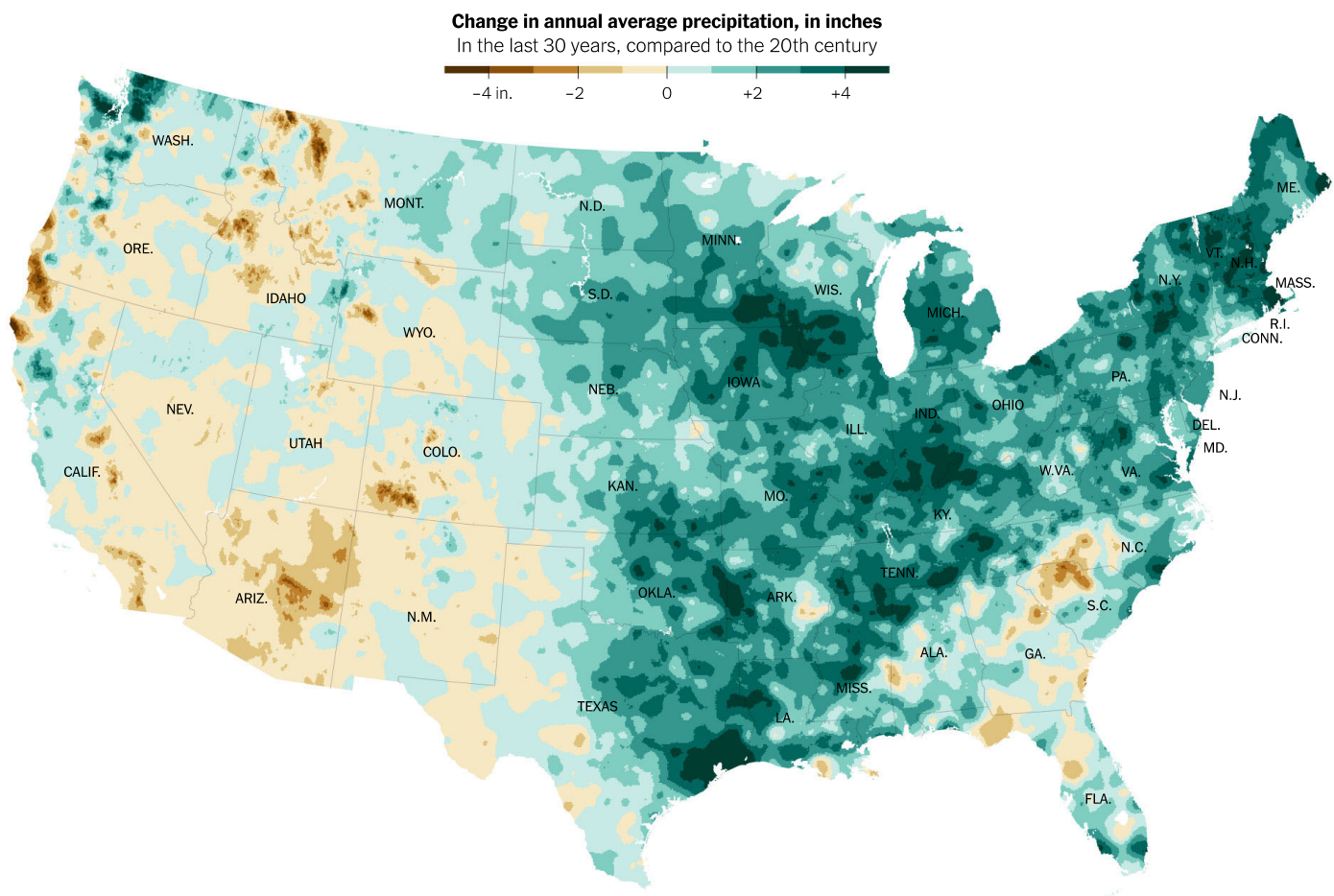


These Maps Tell the Story of Two Americas: One Parched, One Soaked

By Aatish Bhatia and Nadja Popovich Aug. 24, 2021

The country, like most of the world, is becoming both drier and wetter in the era of climate change. It depends where you live.



Source: NOAA's National Centers for Environmental Information

In New York City, a tropical storm delivered record-breaking rains this weekend. Heavy downpours caused devastating flash floods in central Tennessee, tearing apart houses and killing more than 20 people. Yet, California and much of the West remained in the deepest drought in at least two decades, the product of a long-term precipitation shortfall and temperatures that are much hotter than usual.

This divide, a wetter East and a drier West, reflects a broader pattern observed in the United States in recent decades.

The map above, created using data from the National Oceanic and

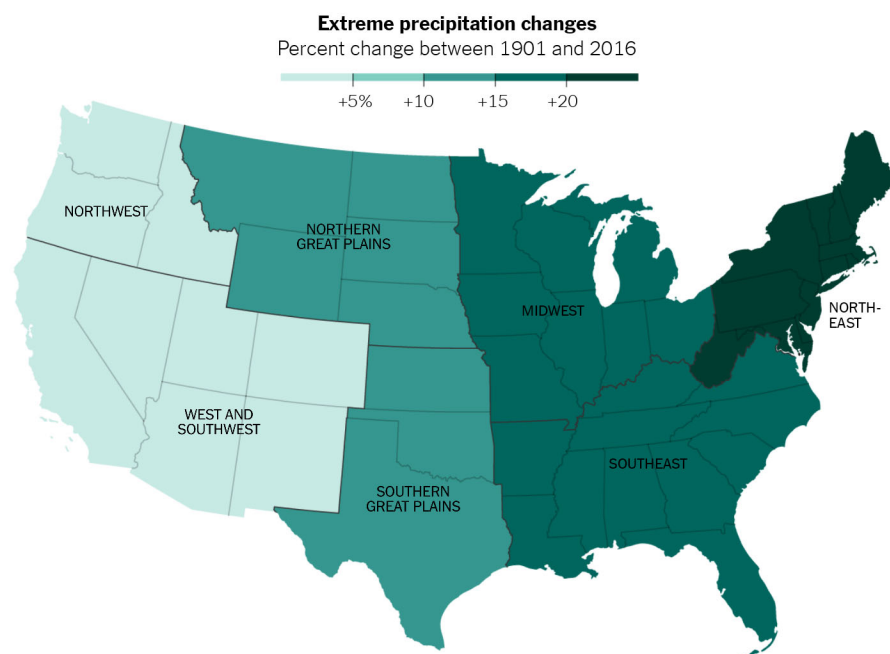
Atmospheric Administration, shows the Eastern half of the country has gotten more rain, on average, over the last 30 years than it did during the 20th century, while precipitation has decreased in the West. (Thirty-year averages are often used by scientists to glean big-picture climate trends from temperature and precipitation data that varies substantially year-to-year.)

It's not yet clear whether these changes in precipitation are a permanent feature of our warming climate, or whether they reflect long-term weather variability. But they are largely consistent with predictions from climate models, which expect to see more precipitation overall as the world warms, with big regional differences. Broadly: Wet places get wetter and dry places get drier.

"There's variability from year to year," and even decade to decade, said Andreas Prein, a project scientist at the National Center for Atmospheric Research. "But climate change is slowly pushing this variability" toward wetter and drier extremes, he said.

Increase in Extremes

How much it rains or snows, averaged over time, is one way of analyzing changing precipitation patterns. Another way is to look at changes in the heaviest rainfalls and snowstorms. That's where the biggest impacts can be felt.



Source: Climate Science Special Report: Fourth National Climate Assessment ■ Map shows changes in 5-year maximum daily precipitation between 1901 and 2016.

The frequency and intensity of heavy precipitation across the country have increased more than average precipitation, according to the most recent National Climate Assessment, with the largest increases seen in the Midwest and Northeast. (Because heavy precipitation is more variable than average precipitation, trends have to be measured over broader

geographical regions.)

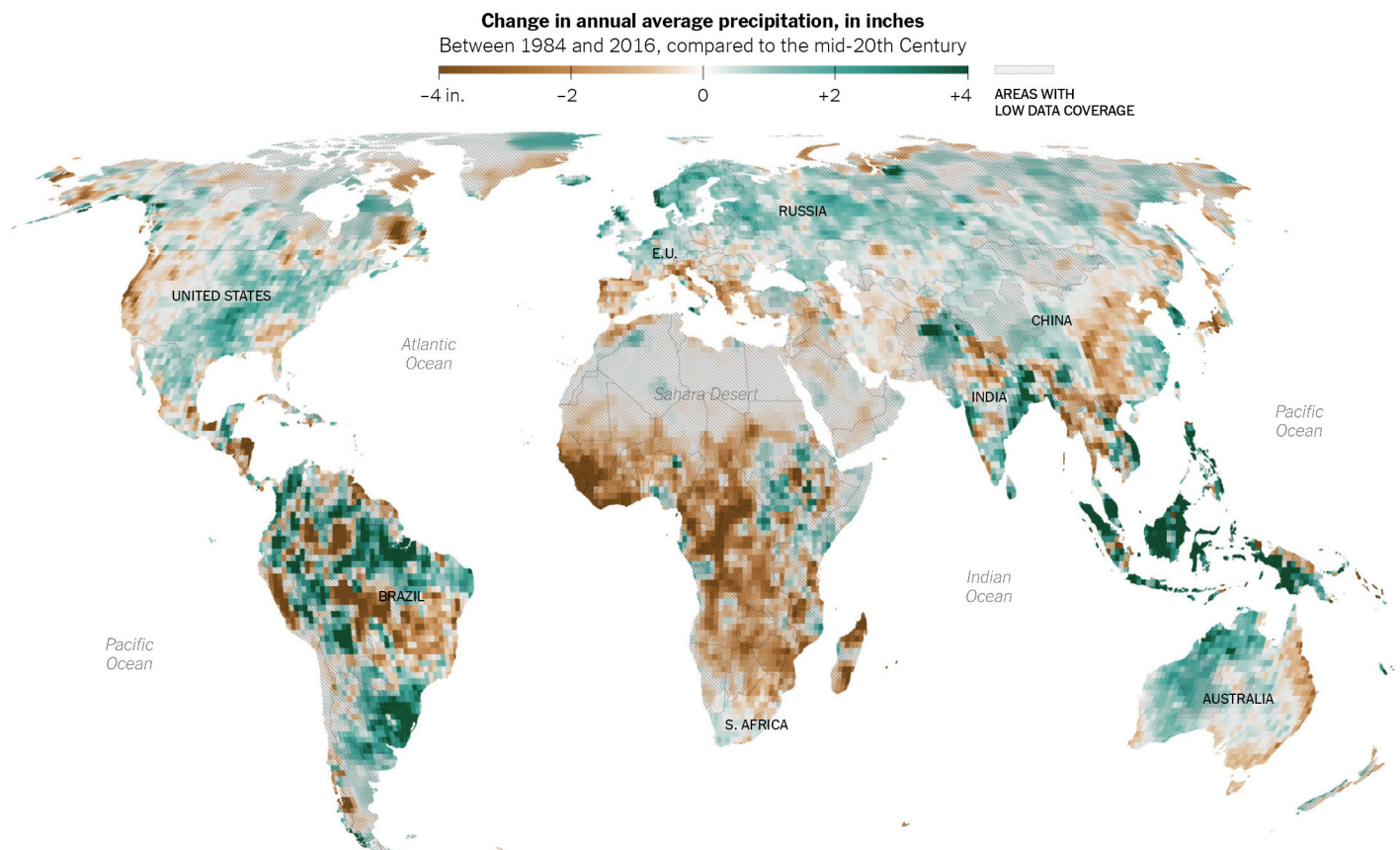
Stronger downpours are a hallmark of climate change. As the climate warms, increased evaporation pumps more moisture into the air. And warmer air can hold more moisture — about 7 percent more with every degree Celsius of warming, or 1.8 degrees Fahrenheit (which is about how much the world has warmed since preindustrial times). That means when it rains, it tends to rain more.

“We’re seeing warmer temperatures and warmer oceans,” said David R. Easterling, director of the National Climate Assessment Technical Support Unit. “So, you have more moisture in the atmosphere that’s able to rain out in these storms.”

As the planet continues to warm, he said, “we just expect that it's going to get worse.”

A Global Pattern

Similar patterns can be seen worldwide: On average, global land areas have seen more precipitation since 1950. But even as much of the world has become wetter, some regions have become drier.



Source: Contractor et al., Journal of Climate ▪ Note: Equatorial regions show a larger change due to their higher average rainfall.

Most of Asia has gotten wetter, driven by a rise in heavy precipitation. Average precipitation has increased in Northern and Central Europe,

while the Mediterranean has gotten drier, on average, and is experiencing water scarcity. Much of Africa has gotten drier. So has eastern Australia.

Extreme precipitation is also on the rise around the world.

A recent report from the Intergovernmental Panel on Climate Change found that heavy precipitation has increased since the 1950s across most land areas with detailed weather records, a trend the report said is likely driven by human-caused global warming.

This summer has seen heavy downpours wreak havoc around the world, from Germany to India and China, with floods causing many hundreds of deaths. This week, a team of scientists reported that Germany's extreme flooding was made more likely by climate change.

"Precipitation is one of the key climate variables," said Aiguo Dai, a professor of atmospheric science at the University at Albany, SUNY. "The direct impacts from a warming temperature are important, but the indirect impact through changes in precipitation and storm intensity will be even bigger."