Nutrient availability and physical conditions as controlling factors of phytoplankton composition and biomass in a tropical reservoir (Southeastern Brazil)

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With 8 figures and 6 tables

Abstract: Phytoplankton species composition and abundance were recorded biweekly over a one-year period in a eutrophic drinking water supply reservoir together with physical and chemical variables. Based on the results of canonical correspondence analysis and variations on phytoplankton composition and biomass two distinct stages were recognised. The first was characterised by low phytoplankton biomass with dominance of Aulacoseira distans and cryptomonads (D and Y assemblages composed by C-strategists (invasive) small, relatively fast-growing species). In the second period Microcystis aeruginosa (M assemblage; an S-R strategist), Anabaena spiroides (H assemblage; R-strategist; ruderal) and Cylindrospermopsis raciborskii (H-Sn assemblage; R-strategist; ruderal) dominated with a high biomass. Abundances of A. distans and cryptomonads were positively associated with NO₃⁻ and N/P ratio and negatively with temperature and light. Cyanobacteria abundance was negatively associated with NO₃⁻ and N/P ratio, and positively associated with temperature and light. D and Y assemblages were selected by conditions of mixing and low light during the cold-dry season. The increasing daily stratification and decreasing nitrogen availability, mainly DIN, favoured the M assemblage, and M. aeruginosa bloomed when DIN concentrations were <5μM. With severe nitrogen limitation, H and H-Sn assemblages of N-fixing species were favoured and dominated the community.

Key words: NO₃⁻ ratio, N/P ratio, stratification, simulation of compositional changes.

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