

4th European Large Lakes Symposium

Ecosystem Services and Management in a Changing World



August 24-28, 2015, Joensuu, Finland



Effects of climate change and nutrients on the secular evolution of the planktonic community in Lake Garda (northern Italy): a multi-proxy approach

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Lake Garda, the largest Italian lake (368 km²), is a key resource for drinking water supply and irrigation, for tourism, and for biodiversity conservation. The evaluation of the lake's vulnerability to human stressors within the current climate change emerges as a stringent necessity. Paleoecological methods were used to understand long-term environmental and ecological changes. Two short sediment cores were collected from the deepest NW basin (Brenzona, 350 m depth) and in the shallower SW basin (Bardolino, 81 m). According to radiometric dating, the cores cover ~700 years. Subfossil diatoms were analyzed to reconstruct the lake total phosphorus and to identify the lake's reference conditions. Until the 1960s, the two basins were ultraoligotrophic and inert toward climatic variability. Since the nutrient enrichment in the 1960s, meso- to eutraphentic planktonic pennate and filamentous centrics increased and partially displaced the formerly dominant oligotraphentic taxa. Analyses of cladoceran remains supported and supplemented the diatom results. Since the 1960s, the drastic change in plankton species composition, from oligo- to mesotrophic taxa, was interpreted as a result of the combined effects of nutrient enrichment and climate change. A peak in sedimentation rates in the mid-1940s, followed by a clear decrease in mineral content, reflects the beginning of the hydroelectrical exploitation of the lake catchment. The study confirms the strength of the multi-proxy paleoecological approach to complement limnological investigations and to understand ecosystem changes at secular scale.

Outliers form the majority of recreational fishers in the living area of the Saimaa ringed seal: Do the fishing regimes differ between outliers and locals?

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Almost the whole of Lake Saimaa represents the habitat of the Saimaa ringed seal (*Pusa hispida saimensis*) that is the most endangered seal in the world. It is a landlocked subspecies of ringed seal (*Pusa hispida*). The entire population of the Saimaa ringed seal currently totals 250-360 individuals. The species has been protected since 1955, and the protective measures consist among all of conservation areas and fishing restrictions. The most important form of restriction is a refusal for fishing nets from April 15 to the end of June in about 15% of the lake. Nearly all fishing in the area is recreational fishing, and thus these restrictions concern a large group of recreational fishers.

The number of recreational fishers from outside the area has considerably increased during recent decades being nowadays as much as 70% of all the recreational fishers in the area. However, local fishers caught more than half of the catch in the area. Local households preferred net fishing, angling and ice fishing in contrast to outsiders, who preferred spinning.

The main reason for the quantity of outsider fishers is probably connected with summer cottages as summer cottage dwellers represent the majority of outsiders. The capital region and bigger towns near the lake-area are the most important regions from where recreational fishers come to fish in the area.

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