

Trees could be key protagonist for forest-grassland transitions

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A study investigating the transition from forests to savannas and vice versa has found that trees could be the key protagonists.

The paper "Physiological responses to low CO₂ over prolonged [drought](#) as primers for forest-grassland transitions," published in *Nature Plants*, found advantages and disadvantages of trees, links to the change from a forest to a savanna.

Savannas are important ecosystems that cover large parts of the globe. Previous studies to understand how [savannas](#) function has focused on disturbance. If [fire](#) and [herbivores](#) are kept away, savannas become tropical forests. If forests are burned, they turn into grasslands which may soon become savannas.

Researcher Dr. Chandra Bellasio said, "It is unclear how disturbance could have caused the original decline of closed [tropical forests](#), as these types of forests do not burn and do not support large herbivores."

It is known that savannas evolved under decreasing CO₂ concentration, accompanied by an increase in drought. This drop in CO₂ was mainly driven by the uplift of mountains like the Himalayas, because when [silicate rock](#) is weathered, the resulting calcium and magnesium ions deposit in ocean beds, "trapping" CO₂.

"In our experiment we measured the effect of drought and CO₂ concentration on three plant types: a forest tree, a savanna tree and a savanna grass," said Dr. Bellasio.

"We show that while trees were advantaged under high CO₂, the forest tree was the most disadvantaged by low CO₂ and prolonged drought, but at the same time it delayed the response to drought and was able to reduce respiration.

"The transition from forest to savanna and vice versa could therefore be primed by specific advantages and disadvantages of trees. Grasses, herbivores and fire would have a less active role than previously thought,

opportunistic spectators ready to take advantage of tree weaknesses. Trees would be the key protagonists of the actions, making their own fortune and misfortune."

More information: Chandra Bellasio et al, Physiological responses to low CO₂ over prolonged drought as primers for forest–grassland transitions, *Nature Plants* (2022). [DOI: 10.1038/s41477-022-01217-8](https://doi.org/10.1038/s41477-022-01217-8)

Provided by University of Sheffield

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