

TROPICAL FORESTS MAY BE GETTING TOO HOT FOR PHOTOSYNTHESIS

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A small percentage of leaves on trees in tropical forests may be approaching the maximum temperature threshold for photosynthesis to work, suggests a study published in *Nature*. An estimated 0.01% of all leaves currently surpass this critical temperature but there are uncertainties in the range of potentially critical temperatures in tropical trees. Modelling suggests that tropical forests can withstand up to a 3.9 degree C increase over current air temperatures before a potential tipping point, therefore action is needed to protect the fate of tropical forests under future climate change. "But the uncertainty in the plasticity and range of critical temperature in tropical trees and the effect of leaf death on tree death could drastically change this prediction," the authors warn.

"The 4 degree C estimate is within the 'worst-case scenario' of climate change predictions for tropical forests and therefore it is still within our power to decide the fate of these critical realms of carbon, water and biodiversity," the authors write.

Recent studies have indicated a resilience of tropical forests to how warming impacts carbon uptake and long-term drought. "However, the critical temperature acts as an absolute upper limit and it seems that, if our assumptions in the model are correct, crossing such a threshold is within the range of our most pessimistic future climate change scenarios," they note. In addition to temperature increase caused by global warming, deforestation and fragmentation can amplify local temperature changes. "The combination of climate change and local deforestation may already be placing the hottest tropical forest regions close to, or even beyond, a critical thermal threshold" they add. "Therefore, our results suggest that the combination of ambitious climate change mitigation goals and reduced deforestation can ensure that these important realms of carbon, water and biodiversity stay below thermally critical thresholds."

Tropical forests serve as critical carbon stores and host most of the world's biodiversity and may be particularly sensitive to increasing temperatures. The critical temperature beyond which photosynthetic machinery in tropical trees begins to fail averages at about 46.7 degrees C. However, whether leaf temperatures experienced by tropical vegetation approach this threshold, or soon will under climate change, remains unclear.

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