## Level Up Audio Project, Season 3

## Episode 5: Mitigating Drought With the City of Woodland, CA

## Voiceover: Welcome to Level Up, a FEMA audio project for practitioners, where communities share their stories and expertise about building resilience and reducing risk from a disaster. Californians are no strangers to drought. Low precipitation and higher temperatures over the past few decades have led to dry conditions all over the region. Climate change is making these impacts even worse. In fact, a recent study showed that the last 22 years have been the driest in the American Southwest in 1,200 years. Extreme drought and declining groundwater quality led the City of Woodland to join with the City of Davis, and the University of California, Davis, to create the Woodland-Davis Clean Water Agency in 2009. Together, they have worked to mitigate against the declining availability of water and increase water quality for residents.

Today, we'll talk to Tim Busch, general manager of the Woodland-Davis Clean Water Agency, and principal utility civil engineer for the City of Woodland. We'll also talk to Matt Cohen, associate engineer for Woodland. We'll hear how implementing a blend of projects on both the demand and supply side has helped to mitigate the impacts of drought. Here's Tim, and later, Matt, speaking with our interviewer, Emily Breen, a community planner with FEMA Region 9. This episode was recorded in July 2022.

## Tim Busch:

This past winter, we received something like 80% of normal precipitation. However, the two years prior to that, we were right around 60% those two years. The damage that was done the previous two years really set us up for a bad year this year. So it is definitely the most severe drought I've ever experienced in my 13 years living in California, and I think really in most people's lifetimes, really. We are reliant here on a combination of rainfall in the lower elevations than snowfall and the higher elevations, and with climate change and really increasing temperatures, the snow line is higher up, meaning that more of the precipitation in mountains is coming down as rain versus snow, which then a lot more of that water will simply get flushed out to the ocean, rather than stored in snow pack for essentially later use in the spring and summer months.

In the overall groundwater region in Yolo County, there had been long-term decline in groundwater levels, primarily centered around the two cities and the university, mainly because they were withdrawing water every day throughout the year, rather than seasonally like the farmland does. And with the last drought 2014/15, we were seeing a pretty rapid decline in groundwater levels, and that impacted the cities in a couple different ways. We get decreased capacity, pumping capacity from the wells, because the greater depth to water makes the pumps operate less efficiently, and therefore, they produce less water. Also, the cities had to lower several of their well pumps deeper, just to get to the water and make them still work for us. It ended up being fairly close

to actually having not quite enough water in that timeframe, so switching to surface water really helped alleviate that issue.

- Voiceover: One tool that helped the water agency and their planning and action around drought was the EPA's Climate Resilience Evaluation and Awareness Tool, or CREAT. This tool assists water utilities in assessing climate related risks to their assets and operations, and then evaluates and compares adaptive measures to increase resilience.
- Matt Cohen: It's a fantastic resource. My favorite thing about it is that the finished product that you get after evaluating your risks and comparing your adaptive measures is really an economic breakdown that you can present to your board or city council. That's going to be more what they're interested in, which is looking at how much it's going to save the rate payers, not so much how many gallons are conserved, or where they need to come from.
- Voiceover: Until 2016, the City of Woodland relied on groundwater to supply all of their drinking water. Due to declining groundwater levels and decreasing water quality, the city needed to switch to surface water. It came together with the City of Davis and UC, Davis as the Woodland-Davis Clean Water Agency, and built a surface water treatment plant, sharing the costs. This allowed the region to rely primarily on surface water, which was of better quality than the local groundwater. This transition has unlocked opportunities to further diversify their sources of water. To gain access to surface water from the Sacramento River, the agency first had to obtain water rights. It's important to note that California's water rights system was created over a century ago. It still relies on the first in time, first in right system that gives priority to water rights that are obtained first, over later junior water rights. The agency obtained a junior water right for up to 45,000 acre feet of surface water per year from the Sacramento River.

This supply can be cut off by the California State Water Board during the summer and other dry periods, typically from April to October. This is called a Term 91 Curtailment. To boost their water supply in dryer times, they purchased a senior water right for 10,000 more acre feet of water from the Sacramento River to use more freely between April through October. However, if water levels drop, and the Term 91 Curtailment goes past October 31st, it must purchase surplus water from their neighbors to supply water to their customers beginning in November. This is starting to happen more often.

**Tim Busch:** Some of the challenges that we're having while the water rights, when the water rights were originally acquired back in 2010, the analysis had indicated that a Term 91 Curtailment going past October 31 was not likely, I don't think it had ever happened before 2010. In the last seven years however, the curtailment has extended past October 31, five times. So from a water utility perspective, we don't want to get into end of October and not have a guaranteed water supply be beginning on November one, and then we don't know how long that need will last. So we have actually been buying water most

years to secure our water supply for November, especially November, December. By the time we get to late December, typically we have some rain by then, and the curtailment goes away. But that's become an increasing challenge.

- Voiceover:So the State Water Board determines Term 91 Curtailments on junior water<br/>rights. The senior water right is controlled by the Federal Government. Although<br/>senior water rights allow the agency to access water from April to October, it<br/>can be restricted during dry years based on the level of storage in the Shasta<br/>Reservoir.
- Tim Busch: That water right has a terminate called Shasta critical year, which means that if Lake Shasta does not achieve a certain level of storage in springtime, that water right can be cut 25%. That happened last year, so last year we were notified in March that our water right would be cut by 25%. That happened, so we had 7,500 instead of 10,000 for the summer months. This year, beginning in January, Bureau of Reclamation was notifying us and other water users that we could expect a worse situation than last year. In March, they said, "Expect maybe 50% of our contract water supply." And this has never happened before, we've never been cut by more than 25%, and simply, the contracts don't allow for that to happen. But due to the severity of the drought, Bureau of Reclamation worked with the water users, and ultimately, our water supply this summer is cut by 82% from previous years. So we were accustomed to 10,000 acre feet for summer months, last year we had 7,500, this year we only have access to 1,800, which is nowhere near enough water for the agency's summer water needs.
- Emily Breen:Wow, that's quite a challenge, I imagine. In terms of forecasting, what do<br/>models project for drought in your region in the next decade, or, say, in the next<br/>50 years?
- Tim Busch:So as part of the agency's planning for a long-term water supply, the state has a<br/>model called CalSim that we use, and we updated it, I think it looks to year<br/>2070, and impacts of climate change through 2070 in the Sacramento River<br/>system. And the longer term projections are that we will see both drier and<br/>wetter conditions. In Northern California, we don't really get like a consistent<br/>amount rain every year, or snow every year. What the models are predicting is<br/>that as we move more into climate change, we will have more heavier weather<br/>stormy events, more larger stormy events, and at the same time, or at different<br/>times, we'll have longer periods of very dry weather.
- Matt Cohen: Yeah, just to add to that, you get more of the extremes, which is going to lead to other potential issues like mudslides, flooding events, beyond the scope of the drought and water supply impacts we're talking here.
- **Emily Breen:** Thank you. So shifting gears just a little bit, how have these drought conditions impacted the demand for water?
- Matt Cohen:Drought has become critical to California's culture. We have a culture of<br/>recognizing the importance of water, and that dates back decades. So the Water

Conservation Act of 2009, Senate Bill X7-7 was passed, and urban water suppliers adopted per capita use targets. So in about a 10-year period, the city almost cut its water demand in half. However, there's somewhat unanticipated consequences too, like you'd think during a drought, you'd see decreased water demand across the board, but that's not quite true. In January and February of 2022, we saw an increase in water usage relative to previous Januaries and Februaries, and it makes sense when you think about it, because when there isn't rain, people start watering their plants. So sometimes we're here expecting less water demand, it's actually more because there isn't water. People are relying on our water more in certain instances. But overall, over the course of decades, we've done a pretty tremendous job of reducing water demand.

- Voiceover:The City of Woodland also built aquifer storage and recovery wells, or ASR wells.These help store water in the wetter winter months for use in the drier summer<br/>months when demand can be three to four times greater.
- Matt Cohen: The aquifer storage and recovery wells play a critical role in Woodland's water management, because they're essentially two-way straws. So in the wintertime when water's plentiful, we can recharge the aquifer, and we can send treated Sacramento River Water underground and store it for summer use. To put it into perspective for you, the City of Woodland has about 3.5 million gallons of aboveground storage capacity, that's enough to last for a few hours. So it really is for balancing supply and demand on a day-by-day basis. So 3.5 million gallons of aboveground storage. Over the last winter of 2021/2022, we stored 835 million gallons in the underground aquifer. So that's enough for a few months, quite a big difference. There are challenges associated with operating aquifer storage and recovery wells, and there was a lot of investigations and planning that went into the decision to go with this route. The city actually worked with Lawrence Livermore Labs to test and determine and make sure that when we inject the water, we can recover the same water that we're injecting. But there's also concern about water quality challenges, in particular disinfection byproducts that can be cancerous to humans in large enough concentrations. So that's another thing we've really had to test out and make sure that we're not forming. And the data so far is showing that it's pretty consistent with the water quality of the surface water we're injecting, so we haven't shown that we're forming new disinfection byproducts, but that's just a couple examples of considerations and challenges that go into proving out the technology.
- **Emily Breen:** Thank you for describing the challenges that need to be tracked. What other benefits do these wells offer?
- Matt Cohen:Great question. California recently passed the Sustainable Groundwater<br/>Management Act, which has all water suppliers in California really paying<br/>attention to water levels now. So for us, and being able to recharge the aquifer,<br/>we're preventing issues that can come with groundwater depletion, like<br/>subsidence, degrading water quality, but especially for us, we're providing<br/>reliability of high-quality water supply.

- **Voiceover:** The City of Woodland also created a recycled water utility to reuse wastewater.
- Tim Busch:Yeah, so the recycled water utility that we have currently, we provide our<br/>recycled water to a power plant, they are our largest user, and we also use it for<br/>a two city parks, and some other landscape irrigation at present. So basically, it's<br/>non-potable use. We have a very high-level of treatment, we have a tertiary<br/>treatment plant with disinfection, and then we add chlorine as it leaves the<br/>facility as well, just to guarantee the safety of the water.
- Emily Breen: And any plans to expand this use?
- Matt Cohen: Yes. So currently, the recycled waters produced by our wastewater treatment plant, only about 25% of it is being used currently. So we still have that additional 75% capacity that's coming out of the wastewater plant that can be used for recycled water purposes. It's really just a matter of connecting the pipes to new users, which really is a matter of getting the funding, and taking the time to do the plans, and construction, and all that. So that's all in the works now, we have a plan right now, and we're in the design phase, and we already got funding for it, thank you State of California. So we're going to put that money to good use, and we're going to expand our recycled water system, and provide recycled water to more parks, and landscape irrigation strips. So the more we can increase recycled water use in the city, the more we're offsetting potable demand. So it's just as good as water conservation, or additional water supply.
- Voiceover: The City of Woodland worked with municipal partners to curb water demand by installing water meters. They also carried out outreach and education campaigns for residents.
- **Emily Breen:** Basic question, which homes and businesses within your users are metered now?
- Tim Busch:100% of the city's customers are meters. All of our residential, all of the<br/>landscape irrigation, all businesses, industrials. We've been fully metered now<br/>for more than a decade. The city went through a couple big projects years ago<br/>to make sure everyone was metered, kind of in advance of the surface water<br/>project. So we have in total a little over 17,000 meters across the city.
- **Emily Breen:** Wow. Okay. Has this curb demand at all these water meters?
- Tim Busch:Yes. Yes, absolutely, in a couple different ways. So with the overall surface water<br/>project, the city over time, nearly doubled water rates, and that, in combination<br/>with customers having meters. There's also a program the city operates called<br/>AquaHawk, where people can log in and view their water usage in real-time. So I<br/>think it's a combination of people being able to see how much water they're<br/>actually using, and seeing how that relates to their water bill now being higher<br/>than it used to be. As Matt stated earlier, we've reduced water use in summer<br/>months especially by about half prior to putting everything into place. The other

thing that really helps as well is that, with the AquaHawk program and water meters, we're really able to see if there's a leak on the customer's side. So, a few years back, we found quite a few occurrences where meters were just constantly running, which indicates there's maybe a leak on the customer's side. So, we were able to reduce water losses from our system, mainly by finding leaks on the customer's side of the meter. **Emily Breen:** Could you talk a little bit about the rates, and what drove those increases in rates? **Tim Busch:** Yes. Yeah, the overall surface water project entirely cost nearly \$280 million, and that split between the three partners. So, the city's portion of that is roughly 60%. So, it is 100% paid for by the rate payers over time. A portion of the project was funded by grants, we constructed a new state-of-the-art fish screen facility in the Sacramento River, that facility was 100% funded through state and federal grants. The rest of the project was entirely funded by rates from the customers. **Emily Breen:** How did you engage the public to get on board with these measures, especially as their water bills started to rise? Tim Busch: Yeah, we did it in a couple of different ways. One, we highlighted the ongoing, and projected future issues with remaining on groundwater, both in water quality, hardness, salinity, and then also quantity, and that the depth of groundwater was increasing, especially during drought years. So there's really a problem with the groundwater that everybody had already pretty wellunderstood, that a lot of people had water softeners, water heaters would not last very long. So they knew that if we went to surface water, they would not need a water softener anymore, water heaters and other fixtures in their house would last longer, coffee pots would last longer, that there was a real direct financial benefit of switching to surface water. So basically, the analysis that we did at that time, that would really offset the increased water rates, we would really offset the more frequent hot water heater replacement, and also buying salt for water softeners. So it wasn't really a direct increase in homeowner's cost overall, it's just basically shifting how they would see the cost, essentially. **Emily Breen:** A lot of tremendous work that's going into mitigating drought, both currently and looking into the future. Who did you collaborate, or what agencies did you collaborate with to make this project a reality? Matt Cohen: We've collaborated with the State Water Resources Control Board, the Department of Water Resources, the California Fish and Wildlife, Bureau of Reclamation. It's been a whole team of engineering consultants and hydrogeologists. We received financing from California's State Revolving Fund program, I'm talking construction companies that build our aquifer storage and recovery wells, the city's well operators are important, as are our distribution operators, and our O&M guys. We've needed support from our city council, city managers, public works teams, Yolo County Flood Control & Water Conservation District. They've all been instrumental, and the public's been very much on our side, and understanding this as well, and we're looking out for them, and it's nice to know that they're looking out for us too.

Voiceover: The City of Woodland has shown that proactive measures that diversify a community's water supply, drawing from groundwater, surface water, ASR wells, and water recycling plants help mitigate the impacts of drought. Getting your community and local government on board is also vital to fund these projects, save water, and adjust to future conditions.

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