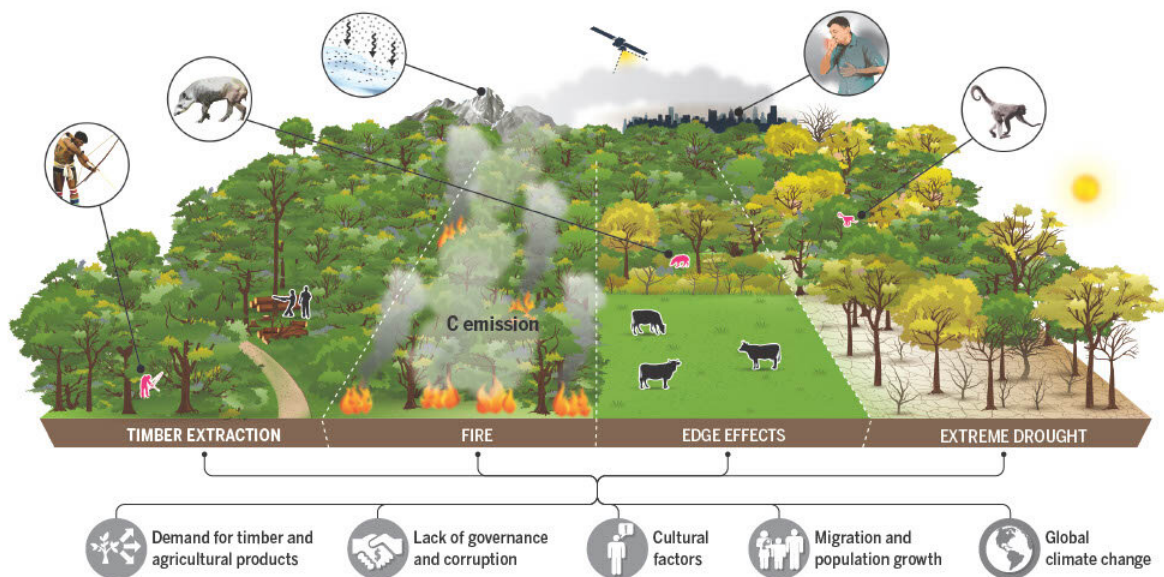


# Human activity has degraded more than a third of the remaining Amazon rainforest, scientists find

January 26 2023



Extended summary figure of the article. Credit: Alex Argozino/Studio Argozino/*Science* magazine

The Amazon rainforest has been degraded by a much greater extent than scientists previously believed with more than a third of remaining forest affected by humans, according to a new study published on January 27 in the journal *Science*.

The paper was led by an international team of 35 scientists and researchers, from institutions such as Brazil's University of Campinas (Unicamp), the Amazon Environmental Research Institute (IPAM), National Institute for Space Research (INPE), and U.K.'s Lancaster University. It shows that up to 38% of the remaining Amazon [forest](#) area—equivalent to ten times the size of the U.K.—has been affected by some form of human disturbance, causing [carbon emissions](#) equivalent to or greater than those from deforestation.

The work is the result of the AIMES (Analysis, Integration and Modeling of the Earth System) project, linked to the Future Earth international initiative, which brings together scientists and researchers who study sustainability.

The findings are the result of an analytical review of previously published [scientific data](#), based on [satellite imagery](#) and a synthesis of published data outlining changes in the Amazon region between 2001 and 2018. The authors define the concept of degradation as transient or long-term changes in [forest conditions](#) caused by humans. Degradation is different from deforestation, where the forest is removed altogether and a new land use, such as agriculture, is established in its place. Although highly degraded forests can lose almost all of the trees, the land use itself does not change.





Photo taken in 2015 of a burning forest in Belterra, in the Brazilian Amazon. In this photo, the flames are about 30cm high. The continuous fire line can be seen at the back of the photo, together with a lot of smoke. Credit: Adam Ronan/Rede Amazônia Sustentável

The authors evaluate four key disturbances driving [forest degradation](#): forest fire, edge effects (changes that occur in forests adjacent to deforested areas), selective logging (such as illegal logging) and extreme drought. Different forest areas can be affected by one or more of these disturbances.

"Despite uncertainty about the total effect of these disturbances, it is clear that their cumulative effect can be as important as deforestation for carbon emissions and biodiversity loss," said Jos Barlow, a Professor of conservation science at Lancaster University in the U.K. and co-author of the paper.

The scientists assess that the degradation of the Amazon also has significant socioeconomic impacts, which should be further investigated.





Photo taken in 2015 of a burning forest in Belterra, in the Brazilian Amazon. In this photo, the fire line is clear, as well as the smoke of the burning forest.  
Credit: Adam Ronan/Rede Amazônia Sustentável





Photo taken in 2018, three years after a fire affected this logged forest that was also affected by edge effects. Photo taken in Belterra, in the Brazilian Amazon. Credit: Erika Berenguer



Photo taken in 2015 of a burning forest in Belterra, in the Brazilian Amazon. While the flames cannot be seen, the smoke coming out of the forest is clear. Credit: Adam Ronan/Rede Amazônia Sustentável

"Degradation benefits the few, but places important burdens on many," says Dr. Rachel Carmenta, a co-author based at the University of East Anglia, in the U.K. "Few people profit from the degradation processes, yet many lose out across all dimensions of human well-being—including health, nutrition and the place attachments held for the forest landscapes where they live. Furthermore, many of these burdens are hidden at present; recognizing them will help enable better governance with social justice at the center."

In a projection made by the team for 2050, the four degradation factors will continue to be major sources of carbon emissions into the atmosphere, regardless of the growth or suppression of deforestation of the forest.

"Even in an optimistic scenario, when there is no more deforestation, the effects of climate change will see degradation of the forest continue, leading to further carbon emissions," says Dr. David Lapola, leader of the study and researcher at the Center for Meteorological and Climatic Research Applied to Agriculture at Unicamp. However, "preventing the advance of deforestation remains vital, and could also allow more attention to be directed to other drivers of forest degradation."





Photo taken in 2019, four years after a fire affected this forest fragment, which has been previously also affected by multiple anthropogenic disturbance, including selective logging, edge effects and fires. Photo taken in Belterra, in the Brazilian Amazon. Credit: Marizilda Cruppe/Rede Amazônia Sustentável





Photo taken in 2019, four years after a fire affected this forest fragment, which has been previously also affected by multiple anthropogenic disturbance, including selective logging, edge effects and fires. Photo taken in Belterra, in the Brazilian Amazon. Credit: Marizilda Cruppe/Rede Amazônia Sustentável

The authors propose creating a monitoring system for forest degradation, as well as prevention and curbing of illegal logging and controlling the use of fire. One suggestion is the concept of "smart forests" which, like the idea of "smart cities," would use different types of technologies and sensors to collect useful data in order to improve the quality of the environment.

"Public and private actions and policies to curb [deforestation](#) will not necessarily address degradation as well," says Dr. Lapola. "It is necessary to invest in innovative strategies."

**More information:** David M. Lapola, The drivers and impacts of Amazon forest degradation, *Science* (2023). [DOI: 10.1126/science.abp8622](https://doi.org/10.1126/science.abp8622).  
[www.science.org/doi/10.1126/science.abp8622](https://www.science.org/doi/10.1126/science.abp8622)

Provided by Future Earth

Citation: Human activity has degraded more than a third of the remaining Amazon rainforest, scientists find (2023, January 26) retrieved 25 April 2024 from <https://phys.org/news/2023-01-human-degraded-amazon-rainforest-scientists.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.