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"Conserve water, drink wine," quips a common bumper sticker.

If only that were true. Making a gallon of California wine, by various estimates, requires anywhere from a few dozen gallons of water to a few hundred.

Most of that water goes toward irrigation. But some goes to the winery itself and comes out as waste. On average, wineries create 6 gallons of wastewater for every gallon of wine, which means that in 2010, the California wine industry produced enough to drown Golden Gate Park in more than 8 feet of runoff. About one-fourth of the industry's waste is produced at this time of year, during harvest.

According to Sheldon Sapoznik, Napa County's land use development supervisor, wastewater mainly comes from washing tanks, barrels, crush pads and floors. No matter the use, it's wastewater that needs to be dealt with.

It's not hard to imagine a solution. Wineries all own vineyards or buy from them. Vineyards need water.

Problem solved, right?

Not quite. Microbes can break down the grape juice and plant matter flushed into the water, but they need oxygen to do it. That's not the problem. The problem is how much oxygen those microbes need, a measurement called biochemical oxygen demand (BOD). In winery waste, there's not nearly enough supply for that demand.

"Winery wastewater obviously has lots of suspended solids," Sapoznik says, "and that means there's a lot of

BOD. We require that BOD be down to less than 50 before irrigation."

High sugar content

Winery wastewater's high sugar content can result in a BOD anywhere from 2,500 to 10,000. By comparison, human sewage registers at a mere 150 to 300.

Dump high-BOD waste in the ground near a waterway, and you wreak havoc - not because of toxins but because the waste drains oxygen from the water, which means it's not available to other life.

"It puts a big slime layer on a creek," says Sapoznik, "and it'll kill fish much faster than if it were a sewer line."

Even wineries far away from rivers can't irrigate with wastewater. That same oxygen demand will starve microbes that help vine roots absorb water and nutrients.

Some wineries have an easy out: Dump wastewater into the same sewer system that their residential neighbors use. But the spike in use can exceed sanitation department thresholds, which translates to big bills. And then a winery can't use that water in the vineyards. Any winery that wants to reclaim the water for irrigation must effect a 50- to 200-fold drop in BOD while navigating government regulations around wastewater.

This has created a thicket of potential options, which firms such as Santa Rosa's Summit Engineering help wineries to navigate.

"The most common treatment method is a pond," says Anu Shah, manager of the company's water and wastewater division. You've probably seen these ponds

on Wine Country back roads: big pools of water with large motors that aerate the liquid. Pump wastewater in; release clean water 60 to 90 days later.

"Those kinds of systems are simple to operate," says Shah.

But ponds take up space that could be used for grapes. And neighbors don't like them: They're unattractive, they're noisy and they smell.

Wineries that prefer a more discreet option might try leach fields, says Shah - set up a septic tank and occasionally flush it into an underground set of pipes with tiny holes drilled along their lengths. Water trickles into the ground at a rate slow enough for bacteria to break down solids without getting starved for oxygen. But a leach field system works only in certain soil types, and the treated water isn't available for irrigation.

An option making inroads into Napa, however, is a hydrate system - a tank with filters that remove big solids and oxygen pumps that let microbes break down the rest. Perhaps its biggest asset: It doesn't take up much space.

"It was upsetting to me to take our land and use it for wastewater ponds," says Chuck Wagner, winemaker for Caymus and Conundrum.

But those were the rules if your effluent reached a certain volume.

"We looked all around for different methods," he says. "There are a lot of systems out there, but there was only one that would pass muster in Napa."

Heavily regulated

The county may have more agricultural rules than any other in heavily regulated California, Wagner notes. "I tell my kids," he says, "figure you live in a national park and you have to ask the ranger before you do anything."

So Wagner installed the Lyve system, also in use at Alpha Omega and Rombauer. He estimates that his series of tanks, sitting in a shed behind the winery, take up about 2,000 square feet. Compare that to a pond that would take 1 or 2 acres.

"It takes management, of course," he says, "but when our water has been processed, it can be used for irrigation."

No worries about aroma, either: "I live downwind of it myself."

It's also possible that winery ponds just need to be rethought.

"We recycle 100 percent of the water that comes through the winery," says Tim Thornhill, a partner in Parducci winery in Mendocino, who built a wetland for treating his water. "And we do it with 20 percent of the energy you would normally use."

Parducci's pond water has a BOD of zero and dissolved oxygen of 5 to 8 parts per million; the minimum requirement for dissolved oxygen in irrigation water is 1 part per million.

"It's like I'm making water," he says, "which is better than making money because I can't always buy water even if I have the money."

He starts his system by being smarter in the winery. Winery workers use brooms and shovels to pick up the bulk of the debris. It saves water and keeps winemaking solids out of the waste. Thornhill also takes the first runoff from barrel-cleaning, a purple concentrate rich with sugars, and puts it on his compost pile.

"It increases the speed on the compost," he says, "and keeps it out of the wastewater."

Final steps

Finally, the thinned-out water, which has a BOD of approximately 2,000, flows downhill into tanks where solids settle out over 15-20 days, and then into four successive "trickle towers," where water drips over boards covered with sugar-loving microbes.

Only then does water go to a pond, which presumably is easier to justify thanks to Mendocino's lower land prices. But the pond isn't your standard rectangular hole.

"I took inspiration from one of the greatest filters in the world," he says, "the Everglades. It's like a labyrinth; water comes in on one end and leaves out the other, and along the way it goes through channels with grasses and organisms that do the actual filtering."

The new wetlands, which occupies about one-quarter of an acre, has transformed what used to be a typically ugly pond into a community park and wildlife magnet.

"It's the No. 1 attraction on the tour," Thornhill says.

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