

Unveiling Phytoplankton Diversity: Taxonomy, Functional Groups, and Environmental Drivers in North China Lakes

Wei Wang¹, Hanjie Huang¹, Zhongshi He², Guotao Zhang¹, Junping Lv¹, Qi Liu¹, Fangru Nan¹, Xudong Liu¹, Yang Liu¹, Shulian Xie¹, and Jia Feng¹

¹Shanxi University

²Institute of Marine and Environmental Technology

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Abstract

To investigate the intricate relationship between phytoplankton taxonomy composition and functional group structure, and identifying the key environmental drivers of phytoplankton community dynamics, we conducted a comprehensive study encompassing 11 lakes and reservoirs located in North China. Environmental parameters, spanning climato-geographic factors and hydrochemical variables, were comprehensively assessed. Phytoplankton were categorized utilizing both traditional taxonomic criteria and functional group classifications. Our investigation unveiled rich phytoplankton diversity across these 11 water bodies, comprising 81 genera spanning 7 phyla. This taxonomic diversity was further organized into 30 distinct functional groups (FG). Remarkably, when comparing community structures, we observed a high degree of similarity between taxonomic and functional group-based classifications in lakes. Redundancy analysis (RDA) results underscored the pivotal role of climato-geographic factors as dominant drivers influencing both taxonomic composition and functional group distribution. Intriguingly, variance partitioning analysis (VPA) revealed that while climato-geographic factors exerted substantial influence, their impact was eclipsed by hydrochemical factors. The intricate interplay of six environmental parameters emerged as influential through stepwise regression analysis. These included chlorophyll-a (chl-a), Chemical Oxygen Demand (CODMn), Total Phosphorus (TP), Total Nitrogen (TN), Secchi Depth (SD), and Longitudinal Position (LON).

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