Who Drives the Climate Train?

As both its victims and its drivers, humans could, at least theoretically, apply the brakes on the locomotive.

By Jane Braxton Little

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California's Caldor fire moved east toward Lake Tahoe as firefighters continued to battle the blaze. *(Michael Nigro / Getty Images)*

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Snow began falling on December 24, big fluffy flakes that made lace on mittens before melting. Within hours it had coated the ashes, the brick chimneys that the flames had left behind, and the jagged remains of roofs strewn across my burned-out town. White mounds soon softened the look of charred cars that are everywhere, while even the scorched trees that stretch to the hilltops were coated in a forgiving winter wonder.

Any moisture would have been welcome. Over the seven months since the Dixie fire destroyed Greenville and several other rural communities in California's northern Sierra Nevada mountains, the drought that led to the flaming disaster had only deepened. October brought brief, drenching rains, but November and December were dry again. Soil that should have been moist was as desiccated as the air, while the humidity hovered just above single digits. We watched bulldozers move the dilapidated walls—what had not long ago been homes—into gigantic dump trucks in a haze of grime. Even the trees that survived had a withered look. Now, it was snowing—for Christmas! We greeted it with hearts as wide as the open mouths of kids savoring falling flakes.

Greenville, my adopted town of 46 years, had been devastated by a climate-change disaster. Sparked by the negligence of Pacific Gas & Electric (PG&E), the Dixie fire scorched nearly one million acres, the distance, if you care to measure, from Philadelphia to New York City. On August 4, a pyrocumulus cloud collapsed on the ridge above the tarnished old Gold Rush community where I worked, erupting into red-hot embers that fell over a several square-mile area. Trees were transformed into towering torches. Flames roared down the nearby mountain, racing through overcrowded forests left bone dry (after a century of ill-advised fire suppression) by a third year of drought. It took less than 45 minutes for that inferno to raze the historic 160-year-old downtown, including my journalism office on the second floor of the oldest building around. About 800 homes went up in flames. Over the

next four months, we gathered in grief in twos and threes in the post offices and shops of neighboring towns, soothing one another.

Now, it was Christmas and snowing! We relaxed and rejoiced amid the ruins.

Little did we know that, driven by our overheated planet, we were about to be whiplashed from drought to deluge. Hotter days and hotter nights have corkscrewed our weather patterns into spiraling extremes, leaving entire regions around the world jerked from the hottest temperatures they've known to the coldest, from devastating fires to disastrous floods. This is uncharted territory and, scientists say, an all-too-grim preview of the future we're creating for ourselves.

By the fourth day of nonstop snow, our euphoria had waned. Electricity was flickering on and off. The Internet was mostly off. We shoveled our steps and then the paths to our cars, only to find them covered all over again. Driveways were challenging and roads treacherous (if open at all). Snow was piling up across the Sierra Nevada, the gigantic tilted block of granite that lies along the state line with Nevada.

At Lake Tahoe, 75 miles to the south, 18 feet of snow was dumped on luxury second homes, collapsing decks, and taxing municipal snow-removal crews gone soft after years of mild winters. Highway 80, the main route over the mountains, was closed for three days by storms that made December the third snowiest month on record and the snowiest December ever. Those storms catapulted the state's precipitation to 258 percent of its average for that point in the year. California water officials were giddy with expectation, predicting that our three-year-old drought would be broken.

Then, of course, it ended. Precipitation of any kind simply stopped. January clocked in as the driest ever for some parts of the state, as well as most of Nevada, Utah, and western Colorado. Last month was the driest February in 128 years, according to a multiagency partnership monitoring drought. And here's the truth of it: If we keep letting greenhouse gases increase in the atmosphere from the burning of fossil

fuels, we better get used to this sort of seesaw experience. Scientists say that, by century's end, such abrupt transitions between wet and dry will increase by another 25 percent in Northern California and possibly double that in Southern California.

WEATHER WHIPLASH

While California may be a poster child for extreme weather events, they are occurring almost everywhere. Such wild swings from tinder-dry to inundation are known as climate or weather whiplash. What causes them is a matter of scientific speculation and the subject of much cutting-edge research, says Daniel Swain, a climate scientist at the Institute of the Environment and Sustainability at the University of California, Los Angeles. Some scientists cite a connection between the polar vortex, a wall of wind that circles the Arctic, and jet streams, the bands of strong winds that generally blow from west to east. As the Arctic warms—at as much as triple the average global rate—it seems to be destabilizing those jet streams and so, according to a study published in *Environmental Research*, provoking abnormal and extreme weather across the planet.

Swain thinks we should imagine it as a colossal tug of war involving complex atmospheric dynamics over the Pacific Ocean. Yes, he says, the world is definitely getting warmer as greenhouse-gas concentrations rise. That, in turn, means wet times will generally be wetter and dry times drier, especially in California. He's also found emerging evidence, as he told me, of what he calls "a relatively weird" regional effect: The loss of Arctic sea ice might actually be counteracting the drying effect of the expanding subtropical zone, keeping California from becoming more arid still in a warming world.

People in my community know local weather and the land. Ranchers, loggers, and firefighters, they understand storms and seasons, soil, water, and trees in an up close and personal way. I've found my place among them over these years, writing about their work and their love of the landscape we share. We here in Greenville may not know anything about what the intersection of the polar vortex and jet streams or atmospheric dynamics are doing to our world, but we certainly know

when our environment is off kilter. Being jerked from the drought that provoked the Dixie fire to that historic snowfall and back again has left us with little doubt: something with the weather is seriously bonkers.

The unexpected uncertainty of weather we once took for granted is spawning anxieties that add to the trauma of living through a town-destroying fire. Instead of one disaster and done, weather whiplash threatens us with disaster after disaster. Having somehow survived fire, we've been thrust into a deeply uncertain future. The forests we turned to for hiking, fishing, and birdsong no longer promise solace. The natural world that welcomed and kept us in this valley ringed by mountains has become unreliable. What can we trust?

A IS FOR ANTHROPOCENE

When it comes to weather whiplash, Australia is exhibit A for Anthropocene, the current geological epoch dominated by the human impact on the environment. Storms have been pounding that island nation's southeast coast since late February, earning the moniker "rain bombs" for their severity. In just two days, the town of Doon Doon in New South Wales received 42 inches of rain, roughly Washington, D.C.'s annual precipitation. Flooding has killed 22 people so far, prompting Prime Minister Scott Morrison to declare a national emergency. This round of extreme wet weather follows the catastrophic bushfires of 2020 that killed 28 people and more than a billion animals, while scorching an area nearly the size of Connecticut in a fashion never before seen.

Worse yet, as we in California have discovered, the recovery time for communities between such climate disasters is shrinking. Simon Bradshaw, a researcher at the Australian Climate Council, summed things up simply enough: "New South Wales was hit hard by the 2019-20 Black Summer bushfires and now it is in the grips of another climate-driven disaster."

Then there's Texas. During the last decade that state has reeled from one of the most significant droughts since the 1950s to a series of deluges that have rivaled any period of flooding Texas has ever experienced.

Rainfall in 2011 was 25 inches below average, forcing mandatory water restrictions. Meteorologist Jeff Lindner called the heat in Houston that August a 10,000-year event. Over the 2011 Labor Day weekend, vegetation primed by that drought combined with 40 mile-per-hour winds to produce the Bastrop fire, the single most devastating wildfire in that state's history. It burned more than 35,000 acres and around 1,600 homes, while the Tricounty fire incinerated over 19,000 acres and 100 homes.

Then the weather seesawed. By the time Hurricane Harvey made landfall at Port Aransas on August 27, 2017, the area had rocketed from drought to deluge. Rainfall for the year was nearly 30 inches above the annual average. Netherland, a city on the Gulf of Mexico, recorded more than 60 inches. The devastation Harvey wreaked affected an estimated 13 million people and included at least 107 deaths, nearly 135,000 homes damaged or destroyed (one third of the total number in four counties), and up to a million wrecked cars.

Governor Greg Abbott, a veteran climate-change denier who has threatened to sue President Biden over policies addressing the crisis, conceded that something was changing dramatically. "We need to recognize that this is going to be a new normal. A new and different normal for the entire region," he said.

Even when such weather swings don't create disasters, they have tangible consequences. Across the American Midwest, for instance, weather whiplash is driving a decline in municipal water quality. After excessive flooding followed a drought in 2012, researchers at the University of Kansas noticed a nitrogen spike in surface waters in the area. In dry times, the nitrogen fertilizer that farmers put in their fields doesn't go into the plants it's intended to enrich. A 2017 study found that the nitrogen stays in the soil, which acts like a sponge, holding it in place. "But as soon as you wet it," Amy Burgin, one of its authors, points out, "like when you wring a sponge, the nitrogen can flood into the rivers." Such increasingly high nitrate levels in drinking water forced the Des Moines Water Works to construct a $4.1 million nitrate removal plant

that costs $7,000 a day to operate. As weather whiplash becomes ever more the norm, scientists expect surface-water nitrate spikes to occur throughout the agricultural Midwest.

Elsewhere, the changing patterns of various kinds of wildlife are only exacerbating the problems caused by weird weather. In eastern Oregon, for instance, widespread drought followed by deep snow has caused elk to move out of the hills to feed on the haystacks that are ranchers' paychecks. Conflicts between wildlife and humans are already common enough, but climate scientists expect them to increase as droughts, floods, and fires push animals off their normal ranges and into agricultural areas.

WHO DRIVES THE CLIMATE TRAIN?

As I've learned all too personally, climate disasters are profoundly destabilizing. They can wrench communities from their roots and turn them upside down. They are also profoundly unjust. Those with the fewest resources and least responsible for the climate crisis are going to continue to bear the brunt of its impact.

And here's the only good news: Climate change is a problem with a solution. We humans created it, which means it's solvable. That, however, would require societal and political will of a kind we simply haven't seen yet. And that's the bad news. We haven't mustered anything close to enough determination to halt the relentless increases in temperature driving the weather that's whiplashing us ever more violently. As United Nations Secretary General António Guterres put it, a recent report by the Intergovernmental Panel on Climate Change is "a damning indictment of failed climate leadership… that reveals how people and the planet are getting clobbered by climate change."

Swain, the UCLA climate scientist, put it this way: "We're on a train going faster and faster down the tracks with perfectly functional brakes. But the drivers, for whatever reasons, are choosing not to engage the brakes."

One of the great ironies of experiencing climate-change disaster may be that we are both its victims and its drivers. We could, at least theoretically, apply the brakes of the locomotive. In our fury over the forces of destruction beyond our control—the flames that incinerate and the floods that inundate our lives—perhaps we'll find the political will and guts to bring meaningful change, at least on a very small scale right here in my town of Greenville.

In its charred devastation, we could now choose solar power over fossil fuels. (And if so, who would blame us for feeling smug about shunning PG&E?) We could choose community gardens over imported produce. All that, however, remains a distant future for a place with a single grocery store, a gas station, and little else. But if we must spend the rest of our lives healing, we can at least invest them in empowering one another and our community in a new way. We have so little left to lose.

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