# Enhanced growth after extreme wetness compensates for post-drought carbon loss in dry forests

With the support by the National Natural Science Foundation of China, the research team led by Prof. Liu HongYan (刘鸿雁) at the College of Urban and Environmental Sciences and MOE Laboratory for Earth Surface Processes, Peking University, reported the compensation effect of extreme wetness for the growth loss in dry forests, which was published in *Nature Communications* (2019, doi: 10.1038/s41467-018-08229-z).

Forests occupy ~30% of land surface area, account for ~75% of the gross primary productivity, and provide massive ecological, economic and aesthetic services to humankind. However, the increasing drought-induced tree decline and mortality have occurred across many regions in the past decades, not only reducing forest productivity and species diversity, but also damaging water/soil conservation and decreasing the climate mitigation abilities of forest ecosystems. Moreover, the fate of forests under a more extreme climate in the coming decades remains uncertain. Increasing drought-driven tree mortality events were reported across many regions. The established drought legacy effect further raises concerns that forests may be devastated in a warmer and drier climate.

The negative effect of drought that is offset by the positive effect of wet episodes at the global scale remains unknown. In the *Nature Communications* paper, they reported the pervasive and substantially enhanced tree radial growth after extreme wetness, compensating 93±5% of the growth deficit due to drought legacy effect globally, which was not captured by state-of-the-art land surface models. This study provides a vital observational constraint to improve both land surface modelling and long-term carbon cycle calculation. They demonstrated that the trees are able to gain more growth after wet episodes, largely offsetting the growth deficit after drought at the global scale, and highlighted regions with insufficient restoration, such as southwestern North America. These findings fueled the confidence that forests have a stronger ability to withstand drought than our past understanding, and will be of significant interest across a wide range of scientific disciplines, forest managers, policy makers, and global communities.

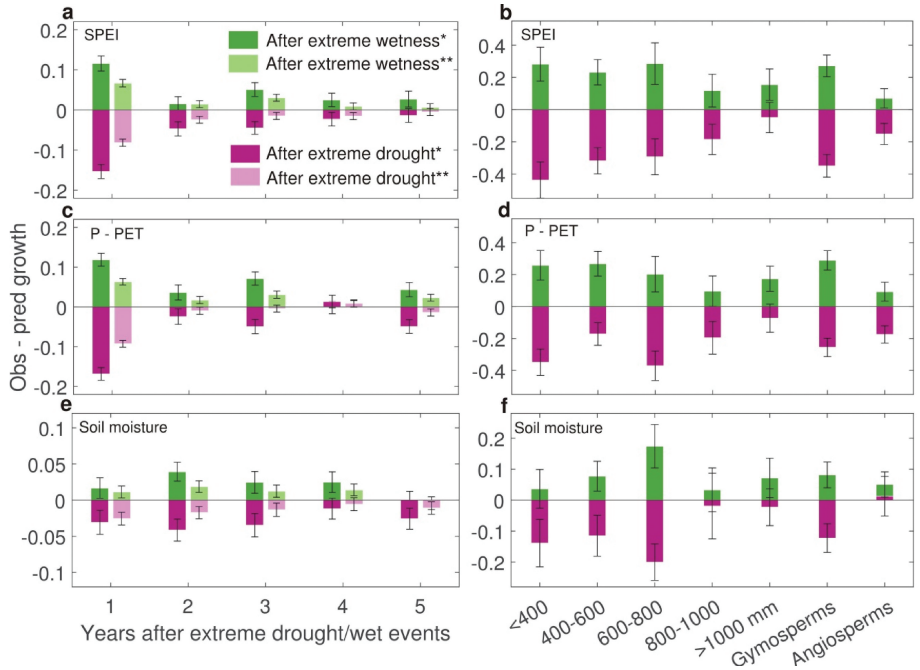


**Figure** Substantially enhanced radial growth after extreme wetness, which compensates drought legacy effect.