

More Amazon extinctions looming unless action is taken: study

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Solimões, the section of the upper Amazon River. Image: Wikipedia.

(Phys.org) -- Scientists in London are predicting that for many species it may take several generations after deforestation of the Amazonian rainforests in Brazil before they become extinct.

The rainforests have been subjected to widespread [deforestation](#) over recent decades as trees have been chopped down to allow areas of [farmland](#) to expand, and to make way for roads. Among the many [species](#) threatened with extinction are the Brazilian bare-faced [tamarins](#) and white-cheeked [spider monkeys](#).

Previous mathematical models of the effects of deforestation on [biodiversity](#) have assumed the deforestation occurs as a single event. The new research extended the model to see what happens when

deforestation occurs in a number of events rather than just one, which more closely models the real situation.

Leader of the research team, Dr Robert M. Ewers from Imperial College London, said there is a time lapse between deforestation and extinctions because animals do not usually die directly, but are forced to live more densely in smaller areas. This leads to increased mortality through reduced breeding rates and more intense competition for food.

Mathematician Daniel Reuman, also from Imperial College, explained that if deforestation occurs in one area and then in another area before the effects of chopping down trees in the first area are felt, there is an “outstanding debt.”

The team used their new model to examine data on deforestation and data on individual vertebrate species affected by loss of habitat over the period 1970-2008, and they found that 80 to 90 percent of extinctions caused by existing deforestation are yet to occur, giving the rainforest a massive “extinction debt.”

The team also used the model to examine a range of scenarios for the future of the rainforest over the next 40 years. These included scenarios with no change from current policies to the more optimistic scenario of a halt to deforestation by 2020. They found that for the most optimistic scenario 38 species would still be lost, but in the worst case scenario 40-50 species would become extinct in the period with an extinction debt of 100 more that would be lost later.

More than 50 percent of the Amazonian rainforest in Brazil is now protected, and the rate of deforestation is declining, and rapid and widespread extinctions predicted by earlier models have proved incorrect, with species loss occurring much more slowly than predicted. The new model now shows that the effects of the deforestation that has already occurred are yet to be fully realized. Dr Ewers said the findings

could be used to target conservation efforts on areas identified by the model as being regions where the extinction debt is greatest. Efforts on these areas could prevent the [extinction](#) debt from being paid.

The paper was published in *Science* and shows how crucial the decisions made by the Brazilian government on deforestation and development will be. Pressure from agribusiness interests and others to relax protection and rapidly develop the region in order to ease the economic crisis are likely to be devastating. Around 40 percent of tropical rainforests are located in Brazil, and they are among the world's most biodiverse regions.

More information: Extinction Debt and Windows of Conservation Opportunity in the Brazilian Amazon, *Science* 13 July 2012: Vol. 337 no. 6091 pp. 228-232. [DOI: 10.1126/science.1219013](https://doi.org/10.1126/science.1219013)

ABSTRACT

Predicting when future species extinctions will occur is necessary for directing conservation investments but has proved difficult. We developed a new method for predicting extinctions over time, accounting for the timing and magnitude of habitat loss. We applied this to the Brazilian Amazon, predicting that local extinctions of forest-dependent vertebrate species have thus far been minimal (1% of species by 2008), with more than 80% of extinctions expected to be incurred from historical habitat loss still to come. Realistic deforestation scenarios suggest that local regions will lose an average of nine vertebrate species and have a further 16 committed to extinction by 2050. There is a window of opportunity to dilute the legacy of historical deforestation by concentrating conservation efforts in areas with greatest debt.

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