

Shifts in the population structure of pikeperch, *Sander lucioperca* (L.), and its implications to the food web interactions in Lake Peipsi

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Pikeperch is a pelagic predator which plays a key role in Lake Peipsi as the main top-down regulator of the ecosystem. Changes in the abundance and population structure of this top predator can have profound cascading effect on lower trophic levels. We investigated the abundance and population structure of pikeperch according to experimental trawl catches in the pelagic area of the lake in autumn 1986 and from 1995 to 2011. Besides eutrophication and climate change, fishery is an important driver of the processes in the ecosystem of Lake Peipsi. Pikeperch is the main target fish of very intensive commercial and recreational fishery. Therefore, size composition of its population structure is to a large extent controlled by fisheries. Our results indicated that the mean length and weight of pikeperch have decreased during last decades. The specimens larger than legal size (40 cm of standard length in 2011) are almost completely removed, leaving an unbalanced population of only a few young year-classes. As a consequence of substantial decrease in the abundance of larger specimens of pikeperch in Lake Peipsi, the predatory pressure of its stock has changed and directed to smaller prey. The ecological role of top predator as a regulator of coarse fish has diminished. Moreover, lake (dwarf) smelt *Osmorus eperlanus m. spirinchus* (Pallas), the first prey fish of pikeperch, has declined dramatically and the size of its stock is so small that the survival of the species is endangered. Therefore the fish community is out of balance between the top predator and its prey. Pikeperch will stay longer in the planktivorous niche which is enhanced by climate warming in summer. Energy transfer in the Peipsi food web is changed profoundly. It is important to reduce the intensity of fishery to a level that allows balanced fish populations to develop.

Does planktonic ciliate community regulate bacterioplankton in a shallow eutrophic lake?

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The mesocosm experiments were conducted from August 20th to September 11th in 2009 in large, shallow and turbid eutrophic Lake Võrtsjärv (270 km², 2.8 m). In Lake Võrtsjärv the zooplankton community is characterized by high ciliate abundances and biomasses that usually exceed that of metazooplankton. Previous research has demonstrated the prevalence of microbial loop in food web of Lake Võrtsjärv and the great importance of planktonic ciliates in it. The aim of the study was to investigate the interactions between bacterioplankton and microbial loop organisms. Our hypothesis was that ciliate community, considered as dominant grazers of bacterioplankton, have a strong influence on bacterioplankton abundances, because ciliates in L. Võrtsjärv are quite abundant (up to 190 ind L⁻¹ in summer). Sampling was carried out 8 times during the experiment from 6 mesocosms (2 control mesocosms, 2 mesocosms enriched by copepods and other 2 mesocosms by copepods and Daphnia community). Besides ciliates, flagellates, metazoo- and phytoplankton and also bacterioplankton samples (48 samples, 8 per mesocosm) were collected to estimate their abundances during the experiment. Generally the number of bacterioplankton decreased during the experiment in all enclosures, although there was an increase in abundances in the end of the experiment in case of mesocosms 3, 4 and 5. The interactions between bacteria and microbial loop will be discussed in poster session.

(First) Paleo-ecological reconstruction of the last two centuries evolution of Lake Garda.

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Lake Garda is one of the four large Central European lakes included in the EuLakes Project (Reg. Nr. 2CE243P3), within the Central European Initiative. The main aims of this project are to evaluate the lake

vulnerability against specific human stressors (e.g. nutrients, hydroelectrical exploitation) in a climate change scenario, and to promote sustainable lake management.

Sediment studies are being used to determine the lake reference conditions before stronger human impact.

Lake Garda is the largest Italian lake. The deep basin (350 m) is little impacted by human activities and is suitable for reconstructions of long term environmental variability, including climate change and its effect on lake ecology. In contrast, the shallow basin (81 m) is strongly affected by tourism and intensive agriculture, and is therefore more suitable for studies on lake eutrophication.

This contribution presents results of the analysis carried out on one short sediment core (56 cm) collected from the deepest point of Lake. The focus is on changes in sub-fossil diatom assemblages since the early 20th century. The core presents two discontinuities. The first one in early 1960, with an increase of Fragilariaeae in spite of centric taxa, as result of nutrient enrichment and climate change. The second one in mid 1940s, with a decrease in benthic taxa, which may be related with the intensive hydroelectrical exploitation of the catchment area. A preliminary diatom based reconstruction of lake TP concentration over the last 200 years match with recent limnological data.

The French Alpine Lakes LTER: a tool for assessing the effects of global change on lake ecology

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This Observatory involves 3 French alpine lakes (Léman, Annecy and Bourget), corresponding to different ecological situations regarding the water quality and ecosystems status. The main goal of the Observatory is to understand and to model the ecological status changes (structure, biodiversity, fluxes) of lacustrine systems exposed to changes (in terms of nature and intensity) of the external drivers (anthropization, climate).

Limnological surveys are organized since 1957 (Léman), 1980 (Annecy) and 1990 (Bourget) and concerned several environmental variables: physico-chemistry (water, meteo), Phyto-, Zoo-, Bacterio- and Virioplankton, fishes (stocks and dynamics). Collections of biological elements are also organized (fish scales; phytoplankton; algae) and the data are gathered and organized in a database.

The initial question of ALO was about phosphorus loads increase and eutrophication risk. But since the 80's and the improvement of wastewater treatment, the main scientific questions are about the consequences of re?oligotrophication and about the consequences of global change (temperature, new pollutants, ..) on the lakes ecology.

Two main results are illustrating the contribution of ALO these questions:

- the links between the organization of planktonic communities and lacustrine ecosystem functioning, in response to local or global environmental changes, including a ?retro observation? approach using paleolimnological data.

- the responses of communities and populations to habitat disturbances by developing a functional bioindication and by contributing to the management and bioconservation of fish stocks.

Temperature, ice and water level regimes of Estonian large lakes: weak trends and strong dependence on NAO

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We studied long-term data on air temperature in Tartu, Estonia, available since 1866, ice-on and ice-off dates and daily water levels in two Estonian large lakes, Peipsi and Võrtsjärv, available since the 1920s, and daily water temperatures in these lakes available since the 1940s. We used the NAO index as a climate variation proxy for the whole period.

The Mann-Kendall trend analysis showed that yearly air temperature (AT) in Tartu increased by 0.09°C per decade since 1866 and by 0.44°C per decade since 1961 with biggest changes occurring in spring. Since 1945, surface water temperature (SWT) in L. Peipsi increased by 0.2°C per decade both in April and August, since 1961 the increase has been faster in April (0.48°C/decade) than in August (0.40°C/decade).

Among ice-on and ice-off dates for the two large lakes since 1920, only the ice-off in Peipsi has shifted significantly (2.3 days per decade) earlier. The resulting shortening of the ice cover duration (2.0 days per decade) is still not statistically significant. In Võrtsjärv the increasing trend of ice cover duration was replaced by a decreasing trend since 1960 but the latter has not turned significant yet.