# Phylogeny vital to study tree growth response to changing climate, say researchers

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Tree performance is generally considered as the consequence of the interplay between ecological and evolutionary processes. However, the differential effect among species and the portion of those differences remain largely unknown, due to the evolutionary history of species (i.e., phylogeny).

In a study published in the *Journal of Geophysical Research: Biogeosciences*, researchers from Xishuangbanna Tropical Botanical Garden (XTBG) and their collaborators explored the link between tree radial growth and evolutionary relationships (i.e., phylogeny), especially under stress conditions such as drought.

They used Blomberg's K statistic to quantify tree growth phylogenetic signal (TGPS) values. The researchers used two long-term tree growth datasets, one monitoring the growth of 225 tree species in a tropical forest in Xishuangbanna (every three months) and another monitoring the growth of 12 tree species in a temperate forest in Washington State, U.S. (every six months).

By analyzing these data, they aimed to quantify the extent of the phylogenetic effect on tree radial growth across precipitation gradients, habitat types, tree sizes, and canopy layers in tropical and temperate forests.

They found that drought caused a more pronounced phylogenetic dependence of growth patterns in temperate and tropical trees.

TGPS values were higher in temperate forests than in tropical forests. Precipitation, tree diameter, canopy strata, and habitat type all affected TGPS values. Low precipitation conditions in Xishuangbanna and competition among large-diameter trees in temperate forests led to phylogenetic conservation of tree radial growth performance.

The results demonstrated that both precipitation amount, large tree diameter, and upper canopy-induced stresses can detect phylogenetic conservatism in growth.

Researchers suggested that multiple environmental indicators (e.g. soil nutrient gradients, temperature, relative humidity, solar radiation) may

be found to affect forest productivity and demography change (i.e., growth, recruitment and mortality) in future research, by using phylogeny as a mirror.

"Our study proves that phylogeny is essential for understanding the differences in growth responses among species and their response to climate change," said Hu Yuehua of XTBG.

**More information:** Ewuketu Linger et al, Phylogenetic Effect on Tree Radial Growth Depends on Drought and Tree Sizes, *Journal of Geophysical Research: Biogeosciences* (2024). DOI: 10.1029/2023JG007607

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