# The Fingerprints on Chile's Fires and California Floods: El Niño and Warming

## Two disasters, far apart, show how a dangerous climate cocktail can devastate places known for mild weather.

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The swirling Los Angeles River on Monday.Jenna Schoenefeld for The New York Times

Two far-flung corners of the world, known for their temperate climates, are

being buffeted by deadly disasters. Wildfires have killed more than 120 people as they swept the forested hillsides of Chile, and record-breaking rains have swelled rivers and triggered mudslides in Southern California.

Behind these risks are two powerful forces: Climate change, which can intensify both rain and drought, and the natural weather phenomenon known as El Niño, which can also supersize extreme weather.

In California, meteorologists had been warning for days that an unusually strong storm, known as an atmospheric river, was gathering force because of extraordinarily high Pacific Ocean temperatures. The rains began over the weekend and several counties were under a state of emergency. By Monday, officials warned that the Los Angeles area could be deluged by the equivalent of a year's rainfall in a single day.

In the southern hemisphere, Chile has been reeling from drought for the better part of a decade. That set the stage for a hellish weekend, when, amid a severe heat wave, wildfires broke out. The president has since declared two days of national mourning and warned that the death toll from the devastating blazes could "significantly increase."

Both the floods and the fires reflect the extreme weather risks brought on by a dangerous cocktail of global warming, which is principally caused by the burning of fossil fuels, and this year's El Niño, a cyclical weather phenomenon characterized by an overheated Pacific Ocean near the Equator.

The disasters in Chile and California follow what was the hottest year on land and in the oceans. They herald what is almost certain to be one of the five hottest years on record, according to the National Oceanic and Atmospheric Administration.

"These synchronized fires and floods in Chile and California are certainly a reminder of the weather extremes and their impacts in otherwise benign Mediterranean climates," John Abatzoglou, a climate scientist at the University of California, Merced, said in an email. Climate variables, along with El Niño's effects are "are the main instruments in the orchestra for individual extreme events," he said, "with the drum of climate change beating louder and louder as the years go by."

In the case of California, extraordinarily high temperatures in the Pacific Ocean have supersized the atmospheric river storms that began Saturday and are expected to continue for at least another day. Parts of the Santa Monica Mountains recorded more than seven inches of rain over the weekend, causing mudslides in some of the wealthiest neighborhoods of Los Angeles.

Up to 14 inches of rain could fall on Monday in parts of region, which would be close to the annual average rainfall. City and state officials urged people to stay off the roads. Rains could peak around the time of the evening commute.

The two disasters highlight what some experts call an underappreciated hazard of climate change. While significant money and attention has gone into preparing for drought in California, the odds of heavy back-to-back storms are also rising in a warming climate. "We're not really ready," said Daniel Swain, a climate scientist at the University of California, Los Angeles, speaking Monday morning in a video he posted online.

"We've neglected to seriously consider the large plausible increases in flood risk in a warming climate," he said.

Brett F. Sanders, an engineering professor at the University of California, Irvine, who focuses on flood management, said atmospheric river events like

the one hitting the state now have been predicted by climate models and are presenting urban planners with new challenges.

"The mentality of the past was that we could control floods, and contain where flooding happened. And outside of that, communities and businesses and residents could kind of go about what they do, and not think about floods," Dr. Sanders said. "But we know now that, around the U.S., we're seeing that infrastructure is undersized to contain the extreme weather of today."

Chile has been under extreme fire weather conditions as an unrelenting drought for much of the past decade has dried up forests and depleted water supplies. Over the weekend came a severe heat wave that also bore the fingerprints of an El Niño period. During an El Niño, warmer-than-usual ocean temperatures in parts of the Pacific can affect climate patterns globally, increasing precipitation in some places and exacerbating drought elsewhere.

It didn't help that, in regions of Chile struck by the heat and drought, there are large monoculture plantations of highly flammable trees close to cities and towns. When a fire broke out, high, hot winds spread flames rapidly. Aerial video showed cars and homes in one of the country's most storied tourist destinations in the Valparaiso region burned to a crisp.

Chile is no stranger to fires during the hot summer months. An estimated 1.7 million hectares have burned over the past decade, triple the territory that burned in the previous decade. A recent study published in the journal Nature found that the "concurrence of El Niño and climate-fueled droughts and heat waves boost the local fire risk and have decisively contributed to the intense fire activity recently seen in Central Chile."

The government increased funding for firefighting this year. It was

insufficient to prevent the country's worst fires in a decade.

Sarah Feron, one of the authors of that study, saw it as a sign of what's to come. "In some regions of the world, we are facing climate fueled disasters we are not prepared for and that we will unlikely to be able to fully adapt to," she said.

Raymond Zhong contributed reporting.

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