

Climate change may kill the Amazon rainforest

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Damage done to the Amazonian forests

(PhysOrg.com) -- The dieback of the Amazonian forests caused by climate change is not inevitable but remains a distinct possibility, according to a study led by the Professor of Ecosystem Science at Oxford.

The study, published in *Proceedings of the National Academy of Sciences*, is a detailed examination of the climatic and ecological evidence of the likelihood of an Amazon dieback. The researchers conclude that the fate of Amazonian forests will critically depend on the interaction between global climate change and local deforestation and fire use. The study suggests direct intervention to maintain the forest is needed to minimise the risk of a 'tipping point' or dieback occurring.

Researchers analysed the simulations of 19 Global Climate Models, comparing them with climate observations from the 20th century, and found that almost all the models under-estimated current Amazonian rainfall. This underestimation occurs because climate models are unable to capture some of the peculiar features of the geography of South America.

After correcting this underestimation of rainfall, they found that most models suggested that Eastern Amazonia was likely to shift towards a more seasonally dry ‘monsoonal’ climate rather than a dry ‘savannah’ climate. This suggests that Amazonia would remain wet enough over the year to sustain a forest although some models suggested a large reduction in rainfall was still a possibility.

The study then examined recent ecological field studies that have explored how Amazonian forests respond to seasonal drying. Critically, these seasonal forests may be fairly resilient to occasional drought, but are likely to be more vulnerable to fires. The study warns that these areas will become tinderboxes if deforestation, logging and heavy fire use is not controlled.

Lead author Professor Yadvinder Malhi, from the Environmental Change Institute at Oxford, said: ‘Forest protection within Eastern Amazonia could play a major role in minimising the prospects of major dieback, while also contributing to tackling global climate change. Forest cover will help Eastern Amazonia adapt to climate change by helping maintain local rainfall in the dry season, limiting the spread of fires and stopping surface temperatures rising too high. This will help people living in the local towns as well as the forests themselves.

He added: ‘Even with sufficient funds and willpower, the implementation of ‘Biosphere Management’ on such a scale will be a huge challenge. Brazil has recently announced an ambitious plan for slowing down

Amazonian deforestation and deserves full international support. It will be critically important to understand the local and national social, political and economic context if this strategy is to succeed. We urgently need to protect one of our planet's most important ecosystems and at the same time mitigate against climate change.

‘Active forest protection in the Amazon forest region can help the region adapt to climate change and minimise the risk of a dieback. This strategy will also contribute to the global effort to reduce greenhouse gas emissions.’

The research was led by Oxford University in collaboration with the School of Geosciences, University of Edinburgh; Centre for Ecology and Hydrology, Wallingford, Oxfordshire; Department of Animal and Plant Sciences, Sheffield; and the Met Office Hadley Centre, Jointcentre for Hydro-Meteorological Research, Wallingford.

Provided by Oxford University

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