

Amazon deforestation linked to long distance climate warming

October 30 2023



The Amazon Forest seen from the Amazon Tall Tower Observatory, a scientific research facility in the Amazon rainforest of Brazil. Credit: Dr Jess Baker, University of Leeds.

Deforestation in the Amazon causes land surfaces up to 100 kilometers away to get warmer, according to a new study. The research, by a team of British and Brazilian scientists, led by Dr. Edward Butt at the University of Leeds, suggests that tropical forests play a critical role in cooling the land surface—and that effect can play out over considerable distances.

It is known that when tropical forests are cleared, the climate in the immediate vicinity gets warmer.

In this latest study, the researchers wanted to know if deforestation in the Amazon was resulting in climate warming further afield, and the study examined the impact of forest loss on sites up to 100 kilometers away.

Critical importance

Dr. Butt, a research fellow based in the School of Earth and Environment at Leeds, said, "Understanding the impact of forest loss in the Amazon is of critical importance.

"The world is getting warmer as a result of climate change. It is important that we understand how deforestation of the Amazon ecosystem is contributing to [climate warming](#). If deforestation is warming surrounding regions, this would have big implications for people living in those areas."

As part of the study the researchers combined satellite data of [land surface](#) temperature and forest loss in the Amazon for the period 2001 to 2020. The study, "Amazon deforestation causes strong regional warming," was reported in the journal *Proceedings of the National Academy of Sciences*.

Data was analyzed at 3.7 million locations across the Amazon basin. The

researchers compared the warming that had occurred over regions with varying amounts of local and regional deforestation.

The researchers classed deforestation within 2km of a data collection point as local. If it was further afield, between 2 and 100 kilometers away, it was classed as regional.

Cumulative impact of regional forest loss

Analyzing the data, the scientists found that in those areas where there was little deforestation both locally and regionally, the average change in land temperature over the 2001 to 2021 period was 0.3°C. Locations with 40% to 50% local deforestation but little regional deforestation, warmed by an average of 1.3°C.

In comparison, in areas with both local and regional deforestation, the average temperature rise was 4.4°C.

Writing in the paper, the researchers added, "The regional warming due to Amazon deforestation will have negative consequences for the 30 million people living within the Amazon basin, many of whom are already exposed to dangerous levels of heat."

Impact of Amazon deforestation

The scientists also analyzed how future deforestation might further warm the Brazilian Amazon over the 30 years from 2020. They looked at two scenarios, one where the Forest Code is ignored and protected areas not safeguarded. The second, where there is some protection in place.

In the southern Amazon, where forest loss is the greatest, reducing

deforestation would have the biggest benefit reducing future warming by more than 0.5°C in Mato Grosso state.

Professor Dominick Spracklen, from the University of Leeds and a co-author in the study, said, "It is well known that protecting [tropical forests](#) is crucial in the fight against global climate change. Our work shows that protecting forests will also have big benefits at a local, regional and national scale.

"We show that reducing deforestation would reduce future warming across the southern Amazon. This would benefit people living across the region through reducing heat stress and reducing the negative impacts on agriculture."

Dr. Celso von Randow, a researcher from the Brazilian National Institute for Space Research and a co-author of the study, said, "In Brazil, studies on the importance of conserving forests for carbon storage are common, but we still lack studies on their biophysical effects. This is important because the Amazon is warming rapidly due to climate change, and now exacerbated by deforestation.

"New efforts to control deforestation across the Brazilian Amazon have been successful and deforestation rates have declined over the last year, and now we see benefits of possibly reducing the warming affecting people living in this region. Recognizing such benefits will hopefully result in more widespread support for continued efforts to reduce [deforestation](#) and protect forests."

More information: Butt, Edward W. et al, Amazon deforestation causes strong regional warming, *Proceedings of the National Academy of Sciences* (2023). [DOI: 10.1073/pnas.2309123120](https://doi.org/10.1073/pnas.2309123120) , www.pnas.org/cgi/doi/10.1073/pnas.2309123120

Provided by University of Leeds

Citation: Amazon deforestation linked to long distance climate warming (2023, October 30)
retrieved 2 May 2024 from

<https://phys.org/news/2023-10-amazon-deforestation-linked-distance-climate.html>

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