

Cladophora in Qinghai Lake as ecological engineer helps increase phytoplankton biodiversity

CHINA, November 21, 2023

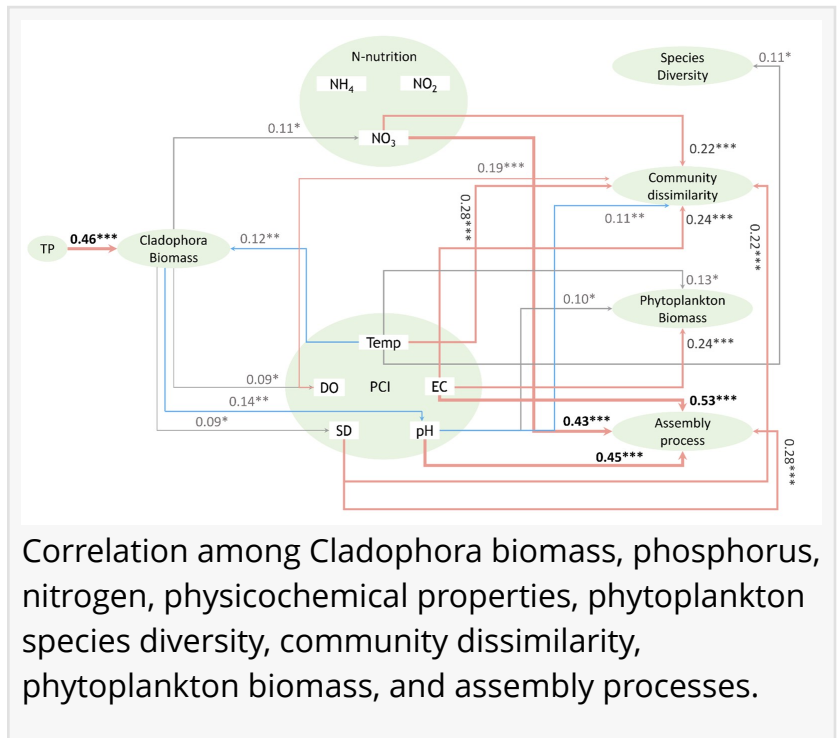
/EINPresswire.com/ -- Using eDNA meta-barcoding to compare phytoplankton communities in four representative regions of Qinghai Lake, the phytoplankton diversity in Qinghai Lake is shaped by a combination of seasonal water temperature variation, regional electrical conductivity variation and Cladophora biomass. The present study is an additional research finding on the positive impact role of Cladophora as ecological engineer.

Excessive filamentous algae growth has become a global concern, posing serious challenges to the management of major bodies of water, including

China's Qinghai Lake, the largest lake of Qinghai-Tibet plateau. While many studies have focused on micro-algal blooms, there remains limited research on [filamentous algal blooms](#) (FABs).

Cladophora, a filamentous green algae that is widely distributed in both marine and freshwater habitats, has been found to support large, diverse populations of microalgal and bacterial epiphytes that influence the cycling of carbon and other key elements. As such, it has been commonly referred to as an "ecological engineer".

Many highland lakes, such as Qinghai Lake, are generally considered oligotrophic, characterized by low phytoplankton abundance, and with a stable zooplankton and benthic community structure. However, due to an increase in water levels caused by a warmer and moister climate, the newly inundated littoral zone has provided a suitable substrate for the growth of Cladophora. Furthermore, an abundance of bird droppings near Bird Island provide phosphorus for growth. This has led to a recurrence of Cladophora blooms after a hiatus of nearly half a century. To date, however, the impact of Cladophora meadows on phytoplankton is still unclear,



particularly in the context of alpine lakes.

To that end, a team of researchers in China profiled the phytoplankton communities in different regions of Qinghai Lake in different seasons using meta-barcode sequencing.

“We compared the phytoplankton assemblages in areas with *Cladophora* blooms to those without,” shared Zhihua Wu, lead author of the study. “We found a correlation between the phytoplankton community structure and various physicochemical factors, including water temperature, electrical conductivity, nitrate levels, and the presence or absence of *Cladophora* bloom.”

The study identified a greater relative abundance of Bacillariophytes in areas with *Cladophora* blooms compared to other regions. Additionally, these *Cladophora* bloom zones showed seasonal fluctuations in phytoplankton biomass and β diversity.

Based on their findings, which were published in the KeAi journal *Water Biology and Security*, the team hypothesized that FABs in alpine lake ecosystems may influence phytoplankton communities.

“FABs can alter the assemblage and assembly process by providing more microhabitats for algae. They could also lead to shifts in the nitrogen level particularly nitrate, possibly through interactions with other nitrogen-fixing organisms,” said Wu. “The presence of FABs and its degradation may lead to changes in physicochemical properties, particularly pH, dissolved oxygen and suspended solids which, in turn, can affect the structure of the phytoplankton community.”

DOI

10.1016/j.watbs.2023.100210

Original Source URL

<https://doi.org/10.1016/j.watbs.2023.100210>

Funding information

This work was supported by the National Natural Science Foundation of China (U22A20454) and the Second Tibetan Plateau Scientific Expedition and Research program (Grant No. 2019QZKK0304).

Lucy Wang

BioDesign Research

[email us here](#)

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