

**Long-term experience of eutrophication management in large and shallow Lake
Balaton, Hungary**

Vera Istvánovics¹, András Specziár², László G.-Tóth², Judit Padisák³, Adrienne

Clement¹ and László Somlyódy¹,

1 – Department of Civil and Environmental Engineering, Budapest University of
Technology and Economics

2 – Balaton Limnological Research Institute of the Hungarian Academy of Sciences
3 – Department of Limnology, University of Veszprém

Nutrient loads of Lake Balaton have been reduced by about 50% during the past 20 years from high levels ($1.46 \text{ mg TP m}^{-2} \text{ d}^{-1}$ and $14.6 \text{ mg TN m}^{-2} \text{ d}^{-1}$) that prevailed in the early 1980ies. Although this moderate reduction was not expected to significantly improve the trophic status of this large (600 km^2), shallow (3.2 m) lake, clear signs of recovery have been observed after a delay of roughly 10 years. This was attributed to the quick decrease in internal P load due to the faster than expected immobilization of mobile P in the sediments that contain about 50% high magnesian calcite. Mean annual biomass of phytoplankton decreased substantially because summer blooms of N₂-fixing cyanobacteria became much shorter and smaller. In the same time, cyanobacteria are still dominate in most summers in the south-western areas where nutrient loads are the highest. Crustacean zooplankton have not shown a pronounced response to diminishing primary productivity probably due to the strong constraints set by the specific geological and morphological features of the lake (high turbidity due to both strong wind action and intense carbonate precipitation). In contrast, strong dependency and threshold behaviour of zoobenthos have been demonstrated as a function of algal biomass and productivity. Below the threshold algal biomass, *Tanypus* and *Procladius* species dominate, biomass and energy transfer efficiency of zoobenthos to higher trophic levels (fish) are low. Above the threshold, *Chironomus balatonicus* gains dominance; both the biomass and transfer efficiency increase significantly.