

# Amazon rainforest now emitting more CO<sub>2</sub> than it absorbs

**Cutting emissions more urgent than ever, say scientists, with forest producing more than a billion tonnes of carbon dioxide a year**



The study found fires produced about 1.5bn tonnes of CO<sub>2</sub> a year, with forest growth removing 0.5bn tonnes. The 1bn tonnes left in the atmosphere is equivalent to the annual emissions of Japan. Photograph: Carl de Souza/AFP/Getty Images

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The **Amazon rainforest** is now emitting more carbon dioxide than it is able to absorb, scientists have confirmed for the first time.

The emissions amount to a billion tonnes of carbon dioxide a year, according to a study. The giant forest had previously been a carbon sink, absorbing the emissions driving the climate crisis, but is now causing its acceleration, researchers said.

Most of the emissions are caused by fires, many deliberately set to clear land for **beef** and **soy production**. But even without fires, hotter temperatures and

droughts mean the south-eastern Amazon has become a source of CO<sub>2</sub>, rather than a sink.

Growing trees and plants have taken up about a quarter of all fossil fuel emissions since 1960, with the Amazon playing a major role as the largest tropical forest. Losing the Amazon's power to capture CO<sub>2</sub> is a stark warning that slashing emissions from fossil fuels is more urgent than ever, scientists said.

The research used small planes to measure CO<sub>2</sub> levels up to 4,500m above the forest over the last decade, showing how the whole Amazon is changing. Previous studies indicating the Amazon was becoming a source of CO<sub>2</sub> were based on satellite data, which can be hampered by cloud cover, or ground measurements of trees, which can cover only a tiny part of the vast region.



### Destruction of world's forests increased sharply in 2020

The scientists said the discovery that part of the Amazon was emitting carbon even without fires was particularly worrying. They said it was most likely the result of each year's deforestation and fires making adjacent forests more susceptible the next year. The trees produce much of the region's rain, so fewer

trees means more severe droughts and heatwaves and more tree deaths and fires.

The government of Brazil's president, Jair Bolsonaro, has been harshly criticised for **encouraging more deforestation**, which has **surged to a 12-year high**, while **fires hit their highest level in June since 2007**.

Luciana Gatti, at the National Institute for Space Research in Brazil and who led the research, said: "The first very bad news is that forest burning produces around three times more CO<sub>2</sub> than the forest absorbs. The second bad news is that the places where deforestation is 30% or more show carbon emissions 10 times higher than where deforestation is lower than 20%."

Fewer trees meant less rain and higher temperatures, making the dry season even worse for the remaining forest, she said: "We have a very negative loop that makes the forest more susceptible to uncontrolled fires."

Much of the timber, beef and soy from the Amazon is exported from Brazil. "We need a global agreement to save the Amazon," Gatti said. Some European nations have said they will **block an EU trade deal with Brazil** and other countries unless Bolsonaro agrees to do more to tackle Amazonian destruction.



[Food brands challenge deforestation rules in UK environment bill](#)

The research, **published in the journal Nature**, involved taking 600 vertical profiles of CO<sub>2</sub> and carbon monoxide, which is produced by the fires, at four sites in the Brazilian Amazon from 2010 to 2018. It found fires produced about 1.5bn tonnes of CO<sub>2</sub> a year, with forest growth removing 0.5bn tonnes. The 1bn tonnes left in the atmosphere is equivalent to the annual emissions of Japan, the world's fifth-biggest polluter.

“This is a truly impressive study,” said Prof Simon Lewis, from University College London. “Flying every two weeks and keeping consistent laboratory measurements for nine years is an amazing feat.”

“The positive feedback, where deforestation and climate change drive a release of carbon from the remaining forest that reinforces additional warming and more carbon loss is what scientists have feared would happen,” he said. “Now we have good evidence this is happening. The south-east Amazon sink-to-source story is yet another stark warning that climate impacts are accelerating.”

Prof Scott Denning, at Colorado State University, said the aerial research campaign was heroic. “In the south-east, the forest is no longer growing faster than it's dying. This is bad – having the most productive carbon absorber on the planet switch from a sink to a source means we have to eliminate fossil fuels faster than we thought.”

A satellite study published in April found the Brazilian **Amazon released nearly 20% more carbon dioxide** into the atmosphere over the past decade than it absorbed. Research that tracked 300,000 trees over 30 years, published in 2020, showed **tropical forests were taking up less CO<sub>2</sub>** than before. Denning said: “They're complementary studies with radically different methods that come to very similar conclusions.”

“Imagine if we could prohibit fires in the Amazon – it could be a carbon sink,” said Gatti. “But we are doing the opposite – we are accelerating climate change.”

“The worst part is we don't use science to make decisions,” she said. “People think that converting more land to agriculture will mean more productivity, but in fact we lose productivity because of the negative impact on rain.”

Research published on Friday estimated that **Brazil's soy industry loses \$3.5bn a year** due to the immediate spike in extreme heat that follows forest destruction.

# Amazon rainforest is emitting more carbon dioxide than it absorbs in some areas, study says

By [Jessie Yeung](#), CNN

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The Jurura river in Carauari, in the heart of the Brazilian Amazon, on March 15, 2020.

**(CNN)** Parts of the Amazon rainforest are now emitting more carbon dioxide than they absorb, raising fears of the potentially devastating

impact on its fragile ecosystems and a further worsening of the climate crisis, according to a new study.

The research, [published Wednesday](#) in the scientific journal Nature, says the Amazon's vital role as [a carbon sink](#) -- absorbing massive amounts of heat-trapping carbon dioxide from the atmosphere, helping to cool the Earth -- is under threat.

"This carbon sink seems to be in decline," the study said. "Over the past 40 years, eastern Amazonia has been subjected to more deforestation, warming and moisture stress than the western part, especially during the dry season."

- Over nine years, researchers led by Brazil's National Institute for Space Research conducted close to 600 flights over four main sites in the Brazilian Amazon, collecting data on the amount of carbon dioxide and carbon monoxide in the atmosphere.

- They found that collectively, these four sites emit 410 million metric tons of carbon dioxide per year, caused mainly by large fires -- often set by humans. These emissions are partially offset by the same regions absorbing about 120 million metric tons of carbon per year; but that's still 290 million metric tons in net emissions -- about the same as the entire [country of Thailand](#) produces in a year.



Once the Amazon rainforest passes the point of no return it could be gone in decades

These damaging factors -- deforestation, land burning, and effects of climate change -- "may have lasting, negative consequences for both the carbon balance of the region and the fragility of its ecosystems," warned a news release by Nature.

The Amazon, roughly half the size of the 48 contiguous United States, is the largest rainforest on the planet. Its environment is intricately linked with the balance of its ecosystems, home to countless species of fauna and flora.

When the rainforest is healthy, its trees and plants pull billions of tons of heat-trapping carbon dioxide from the atmosphere each year, releasing oxygen back into the air. And its vast tree canopy serves as an "air conditioner" for the planet, scientists say, influencing global temperature and rainfall patterns. It is one of the planet's [best defenses against climate change](#).

But in the past 40 to 50 years alone, the rainforest has undergone tremendous and disruptive change due to human impacts. It has lost 17% of its forest, most of which has been turned into agricultural land for

farming and livestock. This, in turn, has caused temperatures to rise and water evaporation to drop, meaning less rainfall.

During the study's nine years, the southeastern Amazon in particular has switched from a carbon sink to a "substantial carbon source," as deforestation and fires increased in frequency and severity, the study said. These factors, along with global climate change, are causing temperatures to increase steadily -- and "these changes appear to be accelerating," it added.

Deforestation and logging have also made the land more vulnerable to fires, which then cause greater damage in an ongoing cycle. The Amazon wildfires made international headlines [in 2019](#) when they burned out of control, at the highest rate on record; at one point, 1½ soccer fields of the rainforest were being destroyed every minute.



Extreme drought and deforestation are priming the Amazon rainforest for a terrible fire season

Much of this is [caused by humans](#), according to environmental organizations and researchers. Even during dry seasons, the Amazon -- a humid rainforest -- doesn't catch fire easily, unlike the dry bushland in California or Australia. Instead, many fires are set by farmers and cattle ranchers who want to clear and utilize the land -- emboldened, activists say, by pro-business Brazilian President Jair Bolsonaro, who made



campaign promises to restore the economy by exploiting the Amazon's economic potential.

Other recent research has also suggested the entire Amazon may soon flip to become a net carbon source instead of sink. [One 2020 study](#) found this could happen by 2050 -- or sooner.

- Though the 2019 fires have since subsided, the rainforest remains at risk; 2020 saw a surge in deforestation, leaving parts of the Amazon parched by drought and loaded with fire-kindling fuel. Experts say the region has rarely been drier than it is now, and fear [a destructive fire season](#) is again looming.

"Climate change doesn't respect political and geographic boundaries," said Paulo Brando, an assistant professor and scientist at the University of California-Irvine, [last month](#). "What happens in the Amazon will affect the entire planet."