# Drought impacts on rainforests are readily apparent on long-term scale

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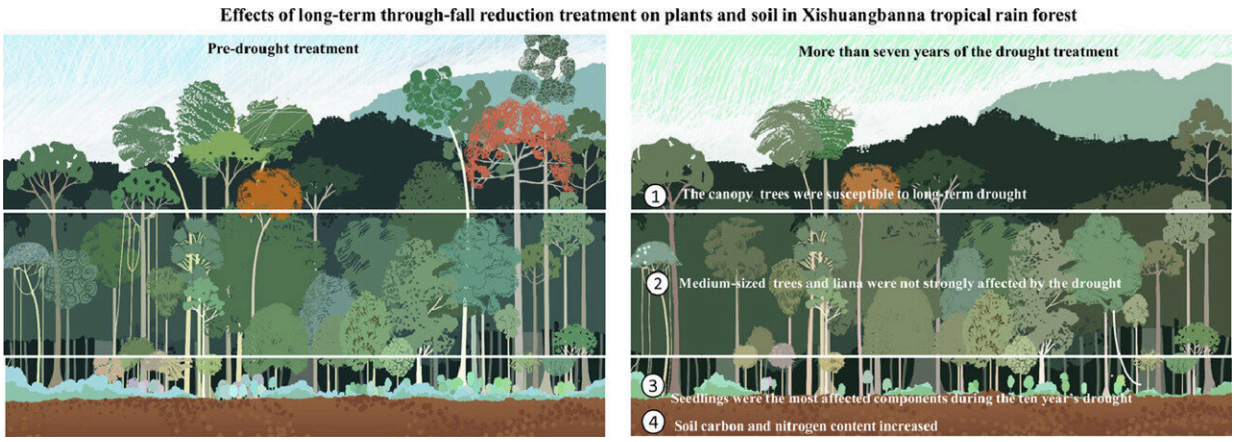


The cumulative drought exerts disruptive effects on tropical rainforests in Xishuangbanna. Credit: Zhou Liguo

Previous studies have shown that droughts have adverse effects on rainforests, such as loss of carbon sinks, increased mortality, decreased photosynthetic capacity, etc. However, studies on the impact of occasional drought on the rainforests are not enough, as the areas tend to recover from such droughts within a few years.

In a study published in *Agricultural and Forest Meteorology*, researchers from the Xishuangbanna Tropical Botanical Garden (XTBG) of the Chinese Academy of Sciences investigated the impact of long-term drought on the tree growth and mortality dynamics, soil carbon

exchange, and nutrient status of the tropical rainforests.

The researchers observed the polyethylene baffle intercepts of the through-fall, field tree dynamics and soil $CO_2$ flux for ten years under relatively light through-fall reduction conditions, since they have established a drought plot measuring 30 m × 30 m size at XTBG in 2011.

They used eddy covariance data and environmental data to conduct an ecosystem drought sensitivity analysis for 12 consecutive years, in order to explore the drought sensitivity of net carbon exchange in tropical rainforests at different time scales.

The results showed that long-term drought led to a sharp decrease in the plant carbon pool of the tropical rainforest in Xishuangbanna. The radial growth rate of the surviving tagged trees was not constrained by drought. In the 10th year of simulated drought, richness of seedlings was dropped dramatically.

They also found that although large trees and seedlings were more susceptible to drought, medium-sized trees performed relatively better (lower mortality rates) in the through-fall reduction than in the control plots.

Moreover, the rainforest showed a strong resilience against short-term drought. The net ecosystem carbon exchange of eddy covariance flux site was insensitive to soil drought on annual scale, while photosynthetic light response parameters were inhibited by drought on decadal scale.

The results of both drought experiment and flux data analysis showed that the impact of drought on the rainforest will be highly apparent on long-term scale.

"Our study provides baseline information for quantitative assessment of future changes in tropical rainforests of the northern edge of East Asia under long-term drought conditions," said Song Qinghai of XTBG.

**More information:** Liguo Zhou et al, The cumulative drought exert disruptive effects on tropical rainforests in the northern edge of Asia - Based on decadal dendrometric measurements and eddy covariance method, *Agricultural and Forest Meteorology* (2022). DOI: 10.1016/j.agrformet.2022.108858

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