

ECOSYSTEM FUNCTIONALITY

Decoding multidimensional biodiversity

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Biodiversity is a major source of ecosystem functions and services. Although the relationship between ecosystem functionality and the taxonomic dimension of biodiversity (number and abundance of species) is well-known in a wide range of ecosystems, its relationship with the phylogenetic (variety of evolutionary lineages) and functional (diversity of resource-use strategies, growth forms and interactions) dimensions of biodiversity remains unclear. Understanding this multidimensional complexity is particularly critical for designing ecosystem management strategies in a time of global biodiversity crisis.

To gain insight into these aspects, Yoann Le Bagousse-Pinguet, from the Universidad Rey Juan Carlos and Aix-Marseille Université, and colleagues have analysed the effects of plant diversity multidimensional traits on the ecosystem multifunctionality of worldwide drylands. They find that plant taxonomic diversity alone explains a limited amount of simultaneous ecosystem functions. However, in such ecosystems, phylogenetic and functional diversity

traits of subordinate plant species are primary drivers of multifunctionality, while those of dominant species mainly control individual nutrient cycles. Their results show that functional redundancy and the diversity of early diverging plant lineages are key traits to include in management actions to conserve and restore dryland multifunctionality.

These findings have important implications for ecosystem management, indicating that the dimensional identity of biodiversity traits, and focusing on particular combinations of such traits, are keys to promote overall ecosystem functionality or to enhance individual functions, such as carbon cycling. They also provide an understanding and basis to manage plant communities for preservation and restoration programs in drylands, which cover approximately 40% of the Earth's land surface.

Abel Barral

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