OC03 - Using ponds to predict shifts from chlorophycean to cyanobacterial dominance in semi-arid temperate climates

Gallego, I.[a], Brasil, J.[b], Huszar, V.L.M.[b], Attayde, J.L.[c], Pérez-Martínez, C.[d], and Casas, J.J.[e]

[a]Department F.-A- Forel, University of Geneva, Geneva, Switzerland [b]Laboratório de Ficologia, Museu Nacional, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil
[c]Laboratório de Ecologia Aquática, Universidade Federal do Rio Grande do Norte, Natal, Brazil
[d]Departamento de Ecología, Instituto del Agua, Universidad de Granada, Granada, Spain
[e]Departamento de Biología y Geología, Universidad de Almería, Almería, Spain

Cultural eutrophication is globally the major water quality problem of freshwater ecosystems. Although eutrophic shallow lakes and ponds may be dominated by potentially toxic cyanobacteria, dominance by chlorophyceans is not infrequent, especially in temperate areas. Moreover, cyanobacterial biovolume and proportion are expected to increase under global warming scenarios. We tested the hypothesis that global warming interacts with eutrophication by inducing a shift from chlorophycean to cyanobacterial dominance in temperate semi-arid climates. To do so, we used a space-for-time substitution approach from 119 temperate and tropical semi-arid shallow systems. We explored the relationship of biovolume and percentage of phytoplankton dominant groups (chlorophyceans and cyanobacteria) with temperature and nutrients (total nitrogen and total phosphorus) through multiple regressions and generalized linear models (GLMs). Our results showed that phosphorus concentration enhanced biomass of both chlorophyceans and cyanobacteria. However, cyanobacteria absolute and proportional biovolume increased with temperature while chlorophycean absolute and proportional biovolume decreased. Thus, predictions of changes in the dominance of phytoplankton groups can be inferred for semi-arid temperate climates, through the evidence of the joint effects of global warming and eutrophication on the shift from chlorophyceans to cyanobacterial dominance.