

Stochastic processes dominate soil microbial community assembly during the restoration of degraded karst forests

Supporting Information

1. Calculation method of soil multifunctionality

Currently, there are several common ways to quantify ecosystem multifunctionality, Such as average value method, factor analysis method, threshold method etc. There are advantages and disadvantages to different approaches. The mean value method was first proposed by Hooper and Vitousek (Hooper & Vitousek 1998), and was also the first to use a comprehensive index to quantitatively characterize multiple ecosystem processes. The method represents ecosystem multifunctionality by calculating the average standardized scores of different ecosystem functions (Z scores), which provides a direct and easy-to-interpret method for quantifying the ability to maintain multiple ecosystem functions simultaneously. However, this approach does not consider the interrelationship between the functions of different ecosystems (Gamfeldt *et al.* 2008). The factor analysis method can obtain the multifunctionality index similar to the average method. Firstly, dimensionality reduction of function index parameters is carried out, factor analysis is performed, and then the scores of each factor are obtained, and then the scores of each factor are used to represent the multifunctionality. This method can measure the tradeoff relationship between various functions to a certain extent. Threshold method is a new framework for computing multifunctionality. In this framework, cluster analysis is performed to identify closely related functions assigned to the same cluster. Each cluster is then assigned the same weight, and the functions within the cluster are equally

weighted. Then the function index is calculated according to the threshold method, and the function weight of each site exceeds a certain threshold value is calculated.

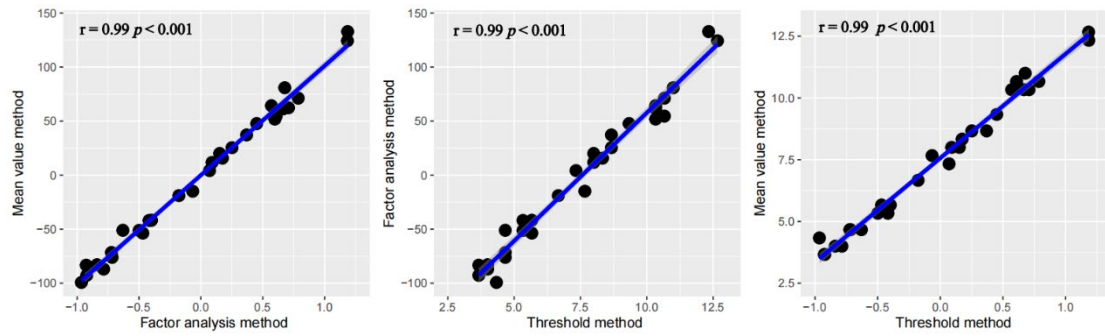


Figure S1. The linear relationship between soil multifunctional index was obtained based on mean value method, factor analysis method and threshold method.

References

1. Hooper, D.U.; Vitousek, P.M. Effects of plant composition and diversity on nutrient cycling. *Ecol. Monogr.* **1998**, *68*, 121–149. [https://doi.org/10.1890/0012-9615\(1998\)068\[0121:EOPCAD\]2.0.CO;2](https://doi.org/10.1890/0012-9615(1998)068[0121:EOPCAD]2.0.CO;2).
2. Gamfeldt, L.; Hillebrand, H.; Jonsson, P.R. Multiple functions increase the importance of biodiversity for overall ecosystem functioning. *Ecology* **2008**, *89*, 1223–1231. <https://doi.org/10.1890/06-2091.1>