

# Modernizing Oregon's irrigation systems can involve unexpected complications

Mateusz Perkowski

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Though preventing leaky canals from losing water doesn't seem like a particularly controversial idea, irrigators in Central Oregon have found out otherwise.

The plan appears to be a quintessential "win-win" for agriculture and the environment: Replacing open canals with piping will save 40% of the water that would otherwise seep into the ground, enhancing the aquatic habitat of the threatened Oregon spotted frog.

Changing the traditional way of doing things is often complicated, however, and modernizing irrigation systems across the arid West is no exception.

More efficient systems have clear benefits but can cause disruptions, such as reducing the amount of irrigation water that previously recharged aquifers or returned flows to rivers late in the summer.

One of the obstructions for the Central Oregon Irrigation District has turned out to be the scenic value created by a 1.5-mile stretch of open canal that runs through a well-heeled neighborhood of Bend.

"If you want to talk hurdles, I've got a lot of them," said Craig Horrell, managing director of the district, which provides water to 45,000 acres in the region.

Neighbors intent on preserving the canal have nominated it as a historic site, potentially triggering a land use fight that could cost millions of dollars in litigation.

The irrigation district plans to bypass that stretch of open canal by burying the pipe along another path, though the dispute has yet to be fully resolved.

## Unintended consequences

In other historic areas, the district will bury piping for irrigation in the ground while still allowing water to course through the open canal as a circulating water feature to avoid upsetting local sensibilities.

"Actually laying the pipe is easy. It's getting to that point," said Mike Britton, manager of the North Unit Irrigation District, which provides water to nearly 59,000 acres in the region.

Open canals in more remote areas are unlikely to encounter such aesthetically based objections to piping, but projects aimed at irrigation efficiency may nonetheless have unintended consequences for other irrigators and river hydrology.

In the Deschutes River Basin, irrigation overhauls are not only being driven by efficiency but also by regulatory necessity.

Winter flows that are stored in a reservoir by the North Unit Irrigation District are being released to improve habitat for the Oregon spotted frog, which is protected under the federal Endangered Species Act. Those irrigators will instead rely on summer flows from water conserved by piping canals in the Central Oregon Irrigation District.

"The canals people have enjoyed walking along are going to change because they have to," said Horrell, COID's managing director.

## Transformative change

For the Powder Valley Water Control District in Eastern Oregon, investments in piping and reservoir development made more than four decades ago have proven transformative for individual irrigators.

Water delivered through pipelines is pressurized, so growers could switch from flood irrigation to center pivots and wheel lines without spending money on electricity for pumps. The system has also allowed farmers to irrigate more land — about one-third of the district's 15,000 irrigated acres grew drylands crops before the development of reservoirs and piped canals.

"We conserve a whole lot of water and we can irrigate additional acres with the gravity pressure also," said Lyle Umpleby, the district's manager. "We've increased the crop production immensely."

Aside from agronomic considerations, the pressurized pipes may someday be outfitted with hydroelectric turbines to generate renewable power.

To an extent, investments in efficiency made by individual irrigators were prompted by the altered flow of water across the district.

When most of the acreage was fed by open canals that farmers used to flood irrigate their fields, excess water traveled from one property to another.

As some growers moved away from flood irrigation, however, their downhill neighbors could no longer count on those flows and had to tap into the pipelines themselves.

"When you switch to sprinklers, you don't get that return flow," Umpleby said.

Within irrigation districts, conflicts over water between individual growers can be defused or resolved equitably because the system is managed as a whole.

## **Impacting neighbors**

In the Eagle Point Irrigation District, which delivers water to more than 8,000 acres in southwest Oregon, a planned change in irrigation practices requires a \$1,250 fee plus charges for staff time, which pays for a review that's intended to prevent harm to other patrons from modified water flows.

"The district has more control over what individuals are doing within the district," said Sarah Liljefelt, an attorney specializing in water law.

When irrigation practices are changed outside a district, however, growers are directly subject to the "prior appropriations" system of Western water law under which junior users may lose the ability to irrigate so that flows to senior users with older water rights are preserved.



Linear irrigation is touted for their efficient use of water and electricity, along with requiring less labor. Courtesy of NRCS Oregon.

Under this doctrine, a senior water right holder may request that state water regulators shut down irrigation by a junior user.

Also, if a farmer invests in sprinklers or other efficient technology and stops flood irrigating, it's possible to re-allocate much of that saved water to additional acreage — potentially reducing return flows to a river.

Senior users can then issue a "call" to protect their access to water, but it may or may not be the irrigator who invested in efficiency who ends up "regulated off."

"It's not a direct correlation to a specific water user who has made changes," Liljefelt said, adding that shut-offs are decided based on the priority date of water rights. "The water master won't pick and chose."

Farmers who have water rights in reservoirs or channels that depend on runoff can also encounter difficulties when uphill neighbors invest in more efficient irrigation methods.

"If that runoff stops, they're kind of out of luck from a water rights perspective," Liljefelt said. "You can't force people to irrigate more to provide runoff, or to irrigate differently to provide runoff."

A similar dynamic can occur if an irrigator who draws groundwater from a deep, confined aquifer shifts to a more efficient method, such as drip or micro-irrigation.

Less water will then flow into a nearby stream or river — potentially affecting surface water irrigators — even as the underground aquifer benefits from curtailed pumping.

Conversely, piping canals and curtailing flood irrigation can reduce the infiltration of water into aquifers in some areas, potentially drying up wells or forcing groundwater irrigators to dig deeper ones.

"It's really artificial recharge, because if those canals weren't there, that recharge wouldn't occur anyway," said Britton, manager of NUID.

Such unintended impacts have led some irrigators to believe government policies in the past have been overly zealous in promoting the piping of canals and urging farmers to abandon flood irrigation.

## **Natural cycles**

Historical flood irrigation mimics natural cycles that benefit irrigators as well as the ecology of a watershed, said Fred Otley, a rancher in Diamond, Ore., who draws water from the Donner und Blitzen River system in Eastern Oregon.

"When regulators and policy makers say that's the thing to do without looking at the whole picture, it can have a very negative impact," Otley said.

Flood irrigation serves a "capture, storage and release" function, as water can remain in the soil for three weeks to three months before re-entering the stream, he said.

That delayed water boosts stream flows during late summer, prolonging irrigation season while also cooling the water for fish and enabling the growth of riparian plants for wildlife habitat, Otley said.

"Water in this system is used over and over again," he said.

Without flood irrigation, water would travel downstream during spring until collecting in an inland lake, and would eventually be lost to evaporation, he said. "It primarily happens due to well-intentioned policy."

Otley said he doesn't oppose investments in irrigation efficiency as long as it's supplementary to the more traditional method.

"The move to sprinklers can be fine as long as it doesn't replace flood irrigation," he said.

In the Burnt River Irrigation District that supplies water to about 20,000 acres in Eastern Oregon, irrigators rely on a mix of traditional flood irrigation in lowland areas and sprinklers in upland areas.

There's more interest in investments in efficiency, including center pivots and wheel lines, above the district's Unity Lake reservoir, where canals carry water to more distant fields, said Wes Morgan, the district's manager.

Below the reservoir, where flood irrigation is dominant, farmers are wary of piping and other changes that would jeopardize the return flows they rely upon, he said.

"All the flood irrigation comes back to the river," Morgan said.

Ultimately, though, major disruptions to the district's irrigation system are unlikely due to the region's agricultural economy.

The soil and climate are most suitable for raising hay that's fed to cattle, rather than more valuable crops that would warrant replacing open canals and buying expensive irrigation equipment.

"You just couldn't put a pencil to it and justify a pipe," Morgan said. "It's tough to make money putting hay through a cow."

