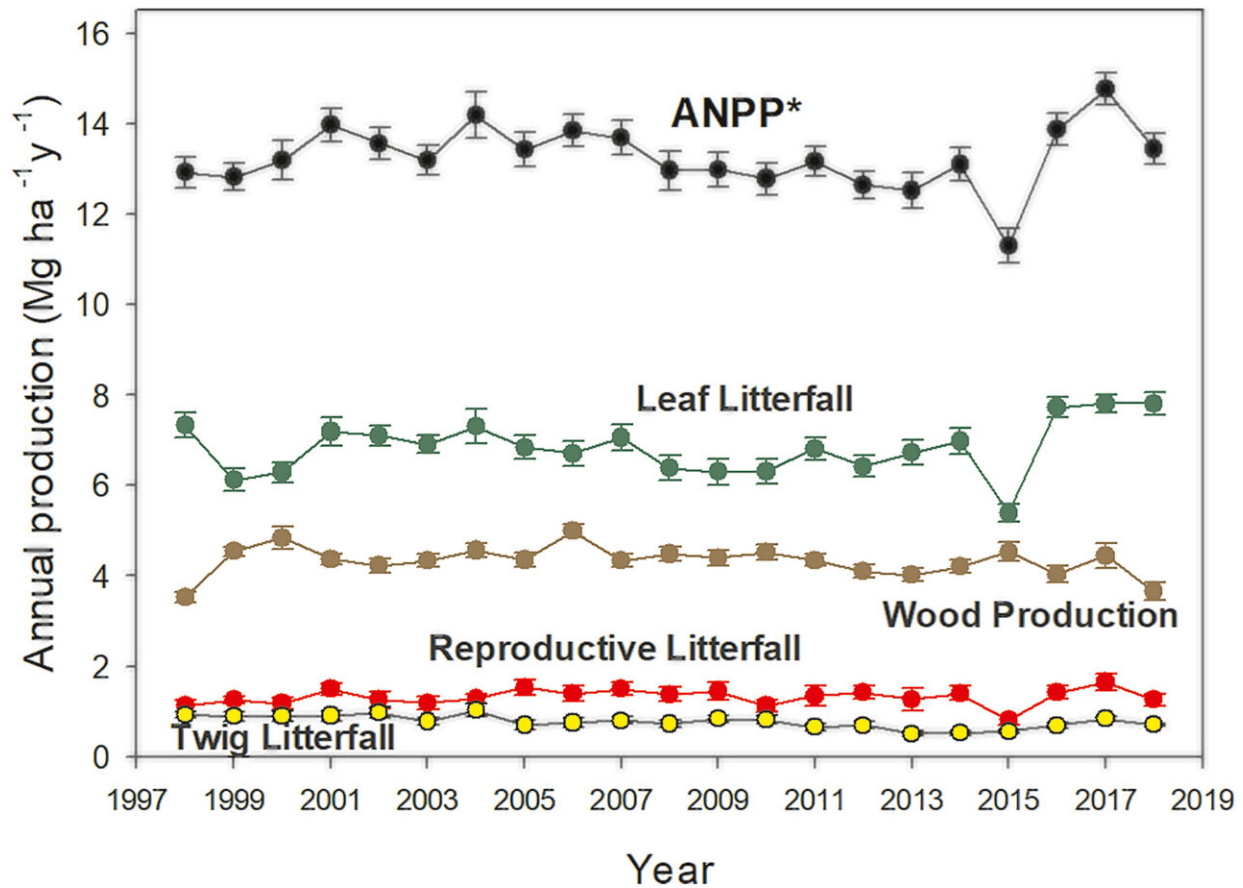


# Drop in rain forest productivity could speed future climate change

January 12 2022, by Rachel Fritts



Landscape-scale aboveground productivity (ANPP\*) and its components at La Selva, Costa Rica, through the 21-year study period. Error bars indicate  $\pm 1$  S.E.M for each 18-plot mean. X-axis: Year 2 of each measurement-year. Credit: DOI: 10.1029/2021JG006557

Tropical forests host a rich diversity of plant and animal life and process vast amounts of carbon dioxide (CO<sub>2</sub>). Therefore, researchers have been particularly interested in how these ecosystems might be affected by climate change. Some have hypothesized that the rise in atmospheric CO<sub>2</sub> is promoting carbon uptake by these forests, making them important carbon sinks. Evidence is mounting, however, that the balance of cost and benefit is reaching a tipping point, and global warming will soon hinder tropical forests' ability to soak up carbon.

In a new study, Clark et al. assessed [tropical forests](#)' annual net primary productivity from 1997 to 2018. They measured wood growth and litterfall in 18 plots in Costa Rica's La Selva Biological Station. The scientists collected litterfall every other week from basket traps and annually measured the growth of all live stems greater than 10 centimeters in diameter. They found that the stress associated with [hotter temperatures](#) outweighed the benefits of increased carbon dioxide. Annual aboveground net primary production fluctuated greatly year to year, but no productivity component increased over the 21 years. Twig litterfall declined, and wood production suffered in years with slightly warmer nights and with particularly hot dry seasons.

The new research provides further evidence that as nighttime temperatures continue rising and as more daytime hours exceed the optimum temperature for photosynthesis, productivity will decline. The authors warn that tropical forests could soon enter into a positive feedback loop that accelerates both [global warming](#) and tropical forest decline. As forests become less productive because of rising temperatures, they will soak up less carbon dioxide, which in turn will lead to more warming. This cycle could pose a major threat to the survival of these highly biodiverse ecosystems.

**More information:** Deborah A. Clark et al, Annual Tropical-Rainforest Productivity Through Two Decades: Complex

Responses to Climatic Factors, [CO<sub>2</sub>] and Storm Damage, *Journal of Geophysical Research: Biogeosciences* (2021). DOI: [10.1029/2021JG006557](https://doi.org/10.1029/2021JG006557)

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