



SIL 100

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ABSTRACT BOOK



THE NEXT 100 YEARS:
SENSING AND SAFEGUARDING INLAND WATERS

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ON395

Predator mediated feedback effects in natural plankton communities

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Biodiversity loss due to climate change is unquestionable and, in some areas, irreversible. While some species cope less well with higher water temperatures, others benefit. A well-known predator in plankton systems is *Chaoborus* sp.. While this predator normally occurs in cycles, its presence is more and more constant throughout all seasons. As a very efficient but also selective predator in zooplankton, increased abundance can lead to shifts in the composition and diversity of the zooplankton community. These changes in the zooplankton can have lasting effects on nutrient recycling in the food web. For example, resources such as nitrogen and phosphorus are used differently by the respective zooplankton genera and are thus less or more available to the primary producers. This in turn can lead to changes in the composition of the primary producer communities, resulting in a shift in traits of the primary producers. The presence or absence of a predator can thus have a major impact on feedback mechanisms in plankton communities. While direct predator-prey effects are well known, there is a lack of knowledge about the above-mentioned feedback effects in natural plankton communities. Here, we present experimental data from eight different lakes that mainly show the changes in nutrient availability for phytoplankton caused by predator-mediated shifts in zooplankton communities. We discuss the resulting community compositions as well as phytoplankton biodiversity and possible implications for the food web.

ON228

Can space-for-time-substitution surveys represent zooplankton biodiversity patterns and their relationship to environmental drivers?

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Space-for-Time-Substitution surveys (SFTS) are commonly used to describe zooplankton community dynamics and to determine lake ecosystem health. SFTS surveys typically combine single point observations from many lakes to evaluate the response of zooplankton community structure and dynamics (e.g., species abundance and biomass, diversity, demographics and modeled rate processes) to spatial gradients in hypothesized environmental drivers (e.g., temperature, nutrients, predation), in lieu of tracking such responses over long time scales. However, the reliability and reproducibility of SFTS zooplankton surveys have not yet been comprehensively tested against empirically-based community dynamics from long-term monitoring efforts distributed worldwide. We use a recently compiled global data set of more than 100 lake zooplankton time series to test whether SFTS surveys can accurately capture zooplankton diversity, and the hypothesized relationship with temperature, using simulated SFTS surveys of the time series data. Specifically, we asked: (1) to what degree can SFTS surveys capture observed biodiversity dynamics; (2) how does timing and duration of sampling affect detected biodiversity patterns; (3) does biodiversity ubiquitously increase with temperature across lakes, or vary by climate zone or lake type; and (4) do results from SFTS surveys produce comparable biodiversity-temperature relationship(s) to empirical data within and among lakes? Testing biodiversity-ecosystem function (BEF) relationships, and the drivers of such relationships, requires a solid data basis. Our work provides a global perspective on the design and usefulness of (long-term) zooplankton monitoring programs and how much confidence we can place in the zooplankton biodiversity patterns observed from SFTS surveys.

ON353

What nutrient enrichment experiments (don't) tell us about underlying co-limitation mechanisms

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Harmful algal blooms (HABs) are increasing in frequency and extent globally, in part due to cultural eutrophication supplying algae with ample nutrients. Nutrient enrichment experiments (NEEs) are widely used to characterize nutrient limitation in aquatic ecosystems. While NEEs provide information about what nutrient(s) are limiting a system from further growth, the underlying mechanisms of co-limitation are not thoroughly explored in most NEEs. Theoretical underlying mechanisms of co-limitation include community composition shifts, heterotrophic-autotrophic mutualistic relationships and metabolic efficiency associated with multiple nutrients in replete supply. We hypothesize that NEEs that measure additional endpoints alongside growth are more capable of discerning what underlying metabolic or community level pathways are leading to two nutrients stimulating a community additively, and that these experiments have the power to advance co-limitation theory. To assess this hypothesis, we conducted a literature review of all ~2500 papers that cite the landmark co-limitation paper, Elser et al. 2007, to determine what proportion of aquatic NEE papers are investigating underlying mechanisms of co-limitation. We also analyzed these citing papers for consistent co-limitation language use based on Harpole et al., 2011 and Morris and Lewis, 1988. While most aquatic ecology researchers are using consistent co-limitation language, preliminary results indicate that <20% of NEE papers report on the underlying mechanism of co-limitation, or measure endpoints other than growth. To more holistically understand and protect our aquatic resources from HABs, researchers conducting NEEs should consider investigating the specific metabolic or community pathways resulting in co-limitation of algal growth.



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