

# Environmental 'one-two punch' imperils Amazonian forests

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One of the world's longest-running ecological studies has revealed that Amazonian forests are being altered by multiple environmental threats – creating even greater perils for the world's largest rainforest.

"It's like a boxer getting hit by a flurry of punches," says lead author William Laurance of James Cook University in Cairns, Australia.

For the past 35 years, a team of Brazilian and international researchers has studied how diverse communities of trees and vines respond when the Amazonian rainforest is fragmented by cattle ranching.

The fragmented forests, they found, change rapidly. "Lots of trees have died while vines, which favour disturbed forests, proliferate rapidly," said Jose Luis Camargo of Brazil's National Institute for Amazonian Research.

But the biggest surprise is that nearby undisturbed forests, which were also being carefully studied, changed as well. Trees there grew and died faster, and the vines also multiplied.

"These changes might be driven by increasing carbon dioxide in the atmosphere," said Thomas Lovejoy of George Mason University in Virginia, USA, who initiated the long-term study. "Plants use carbon dioxide for photosynthesis and when it increases, the [forest](#) evidently becomes more unstable and dynamic, as long as the soils have enough nutrients."

The investigators say a key implication is that many forests are being affected not only by land-use changes such as habitat fragmentation, but also by global-scale changes such as rising [carbon dioxide](#) and climate change. In some cases different drivers reinforce one another, increasing their impacts on forests.

"A big implication is that it's going to be harder to predict future changes to ecosystems if they're being affected by several environmental drivers," said Lovejoy.

The researchers expect such changes to increase in the future.

"Humans continue to dump billions of tons of greenhouse gases into the atmosphere every year, and it's evidently affecting even the remotest forests on Earth," said Laurance.

**More information:** William F. Laurance et al. (2014) Apparent environmental synergism drives the dynamics of Amazonian forest fragments. *Ecology*. [www.esajournals.org/doi/abs/10.1890/14-0330.1](http://www.esajournals.org/doi/abs/10.1890/14-0330.1)

Provided by James Cook University

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