Santa Clara Remotely Monitors Waterways To Prevent Floods

The Silicon Valley boom has been one of the greatest economic success stories of the last few decades. Computer hardware innovation in the 1970s led to software development and then to social media, distributed computing and all the game-changing apps and services of the 21st century. While some of this growth now centers on the city of San Francisco, the nexus of leading tech companies remains 40 miles south, between Stanford University and San Jose.

This area, Santa Clara County, is a landscape of marshes and flatlands that give way to the low mountains that ring the Bay. Just 50 years ago, this was farmland. Now, Apple, Google, Facebook, Oracle, Intel and more than 1,500 other tech companies have grown over the old orchard rows. No other Northern California county has grown as fast as Santa Clara; the county's population has increased by more than 15 percent since 2000.

Location:
Santa Clara County, California

Application:
Real-time video surveillance

Solution:
OnSight™ Portable Surveillance Unit

While this growth has largely been good news, such fast development has created strains in unexpected places. Jay Lee, a Field Construction Supervisor for the Santa Clara Valley Water District, sees the fallout of rapid growth in the County's watersheds and among its homeless residents.

What Fast Growth Leaves Behind

Growing populations create more debris, some of which ends up in the County's creeks, blocking water flow and making them more vulnerable to flooding. "The channels have gotten narrower and narrower. More garbage goes into the creeks," Lee explains. "One solution might be to cement-line these waterways. But they're wildlife habitat, so that's not an option."

Meanwhile, the cost of housing has far outstripped average wages. The median price of a home in the county tops $1.2 million, and average rent has risen to more than $2,700; many with less education and income find themselves left behind. The county's homeless population has grown to more than 7,300. Of those who can't find an affordable apartment, nearly three-quarters have no shelter. That means they're sleeping rough, often along the area's waterways.

"These people end up around the creeks. The space is free. The landscape hides them. It's like a blind spot," says Jim Chaote, also a Field Construction Supervisor with the water district.
While the county doesn't want to create a humanitarian crisis by clearing out folks who've fallen on hard times, growing populations around the watersheds create a safety issue during the rainy season, Lee explains. His staff ends up on the frontlines of both human and environmental emergencies.

Nature Is Stubborn

Flash floods have long been a natural part of the California ecosystem, but they can create havoc in metropolitan areas. Many of the most densely populated places in the state were once floodplains that could absorb winter storm water. Now, these places have become vast networks of homes, businesses, and transportation corridors.

Santa Clara County is more susceptible to flooding than many other urban areas in the state. The Los Angeles area to the south has a huge system of concrete flood control channels. Sacramento, the state's capital to the east in the Central Valley, relies upon levees to keep back the waters of the Sacramento and American rivers. Santa Clara leverages these management methods, but on a smaller scale than LA or Sacramento, making it more vulnerable to rising waters, Lee explains.

During the winter of 2017, heavy rains caused Coyote Creek to overtop its banks before authorities could adequately alert residents. Whole neighborhoods in central San Jose flooded. Cars and homes were inundated. Many residents had to be evacuated by boat. Juanita Wilson had been preparing for a trip to the DMV when she heard firefighters yelling warnings over a loudspeaker. She opened her door and there was water everywhere.

"I didn't know what to do, I felt lost," Wilson told the local NPR affiliate. Wilson ended up losing all her possessions in the flood.

By the time the flood waters receded, more than $73 million in damage had been done, displacing more than 14,000 people, both homeowners and the homeless.

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>
> Jay Lee, Santa Clara Water District Field Construction Supervisor

The Reactive Technology Paradigm

In the aftermath, water district staff have tried to be even more vigilant about monitoring what's going on along the 275 miles of creeks that it manages. The district deployed crews to make daily operation checks. They also installed solar-powered cameras that would send snapshots of various waterways every few hours.

But the coverage was still spotty. "We had to drain off manpower from other projects to make those checks," Lee explains. "And the camera system we had was cobbled together. It was unreliable. We got a lot of false positives."

Sometimes, district staff would get alert notifications from various sensors. Sometimes, a resident would call, alerting them to a problem. Because the system wasn't completely reliable, Lee, Choate or another staffer would have to drive out to assess the situation. Sometimes, the problem would be real; other times it would be a false alarm. Even worse, sometimes the cobbled together camera system would just stop working altogether and a staffer would have to go out into the field to troubleshoot.

Lee says his department was especially worried about what might happen to homeless encampments along the creeks during a flood emergency. Each year, district staff get called out hundreds of times to clean up encampments. "How would we rescue those folks?" Lee asks. "They don't have any warning systems."

A Reliable, Turnkey Solution

In a meeting with the City of San Jose, someone mentioned V5 Systems to Lee. A Silicon Valley municipality had just installed OnSight units to keep track of illegal trash dumping, which can clog up (and poison) waterways. When Lee and Choate saw the product demo, they were impressed that the technology could be scaled and customized in a modular configuration. They also liked that the solution was self-powered, easy to deploy and built for outdoors locations.

The water district decided to install OnSight units along waterways that had been covered by an unreliable system of old cameras cobbled together in a 'network'. The district mounted the units on steel poles that had supported the old network. Deploying the new technology took less than 30 minutes per unit. Each unit is self-powered, relying on a proprietary solar, battery and power management system.

The technology solved a problem without busting budgets. The water district didn't have to do expensive trenching to put down electrical lines to power the units. If heavy rains started to cause concern, district staff could just check the live video on a web browser or a mobile app. Now, there was no need to battle through traffic in stormy weather to verify a situation in-person, conserving both energy and staff time.

Mischief Managed

When the water starts rising dangerously or someone dumps a load of debris into a creek, Lee's staff knows about it immediately. The OnSight unit transmits real-time, high-definition video of conditions along the creeks. District staff can monitor the situation via Wi-Fi, satellite, cellular or radio networks. Even if an alert comes in during off-hours, it's simple to check the situation remotely. If there's an emergency, Lee and Choate can dispatch crews to fix things before they get out of hand.

"It frees up manpower to deal with other hotspots," Lee says. "It saved our personnel time, and that's dollars saved."

With the 24/7 video streaming, Lee says the OnSight unit also gives the water district more time to react. Floods not only destroy property, but also pose a public health risk if sewage gets into the flood waters. "With the units in place, we have more warning in the event of a storm surge," Choate says.

> "We liked that this was a turnkey system. It provides 24/7 video streaming. It's 100 percent self-powered. We don't have to worry about the system blinking out. It is more reliable."
>
> Jay Lee, Santa Clara Water District Field Construction Supervisor

That means water district staff have more time to get the word out to vulnerable populations in homeless encampments; more time to protect property; more time to get people out of harm's way; more time to respond to illegal dumping in waterways; more time to avoid public health issues.

At the same time, district crews can monitor conditions remotely. This not only saves manpower, but it also keeps public employees out of dangerous situations. It's a win-win.

"In the long term, the OnSight units maximize value," Lee says. "Before, I'd have to get in my truck and drive through a storm. And a lot of times, all that time and effort would be for nothing. With the OnSight unit, I don't have to waste my time. It frees me up to address other important issues."

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