, and Project Delivery Committee.

Table 2 presents a sample revenue-allocation plan for the WRIST Fund using five designated sub-funds. The sample plan allocates \$234.4 million per year, (a voter-approved WRIST at .5%). On an annual basis, the JPA Board of Directors would adopt allocation ratios for the sub-funds, and then allocate the pooled revenues to the sub-funds based on the adopted allocation ratios. Once the JPA Board of Directors adopts the revenue allocations for each sub-fund, the JPA Board of Directors would allocate funds to each county for those sub-funds that have county allocations. The county allocation will be in proportion to taxable sales transactions in each county and will change each year based on prior-year transactions.

Detailed information about the proposed structure and operations of the EIFD and JPA will be available in an upcoming report from the California Water Institute, “San Joaquin Valley Water Infrastructure Financing Strategy.”

Conclusion

The San Joaquin Valley economy is heavily dependent on agriculture production revenue for employment, prosperity, and economic stability. Water supply

availability is the single most important resource for the Valley’s economic survival, and is, unfortunately, at-risk because of aged, worn, and deteriorated infrastructure, implementation of SGMA, and forecasted climate change conditions. The level of economic losses forecasted for agriculture in the San Joaquin Valley is alarming at \$6 billion in lost agricultural production annually. The cost to repair, expand, and modernize the water system infrastructure in the Valley is also estimated at \$6 billion. The San Joaquin Valley must develop ways to make strategic capital investments in water infrastructure to reduce economic losses through proposals such as the WRIST.

References

Funding Water Without Drowning In Debt: A Literature Review of Public Funding For Water Infrastructure, Dr. Thomas T. Holyoke, Professor, Department of Political Science, California State University, Fresno, November 2019

Socioeconomic and Demographic Trends of the San Joaquin Valley 1970—2017, Dr. Amber Crowell, Assistant Professor, College of Social Science, California State University, Fresno, June 2019

Economic Impact Analysis of SGMA Implementation in San Joaquin Valley, Dr. David Sunding, UC Berkeley and The Brattle Group, January 2020

NOTE: The eight-county San Joaquin Valley includes the counties of San Joaquin, Stanislaus, Merced, Madera, Fresno, Kings, Tulare and Kern.

Table 2
Sample WRIST Revenue Allocation Plan, San Joaquin Valley

County	Example Annual Revenue Allocation, 0.50% Special Tax Increment					
	County Revenue Allocation, %	JPA Mgmt and Admin, 5%	Regional Infrastructure Fund, 50%	Local Drinking Water Fund, 15%	Local Ag Irrigation Project Fund, 15%	Local Environmental Projects Fund, 15%
San Joaquin	18.37%	\$11,721,819	\$117,218,185	\$6,459,894	\$6,459,894	\$6,459,894
Stanislaus	14.30%			\$5,028,660	\$5,028,660	\$5,028,660
Merced	4.90%			\$1,723,107	\$1,723,107	\$1,723,107
Madera	2.61%			\$917,818	\$917,818	\$917,818
Fresno	23.71%			\$8,337,730	\$8,337,730	\$8,337,730
Kings	2.65%			\$931,885	\$931,885	\$931,885
Tulare	10.06%			\$3,537,645	\$3,537,645	\$3,537,645
Kern	23.40%			\$8,228,717	\$8,228,717	\$8,228,717
TOTAL	100%			\$11,721,819	\$117,218,185	\$35,165,456