

Tropical Forests Are Losing Their Ability to Soak Up Carbon

The forests could switch from a carbon sink to a carbon source by the mid-2030s.



Leafy tree crowns crowd Africa's wooded Ivindo National Park in central Gabon. Credit: Kath Jeffery

By [Jenessa Duncombe](#) © 9 March 2020

The towering stands of old-growth trees in Africa's [Salonga National Park](https://whc.unesco.org/en/list/280/) (<https://whc.unesco.org/en/list/280/>) in the heart of the Democratic Republic of the Congo are the most pristine and protected rain forests on the continent. But these trees are slowly sequestering less and less carbon each year, according to a new [study](https://www.nature.com/articles/s41586-020-2035-0) (<https://www.nature.com/articles/s41586-020-2035-0>) in *Nature*.

In a survey of hundreds of thousands of trees across South America and Africa, including in

Salonga National Park, analysis suggests that tropical trees have reached their limit when it comes to absorbing carbon because too many trees are dying and forests are shrinking.

By the mid-2030s, tropical forests are predicted to release more carbon than they absorb.

“We show that peak carbon uptake into intact tropical forests occurred in the 1990s,” lead author [Wannes Hubau](https://www.africamuseum.be/en/staff/1091) (https://www.africamuseum.be/en/staff/1091), a researcher at the Royal Museum for Central Africa in Tervuren, Belgium, [said](https://www.eurekalert.org/emb_releases/2020-03/uol-tfc030220.php) (https://www.eurekalert.org/emb_releases/2020-03/uol-tfc030220.php). By the mid-2030s, tropical forests will release more carbon than they absorb, a reversal of their role in the past, according to the study’s projections. Our planet will have one fewer place for our atmospheric carbon to go.

Environmental scientist [Thomas Lovejoy](https://unfoundation.org/who-we-are/our-people/thomas-lovejoy/) (https://unfoundation.org/who-we-are/our-people/thomas-lovejoy/) at the United Nations Foundation, who was not involved with the research, told [Bloomberg](https://www.bloomberg.com/news/articles/2020-03-04/tropical-forests-are-reaching-their-carbon-dioxide-limit) (https://www.bloomberg.com/news/articles/2020-03-04/tropical-forests-are-reaching-their-carbon-dioxide-limit) that the study is “not good news in terms of the carbon cycle and carbon dioxide sequestration by tropical forests in Africa and Amazonia.”

Higher Temperatures and Droughts Strain Trees



Mist mingles with the canopy of the Amazon forest in Brazil. Credit: Peter Vander Sleen

Satellite images have shown forests in the tropics [growing greener](https://science.sciencemag.org/content/300/5625/1560.full?cookietest=yes) (https://science.sciencemag.org/content/300/5625/1560.full?cookietest=yes) over the past several decades because there’s more carbon dioxide in the atmosphere for them to absorb.

“Extra carbon dioxide boosts tree growth,” Hubau said, “but every year this effect is being increasingly countered by the negative impacts of higher temperatures and droughts, which slow

growth and can kill trees.”

Analyzing African, South American, and Southeast Asian forests together, the researchers discovered a worrying trend: Tropical forests in this decade will annually sequester a third of what they could absorb in the 1990s. The trees are dying, the forest is overtaxed, and the forests simply can't absorb carbon at a faster rate, even though the concentration in the atmosphere is increasing. Tropical forests will stop sucking up carbon earlier than shown by “even the most pessimistic” climate models, the authors wrote in their paper.

“Intact tropical forests remain a vital carbon sink, but this research reveals that unless policies are put in place to stabilize Earth's climate, it is only a matter of time until they are no longer able to sequester carbon,” author [Simon Lewis](https://environment.leeds.ac.uk/geography/staff/1062/professor-simon-lewis) (<https://environment.leeds.ac.uk/geography/staff/1062/professor-simon-lewis>), from the University of Leeds in the United Kingdom, said.

A Tale of Two Forests

The paper came from years of work in the field: More than 100 scientists repeatedly measured 244 plots in tropical old-growth forests across the Congo Basin, West Africa, Lower Guinea, and East Africa. Across several decades, they mapped and assessed each tree above a certain size in each plot, stretching a measuring tape around their trunks and recording their heights using lasers or clinometers or, in some cases, by scaling the trees. In all, the census racked up 135,625 trees from 11 African countries.

The study predicts that African forests will share a fate similar to that of Amazon forests but will lag several decades behind.

With thousands of trees mapped in Africa, the authors used an equation to calculate the forests' carbon storage over time. They found that African forests held the most carbon in their biomass between the years 2000 and 2010, but their capacity to take in more is shrinking.

In contrast, forests an ocean away in the Amazon have been dying for years. The forests suffer through higher temperatures and more frequent droughts than African forests, and their carbon uptake [peaked](https://www.nature.com/articles/nature14283) (<https://www.nature.com/articles/nature14283>) in the 1990s. The study predicts that African forests will share a fate similar to that of Amazon forests but lag several decades behind.

Tropical forests in Southeast Asia, although included in the study, have shrunk in area so much that they have tiny carbon sinks compared with Africa or the Amazon.



Researchers traveled by canoe into extremely remote areas, like Salonga National Park deep within the Congo Basin, to measure tree height and width. Each plot measured in the study represents several months of work traveling, measuring, and analyzing. Credit: University of Leeds/Simon Lewis

“Seriously Invest in Preparation”

The changes over three continents have added up: Tropical forests sequestered 21 billion metric tons less carbon dioxide in the 2010s than they did in the 1990s. That difference is equivalent to a decade of fossil fuel emissions from the United Kingdom, Germany, France, and Canada combined.

“The capacity of tropical forests to capture anthropogenic carbon emissions could be severely impaired.”

Tom Crowther (<https://scholar.google.com/citations?user=EYjCeRIAAAAJ&hl=en>), an assistant professor at the Swiss Federal Institute of Technology in Zürich, told the *Guardian* (<https://www.theguardian.com/environment/2020/mar/04/tropical-forests-losing-their-ability-to-absorb-carbon-study-finds>) that the latest research provides “concerning evidence” and that “the capacity of tropical forests to capture anthropogenic carbon emissions could be severely impaired.”

Looking forward, study author [Bonaventure Sonké](https://scholar.google.com/citations?user=U24RCAYAAAAJ&hl=en) (<https://scholar.google.com/citations?user=U24RCAYAAAAJ&hl=en>), from the University of Yaoundé I in Cameroon, said climate change impacts in the tropics may be more severe than anticipated. “African countries and the international community will need to seriously invest in preparation for ongoing climate change impacts in tropical regions.”

—Jenessa Duncombe (@jrdscience (<https://twitter.com/jrdscience>)), Staff Writer

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