

# WATER RISK MITIGATION

A Tool to De-Risk Agricultural  
Loan and Investment Portfolios



# Water risk is business risk, but building water resilience is building financial resilience.

The persistent drought in the American West leaves farmers lying awake at night, riddled with questions of how to pay back their loans when the future of their crops remains inextricably tied to the diminishing water resources. The news headlines each morning from California Farm Water Coalition, the New York Times, and the Sacramento Bee only make the morning coffee more stressful, as the doomsday articles run in circles about the need for fallowed land, the megadrought, and regions that are “wrung dry.” As of the beginning of August 2021, 99% the US west of the Rockies is experiencing drought.

## The New York Times

Drought and Wildfires in U.S. | Drought: What to Know | Maps of Drought Severity | Wildfires Rage Early | The Water War

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For some California farmers, selling off water rights is now more lucrative than growing food.

DROUGHT 2021

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As drought worsens, regulators impose unprecedented water restrictions on California farms

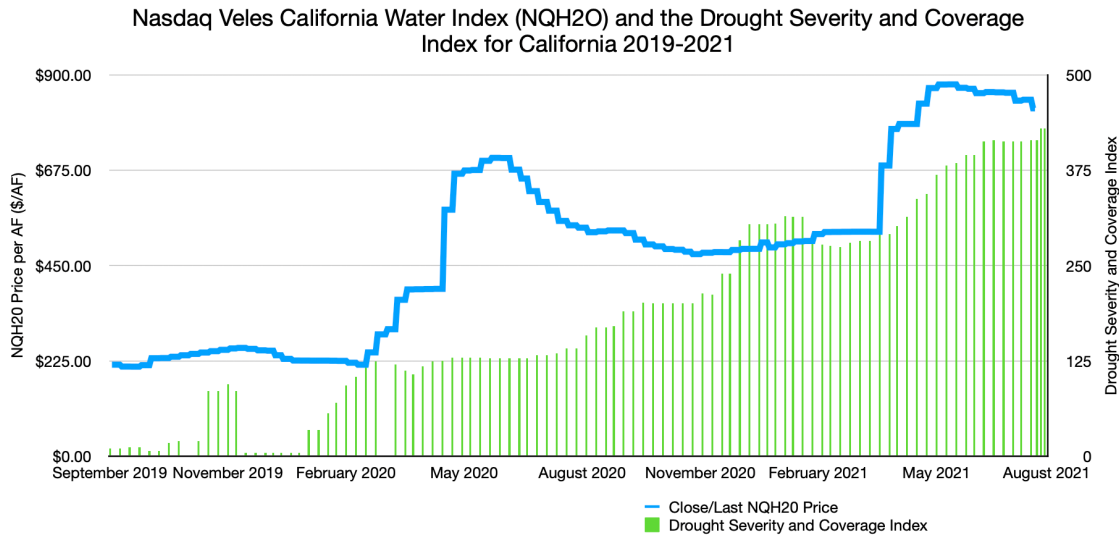
### Then and now: A 'megadrought' in California

### Facing 'dire water shortages,' California bans Delta pumping

**'Potentially the worst drought in 1,200 years': scientists on the scorching US heatwave**

# As an agricultural finance professional, what does this drought mean for your portfolio's risk?

Water risk is a business risk for farming operations and agricultural finance institutions alike (see [Water Stress & Regulations Impact to Farmland White Paper](#)). Drought conditions, the high price of water, and new regulations that limit necessary water supply are all strong causes of financial risk for both parties.



Data on water prices per AF from the NQH2O index matched with the Drought Severity and Coverage Index (DSCI) for California between 2019 and 2021. Graph by AQUAOSO.

The price of water varies dramatically with the extent of the drought; the figure below shows the increase of price of water as drought conditions deepen. The aggregation of these factors causes more fallowing or repurposing of land as it's not financially beneficial for farmers to grow crops with exorbitant water prices. But people still need farmers to produce food, and farmers depend on loans and investments from agricultural lenders and investors for their early-season expenses. How can financial institutions balance the risk of agricultural investments in light of water scarcity?

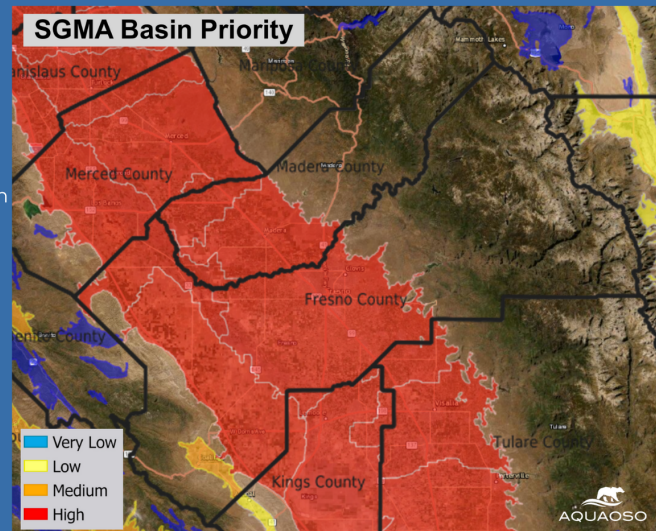
Traditionally, farming practices in CA relied on the plentiful water supply that flowed into the Central Valley. As the population grew and farming operations expanded, the water became more scarce. Farmers have learned to adapt. Agricultural intensification over the past decade in CA's Central Valley highlights the "work" in the working lands. According to American Farmland Trust, the Central Valley produces 43% more food with the same quantity of water used 50 years ago.

## CASE STUDY: FRESNO COUNTY

Fresno County faces water shortages and water risk in this drought. As shown in the Sustainable Groundwater Management Act (SGMA) Basin Priority map, the agricultural land in Fresno county overlies a basin deemed high-priority by the California Department of Water Resources. Many of the subbasins in this county are critically overdrafted. Under new SGMA regulations, these basins are required to create Groundwater Sustainability Plans (GSPs) that regulate groundwater withdrawals so the groundwater levels remain at sustainable levels, meaning users do not overdraft and diminish future water supply.



Water districts in this region typically receive surface water from the county's eastern boundary—the Sierra Nevada Mountains. But a low snowfall year in combination with high temperatures causing an early melt is reducing water supplies throughout the county. Furthermore, water districts such as Westlands Water District and the Fresno Irrigation District received none of their contracted water allocations from their contract with the federal government via the Central Valley Project. These severe cutbacks are just one of the red flags that should be going up for growers, agricultural lenders, and investors about the future of water deliveries in this region.



Climate change continues to ravage the American West causing persistent drought. Farmers must adapt traditional farming practices to meet the current water situation. With water resilience comes financial resilience.

Building water resilience into farming operations is a huge opportunity for financial professionals to de-risk their portfolios.

# The Solution to Water Risk is Building Water-Resilience

It seems climate change is actively working against farmers—dry conditions are becoming drier throughout the West, early summer heatwaves in the Pacific Northwest caused large-scale crop destruction, and unpredictable floods caused massive crop damage. What is a detriment to farmers is, of course, a detriment to the financial engines that allow their businesses to operate. Where are those helping the farmers adapt to this new, drier climate to continue producing food for the country while maintaining economic sustainability? Long-term solutions are needed to mitigate financial risk and build long-term resilience for both financial institutions and growers.

## The good news is, there are water-risk mitigation programs in place to build solutions.

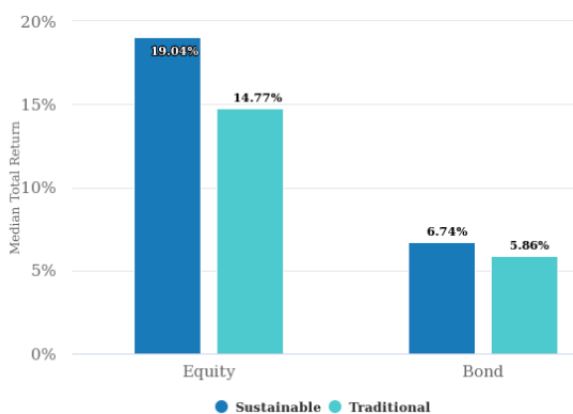
Federal and state agencies, and private conservation organizations have programs to help farmers make changes to reduce their long-term water risk. Grant funding, like USBR's WaterSMART program, funds infrastructure improvement programs that can reduce the conveyance loss in delivering scarce water resources and reduce irrigation inefficiencies, maximizing the water that reaches farms. Mitigation programs like these can benefit ag finance professionals and farmers to mitigate their water risk, and simultaneously doing good for the environment. The NRCS has incentive payments to help farmers develop and grow conservation practices, like cover cropping, that benefit the farmer's soil health, the greater water system, and the environment. As farmers increase their water resilience through mitigation, they decrease their risk, directly impacting agricultural lender or investors' portfolios.

Encouraging lasting solutions within the agricultural community will help build a water-resilient future; farmers that are building water resilience by actively de-risking their business operations should be rewarded. In the past five years, AQUAOSO learned that the relationship between the financial institution and farmer is a powerful one. We think it's important to leverage this relationship to build the water resilience that benefits the long-term financial sustainability of the finance professionals, farmers, and environment.

## What's the easiest way to de-risk an agricultural loan portfolio? Actively work with farmers that are de-risking their operations.

Water-resilient agricultural investments and ESG investments are parallel approaches for building a sustainable investment portfolio for the long term. ESG investors and farmers utilizing water-risk mitigation strategies have a critical commonality—they are forward thinkers. Instead of relying on the status quo business strategy to propel them, these groups are reading the current situation and making adaptations to their strategies to improve their returns. Building resilience isn't just a feel-good check-box; it's a smart business decision that reduces risk and increases the bottom line, especially over time.

**Median Total Returns on Sustainable and Traditional Investments in 2020**



Graph from Morgan Stanley's Institute for Sustainable Investing blog post highlighting the increased median total return for ESGs versus traditional investments across equity and bond funds.

Over the past decade, ESG investments have soared. Even in the market turmoil of 2020, ESGs outperformed and proved to be less risky than their non-ESG counterparts. In 2020, ESGs outperformed their non-ESG counterparts by a median of 4.3%.

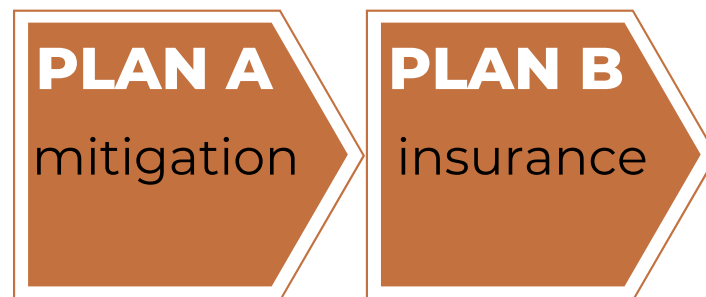
It is likely that the future of agriculture portfolios will quickly follow the trend toward sustainable investing, just as traditional investment portfolios caught on to ESG investing. These sustainable and forward-looking decisions don't just apply to ag investors, but ag lenders as well.

Rabo Agrifinance picked up on this quickly—in 2019 they started offering a flexible loan structure to help farmers through their transition to organic farming. Change is risky, but with an eye on the future, RaboAgrifinance saw this as an opportunity to help their farmers build sustainability, differentiate in the marketplace, and increase their long-term ROI. Building water resiliency into both agricultural loans and investment portfolios is a forward-thinking approach that will lead to long-term returns.

## How can lenders and farmers work together to mitigate the financial risk that stems from water insecurity? The answer is mitigation.

Mitigation is a bit like preventative medicine—perhaps you don't think you need a doctor's check-up right now, but later, it can save you time and money if you catch your high blood pressure early. The same goes for agricultural mitigation. A farm's water resources may look good on paper currently, but a lack of water can change that quickly. Farms need to have a plan in place to deal with their operations during a drought, and with the current persistent nature of drought, now is the time.

Traditionally, we could transfer some of the risk involved with growing crops to insurance products. Multi-peril crop insurance allowed for a nearly full-coverage plan for many farms. Disaster assistance programs continue to fund drought-related losses, but though these emergency loans and payments are great for recovering short-term losses, they are unsustainable in the long run. Parametric drought insurance for agriculture provides a quick payout for farmers when soil moisture levels or cumulative rainfall drop to a certain level, measured by drought intensity, not the magnitude of actual losses. These insurance products can provide quick relief payments, but for the overarching farming system, they can create unrealistic expectations about the future of farming. A [recent EDF report](#) on climate-related financial risk highlights that federal entities must now report on climate-related risk factors, which may change the structure and underwriting for USDA loans. Building water resilience, outside of traditional insurance will become critical for maximizing agriculture finance. Mitigation is very different from things like crop insurance and emergency loans, which exist to be a safety net when things go wrong. Mitigation should be Plan A for tackling water-related risk.



It is a smart business decision to work with farmers that are building a sustainable future for themselves because it reduces risk. Working with farmers to fund or encourage projects that mitigate water risk by building water resilience into their operations is the key to long-term financial sustainability for both parties. Below are tips on how to identify farmers that are leveraging these water risk mitigation solutions.

# What does water-risk mitigation look like?

Water-risk mitigation is a group of actions that build water resilience into farming operations. As aforementioned, water resilience is financial resilience. Water resilience can come in many forms, but at the core, it is either finding ways to supplement and guarantee water supply or reduce demand by making the farm and crops more efficient. Supply-side mitigation may look like joining a water market to increase the ability to obtain water when traditional sources run low. Demand-side mitigation may look like updating old irrigation systems that lead to high evaporative losses.

The landscape of federal, state, and private grant programs for mitigation can be overwhelming and decentralized. Many agencies have very different goals and desired outcomes for their capital. Below are categorized water-risk mitigation options for farmers:

## Supply Side Mitigation

Farmers may be looking to supplement their current water supply to keep their business in full operation. Water typically comes from two sources: water districts and groundwater pumping. These sources can be very limiting for farmers, especially during a drought when water districts cut off the water supply and SGMA regulated Groundwater Sustainability Plans (GSPs) limit pumping abilities. Below are sustainable and long-term options for farmers to source more water from:

### 1 WATER MARKETS

Water Markets are becoming increasingly popular as drought conditions worsen. In fact, without them, the [Public Policy Institute predicted](#) that the San Joaquin Valley of California would need to fallow 30,000 more acres and pay \$1 billion more each year to end the current groundwater overdraft. In a water market, farmers can buy and sell water rights in times of need or excess. Some farmers may even choose to sell their entire water supply instead of growing crops for the year, as this may be more profitable if water prices are high. Having access to a water market can provide options and financial security during times of drought. [USBR WaterSMART Water Marketing Grants](#), as well as private water markets, like The [Nature Conservancy's Water Sharing Investment Partnership](#), are aimed to expand water market opportunities.



## 2 CONVEYANCE INFRASTRUCTURE IMPROVEMENTS

Conveyance Infrastructure Improvement is one of the fastest ways to increase water supply. Conveyance loss via seepage is the major way water is lost after its diversion point. Imagine buying a cup of water, then carrying it to your table in a cup with holes in the bottom. This is essentially what it's like to have an unlined canal. [The Food and Agriculture Organization of the United Nations estimates](#) that in a long, unlined canal, 20-40% of the water can be lost during transportation into the soil. In comparison, canals that are lined only lose about 5% of the water along the way, due to evaporation. Water is a precious and costly resource, why are we letting our supply seep into the ground on its way to crops?

Though it may be costly upfront, upgrading old infrastructure, like canals, can greatly increase the water supply. The [2007 Coachella Canal Lining Project \(CCLP\)](#) lined 36.5 miles, saving 26,000 AF of water per year. The cost of this project was \$120 million from start to finish but was split between USBR (70%) and the County water authority (30%).

The economics: On August 4th, 2021, the Nasdaq Veles California Water Index (NQH2O) closed at \$892 per Acre-Foot of water—a historic high. The 26,000 AF of water savings from the 2007 Coachella project accounts for approximately \$23.2 million of savings in today's water prices. At this current price of water, the return on investment for this project would be about 5 years, with infrastructure that lasts much longer.

The Bureau of Reclamation Drought Response Program [WaterSMART grant](#) and [NRCS' EQUIP WaterSMART Landscape Conservation Initiative](#) both aim to build long-term drought resilience through infrastructure improvements. Organizations like the [Farmers Conservation Alliance](#) helps irrigation districts create shovel-ready projects that utilize these funding sources. Irrigation modernization can include the co-benefit of hydropower, so working with local energy companies may be beneficial to both parties.

# 3 WATER BANKING & GROUNDWATER RECHARGE

Water Banking and Groundwater Recharge are an idea and technology that go hand in hand. In the Central Valley of CA, the [Kern County Water Bank](#) “stores”, or banks water in an aquifer that sits underneath the county. This act of storing water underground is known as recharge—it allows users to replenish water supplies of an underground aquifer and use this stored water at a later date. Unlike storing water above ground, like in a reservoir, there is no risk of evaporation. In times of excess, farmers can store water for times of need.

This promising advancement has received recent [funding from CA Proposition 1](#) and is expected to expand in demand. The CA Department of Water Resources has grants under the [Sustainable Groundwater Management Program](#) that can help offset the costs of recharge.

## Demand Side Mitigation

These types of mitigation options get at what the municipal water groups have been asking customers for a decade—use less water. We know in the agriculture world this isn’t just as easy as taking shorter showers. Deficit irrigation doesn’t work for all crop types, and this isn’t a sustainable solution. We know that deficit irrigation in almond orchards can lead to smaller nut size and can have impacts on future nut load. Fallowing land is another option brought up in this space. Though short-term, that may be the solution for some, there are more financially sustainable options in the long term.

# 1

## IRRIGATION EFFICIENCY INFRASTRUCTURE IMPROVEMENTS

Irrigation Efficiency Infrastructure Improvements can make huge improvements in water use efficiency, therefore reducing the quantity of water needed to grow crops. Typical irrigation options in California range from flooding or furrow irrigation, to subsurface irrigation, to sprinklers, to drip irrigation. In 2010, the CA Department of Water Resources reported that 43% of farms still used gravity-fed irrigation, like flooding and furrows, which range from 67.5%-75% in irrigation efficiency. Drip irrigation, which is 85.7-90% efficient, was only used by 39% of the farms. Upgrading irrigation systems can increase water efficiency, and with a limited water supply, we can't afford to not put every drop to good use.

The CA Department of Food and Agriculture funds a State Water Efficiency & Enhancement Program (SWEEP), which gives grants to those seeking to implement irrigation systems that reduce their water usage through increasing efficiency. As the price of water increases during drought, investing in efficiency upgrades can pay off.

The Almond Board of CA reports that California Almond Growers has seen a 77% adoption rate of micro-irrigation and on-demand based irrigation by California almond growers which has helped them to achieve a 33% reduction in the water needed to grow almonds in the past decade.



[Blue Diamond's Sustainability plan](#) includes installing double drip irrigation systems in their orchards

## 2 CONSERVATION EASEMENTS

Conservation Easements are typically grant-funded programs that incentivize farmers to set aside land for conservation practices, such as the maintenance of wetlands, or to prevent future development. These programs are profitable for farmers, as they are paid to incorporate conservation practices into farms, and receive tax benefits from this. With the price of water as high as it has been, sometimes it can make financial sense to take land out of production. But this doesn't have to be a total loss; conservation easements can fund this.

Many programs even allow for conservation easements on working lands. These agricultural conservation easements are designed to prevent farmers from selling their land to developers, but production on the land can continue as is under these agreements. Conservation easements reduce water demand directly by offsetting the costs of taking land out of production, and indirectly by benefitting the surrounding environment.

Programs for conservation easements include partnerships with Fish and Wildlife or grant funding from NRCS and the CA Department of Conservation.

## 3 REGENERATIVE AGRICULTURE

Regenerative Agriculture has the potential to bring climate and water resilience to farms. This movement, revitalized recently, aims to integrate the farm ecosystem and heavily focuses on soil health. Practices such as no-till, cover cropping, and diverse crop rotations all help to maintain the soil structure and microbial communities that keep soil properties, like infiltration capacity at healthy levels. A recent EDF report highlights that no-till systems have the agronomic and GHG emission reduction co-benefits as they reduce operating costs and time. Though the scientific literature has not directly quantified the water conservation impacts of regenerative agriculture, we do know that healthy soils are more resilient to perturbation. It is suggested that cover cropping can decrease evaporation from soils as compared to bare soils, and we look forward to the release of the OpenET to help quantify the water-saving benefits of cover cropping.

Regenerative agriculture is catching the attention of investors, who currently have \$47.5 billion invested in the US regenerative agriculture market currently. According to a [report](#) funded by Conservation Innovation Grant from the Natural Resources Conservation Service (NRCS), it is estimated that “\$700 billion of investment in regenerative agriculture in the next 30 years could not only return \$10 trillion, a return on investment of 14.3 times but could mitigate nearly 170 Gigatons of CO2 emissions (GtCO2e)”.

Programs such as the [CA Healthy Soils Program Incentives Program](#) fund conservation practices aimed to increase soil health. Farmers can receive [tax benefits](#) by implementing NRCS Conservation Practices as well.

# Looking Toward the Future of Mitigation Funding

Each mitigation option has its pros and cons, and associated costs, but it is exciting to see a future where federal, state, and private programs fund improvements. As water scarcity continues, we expect to see an increase in funding for such projects. We predict that future funding will help the following mitigation options:

- Expansion of water markets throughout the West
- Payments for land transitioning (i.e. conversion of agricultural land to solar farms)
- Crop switching (i.e. incentives to switch to less water-intensive crops)
- An increase in Regenerative Agriculture/Healthy Soils Programs as the link between healthy soils and water conservation is solidified, or if carbon markets expand
- Increase of recharge project funding once pilot projects are completed in California

## So where do agricultural finance professionals go with this information?

We know water risk is a financial risk, and we know that mitigation measures can reduce this, bringing financial resilience to agricultural lenders, investors, and farms alike. Building resilience into a portfolio is thinking toward the future and is a smart business decision.

Many opportunities exist for farmers to start building water resilience, and every farm requires a unique solution. The best thing for the agricultural financial institutions to do is to encourage and provide resources for their portfolios to adapt to the current and future drought scenarios. AQUAOSO's GIS Connect tool can help to identify and understand the water risk of an agricultural operation. The platform also allows users to monitor the water risk in real-time. It is the responsibility of agricultural finance professions to work with their portfolio's farmers, irrigation districts, and groundwater agencies to come up with a plan to mitigate water risk. AQUAOSO is here to help connect the dots.

It is important to acknowledge that mitigation projects take time and resources to implement. Many mitigation projects take a while to see a return on investment. For example, regenerative agriculture can have incredible benefits for soil health, but rebuilding this may take up to five years. But in the long term, building water resilience is invaluable to our nation's agricultural community and finance professionals. The benefits of water risk mitigation will long outweigh the cost of implementation—especially if the cost of implementation is spread between many of the financial machines that drive agriculture. Federal, state, and private funding is here to help, and the time to start thinking about mitigation is now.

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## For more information on this topic, visit:

- [Impact of Water Regulation - Webinar](#)
- [Impact of Water Stress on Farmland Value - White Paper](#)
- [Is California Agriculture Prepared for Another Drought? - White Paper](#)
- [How to Reduce Risk in Portfolios with Modern Risk Decision-Making](#)
- [3 Barriers to Sustainable Agriculture Adoption](#)
- [3 Sustainable Finance Trends in U.S. Agriculture to Lessen Risk and Build Resilience](#)
- [Nature-Based Solutions to Physical Risks in Agriculture](#)
- [The Growing Prevalence of Flood Damage in Agriculture](#)
- [ESG Risk for Banks in Agriculture Should Be Mitigated with A Reportable Framework](#)



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