

REVERSING PRECIPITATION LARGELY REVERSES SOIL MICROBIAL COMMUNITIES IN DESERT STEPPE

Hongying Yu, Lang Li, Quanhui Ma, Xiaodi Liu, Yibo Li, Yuhui Wang, Guangsheng Zhou, and Zhenzhu Xu 

Study Description

In this field experiment, we established five levels of precipitation with nitrogen addition over the first 3-year and then balanced this with compensatory precipitation in the fourth year, to recover to the levels expected over 4-year in a desert steppe. The study specifically aimed to quantify resistance, resilience, and limitation/promotion index of soil microbial communities to environmental changes. Soil microbial communities were enhanced/constrained with increased/decreased precipitation, and the responses were largely reversed by reversing these precipitation treatments. These findings shed light on the potential responses of soil microbial communities to climate change in these arid ecosystems.

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Photo 1. The current study site on a desert steppe in Damao County, Inner Mongolia, China. The vegetation in this arid ecosystem mainly consists of native grasses, including *Stipa tianschanica* var. *klemenzi*, *Cleistogenes squarrosa*, *Neopallasia pectinata*, and *Erodium stephanianum*. Photo credit: Zhenzhu Xu.



Photo 2. The experimental facility in field. We applied rainout shelters to achieve 50% and 25% precipitation reduction by changing the number of V-shaped acrylic strips. A steel pipe frame was used to support the V-shaped acrylic bands (92% light transmittance). For the precipitation addition treatments, four and eight V-shaped steel sheets were uniformly located outside the plots for the 25% and 50% addition treatments, respectively. Photo credit: Quanhui Ma.



Photo 3. A 50% precipitation reduction treatment by covering the number of V-shaped acrylic strips. Photo credit: Quanhui Ma.



Photo 4. Plant growth and physiologic traits were measured in a plot. Photo credit: Zhenzhu Xu.



Photo 5. A group photo of the study team during field survey and measurement work (16 August 2018). From left to right: Hongying Yu, Miao Qi, Wenjuan Wu, Zhenzhu Xu, Xiaodi Liu, Lang Li, Quanhui Ma. Photo credit: Quanhui Ma.

These photographs illustrate the article “Soil microbial responses to large changes in precipitation with nitrogen deposition in an arid ecosystem” by Hongying Yu, Lang Li, Quanhui Ma, Xiaodi Liu, Yibo Li, Yuhui Wang, Guangsheng Zhou, and Zhenzhu Xu published in *Ecology*. <https://doi.org/10.1002/ecy.4020>