

Parts of Amazon on the verge of forest-to-grassland shift

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The stability of the Amazon rainforest, and the ecosystem's resilience to widespread deforestation, may be much lower than previously thought. The replacement of stands of trees with grassland changes evapotranspiration rates and atmospheric moisture convergence, which in turn reduce regional rainfall, a feedback effect that could drive further deforestation. Previous research indicated that a dramatic shift from forest to grassland could overtake the Amazon when the total deforested area hits 40 to 50 percent of the forest's current size. New research by Pires and Costa, however, find that the deforestation needed to trigger this equilibrium shift is much lower, closer to just 10 percent.

Using a climate-biosphere model the authors calculated how different parts of the Amazon, such as the forest interior or the border regions, would stand up to deforestation-induced precipitation changes. They find that in different zones of the Amazon the precipitation responds to deforestation in different ways. In some places deforestation causes a linear decrease in precipitation. In some areas, it takes dramatic deforestation to induce a change in rainfall, while in others, slight deforestation results in sharp precipitation declines. The fact that the region's sensitivity to deforestation was found to be significantly higher than previously reported stems from the fact that in addition to the rainforest itself the authors also considered [deforestation](#) of nearby cerrado, a region of savanna-like vegetation in central Brazil.

The authors argue that to avoid an equilibrium shift, 90 percent of existing forest and 40 percent of cerrado land should be preserved.

Presently, around 40 percent of the Amazon is protected area. They suggest that the forests of Bolivia and of Brazil's Pará state are most susceptible to such an equilibrium shift.

More information: Pires, G. and Costa, M. Deforestation causes different subregional effects on the Amazon bioclimatic equilibrium, *Geophysical Research Letters*. DOI: [10.1002/grl.50570](https://doi.org/10.1002/grl.50570) , 2013
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