

Experts: Extreme rains, floods to be more common globally

By Isabella O'Malley,
Brittany Peterson
and Drew Costley

Associated Press

Schools in New Delhi were forced to close Monday after heavy monsoon rains battered the Indian capital, with landslides and flash floods killing at least 15 people over the last three days. Farther north, the overflowing Beas River swept vehicles downstream as it flooded neighborhoods.

In Japan, torrential rain pounded the southwest, causing floods and mudslides that left two people dead and at least six others missing this week. Local TV showed damaged houses in Fukuoka prefecture and muddy water from the swollen Yamakuni River appearing to threaten a bridge in the town of Yabakei.

In Ulster County, in New York's Hudson Valley and in Vermont, some said the flooding is the worst they've seen since Hurricane Irene's devastation in 2011.

Although destructive flooding in India, Japan, China, Turkey and the U.S. might seem like distant events, atmospheric scientists say they have this in common: Storms are forming in a warmer atmosphere, making extreme rainfall a more frequent reality now. The additional warming that scientists predict is coming will only make it worse.

That's because a warmer atmosphere holds more moisture, which results in storms dumping more precipitation that can have deadly outcomes. Pollutants, especially carbon dioxide and methane, are heating up the atmosphere. Instead of allowing heat to radiate away from Earth into space, they hold onto it.

While climate change is not the cause of storms unleashing the rainfall, these storms are form-



The swollen Beas River surges Sunday in Kullu, Himachal Pradesh state, India, after torrential rains. **AQIL KHAN/AP**

ing in an atmosphere that is becoming warmer and wetter.

"Sixty-eight degrees Fahrenheit can hold twice as much water as 50 degrees Fahrenheit," said Rodney Wynn, a meteorologist at the National Weather Service in Tampa Bay. "Warm air expands and cool air contracts. You can think of it as a balloon — when it's heated the volume is going to get larger, so therefore it can hold more moisture."

For every 1 degree Celsius, which equals 1.8 degrees Fahrenheit, the atmosphere warms, it holds approximately 7% more moisture. According to NASA, the average global temperature has increased by at least 1.1 degrees Celsius (1.9 degrees Fahrenheit) since 1880.

"When a thunderstorm develops, water vapor gets condensed into rain droplets and falls back down to the surface. So as these storms form in warmer environments that have more moisture in them, the rainfall increases," explained Brian Soden, professor of atmospheric sciences at the University of Miami.

"As the climate gets warmer we expect intense rain events to become more common, it's a very robust prediction of climate models," Soden added. "It's not surprising to see these

events happening, it's what models have been predicting ever since day one."

Gavin Schmidt, climatologist and director of the NASA Goddard Institute for Space Studies, said the regions being hit hardest by climate change are not the ones who emit the largest amount of planet-warming pollutants.

"The bulk of the emissions have come from the industrial Western nations and the bulk of the impacts are happening in places that don't have good infrastructure, that are less prepared for weather extremes and have no real ways to manage this," Schmidt said.

Despite growing alarm among climate scientists, there are few signs of the kind of widespread societal change that would reduce the greenhouse gas emissions that are dangerously heating the planet.

"More and more people recognize climate change as a problem, but they don't like the solutions," said Paul Slovic, a professor at the University of Oregon who specializes in the psychology of risk and decision making. "They don't want to have to give up the comfort and conveniences that we get from using energy from the wrong sources, and so forth."

The New York Times
contributed.