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First Drought, then Flood. Can the West Learn to Live Between Extremes?



Illustration by Jacqueline Tam

BY Brooke Jarvis
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When Californians aren't thirsting for water, they're drowning in it. But experts see a way to navigate climate swings.

The shadows were long and the wind across the flatlands fierce as trucks and ATVs began pulling into Chepo Gonzales's yard one afternoon this March. "Did you double up your socks today?" Gonzales teased one of the arrivals, a man who complained about cold feet during the previous night's patrol. Another man leaned out the window of his truck and offered a more serious status report: "There's a lot of water out there, but it's flowing north."

There was so much water, in fact, that across the state it was spilling over the banks of rivers and bursting the walls of levees. For more than a week, Gonzales and his neighbors had been doing their rounds three to four times a day, looking for signs of danger along the various creeks and canals that surrounded Allensworth, a small town of houses, trailers and barns tucked amid the vast, flat farms of the San Joaquin Valley in central California. They had been ordered to evacuate — the roads into the town were officially closed — but here they still were. "I'll live here till the day I die," Gonzales said. He loved the quiet and open spaces. If the water came high enough, he laughed, he would just move onto the roof of his house with a tent, a cooler and a grill.



Everyone knew the town was built on what had once been the shore of an enormous inland lake, called Tulare for the tules, or reeds, that grew around it. But the lake, once the largest west of the Mississippi, was long ago reduced to a memory: It was drained in the late 1800s to make way for wheat fields and orchards and dairies. Dust storms became a problem. So strong was the valley's thirst for water that even the groundwater beneath the lake's historical beds was rapidly disappearing, drawn by so many wells that the ground itself crumpled downward, in some places sinking by nearly 30 feet. In Allensworth, dwindling groundwater meant that the town well often drew water made toxic by high concentrations of agricultural runoff, and residents were advised to boil it. Creeks were marked blue on maps, but they were usually more like dusty ditches, Gonzales's 21-year-old son, Chepito, told me. Until this winter, the only way he really thought about them was as tracks for racing ATVs. But this winter had changed how people thought about a lot of things.

Since New Year's, storm after storm had pummeled the state, dropping epic quantities of water and snow. The water made its way toward the bottom of the valley, as it always had, coursing through waterways held in by earthen levees that, during drought years, grew desiccated and weak, pocked with squirrel burrows. In some parts of the valley bottom, the water wasn't really contained at all. Deanna Jackson, the executive director of the local agency that manages groundwater in the Tulare Lake Hydrologic Region, described the flooding to me as "vagrant flows, wild flows," nearly unmanageable water sheeting across the landscape. Houses and farms and dairies flooded, and people were using excavators to hastily build earthen dikes around their properties. Some of these, around houses and small dairies, were a few feet tall; others, around the lands of the largest and richest agriculture companies, were towering and miles-long. Sometimes these fortifications enraged neighbors, whose land the water found instead. In a valley where powerful interests had long jockeyed for access to water, the arguments were now about who would bear the flood.

A few days before, a canal wall along a train track just north of Allensworth, visible from Gonzales's yard, began to crumble. A froth of brown storm water started to spread toward the houses. Neighbors grabbed shovels and came running; Gonzales and his son brought over the tractors that Gonzales usually uses to muck out paddocks. When they ran out of sandbags, their neighbor Ruben Guerrero, who rushed from work at a nearby elementary school to join the emergency response, had an idea: to fortify the canal wall with the help of a roll of sheet plastic he was planning to use for a house-painting project. The men finally forced the water back with a fix that was part berm, part sand burrito. As the flood pulse receded, they celebrated their victory. But it turned out to be another case of competing interests: The railroad company that owned the land dismantled their work, saying that by protecting their houses, they had threatened the company's property. So hour by hour, they patrolled the levee, watching the water flow through, quick and deep.

Shortly after, another alert went through town: A different levee, this one along Deer Creek, had given way. Floodwater was again flowing toward Allensworth. First, though, the water surged into a pistachio orchard, where it threatened to uproot trees and drown them in sediment. A video that later went viral captured the farmer's response: He drove two pickup trucks to the top of the levee, filled their beds with soil to weigh them down and then revved the engines and propelled the trucks straight into the flooded breach where the levee wall used to be. (One, fittingly, was a Chevy.) Heavy equipment and helicopter loads of sandbags from Cal Fire completed the job, but rumors swirled about why the breach had occurred. Jack Mitchell, the head of the local flood-control district, reported that it looked as if a cut had been made with machinery. Had someone intentionally cut the levee, jeopardizing Allensworth, not to mention someone else's farm, to save his own? "I can't see how a tree, or a product, a vegetable, is more important than a life," Guerrero said, shaking his head. "Tomatoes are not the only ones that matter. Our lives matter, too."

Around town, houses were marked with what looked at first like little streamers but were really bits of caution tape, placed by a swift-water rescue team, as a preparatory measure, to mark which houses were still occupied: red if a house was empty, yellow if it wasn't. "It's rare to see red ones," said Kiara Rendon, an Allensworth resident. Her car was packed with supplies, for herself and the younger siblings she cares for, but she had yet to leave: "A lot of people didn't evacuate because this is all they have." A community leader in Allensworth named Denise Kadara told me the same thing. Allensworth was the first town in California to be established by African Americans. It is named for Col. Allen Allensworth, who escaped slavery by fleeing behind Union lines and then joined the Navy before making his way to California. It later became a home for farmworkers and people who couldn't afford to live elsewhere. Kadara felt certain that if residents had followed the order to evacuate, Allensworth would have been sacrificed to save other places deemed more valuable.

A few days earlier, Rendon came home to find her sister, five months pregnant and alone with a 3-year-old, shoveling mud as water rose in the field behind their house. Rendon took me to see the spot where a crew from Cal Fire helped the family make a small drainage ditch and where water was finally running away from their home. Her gaze kept drifting east, where the other legacy of the storms, a record-setting snowpack, 50 feet in places, glistened white on the distant mountains. All of that water, she knew, would have to find its way to low ground. She didn't know what would happen then.

"A lot of people would say, You live out in the desert," she said thoughtfully, as water rushed past her feet. "But look at it now."

In recent years, it is the dry side of California that has captured headlines: dwindling reservoirs where boat ramps lead only to sand, almond orchards ripped up for lack of irrigation water,



catastrophic wildfires that rage through desiccated forests and into towns. In the longer view, though, the state's water problems have come just as often from deluge as from drought. Other parts of the country can count on reasonably steady precipitation, but California has always been different, teetering between drenching winters and blazing summers, between wet years and dry ones — fighting endlessly to exert control over a flow of water that vacillates, sometimes wildly, between too much and too little.

As we've learned more about how humans are transforming the planet's systems, these swings have grown only more pronounced, leaving experts to wonder how the state will face a future balanced ever more precariously between wet and dry. Can it find ways to better handle — to steward, even — the overwhelming water when it does come? And will those measures be sufficient for it to withstand the times it doesn't? These questions matter not just to California and those who live there, but to anyone who eats the food the state produces, who is affected by the fluctuations in its economy or who lives in a place trying to manage its own climate-fueled "extremification" — in other words, all of us.

California's very first biological survey began amid extremes. A botanist on that expedition described contending with clouds of dust and struggling to find enough water to keep the mules going. Then, on Christmas Eve in 1861, the rain began to fall, and it didn't stop for 43 days. In the floods and mudslides that followed, uncountable homes were swept away, and thousands of people (as well as hundreds of thousands of cows) died. "Nearly every house and farm over this immense region is gone," the botanist wrote to his brother. Floodwater covered the Central Valley for 300 miles. In Sacramento, under 10 feet of muddy water, the new governor took a rowboat to his inauguration. But soon the young Legislature simply gave up and moved to the coast for six months while the capital dried out. It took another year before the bankrupted state was able to pay its employees again.

This founding story of statehood proved prophetic. The state's shifts into abundance or drought were often so complete that it became easy to believe, at least for a while, that you could live — and build — in one reality as if the other didn't exist. "Even with geology functioning at such remarkably short intervals, people have ample time to forget it," John McPhee wrote in 1988, about why rich people in Los Angeles kept building homes on mountainsides that frequently collapsed in heavy rain. John Steinbeck described a similar amnesia among farmers in the Salinas Valley, where sometimes "the land would shout with grass" and other times it would crack and scab and the cows would starve. "It never failed," he wrote, "that during the dry years the people forgot about the rich years, and during the wet years they lost all memory of the dry years. It was always that way."

But farming and cities depend on predictability, and as its population and industries grew, California sought to take control of its water destiny. The state built a vast plumbing system, in the form of dams and reservoirs and canals and aqueducts and levees and pumping stations, that could collect water and move it around, keeping it out of the places where it wasn't wanted and moving it to the places where it was. "Everything depends on the manipulation of water," Marc Reisner wrote in the 1986 book "Cadillac Desert." "On capturing it behind dams, storing it and rerouting it in concrete rivers over distances of hundreds of miles."

The system strained to adapt to what nature offered and was far from equitable, with the state's poor suffering the most during both flood and drought alike. In wet years, there were floods big enough to overwhelm levees and mad scrambles to get rid of water that quickly went from precious to perilous. The trucks in the Deer Creek levee were not an anomaly but part of a tradition: A few hundred yards from where Gonzales and his neighbors repaired the canal wall north of Allensworth, Gonzales pointed to the spot where he believes his father's '39 Plymouth still resides after being pushed into a different breach during a flood when he was a child. The elder Gonzales might have gotten the idea from J.G. Boswell, a land baron and farmer whom the journalist Mark Arax called "the king of California" and whose company was among those now throwing up impressive new earthenworks around the orchards it cultivated in and around the old lake bed. In 1969, when a key levee threatened to burst and flood his land, Boswell sent workers with pocketfuls of cash to every wrecking yard in the San Joaquin Valley. "Using cranes, they laced eight miles of the big, curved levee with Chevys, Cadillacs, El Dorados, Pontiacs and Thunderbirds," Arax wrote. "A bumper-to-bumper bulwark" against the ghost of a lake.

In dry years, there were fights over how much water to leave flowing through rivers and the Sacramento-San Joaquin Delta, where fish and other species desperately needed it, but which looked to some farmers like waste. Year after year California borrowed heavily from its future, pulling from its groundwater as if overdrawing from a bank account, which caused new problems. The water left behind was increasingly unsafe to drink, and when the land above the extracted groundwater sank, the elaborate infrastructure atop it sagged and struggled to deliver water. When groundwater was depleted near the coast, it allowed seawater to intrude, turning coveted freshwater brackish.

By the 2010s, a decade in which so many forecast climate disasters began to arrive that the climate scientist Kate Marvel called it "the decade we knew we were right," California was already beginning to seem like a different state — or, put another way, more itself than ever before. The driest four-year stretch since the state began keeping records killed more than 100 million trees, fueled horrific wildfires and left taps dry —



Illustration by Jacqueline Tam

and then gave way, in 2017, to California's second-wettest year ever. Flooding caused more than \$1 billion in damage just to roads and highways; in Big Sur, landslides buried Highway 1 under more than 65 feet of rock and dirt. On the northwestern edge of the Central Valley, 180,000 people had to evacuate downstream from Oroville, California's second-largest dam, as it threatened to give way. And then came yet another whipsaw, back to drought.

The speed and severity of the transitions were sometimes dizzying. Paradise, the town where 85 people were killed by a drought-fueled wildfire, is less than 20 miles from the dam that nearly failed during the deluge the year before. And just weeks after the fire, some evacuees had to relocate again: Intense rain was battering the fire scars, and the camp they'd moved to was now in the path of flash floods.

Still, the system worked well enough for the state's population and farms to explode in size, and for some to make a rich living while riding the whiplash between wet and dry.

By the 1990s, scientists modeling the future impacts of the world's changing climate were predicting that one of the major problems for California would be the intensification of its already

considerable precipitation extremes: a future of ever wilder swings between deeper droughts and more dangerous storms. It didn't take long for it to become clear that the shift was already underway. Although California's average precipitation stayed fairly steady, the averages masked important changes in the way water arrived. Less of it fell as snow, which was a problem because slowly melting snowpack acted as a natural reservoir — a much more capacious one than anything the state could possibly build to replace it — safely storing winter wetness and then meting it out in the dry summer. It came less often, which stretched out the time that plants and animals and soils and farmers had to suffer through drought. And when water did come, it was more likely to do so suddenly (so that parched and fire-scarred landscapes were less prepared to absorb it), with greater intensity (so that it caused flash

floods and burst levees) and with overwhelming quantity (so that water managers ran out of safe places to put it).

The storms that pummeled the state in 2017 arrived, like much of California's rain, in the form of atmospheric rivers, great currents of water vapor that form over the tropics and flow through the sky, often turning to rain and wind when they collide with land. (This is true of the West Coast in general, and Oregon, Washington and British Columbia are all facing their own versions of future water whiplash.) The average such river, according to the National Oceanic and Atmospheric Administration, carries the same amount of water as the Mississippi does at its mouth, but a large one can carry 15 times as much. Sometimes the rivers arrive one after another, crashing like so many waves against a shore. The 1862 flood was this sort of event. The storms that caused it have since been estimated to be 100- to 200-year events, meaning that under historical conditions they would have a 0.5 to 1 percent chance of occurring in a given year — rare enough that we could, like Steinbeck's farmers, allow ourselves to forget about the risk, but not nearly so rare that we should.



Of course, our present reality is such that historical conditions, and the risks and constraints associated with them, are becoming less and less relevant. In 2011, a team of more than 100 scientists, engineers and other experts convened by the U.S. Geological Survey modeled what a similar storm — they called it the ARkStorm, for Atmospheric River 1,000 — would do to the California of today, with its much larger population and expansive, vulnerable infrastructure. The answer included hundreds of landslides, millions of people evacuated and financial damages more than three times as high as what even a severe earthquake might bring. But that assessment looked only at the potential impacts of a storm of historic proportions. Climate change is not only making events like the 1862 catastrophe more likely to occur (by 300 to 400 percent, according to one estimate); it is also creating the conditions for storms that will make the 1862 flood look small. The two atmospheric rivers that led to a near catastrophe at Oroville, one study found, carried 11 to 15 percent more rain than would have been possible if humans had not altered the atmosphere. And the largest rivers of the future will be even bigger, last longer and carry water at a much higher density. They will also arrive more often.

When the climate scientists Xingying Huang and Daniel Swain modeled ARkStorms based on California's predicted conditions, they found that future storms would be able to douse California with a load of water 45 percent greater than anything that has been possible under historical conditions. Because the precipitation is likely to fall quickly and be tilted toward rain instead of snow, peak runoff would mean between two and four times as much water racing across the landscape as during the largest floods of the past.

That updated analysis was published in August 2022, when California was once again parched: More than 99 percent of the state was officially in drought, and large swaths were considered extreme or exceptional. "The apparent irony of publishing research on the growing risk of a California megaflood in the midst of a severe drought is not lost on the authors," Swain wrote on his blog. At the time, forecasts called for the dry trend to continue, but Swain cautioned that California should not make the old mistake of forgetting the wet times during the dry ones. The research suggested, he wrote, that "it's only a matter of time before this latent increase in severe flood risk becomes 'unmasked' in the Golden State."

The months that followed were no ARkStorm but quickly offered a startling reminder of how unprepared the state is even for smaller events. By the end of March, 31 atmospheric-river storms, including six classified as strong and one as extreme, hit the West Coast. Near Sacramento, the Cosumnes River broke out of its levees. Three people died, and an evacuation order had to be rescinded when floods made the roads too dangerous for escape. A creek outside Planada filled the town with waist-high water, destroying houses and cars. In the Bay Area, high winds shattered the glass of skyscrapers, blew a couch from a high-rise

apartment onto the sidewalk below and killed five people in a single day. Tornadoes touched down outside Los Angeles, and snow fell as low as the Hollywood sign. In the San Bernardino Mountains, the snow drifts piled so high that roofs collapsed, natural-gas lines fractured and caused fires and the Sheriff's Department had to airlift rations to people who were stranded. Water managers worried that the disaster some had started to call the Big Melt was just beginning.

Driving over the coastal mountains during one of this spring's weaker atmospheric rivers, I had to pull over to wait out blinding rain and a fusillade of flying tree branches. I was on my way to visit Pajaro, a town south of Santa Cruz. Nearly two weeks earlier, the Pajaro River broke through a levee at midnight, prompting a hurried evacuation of 8,500 people, many of them workers in the valley's berry and salad industries. Families were still sleeping in cars or in hotels or in the makeshift shelter at the county fairgrounds, their debts mounting while their homes sat empty and the fields were too flooded to be worked. Every day people gathered on the edge of the closed bridge leading to town, where the river still ran high and brown and tents dotted the riverside, to ask when they would be allowed to resume their lives. On the day they were permitted to re-enter town, nearly two weeks after the flood, I watched shopkeepers mucking out buildings and residents wheeling home bottles of donated water. The public water system was still inoperable.

Andrew Fisher, a professor at the University of California, Santa Cruz, who has studied the Pajaro River watershed since the 1990s, told me that he regards it as a microcosm of the problems and possibilities of California's water future. For decades, it has been known that the levees on the river were dangerously out of date, designed for the more moderate California of the past. By the time of this year's floods, the levees were prepared for only an eight-year flood, or one with about a 12 percent chance of happening in any given year — hardly the contingency that infrastructure should be built to address. "That's kind of putting up a flimsy garden fence around your property to keep out wildebeests," one hydrologist told me. Although federal funds were available, the towns in the valley weren't rich and never had the money to pay their share for a replacement. Decisions about levee updates — which are sorely needed in much of the state but are currently governed by a hodgepodge of regulations and funding schemes — are prioritized in part according to the value of the property to be protected. This too often leaves low-income areas high and dry, or, more accurately, low and wet. "It's not the same as redlining," Fisher said, pausing as if to consider whether he agreed with his own statement. "But it is a systematic problem if you have a decision process that essentially writes off poor people." To protect the most vulnerable communities, water experts have begun pushing the state to set much higher minimum standards for all levees. But that would take billions of dollars, and the political will to spend them.



The Pajaro Valley isn't attached to the large canal system on the other side of the coastal mountains. (The idea of building a connection was floated, but local critics saw the cost as a public subsidy for corporate farms and defeated it.) This means that there's already no infusion of water from outside the natural watershed, unlike in Southern California, which for decades has pulled large quantities of water from the hugely overdrawn Colorado River and is beginning to face a future of difficult cuts. There's also no access to snowpack from the Sierra — a reality that will eventually and painfully come for the rest of the state as Sierra snowpack declines precipitously over the coming decades. "That's more water than is stored behind all the dams in the state!" Fisher said.

Because the Pajaro Valley already has to make do with its own limited water budget, farmers and water managers have learned to make some of the hard choices that are still pending in other regions. Statewide groundwater conservation has been required by law since only 2014. The valley still overdraws its groundwater, but by less than it used to, thanks to the recycling of wastewater, conservation measures and proactive efforts to recharge its aquifers. Withdrawals of groundwater in the valley are tracked, which isn't the case in most other places, and they are very expensive.

Fisher believes that a lot more can be done to expand on these ideas and implement them elsewhere, but that any lasting solution will require a deeper understanding of what he calls hydrological services: the way that different parts of a healthy watershed can support the resilience of the whole if allowed to do so.

Before California was developed, rivers that coursed down from the mountains slowed as they reached the valley floor, then meandered across a landscape rich with oxbows and seasonal wetlands. Here, habitat for fish and other animals developed, and areas of slow water offered places for microbes, mussels and arthropods to clean pollutants out of water and for water to trickle down into aquifers, recharging them. A lot more of the land was porous, full of native plants and spongy soil instead of pavement and sunbaked agricultural fields, which meant that more water could be absorbed. (When researchers built a model of the predevelopment Pajaro Valley and then virtually rained on it, they found that significantly less water ran off as floodwater because so much was sucked into the landscape.) Groundwater was generally high enough that water was able to flow back and forth between rivers and aquifers, which helped regulate river temperatures and kept aquifers from filling with salts and pollutants. Today this connection has largely been severed.

In a future in which snowpack dwindles and good dam sites are already in use, the best place for water storage will be underground. The potential is enormous. While California's

reservoirs can hold about 40 million acre-feet of water, the state has emptied three times that amount from its groundwater basins. But first the water needs an opportunity to penetrate those basins. Not all soils are good for groundwater recharge; you need areas with deposits of gravel, sandy soil instead of clay. Because rivers drop different sizes of sediments depending on how fast they are moving, finding these areas requires uncovering the historical hydrology below California's surface. Fisher showed me maps produced by electromagnetic survey that reveal the composition of soils. The places he wanted to target for recharge stood out in dark relief, snaking like the curves of long-forgotten rivers, which is exactly what they were.

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"I see it as replumbing California for the future climate," said Julie Rentner, director of the conservation nonprofit River Partners. It was a bright, chilly day near Modesto, and Rentner was showing me some farms that were once typical of the Central Valley: laser-

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Julie Rentner, River Partners



leveled fields sown in alfalfa and wheat. On that day, though, the land looked more like the valley of a couple of centuries ago. The San Joaquin and Tuolumne Rivers had broken their banks and flooded the fields — which were no longer fields so much as cospes of carefully planted trees and other native plants sitting four feet deep in water. Everywhere there were birds; a river otter darted across the top of a levee. Six months earlier in this spot, Rentner told me, you could “ankle wade” across the San Joaquin, a river once fed by the waters of Tulare Lake, back when the lake was sometimes high enough to overflow its banks. Now a little rill of wavelets across the surface of the flood was the only thing that marked the river’s usual borders.

This land had flooded before, most notably in 1997, when levees broke in 17 places. River Partners later worked to buy the farmland from its frustrated owners, hoping to turn it into habitat for threatened native species. But soon, Rentner said, the group started hearing from flood-management people and groundwater-recharge people who were excited about how many different benefits a reimagined version of the property could provide for the state and for local residents, who had little access to natural spaces. The restoration project at the confluence of the two rivers, known as Dos Rios, appeared on the cover of the most recent Central Valley Flood Protection Plan, a template of what was possible. It is slated to become California’s newest state park.

In Grayson, a town near Modesto that came close to flooding in January, a group of residents explored a different floodplain, where high waters now lapped against yards at the town’s edge, that River Partners is helping to restore. John Mataka, who has lived in Grayson for almost 50 years, told me that he considers the restoration “a form of reparations for the community.” The San Joaquin, on which Grayson was once a stop for steamboats, supported a rich salmon fishery before dams and agriculture transformed the river. Today Grayson depends on groundwater, but the water supply has so much agricultural runoff that it requires advance treatment to meet safety standards for drinking. Mataka hoped that the restored floodplain would provide more and cleaner water. He was convinced that it had already protected his house from recent floodwaters that had entered the town. “We would have been like Planada,” he said.

After decades of delays, a plan to improve flood control on the Pajaro River finally received enough funding to move forward last September, months before the levee was breached in the middle of the night. The repairs will come too late for the displaced people of Pajaro, but Fisher and other experts and planners still see them as an opportunity — a chance to rethink how water will flow in the valley and in the California of the future. Instead of containing the river within narrow walls, the new plan makes room for the water to begin to meander and spread as it once did. The group is pushing to design areas that can be allowed to flood when waters run high that can serve as wildlife habitats and places for water to re-enter the earth.

Fisher is also partnering with local landowners to set up experimental catchment and infiltration basins — including some lined with wood chips or almond shells, whose carbon helps microbes remove pollutants — for recharging groundwater. One farmer called Fisher after seeing him give a talk, determined to make sure the valley still had groundwater when it was his grandchildren’s turn to farm. This, Fisher noted, was an all-too-rare motivator in a state where much of the land is owned by pension funds and other distant investors.

In the Central Valley, Helen Dahlke, a hydrologist at U.C.-Davis, is working with farmers to experiment with diverting floodwaters to their vineyards, fields and orchards: Where does it infiltrate best? What crops are most capable of handling it? She told me that when she first came to California 10 years ago, the primary goal for floodwaters was to get rid of them: to confine them to narrow channels, to move them off the landscape as quickly as possible. When she tried to push farmers to hold floodwater on their cropland so it could recharge the groundwater below, most thought she was nuts. Why deal with sediment or crop damage when there was an irrigation system that still pulled from reservoirs or aquifers? But the intervening decade of floods and droughts had made it difficult to ignore the role of floodwaters — as potential resource and threat alike — and farmers are growing more interested. This year, in particular, she said, “I think a lot of people are finding that this land used to serve as spreading ground for flood retention every spring.”

Similar projects, using flooding and wastewater to replenish groundwater basins, are spreading — but still tiny compared with the state’s future needs. To really scale up, the state will have to tackle various regulatory and infrastructural hurdles, including dealing with California’s complicated system of water rights and finding ways to move water where it needs to go despite inadequate canals. Planners and politicians will also need to get serious about the aspects of climate risk that are still under our control, such as whether we continue to build in the most dangerous places or grow the most water-intensive crops. Water experts also recommend taking large swaths of farmland out of production, because saving aquifers will require both reduced pumping and space for increased recharge. Floods and droughts, historically managed separately, will need to be tackled holistically, balancing, for example, the need to keep empty space in reservoirs for flood control and the need to use that space to capture as much moisture as possible to recharge groundwater basins.

It took nine different funding programs and more than a decade of work just to buy the Dos Rios land, Rentner told me. Negotiations to breach the levee that ran across it, keeping floodwaters off half the reserve, were still going on; decommissioning a federal levee can require an act of Congress. And the Dos Rios land is only a couple of thousand acres. Estimates suggest that California needs to retire hundreds of thousands of acres of agricultural land, at a minimum, to



make way for a more resilient water system. In the fall of 2022, the state allocated \$40 million for the restoration of natural floodplains, but then abruptly cut that funding when the economy sputtered and projections for state revenues ran low. The cuts were announced the same day that Planada was evacuated.

Still, the sun was sparkling off the water, and the levee was dotted with deer prints. The leaves of the submerged trees were turning the fresh green of spring. Rentner confessed herself to be “hopelessly hopeful” that, despite everything, a different sort of state was still possible.

To the south, in the basin that once held Tulare Lake, the floodwater was still coursing through rivers and canals toward the old lake bed. There had been so much land subsidence since the last flood that no one knew quite what the contours of this one would be: The low places and danger zones would be discovered as the waters arrived to fill them.

One morning, not far from Allensworth, I met up with Frank Fernandes, a third-generation dairy farmer in the valley, and Kathy Wood McLaughlin, a biologist and water consultant who sits on the board of the Tule Basin Land and Water Conservation Trust with him. Fernandes had spent the last week in a frenzy, checking on the cattle he raises with his brothers and clocking long nights helping his neighbors evacuate their herds to higher ground. (The trickiest part was not the evacuation itself, he explained, but finding places where the cows could continue to be fed and milked on their inflexible schedule.) Now he finally had a moment to take in the transformation of a world he’d known all his life.

It was a startling and confounding new geography. Helicopters buzzed in the skies above us, ferrying ever more sandbags into ever more breaches. Farmers in pickup trucks kept flagging Fernandes down — he seemed to know everyone — eager to trade news about whose land was flooding and where the latest breaches were and to offer tips about navigating this new world. “Down this road,” one advised, “you just have to watch out for the sinkhole and then climb the hill from ‘Dukes of Hazzard.’” We drove over a steep new embankment and past ruined cars abandoned in high water. At one point, we had to stop at a destroyed bridge, where a pair of beekeepers from Utah were stranded, puzzling over how to recover their hives, which they’d rented out to pollinate almond trees on the other side. Fernandes, who proved game to push his truck through impressive mud pits, offered to guide them the long way around.

It was still March, and the air was chilly, a small blessing. With so many canals already failing, no one wanted the record snowpack to melt into the valley any quicker than it had to. But water managers knew that they could only do their best to manage

the water’s arrival; nothing would stop it from coming. By mid-May, there would be hundreds of thousands of acre-feet of standing water, and the state would be scrambling to save the city Corcoran, as well as the large prison there, from the part of the flood that had yet to arrive. After weeks of flooding, the governor did an about-face on the flood budget, putting back the \$40 million for floodplain restoration and adding \$250 million for emergency response, including flood control on the Pajaro River, and raising the levees around Corcoran by four feet. But the region’s thick clay soils, remnants of a lake far more ancient than Tulare, meant that the water would most likely take years to fully drain away.

Fernandes drove through fields of winter wheat that were revisiting their past as wetlands, thick with birds that Wood McLaughlin delightedly identified as coots and avocets and black-necked stilts, and onto a piece of land that the land trust bought to turn into restored floodplain and habitat. Flocks of white-faced ibises flew overhead, their long beaks and legs stretched elegantly against the sky.

A few wrong turns and levees later, we arrived at a place, just south of Corcoran, where we could finally go no farther. The water had risen over the road, over the land, up the sides of houses and abandoned vehicles, as far as we — and the others who’d gathered to gawk at this astonishing sight — could see. The old hydrology was reasserting itself, the lake bottom transmuted back into a lake.

At the site of yet another levee breach, Fernandes stopped to chat with a pipeline technician he knew, until he looked back and realized that the road we’d driven in on had disappeared under the rising water. “We’ve got to go!” he yelled, and we all scrambled back into the truck. We’d have to find a different way out.

