

Emergence of a resource acquisition tradeoff at the community scale during environmental change

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Abstract

Trophic change has induced substantial changes in biomass and composition of aquatic communities. Based on phytoplankton data from Lake Constance we demonstrate that community function is closely connected to community composition and responds strongly to trophic change. Community mean traits phosphate affinity and light affinity are tightly linked to trophic state during eutrophication and re-oligotrophication, suggesting reversibility of community function. Phosphate and light affinity are anti-correlated. This anti-correlation is weak in the species pool distinguished in the dataset, but strong when weighting the traits by the species biovolumes or when comparing community mean traits from different trophic states. The emergence of this tradeoff between phosphate and light affinity indicates competitive advantage of species with traits near the tradeoff line. The correlation between community mean maximum growth rate and trophic state turned out to be spurious and resulted from the development of Dinophyceae spp. which have an alternative mode of nutrition.

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