

Impact of recurrent drought on grassland productivity is mediated by ratio of grasses to forbs

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As a result of global change, the frequency of droughts has increased significantly worldwide, causing severe damage to the functioning of

grassland ecosystems. Drought events affect not only the current composition and structure of grassland plant communities, but also their future structure and function and their response to environmental change. Previous studies have focused on investigating plant community resistance to drought, while research on the structural and functional resilience of plant communities following extreme drought is far from adequate.

In view of this, Dr. Luo Wentao from the Institute of Applied Ecology of the Chinese Academy of Sciences (CAS), together with colleagues, has examined the [grassland](#) natural restoration following two consecutive years of extreme [drought](#) manipulation and investigated the carry-over effects of the extreme drought event on plant community structure and function.

The researchers found that within two years after the cessation of extreme drought treatment, plant productivity of the drought-treated communities could be largely restored, or even become significantly higher than that of control communities, suggesting that extreme drought can have positive carry-over effects that can improve the sustainability and stability of grasslands.

This finding challenges the conventional judgment that "drought has negative carry-over effects on grassland productivity."

The researchers clarified that the positive carry-over effect is due to the rapid recovery of grasses and their competitive exclusion effect on forbs, as well as an apparent change in plant community functional composition (the ratio of grasses to forbs).

"When extreme drought events recurred, the plant community composition could be altered even more significantly compared to the impact of a single extreme drought," said Dr. Luo. "The drought induced

changes in plant community-level traits and functions may weaken the stability of the plant community in response to the next extreme drought."

Exploring the variation and maintenance mechanisms of grassland ecosystem function in response to drought is one of the "hotspots" in global change ecology. The study shows that the impact of extreme drought on grassland ecosystems will continue even after the drought ends. The carry-over effects of [extreme drought](#) and their driving mechanisms found by the study are crucial for understanding and predicting the impacts of global climate change on grassland ecosystems.

This study was published in *Ecology*, titled "Responses of a semiarid grassland to recurrent drought are linked to community functional composition."

More information: Wentao Luo et al, Responses of a semiarid grassland to recurrent drought are linked to community functional composition, *Ecology* (2022). [DOI: 10.1002/ecy.3920](https://doi.org/10.1002/ecy.3920)

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