

Ecological changes of Central European Lakes within the EU Project EULAKES: nuisance cyanobacteria and cyanotoxins, and their impact on aquatic ecosystems and water quality at different temporal scales

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The project EULAKES (European Lakes under Environmental Stressors) started in 2010 within the Central Europe Programme. The study comprises the lakes Garda (I), Neusiedler (A), Balaton (HU), and Charzykowskie (PL). The main topics in our research include the study of the impact of nuisance cyanobacteria on the trophic webs and human health in Lake Garda, and paleolimnological studies aimed at evaluating water quality on long temporal scales. In Lake Garda, *Planktothrix rubescens* and *Anabaena lemmermannii* are the most frequent potential toxic species. Since April 2010, this lake was investigated by monthly sampling. Cyanobacteria were identified and quantified; parallel to that, molecular diversity of toxins was also analyzed by Liquid Chromatography/Mass spectrometry. Microcystins (MCs) were mostly represented by desmethylated microcystin-RR (more than 90% of the total), which has a toxicity level of ca. 4 times lower than the most toxic microcystin (MC-LR, 50 µg kg⁻¹ b.w.). Anyway, total microcystin concentrations never exceeded the limit of 1 µg l⁻¹. In the considered period, the highest concentrations of MCs were found in the summer months, coinciding with the metalimnetic development of *Planktothrix* populations. On the other side, paleolimnological investigations include geo-chemical (i.e. inorganic and organic matter, radionuclides, ash particles) and biological proxies (i.e. algal pigments, diatom remains, akinetes) which are analysed in sediment cores from each of the four lakes in order to reconstruct long-term (secular) lake ecological and trophic evolution in relation to environmental stressors, and to define reference conditions and restoration targets. In this regard, the study will report a few preliminary results about the distribution of akinetes in the sediment cores, with the aim to investigate the colonisation history by potentially toxic filamentous taxa in Lake Garda. The integration of modern and paleoecological studies represents a strong approach in evaluating and interpreting the present environmental impacts in the light of the long-term ecological history in the different aquatic ecosystems.