

# No-win situation for agricultural expansion in the Amazon, research says

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This is a cattle pasture on former rainforest. Credit: Michael T. Coe

The large-scale expansion of agriculture in the Amazon through deforestation will be a no-win scenario, according to a new study. Published today in the journal *Environmental Research Letters*, it shows that deforestation will not only reduce the capacity of the Amazon's natural carbon sink, but will also inflict climate feedbacks that will

decrease the productivity of pasture and soybeans.

The researchers used [model simulations](#) to assess how the agricultural yield of the Amazon would be affected under two different land-use scenarios: a business-as-usual scenario where recent deforestation trends continue and new protected areas are not created; and a governance scenario which assumes Brazilian environmental legislation is implemented.

They predict that by 2050, a decrease in precipitation caused by deforestation in the Amazon will reduce pasture productivity by 30 per cent in the governance scenario and by 34 per cent in the business-as-usual scenario.

Furthermore, increasing temperatures could cause a reduction in soybean yield by 24 per cent in a governance scenario and by 28 per cent under a business-as-usual scenario.

Through a combination of the [forest biomass](#) removal itself, and the resulting [climate change](#), which feeds back on the ecosystem productivity, the researchers calculate that biomass on the ground could decline by up to 65 per cent for the period 2041-2060

Brazil faces a huge challenge as pressure mounts to convert forestlands to [croplands](#) and cattle pasturelands in the Amazon. A [fine balance](#) must be struck, however, as the natural ecosystems sustain food production, maintain water and [forest resources](#), regulate climate and air quality, and ameliorate [infectious diseases](#).

Lead author of the study, Dr Leydimere Oliveira, said: "We were initially interested in quantifying the environmental services provided by the Amazon and their replacement by [agricultural output](#).

"We expected to see some kind of compensation or off put, but it was a surprise to us that high levels of deforestation could be a no-win scenario – the loss of environmental services provided by the deforestation may not be offset by an increase in agriculture production."

The researchers, from the Federal University of Viçosa, Federal University of Pampa, Federal University of Minas Gerais and the Woods Hole Research Center, show that the effects of deforestation will be felt most in the eastern Pará and northern Maranhão regions.

Here the local precipitation appears to depend strongly on forests and changes in land cover would drastically affect the local climate, possibly to a point where agriculture becomes unviable.

"There may be a limit for expansion of agriculture in Amazonia. Below this limit, there are not important economic consequences of this expansion. Beyond this limit, the feedbacks that we demonstrated start to introduce significant losses in the agriculture production," continued Dr Oliveira.

**More information:** Large-scale expansion of agriculture in Amazonia may be a no-win scenario, Leydimere J C Oliveira, Marcos H Costa, Britaldo S Soares-Filho and Michael T Coe 2013 *Environ. Res. Lett.* 8 024021. [iopscience.iop.org/1748-9326/8/2/024021/article](https://iopscience.iop.org/1748-9326/8/2/024021/article)

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