

Humans may have helped the decline of African rainforests 3000 years ago

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Daintree Rainforest. Photo taken June 2005. Image: Wikipedia.

(PhysOrg.com) -- Large areas of rainforests in Central Africa mysteriously disappeared over three thousand years ago, to be replaced by savannas. The prevailing theory has been that the cause was a change in climate, and the deforestation then enabled humans to increase their agricultural activities. A new study suggests that climate change alone cannot fully explain the transition and that human activities might be implicated.

Geochemist Germain Bayon and colleagues from the French Research Institute for Exploration of the Sea in Plouzané, France, analyzed marine

sediment cores representing the last 40,000 years, taken from the mouth of the Congo River. The team looked for geochemical markers such as hydrogen, which correspond to rainfall levels that affect natural levels of erosion, and they also looked at potassium, which erodes quickly, and aluminum, which is more immobile.

The core samples revealed evidence of severe chemical weathering starting around 1,500 BCE, a time that coincided with a period in which Bantu-speaking tribes arrived in the area, having migrated from regions near what is now the border between Nigeria and Cameroon. Chemical weathering in samples dating before this era was consistent with the changes in rainfall patterns, but by 1,000 BCE the weathering seen was decoupled from the rainfall evidence.

Chemical weathering can be caused naturally by rainfall and normal erosion, but it can be accelerated by [deforestation](#) and intensive agriculture. Since the [climate](#) was changing at the time and becoming drier, a reduction in chemical weathering would ordinarily be expected rather than the peak actually found.

The Bantu people were farmers and had developed iron-smelting techniques. Iron-Age Bantu archaeological sites have yielded ceramics, furnaces, tools, the remains of agricultural products, and a variety of iron artifacts.

Bayon and colleagues suggest, in their paper published in the journal *Science*, that the farmers' clearing of land for agriculture and their iron smelters, in addition to the changing climate, would explain the collapse of the rainforest and its replacement by grasslands and savannas in the region. The researchers were unable to estimate to what extent human activities were responsible, but they suggest the evidence from the sediment core shows human influence was "already significant."

The paper's authors say their results were unexpected, but reveal that humans can have an enormous effect on the environment. While their findings do not necessarily contradict the prevailing theories, because the changing climate enabled the farmers to practice agriculture in the region, the Bantu farming practices themselves then changed the patterns of soil erosion.

The study could have implications for the current situation in the world's largest rainforests in the Amazon, where large areas are being deforested, largely for cattle or soy bean farms, and for industrial purposes and road construction. This, together with the current changes in climate, could also result in a rapid disappearance of remaining [rainforests](#) and their replacement by grasslands, with a massive resultant loss in biodiversity, and feedback changes to the local climate. Rainfall in the Amazon is already reducing, and there have been major droughts, notably in 2005 and 2010.

More information: Intensifying Weathering and Land Use in Iron Age Central Africa, *Science*, [DOI: 10.1126/science.1215400](https://doi.org/10.1126/science.1215400)

ABSTRACT

About 3000 years ago, a major vegetation change occurred in Central Africa, when rainforest trees were abruptly replaced by savannas. The consensus is that the forest disturbance was caused by climate change. We show here that chemical weathering in Central Africa, reconstructed from geochemical analyses of a marine sediment core, intensified abruptly at the same period, departing significantly from the long-term weathering fluctuations related to the Late Quaternary climate. Evidence that this weathering event was also contemporaneous with the migration of Bantu-speaking farmers across Central Africa suggests that human land-use intensification at that time already had a significant impact on the rainforest.

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