



Research Group on  
Atmosphere-Biosphere  
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**UFV**

Science for a Sustainable Biosphere

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

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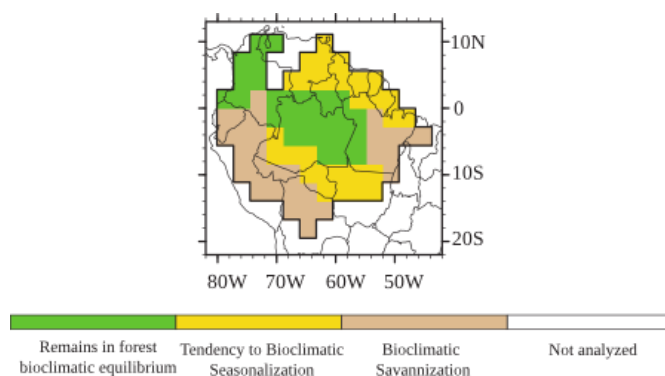
The stability of the Amazon Rainforest, and the ecosystem's resilience to widespread deforestation, may be much less than previously thought. By changing evapotranspiration rates and atmospheric moisture convergence, the replacement of stands of trees with grassland brings a reduction in regional rainfall, 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% of the forest's current size. New research by Pires and Costa (2013), however, found that the deforestation needed to trigger

this equilibrium shift is much lower, closer to just 10%.

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 found 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 plains, land that is often cleared for agriculture.

The authors argue that to avoid an equilibrium shift, 90% of existing forest and 40% of Cerrado land should be preserved. Presently, around 40% of the Amazon is protected area. They suggest that the forest of Bolivia and of Brazil's Pará state are most susceptible to such an equilibrium shift.



Regions of uniform tendency to transition after deforestation

## Reference:

Pires G F and Costa M H  
2013 Deforestation causes different subregional effects on the Amazon bioclimatic equilibrium *Geophys. Res. Lett.* **40** 3618–23

Full paper available at:

<http://dx.doi.org/10.1002/grl.50570>