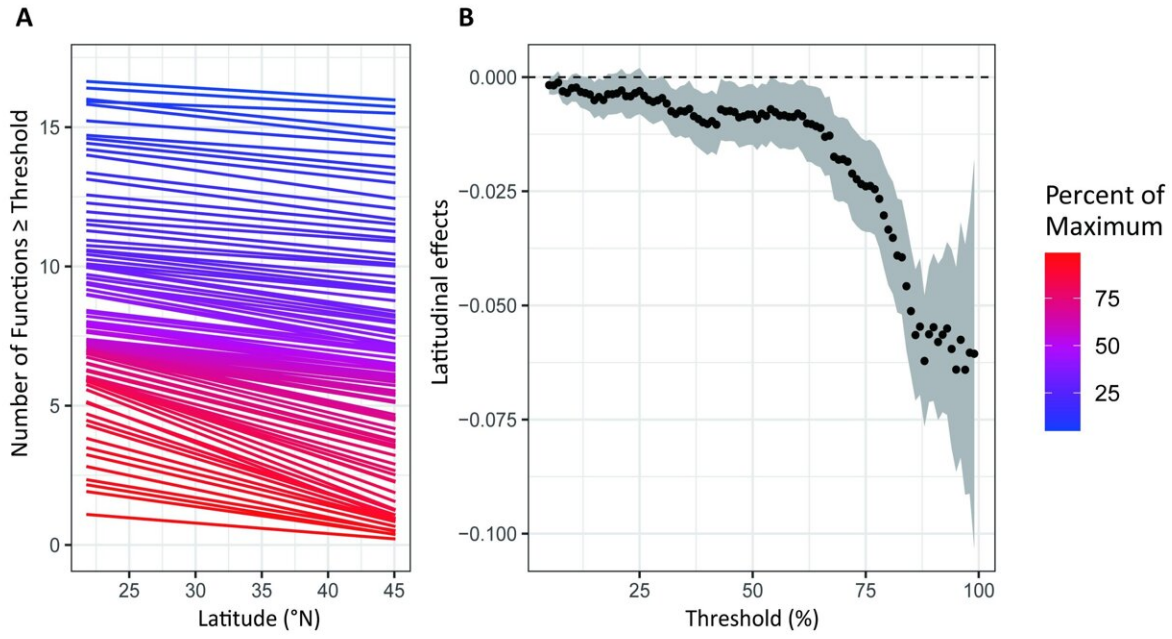
Study finds link between ecosystem multifunctionality and microbial community features

April 12 2024, by Zhang Nannan



Latitudinal effects on EMF through multiple thresholds approach. Credit: WBG

Ecosystem multifunctionality (EMF) is the ability of an ecosystem to provide multiple functions simultaneously. Microorganisms are proxies for soil communities and possess diverse functional traits that support multiple ecosystem functions. However, the complex relationships between the microbial network and EMF, especially at a large spatial

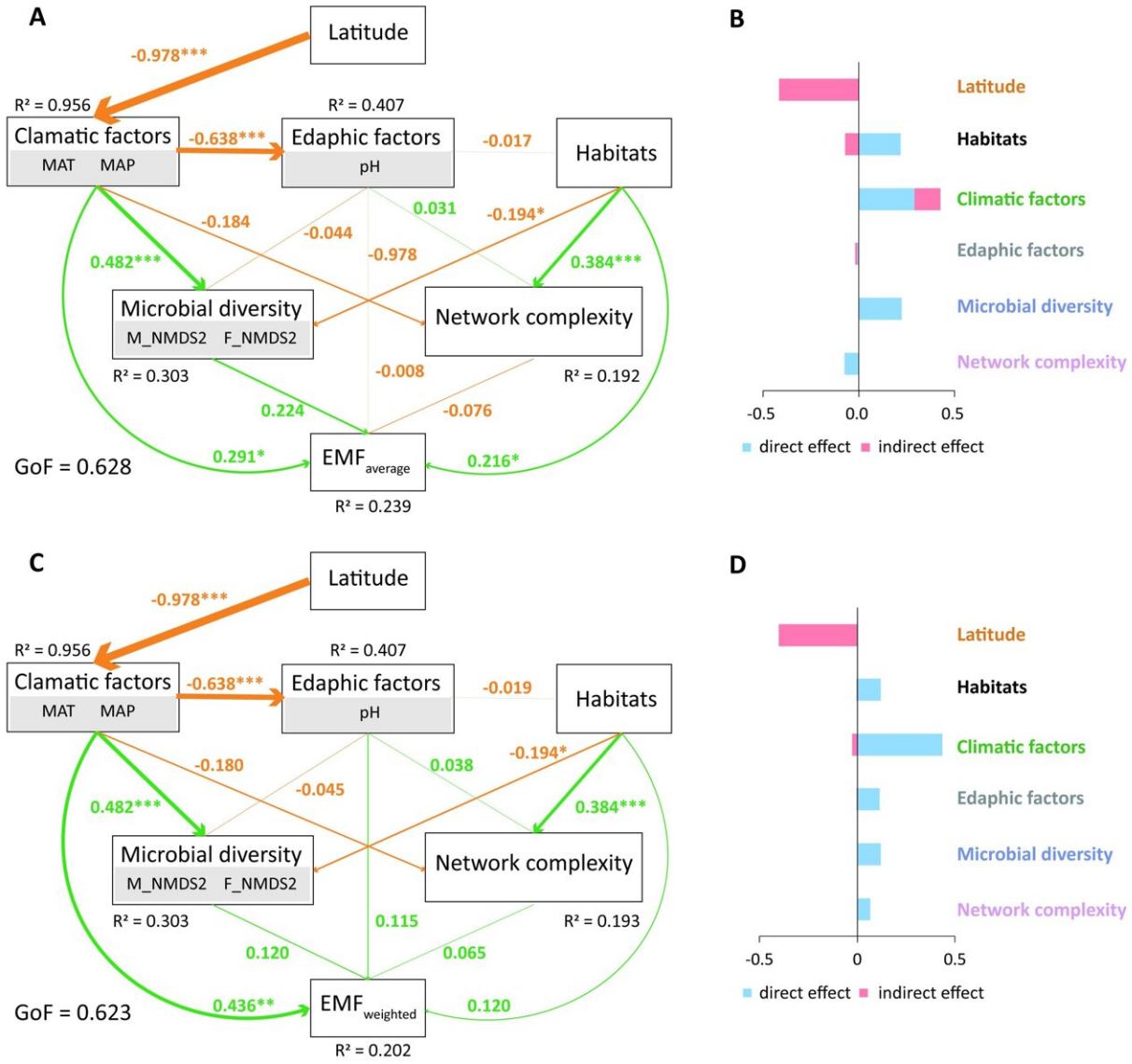
scale, remain largely unknown.

Researchers from the Wuhan Botanical Garden of the Chinese Academy of Sciences selected 30 higher-order rivers for soil, sediment, and water sampling along a latitudinal gradient in eastern China to calculate EMF using 18 variables related to nitrogen cycling, nutrient pool, plant productivity, and water quality. Meanwhile, the microbial diversity and co-occurrence network were also analyzed.

Results were published in *mSystems* in a paper titled "Linking ecosystem multifunctionality to microbial community features in rivers along a latitudinal gradient."

In riparian rhizosphere and bulk soils, but not in channel sediments, EMF had significant negative associations with latitude. In channel sediments, microbial taxonomic and functional richness was significantly higher in the low-latitude group than those in the high-latitude group. The complexity of microbial co-occurrence networks increased with increasing latitude.

Investigation of the contributions abiotic and biotic factors to EMF revealed that environmental conditions, especially, geographic and climatic factors, were the main drivers of EMF. Microbial diversity and network complexity contributed little to explaining EMF, and only betweenness centralization was significantly related to EMF.



Partial least squares path model showing the cascading effects of environmental and microbial factors on EMF average (A, B) and EMF weighted (C, D). Credit: WBG

This study fills a critical knowledge gap regarding the latitudinal patterns and drivers of EMF in river ecosystems and provides new insights into how microbial diversity and network complexity influence EMF from a

metagenomic perspective.

More information: Miaomiao Cai et al, Linking ecosystem multifunctionality to microbial community features in rivers along a latitudinal gradient, *mSystems* (2024). DOI: 10.1128/msystems.00147-24

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