

Indigenous territories and protected areas are key to forest conservation in the Brazilian Amazon, study shows

January 6 2023



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A study led by researchers with the Center for Earth Observation and Modeling at the University of Oklahoma analyzed time series satellite images from 2000 to 2021, revealing the vital role of Indigenous territories and protected areas in forest conservation in the Brazilian

Amazon. The study results, recently published in *Nature Sustainability*, called attention to the negative impacts of weakened governmental conservation policies in recent years.

The Brazilian Amazon encompasses the largest tropical [forest](#) area with the highest biodiversity in the world. Since 2000, Indigenous territories and protected areas have increased substantially in the region and by 2013, Indigenous territories and protected areas accounted for 43% of the total land area and covered approximately 50% of the total forest area.

However, tensions between forest conservation and socioeconomic development goals persist. In recent years, forest conservation has been threatened by large socio-ecological changes in Brazil. Weakened forest and environmental policies and enforcement as well as impacts from the COVID-19 pandemic had devastating impacts on Indigenous groups in the region.

In this U.S.–Brazil collaborative study, Yuanwei Qin, Ph.D., and Xiangming Xiao, Ph.D., of OU's Center for Earth Observation and Modeling, with Fabio de Sa e Silva, Ph.D., assistant professor of international studies and Wick Cary Professor of Brazilian Studies in the OU College of International Studies, worked with collaborators from the Brazilian National Institute for Space Research and the National Institute for Research in Amazonia in Brazil. The research team combined multiple [data sources](#) to document and quantify the dynamics and impact of forest loss in the Brazilian Amazon over the past two decades.

Because of frequent cloud cover and fire-induced smoke in the Brazilian Amazon, annual forest maps from analyses of optical images have only moderate accuracy. In a [2019 paper](#) published by the same journal, the research team combined image data from both optical and microwave sensors to generate annual Brazilian Amazon forest maps. Using these

annual forest maps, they assessed the effects of Indigenous territories and protected areas on deforestation dynamics in the Brazilian Amazon through 2021.

"Between 2000 and 2021, the areas designated as Indigenous territories or protected areas increased to cover approximately 52% of forests in the Brazilian Amazon, accounting for only 5% of net forest loss and 12% of gross forest loss in the period," said Qin. "This finding highlights the vital role of Indigenous territories and the protected areas for forest conservation in the region."

The protected areas in the Brazilian Amazon are subject to different state and national governance arrangements and have different management objectives, including strict protection or sustainable use. They found that from 2003 through 2021, gross forest loss fell 48% in the protected areas subject to strict protection and 11% in the protected areas subject to sustainable use.

"These varying effects on [forest conservation](#) call for more in-depth causal analyses by researchers and invite stakeholders, decision-makers, and the public to reassess existing policies for these areas. Legal designations are important, but if the law is not enforced, the intended protection of forests and biodiversity will be illusional. This is an area in which Brazil is knowingly failing," de Sa e Silva said.

The results from this study also show that annual forest area loss was affected by Brazilian forest policies, as evidenced by a large reduction of forest area loss in the early 2000s to mid-2010s, corresponding with Brazilian President Luiz Inácio Lula da Silva administration in 2003–2010, and renewed rise of forest area loss even among Indigenous territories and the [protected areas](#) in 2019–2021, corresponding with President Jair Bolsonaro's administration in 2019–2022.

"How to rebuild effective policies and reduce forest area loss in the Brazilian Amazon in the coming years will be one of the grand challenges for Lula's administration and international communities," Xiao said.

This study adds to a portfolio of research efforts to document forest areas in the Brazilian Amazon by Qin and Xiao, including a 2019 paper, "Improved estimates of forest cover and loss in the Brazilian Amazon in 2000–2017," published in [Nature Sustainability](#); a 2021 paper, "Carbon loss from forest degradation exceeds that from deforestation in the Brazilian Amazon," published in [Nature Climate Change](#); as well as two others. Learn more at ceom.ou.edu.

More information: Yuanwei Qin et al, Forest conservation in Indigenous territories and protected areas in the Brazilian Amazon, *Nature Sustainability* (2023). [DOI: 10.1038/s41893-022-01018-z](https://doi.org/10.1038/s41893-022-01018-z)

Provided by University of Oklahoma

Citation: Indigenous territories and protected areas are key to forest conservation in the Brazilian Amazon, study shows (2023, January 6) retrieved 25 April 2024 from <https://phys.org/news/2023-01-indigenous-territories-areas-key-forest.html>

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