75% of Amazon rainforest shows signs of loss, a 'tipping point' of dieback, study shows

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The Amazon rainforest may be nearing a "tipping point" of dieback, the point where rainforest will turn to savanna, a new study shows.

Signs of loss have been found in more than 75% of the rainforest since the early 2000s, according to research that outlines this troubling trend.

"Deforestation and climate change are likely the main drivers of this decline," said study co-author Niklas Boers, a professor at the Technical University of Munich.

Using satellite remote sensing data, researchers found what they call "resilience"—the ability to recover from events such as droughts or fires—has declined consistently in the vast majority of the Amazon rainforest.

Loss of resilience is most prominent in areas that are closer to human activity, as well as in those that receive less rainfall, the study said.

Overall, the Amazon rainforest is becoming much less resilient—raising the risk of widespread dieback, the research shows. "The rainforest can look more or less the same, yet it can be losing resilience—making it slower to recover from a major event like a drought," said study co-author Tim Lenton of the University of Exeter in the United Kingdom.

The study was published Monday in the peer-reviewed British journal *Nature Climate Change*.

Experts believe the Amazon could soon reach a critical line, the crossing of which would trigger dieback and turn much of the forest to savanna. That would have major consequences for biodiversity, global carbon storage and climate change.

It is not clear when that point could be reached, but the study said the loss of resilience is "consistent" with an approaching watershed moment.

"The Amazon rainforest is a highly complex system, so it's very difficult to predict if and when a tipping point could be reached," said study lead author Chris Boulton, also of the University of Exeter.

"Many researchers have theorized that a tipping point could be reached, but our study provides vital empirical evidence that we are approaching that threshold," Boers said. "Many interlinked factors—including droughts, fires, deforestation, degradation and climate change—could combine to reduce resilience and trigger the crossing of a tipping point in the Amazon."

Tropical forests such as the Amazon play a crucial role in climate regulation, experts say.

The Amazon rainforest is biologically the richest region on Earth, hosting about 25% of global biodiversity, and it is a major contributor to the natural cycles required for the functioning of the planet, according to the environmental group Panthera.

"The Amazon is the largest tract of continuous rainforest on the planet, and it plays a critical role in the (Earth's) climate system," Laura Schneider, a geographer at Rutgers University, said in 2019, when devastating wildfires were scorching the forest.

One crucial role is absorbing carbon dioxide, a heat-trapping gas that's a significant cause of global warming.

"With nearly 100 billion tons of carbon stored in its trees, it keeps nearly 400 billion tons of carbon dioxide out of the atmosphere," said Daniel Nepstad, director of the Earth Innovation Institute, an organization that works to promote low-emission rural development.

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