This article outlines a unique groundwater "self-governance" method being attempted in Colorado. Essentially, farmers have created an innovative irrigation market by charging themselves to pump and using the money raised to pay other farmers to leave their land fallow. It is a good example of what communities that are linked by a depleting resource are capable of when they accept that they need to live within new natural resource limits, or perish.

You will find interesting commentary on the prior appropriation system, the sharing of water scarcity and, of course, the numerous challenges faced by innovators trying to make change.

**Farmers agree to tax those who deplete groundwater**

by Cally Carswell
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**SAN LUIS VALLEY, COLORADO**

In the early 1990s, bumper stickers throughout this valley screamed "STOP AWDI" -- shorthand for American Water Development Inc., Canadian millionaire Maurice Strong's company, which wanted to sell the groundwater underneath his local ranch to distant cities. Farmers and ranchers allied with environmentalists, the National Park Service, the U.S. Fish and Wildlife Service and even a New Age ashram in protest, fearing that exporting water would obliterate crops, pastures and wetlands used by migratory birds. Locals overwhelmingly approved a tax to help fund a lawsuit against the plan. At a courthouse rally, musician Don Richmond crooned:

*Some of us have taken only what we need,*
*Some of us have seen the need turn into greed,*
*Some of us would sell our future down the drain,*
*Washed down by water from the land of little rain.*

Strong lost, and a few years later, a similar water-export scheme was similarly skunked. People here had accomplished something remarkable: Together, they resisted the pressure to grow cities with water once used to grow crops.

"That's always been the fear -- that we're going to lose our water to somebody else," says seed potato grower Brian Brownell. And there is water to lose, even in this high-desert valley southwest of Colorado Springs. It receives less rain than Phoenix -- a mere seven inches or so annually. But what it lacks aboveground it makes up for below: A deep artesian aquifer and a shallower underground reservoir store vast amounts of water. Wells punched into the artesian pool, which is trapped and pressurized by a clay cap, once flowed as freely as 19th century oil gushers, freezing into ice towers in winter that transformed parts of the valley into a sprawling, frozen sculpture garden.

But those sopping glory days are gone. For the last decade, the Rio Grande Basin, which the valley crowns, has endured record-setting drought. The aquifers are rapidly draining, pulling
river and stream levels after them. If the farmers who use these aquifers don't begin to turn things around, the state's water regulators could shut off thousands of wells -- a devastating economic blow.

The West is thick with similar stories, with groundwater loosely policed and especially vulnerable to the tragedies that befall common resources -- problems that will only worsen in the drier years that climate change is expected to usher in. What's different here is the response: Instead of denying or ignoring the problem, farmers are facing the fact that agriculture has outgrown its water supply. They admit they must live within new limits, or perish. Determined to avoid state intervention, they've created an innovative irrigation market, charging themselves to pump and using that money to pay others to fallow their land. Thousands of acres have come out of production, and their sights are set on fallowing tens of thousands more.

Brian Brownell is among those cutting back. When I visited last September, the valley's potato harvest was in full swing, and dust clouds over fields where farmers were exhuming spuds were visible from miles away. Dust also levitated above a field on Brownell's farm, but nothing was being harvested. Instead, the Sudan grass he'd planted was being hacked to pieces and tilled into the soil. He'd received $96,000 for putting 480 of his 1,680 acres into this "green manure" instead of a more water-hungry and profitable commercial crop.

"Everybody's pumping too much water," he said. His gray sideburns bristled on tanned skin, and his lips curved down in thought. "People have to start to buy in to the community thing, instead of 'me,' 'my farm,' 'my deal.'"

This time, farmers are scrambling to save local agricultural not from outsiders who covet their water, but from themselves.

"It's only going to work," said Brownell, "if everybody does something to save the water."

**The San Luis Valley's** 8,000 square miles are flat as plywood, hemmed in by the San Juan Mountains to the west, and to the east by the Sangre de Cristos, a dramatic wall of serrated peaks edged by sand dunes that seem plucked from a North African desert. The valley's 46,000 residents live in scattered small towns, beneath lonely willows and cottonwoods, and around highway outposts where a few stores merit a mark on a map. It's a tough place to live, and attracts some unconventional folks: The valley is home to hot springs (and a communal kitchen) frequented by nudists, an alligator farm, a community of 1,500 with 23 spiritual centers, and a UFO watchtower unimpaired by light pollution, where camping costs $10 a night.

But mostly, there are farms -- big ones. The center-pivot sprinklers here are among the most tightly packed in the world, and their hulking aluminum spines give the valley floor the illusion of topography. The annual harvest -- largely potato, barley and alfalfa -- is worth some $300 million, and without it, a number of the towns probably wouldn't exist. There are no mines, no ski resorts, no gas wells. Alamosa, the biggest town at 8,937 residents, boasts a small college and a hospital. Almost everything else -- the fertilizer and tractor dealers, the Safeway, the county governments and K-12 schools -- is supported primarily by money from the fields.

At a more basic level, everything runs on irrigation water. From the 1850s, when Hispanic settlers dug the first ditches, until the 1950s, most of that water was diverted from the Rio Grande and its tributaries and flooded onto fields. Then, drought and technological innovation spurred a well-drilling boom. Groundwater nursed crops through dry years and the late season, when rivers shrunk. Soon, center-pivot sprinklers were hooked up to wells, watering crops evenly and efficiently all season long, and many farmers started irrigating exclusively
with wells, using river water merely to recharge the aquifer. Marginal land became profitable, crop yields -- and water consumption -- grew, and large-scale commercial agriculture came into its own.

For decades, the Colorado Division of Water Resources, also called the State Engineer's Office, granted well permits as generously as dentists dispense toothbrushes, ignoring basic hydrology. The water in the ground and the rivers was connected, and voracious well-pumping could lower streamflows -- a serious problem, since the river water was already claimed. Following the logic of prior appropriation -- the Westwide system that gives priority to those with the oldest water rights -- wells that were connected to streams should only pump after older river irrigators are sated. But the opposite happened. In the late '60s, the state clamped down on river irrigators to comply with the Rio Grande Compact, which requires Colorado to leave water in the river for Texas and New Mexico. Well owners, meanwhile, pumped happily away.

In 1975, the State Engineer tried to phase out a slew of wells, but a court encouraged a softer approach. Wells were drilled in the valley's "closed basin," where streams don't drain to the Rio Grande. They sipped gingerly from a high water table, "salvaging" what would otherwise evaporate and piping it to the river. The Closed Basin Project seemed like a win-win: Wells kept pumping, river irrigators got water, and regulators backed off. It produced less water than expected, but the '80s and '90s were so wet that few people cared. Mother Nature bought rounds for everyone.

Then, in 2002, she closed her tab. The brutal drought that still grips the valley began that year, when the Rio Grande shriveled to a quarter of its average flow. Because the state still hadn't finalized regulations to cut off wells before river users, fields with old river rights withered while wells went on a bender. The Closed Basin Project could no longer keep peace between well and river users, or help Colorado meet its downstream commitments without further limiting river diversions.

The drought also made it obvious that agriculture here was overgrown: Water demand far outstripped supply. The valley had become an anti-gravity sieve with some 6,000 holes sucking it dry. In 2002 alone, the shallow aquifer north of the river lost 400,000 acre-feet -- more than Nevada siphons from the Colorado River annually. In the decade since, it's hemorrhaged double that. At a 2003 Alamosa confab, then-State Water Engineer Steve Vandiver didn't mince words: "Without some significant moisture, the entire system is now in a death spiral."

**Around the same time**, another agricultural water crisis further convinced a few key valley leaders that business as usual could not be sustained.

Along the South Platte River northeast of Denver, pitiful snowpacks and two court decisions abruptly idled thousands of wells. A few years into the drought, Tom Cech, then-manager of the Central Colorado Water Conservancy District, which helps develop and administer water supplies along the South Platte, stood before 700 people in Greeley to deliver sober news. Well owners wanted to know what it would take to resume pumping as usual. Cech did the math: "The cost would pretty much be equal to purchasing all of your farms again," he recalls saying. "You could see 700 sets of shoulders drop. It was like going through a death -- shock, anger, depression. Some folks were going to lose their farms."

Before the South Platte crisis, whenever there was a "call" on that river -- meaning that those with junior rights had to wait with empty buckets until senior users got their share -- well owners could keep pumping if they submitted annual plans to the State Engineer to balance what they extracted by increasing supplies for senior-right holders. (They might lease
reservoir water that could be sent downriver, for instance.) But the court revoked the state's authority to approve those temporary plans. Well owners had to come up with permanent "augmentation" plans and maneuver them through water court -- an expensive, lengthy and litigious process that required them to find more water to protect senior water rights.

Worse, calls on the South Platte that used to last a couple months now lingered nearly year-round. Well users had to come up with a lot more "replacement" water, and many couldn't find or afford it.

In the San Luis Valley, until the big drought, the Closed Basin Project had excused well owners from supplying replacement water when a call was made on the Rio Grande. Due to the valley's complex geology, its wells generally don't have as clear a linkage to surface flows as many South Platte wells do. Still, people here saw a specter looming: If the Rio Grande did follow the South Platte's rules, easily half the valley's wells could be shut off. And because so much of the local economy depends on agriculture, the ripple effects would be prolific.

But a fiercely intelligent San Luis Valley potato farmer and out-of-the-box thinker named Ray Wright imagined a different future, one in which people solved their groundwater problems out of court. Before he was killed in a freak accident three years ago, Wright was president of the taxpayer-funded Rio Grande Water Conservation District, charged with developing and protecting the valley's water supplies. He believed it was inevitable that irrigated agriculture would be downscaled, whether by regulators, courts or climate. So why shouldn't the community experiment with self-governance? "Ray's view," says David Robbins, the water district's lawyer, "was, 'Why don't we try to do this cooperatively?'"

Wright's business card asserted that he "speaks farmer fluently," and he was equally well-versed in water politics and policy. He, Robbins and a few comrades hatched a plan to rebalance the water budget through a system of shared sacrifice, where every pumper helped pay down the groundwater debt. They proposed dividing the water district into "sub-districts" composed of folks united by geography, who already managed ditches together and talked shop over coffee every morning. Computer models would determine the collective impact of each sub-district's wells to figure out how much the group needed to trim its pumping to rebuild the aquifer, and import new water to mitigate effects on rivers and streams. And water would no longer be free: Irrigators would pay for every drop pumped that couldn't be offset. That money would buy new water and pay farmers to fallow marginal land. In effect, those whose operations remained viable would help soften the landing for everyone else.

In 2004, state Sen. Lewis Entz, R, another local potato farmer, pushed a bill through the Legislature mandating the aquifer's restoration. It authorized sub-districts to charge for pumping, and create court-approved groundwater management plans and state-endorsed annual plans to bolster rivers. It also directed the state to finally develop well regulations for the valley. Once those rules are in place, well owners here will have three choices: Enroll in a sub-district, get an augmentation plan through court, or close their valves.

Lax regulation in many intensively farmed places has allowed pumpers to deplete Western aquifers, harming rivers and everything that depends on them. As supplies run increasingly short, conflicts between well and river users -- including people and fish -- are intensifying, from Idaho's Snake River Plain to California's Central Valley. Idaho irrigators have been engaged in an epic battle for most of the decade over the decline of the Eastern Snake River Plain Aquifer, with river users begging the state to turn off junior wells, and well users arguing that it's obligated to let them exploit groundwater for human gain. Some progress has been made: The federal Conservation Reserve Enhancement Program (CREP) has paid farmers to fallow just under 20,000 groundwater-irrigated acres, and a plan to rebuild that
The San Luis Valley sub-district experiment is a rare attempt at a comprehensive solution to groundwater mining that tries to balance senior water users' expectations with the needs of economies built on wells. If it works, it could be a model for community-based groundwater management. And already, it represents a sort of evolution: The fact that farmers here are monitoring and worrying about their water table is itself a sign of progress, says water economist David Zetland, especially compared to places like California's Central Valley, where even measuring wells' appetites is controversial. "In the Central Valley, you will never hear it said publicly that restricting water use may be necessary," says Stanford University water researcher Rebecca Nelson.

Many locals believe the long-ago fights against water exporters laid the groundwork for the sub-districts by uniting the valley's sometimes-quirky water users. Others credit the multigenerational roots many have here. "People talk about us as the 'Kumbaya Basin,' " says Heather Dutton, a farmer's daughter who now does Rio Grande restoration work. She repeats the valley's unofficial slogan: "We try to solve our own problems."

In 2006, after three dry years, and a wetter one that didn't boost the aquifer, a majority of the 250 farm owners representing most of the land in the most heavily irrigated part of the valley --174,000 acres north of the Rio Grande -- signed petitions to create the first sub-district. (Five additional sub-districts are in the works, pending completion of the groundwater models quantifying wells' impacts.) Ray Wright's partner, Mona Syring, remembers rallying support for the idea this way: "They talked and talked and talked and talked -- and talked and talked."

Steve Vandiver, now the Rio Grande Water Conservation District manager, and his staff are the mechanics doing the unglamorous work of putting these ideas into practice. Vandiver is broad-shouldered, with a full mustache, and his gaze tends to drift skyward when he explains the complicated business of water administration. His work is an endless stream of meetings, plans and reports. Last fall, when I visited, his staff was excavating reams of emails for a trial challenging the management plan for Sub-district 1. Vandiver was clearly spread thin, but seemed upbeat -- with a few significant caveats.

Last year was the second that Sub-district 1 charged pumping fees, and the first it inked fallowing contracts and repaid the river for ongoing pumping. Enough money was coming in, and going back out, to fallow 8,300 acres last year, Vandiver reported -- far short of the 40,000-acres-by-2021 goal, but a good start. Another 15,000 to 20,000 acres were rested through private insurance that pays farmers not to plant during droughts, and pumping dropped 20 percent. This year, Vandiver expects to offer 15-year fallowing deals by tapping federal CREP funds, as well as the annual sub-district contracts to encourage participation. Vandiver also plans to pay farmers based on their pumping reductions -- as opposed to how many acres they fallow -- to promote maximum water conservation.

Then came the "buts," which could scuttle the whole scheme. Commodity prices have soared to all-time highs. As long as farmers can fetch top dollar for barley and alfalfa -- the valley's thirstiest crop -- the pumping fees won't dissuade them from mining the aquifer. And it turns out, this community -- like any other -- is not totally united: Though everyone in the sub-district is charged for pumping -- with bills that can run zero to $200,000 per farm, and bringing in more than $5 million -- not everyone is conserving. "There's a whole group that has vowed that as long as there's water in their hole, they're going to pump it," Vandiver said.

And the biggest "bugaboo" of all, he said, is the weather. Pumping didn't drop far enough in 2012; it was another dry year, and the aquifer still lost more water than it gained. This winter
looks no better. "We've seen a dramatic change in the water supply that supports this whole thing," Vandiver said flatly, leaning back in his chair. "And if that continues, it finally unravels."

The next day, I traveled to the east side of the valley, where the first threads were coming loose. As Brian Brownell's Sudan grass was plowed under -- a form of fallowing -- we discussed how the new system was working for him. The $96,000 payment from Sub-district 1 for fallowing a quarter of his total acreage was at most a third of what the Coors beer company would have paid for a rotational barley crop. But it was better than nothing. Brownell had already been rotating some of his potatoes with Sudan grass instead of a cash crop for a couple years to save water. (In total, at least half his farm was fallowed last year, but only about half of that acreage was enrolled in the sub-district program.) It was nice to get some money out of the ground for "doing the right thing," he said. "(But) it's not the money, to me, anyway. It's the resource."

Brownell acutely feels the pinch of its decline. His area's water table has always been lower than in places farther west. As it droops further, wells here have begun to spit air. "When I came into farming, we were thinking 20 years ahead," he lamented. "Now, it's maybe two years, if we're lucky."

Brownell, who just turned 58 -- a birthday celebrated with blueberry pie and a water meeting -- was just out of college and working in Kansas in 1979 when his dad called to ask if he wanted to come back to the farm. ("It was 110 degrees in Kansas," he recalled. "I thought about it for about two minutes.") He relishes the challenges of running a business, and in optimistic moments, can spin his water troubles as just the latest in a long line of problems to solve. "You have to be adaptable anymore," he said.

Cutting his farm's thirst by fallowing big chunks of it and linking sprinklers to multiple wells to water his remaining fields has helped him adapt -- so far. But last year, potato prices dropped, and even those fields were a money drain.

"If you start having a string of bad years, it's" -- he let out a resigned laugh -- "it goes from bad to worse. You have a harder time getting loans from the bank, you start seeing farm sales. But who's going to buy the farms if the water is running out? The value of things could drop pretty quickly."

"The edges of this thing will go first," Vandiver had explained. "The little guys in the places where the aquifer isn't as good, those folks will have to go somewhere else or work for somebody who survives." Farmers atop the deeper parts of the aquifer will fare better, though their future is far from assured. "If we are in some kind of drying trend, where we're going down, down, down," Vandiver said, "nothing's going to work except to just shut the wells off."

While many have grudgingly accepted sub-districts as their best option -- no one enjoys fat water bills -- a few holdouts still think the whole enterprise is a bunch of bull.

Ed Nielsen is one of them. A white-haired rancher with flushed cheeks, Nielsen settled in Saguache, in the valley's northwest corner, because subdividing Texans were ruining his native Meeker, Colo., for ranching. Now, he says, the San Luis Valley is being wrecked for ranching, too.

Nielsen drove me down a skinny two-lane along Saguache Creek, past modest pastures -- including one of his own -- that are still flood-irrigated with creek water, a method that needs a high water table to support the spread of water across the land. A number of ranchers here hold old water rights, and the state, they say, has shirked its duty to protect them.
"This is my place here. We never even got this pasture wet," Nielsen said as we pulled up to a field of patchy, brittle stubble. Economic devastation was already visiting Saguache Creek, he argued. He'd stretched himself to buy hay for winter, and couldn't do so again. "Water is finite," Nielsen bristled. "Am I going to put it on my surface crop, or are they going to pump it? It's one or the other. And I have the senior decree."

One source of his frustration lies just south of his anemic pasture: North Star Farm, one of the valley's large alfalfa operations, which taps groundwater with rights junior to those of most ranchers around here. Last year, Nielsen had water for only four days, and harvested 5 percent of his normal hay crop. North Star, meanwhile, watered thousands of acres through the fall, reaping multiple cuttings. Plus, the North Star wells and others have for years slowly strained the supply of creek water and lowered the water table.

"There's a long history of agriculture here," Nielsen said. "(It's) always survived Mother Nature's droughts. This one is partially manmade."

He ticked off some of the reasons he's skeptical of the sub-district remedy: The price of water is set artificially low. At $75 an acre-foot, farmers in Sub-district 1 pay as little as a third of what the sub-district paid for imported water -- too little to discourage moneymakers like North Star. He also believes the sub-district's timeline for recovering the aquifer -- they must show gradual gains in the next five to 10 years, and reach sustainable levels by 2031 -- is too slow. And the model the state is developing to calculate wells' impact is too coarse, he says, because it groups wells in half-mile chunks, which could obscure the impact of the worst stream depleters. (The state admits the model is imperfect, but says it can't model individual wells.) Nielsen would like to see well owners replace every drop of water they consume whenever water is short, as traditional augmentation plans require in Colorado, or be cut off.

He, a few allies, and a group from Hispanic settlements in the valley's southern end sued the water conservation district over the legality of the entire sub-district concept. They lost in Colorado's Supreme Court, but filed new lawsuits over its water management plan -- winning on points that forced tougher senior water rights protections, but scoring no major victories.

To them, it seems "well rule" has replaced "priority rule." And in a way, they're right. The state has promised well regulations for years, and they are imminent once the groundwater model is completed. But in the meantime, wells outside Sub-district 1 continue pumping.

"I guess we've done a lot of damage in the valley (with the lawsuits)," says 88-year-old Manassa cattleman Kelly Sowards, part of another surface-water group that sued the sub-district. Indeed, the lawsuits have exposed and aggravated decades-old rifts. As one sub-district farmer put it: "It's just totally unacceptable, those people and their objections. The sub-district has done everything it could to satisfy their objections. And we (still) have to pay lawyers to fight these jackasses."

"It couldn't be helped," says Sowards. Some ranchers and small farmers believe their survival is a low priority in a valley dominated by big -- and more profitable -- farms. "We're trying to get a fair shake on water that was ours at one time. I guess the wells have got so much influence, money-wise and so forth, that the state hasn't done anything for 40 years. They just let us go."

George Whitten's piece of ground sits at the end of Saguache Creek, which rarely gets wet anymore. Whitten is a slight but sturdy man with wise eyes, strong opinions about sustainable agriculture and an independent mind. Thirty years ago, he stopped baling hay; he rakes it into piles airy enough not to mold and thatched enough not to blow away, and lets his cows nose through snow to get to it. It's a cheap system well-suited to this arid clime, he said, but it's raised eyebrows over the years.
Whitten, long active in valley water issues, has caught flak from neighbors for his take on the sub-districts, too. The meadow surrounding his home is a knapweed-bordered anomaly: Chunky native grass maintained through intensive, rotational grazing, inspired by holistic grazing guru Allan Savory. "We use livestock to prepare the soil, so when it rains, the seed is planted and fertilized," he explained. "But I've prepared the soil for rain, and there's been no rain."

He relies primarily on an artesian well to flood-irrigate the meadow. If a sub-district did get started in his neighborhood, it would either save him or put him under. He owns surface water on a property clear across the valley, but because of the distance, he's unsure he could use it to cover his pumping. And his margins are too tight to pay high water bills.

Despite the uncertainty, sitting at his kitchen table, warmed by sun streaming through wraparound windows, he said: "I believe in the premise of the sub-district, which is to recover the aquifer. And to do that in a way that's reasonable, and not just say, 'This is the priority system, and we haven't lived by it for the last 25 years, but today we start?' I mean, that's just collapse. It would be anarchy."

Not that he's an apologist for Big Ag. He owns a pasture just south of North Star Farm, and believes the North Star wells have left it dusty and ashen, like Nielsen's. The valley's heavily fertilized, mechanized farms represent what Whitten detests about modern agriculture. "We're thinking about that monoculture farm as the jewel," he said. "It's the problem."

Getting a sub-district started around Saguache won't be easy, he says, because there's resistance to using anything other than a strict priority system to manage water. Still, Whitten believes it's time to evolve. Lately, he's engaged in his own magical thinking. "If you have livestock that are migratory, you go where the resource is," he said. "If we could migrate every year from here to Albuquerque and back, the cattle (would) never be out of feed. Twenty years ago, I wasn't even dreaming about anything like that. Stewardship, that was the way of the future." Now, he said, only half-jokingly, perhaps we'll all end up drinking our own pee in "stillsuits," the moisture-retaining armor worn by survivalists on an alien desert planet in the 1965 sci-fi novel *Dune*.

He doesn't expect others to entertain such radical notions. But the sub-districts are at least a small step in a new direction. "That we've created this wonderful oasis (on our ranch) is no different than the fact that they've created a wonderful potato field," he says. "(Wells aren't) a natural thing. I'm as big a part of the problem as anybody else. So that's why the sub-district thing makes sense to me. It's a way we can start to have a conversation as a community and actually set things in motion." He skipped a beat, then added: "I'm disappointed that it doesn't rain and it doesn't snow."

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