



Irrigation technology: Smart water solutions for state's farmers

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Faced with another dry year, California farmers and ranchers are looking for ways to stretch their water supplies to the maximum, hoping they won't lose everything they've invested in their crops.

For farmers in the drought-stricken regions of the state, progress is taking the form of new irrigation technology that in many cases is providing farmers with additional water, greater efficiency and monetary savings.

"Smart controllers" are one example of the trend.

Traditional irrigation controllers are automatic timers that turn the irrigation on and off according to a set schedule. Smart irrigation controllers, on the other hand, automatically adjust irrigation run times based on inputs like rainfall, current temperature, historic water use and soil moisture levels.



Five Points farmer John Diener with his state-of-the-art center pivot irrigation system, which is programmed using the GrowSmart control box.

"The future of farming will be the integration of crop models, GIS (geographic information system) data, local soil maps, historic weather information, precision agriculture and site-specific data entered into a smart controller that will manage on-farm agronomic practices like irrigation scheduling, fertigation and chemigation in a much more efficient, economic and eco-friendly manner," said Diganta Adhikari, a database analyst with the Center for Irrigation Technology at California State University, Fresno.

"Any system failure or human intervention needed will be initiated by alerts that can be sent to the farmer via phone, PDA (personal digital assistant) or e-mail," he said. "A number of manufacturers are currently working on this technology and are market-ready."

Adhikari pointed out that this technology is just the beginning of a new era of farming.

For example, new cutting-edge technology built to enhance irrigation efficiency is being tested in Southern California by a handful of avocado growers.

The California Avocado Commission and growers have joined the Rancho California Water District and an irrigation company to study the use of the company's smart controller to conserve water in avocado groves.

The purpose of the study is to ensure that the smart controller technology will supply the trees with enough water to grow a good-yielding crop.

"The controller can change irrigation schedules automatically without people as the weather changes," said Tom Ash, director of conservation for HydroPoint Data Systems Inc., the manufacturer of the

WeatherTRAK smart controller.

"When you provide the controller with the soil type, plant type, sun, shade, slope and sprinkler output, it can calculate an efficient irrigation schedule."

For the past few years, HydroPoint Data Systems has been working primarily with the landscaping industry and is now marketing its smart controller to farmers, especially those like Temecula avocado grower Steve Schweizer, who is seeking new ways to conserve water.

"We want to be proactive in saving water, and anything that will benefit our industry, we definitely want to take advantage of that," he said.

Schweizer, who manages avocado groves in Riverside County, is taking part in the study and said he expects to have the technology installed in his grove next month.

The WeatherTRAK smart controller is one of about a dozen on the market today that utilizes weather data to time irrigations.

Westside grower recycles irrigation water

On the Central Valley's Westside, where farmers are faced with saline soils and a shallow water table, John Diener is a trendsetter when it comes to maximizing the use of his water supply.

"A neat thing about a lot of guys on the Westside like John is they can take a very limited amount of water and stretch it," said Liz Hudson, public relations coordinator for the Fresno County Farm Bureau. "This reuse of subsurface drainage water is just one tool they use that helps with water conservation and water management, but it also has tremendous environmental value in taking this water and using it as a resource."

Diener, who is president of Red Rock Ranch near Five Points, has worked with researchers since 1996 to utilize integrated on-farm drainage management, a system that captures and reuses irrigation water. With each watering, salt is extracted from the soil and selenium is drawn into the plant. About 90 percent of the subsurface drainage water is used to produce crops. The remaining 10 percent is moved into a solar evaporation area where salts are captured from the water after its final use so that no salt or selenium is discharged back into the environment.

Fewer salts in the soil allow Diener, a diversified grower, to farm vegetable crops such as tomatoes, lettuce and broccoli.

"As a farmer our primary purpose in trying to generate a profit is also how we manage resources," he said. "Our job is to efficiently and effectively run a sustainable, long-term resource management program."

Diener and researchers are now working on the final phase of the solar evaporation project so that the salt can be marketed. He is currently looking into marketing the salt to the California Air Resources Board for dust control.

Since Diener's reuse of subsurface drainage water has proven successful, more growers have followed

suit, said Westside Resource Conservation District Manager Sarge Green.

"Other growers are now using the same kind of system. One grower south of Bakersfield converted evaporation ponds to a solar evaporator like John's," Green said. "He has been so successful that he was able to buy more land and convert it over to growing cash vegetables.

"What is spreading is a truly integrated solution and that is the key. You've got to manage the resources from the very beginning to the very end in a very careful way."



Diganta Adhikari, a database analyst who does research at the Center for Irrigation Technology at CSU Fresno, uses computer technology to test moisture levels in the soil.

New technology saves water and energy use

As a Westside grower, Diener said that when he sees new technology that will help him with irrigation efficiency, he takes advantage of it, such as using the new generation of center pivot irrigation equipment.

"He's not the only one," said Bill Green, Ag Pumping Efficiency Program education manager at the Center for Irrigation Technology.

"Center pivot irrigation systems, which are the No. 1 irrigation system in the world by far, have taken off like gangbusters," he said. "It has never been very popular in California, but all of a sudden people are really looking at this since there are some advances in the technology. The new pivots combine both energy and water efficiency and those two things are tied together anyway because it always takes energy to move water.

"When you have adequate water technologies that save you a little bit here and a little bit there, they don't really catch on until things get really tight. Necessity is the mother of all invention."

Water reclaimed, recycled in Sonoma Valley

In the Sonoma Valley, where some 170 square miles of the Sonoma Creek watershed drains into the San Pablo Bay, grape growers and dairy ranchers, as well as local residents, businesses and governments, are exploring new ways to increase the supply of usable water while replenishing the groundwater supply that the agricultural community depends on as the basic source of water.

Sonoma winegrape grower Tito Sasaki, who is on the advisory panel for the Sonoma County Water Agency's groundwater management plan, is now participating in an agency project that involves the use of tertiary treated recycled water. This water is used as a medium for a geothermal energy distribution system that increases the storage capacity for recycled water. This project will also offer reliable and cost-effective heating and cooling, while reducing the community's carbon footprint.

"I see green pastures with this program," said Sasaki, who also is a member of the California Farm Bureau Federation Water Advisory Committee. "We are addressing groundwater problems, not through controls and regulations, but through exploration of alternative sources of water including tertiary-treated recycled water, which will soon be available to most of the agricultural and urban users in the valley."



Tito Sasaki operates a vineyard next to the Sonoma Valley Wastewater Treatment Plant, which is an extended aeration return activated sludge plant that filters water to a tertiary level via a new filtration system. Through the Sonoma County Water Agency's use of new technology, growers like Sasaki will be able to benefit from the expanded use of recycled water for irrigation.

Sonoma County Water Agency Deputy Chief Engineer Cordel Stillman describes the agency's Regional GeoExchange Energy Efficiency project as using proven and reliable technologies to lower the energy needs of buildings through conservation, to a point where the remaining energy needs can be met using renewable resources.

The centerpiece of this project, he said, is to heat and cool buildings using geothermal heat pumps. Such pumps have been installed in schools, residences and large buildings for more than 50 years. They use water to transfer the underground temperature, which is near constant year-round, to rooms where additional energy needs to heat and cool will be minimal.

"We take existing infrastructure and make it as energy and water efficient as possible, then add heat pump technology, which cuts heating and ventilation costs down 40 to 50 percent, and use recycled water to make those work," Stillman said. "Then we add renewable energy sources to get the buildings down to the lowest carbon footprint possible, even a negative footprint. This will help

finance the expansion of recycled water for irrigation."

The proposed water source for the geothermal heat pumps is the Sonoma County Water Agency's highly treated wastewater. Pumping the recycled water to buildings for this purpose means this water will replace potable water. This offset of potable water use will save hundreds of thousands of gallons in drinking water a year, Stillman said.

"We're using tertiary treated water at a number of locations. In fact, even before that, we were using secondary water for a lot of ag uses such as at dairies and at vineyards," Stillman said. "The beauty of this is, by using this recycled water, it is going to extend irrigation systems to areas where they hadn't been before. Right now we're giving the water away."

The agency is now embarking upon construction of the distribution network of tertiary treated recycled water for farms, golf courses and urban landscaping throughout the Sonoma Valley, Stillman said. It has also started a groundwater monitoring and analysis program utilizing public and some volunteer private monitoring wells. In the near future, surplus water from the Russian River during winter will be stored underground through the local water district's wellheads.

Sasaki, who has farmed in Sonoma for more than 30 years with his wife, Janet, grows pinot noir winegrapes next to the Sonoma Valley County Sanitation District.

"The Sonoma County Water Agency has taken these proactive approaches and as a result, presented us with a new perspective for agricultural water issues," Sasaki said. "It is up to us to be creative and to take advantage of the new business environment."

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