ABSTRACT BOOK

catching young specimens/fish fry and predator-prey imbalance have been common problems associated to fisheries in Peipsi for the last two centuries.

Spatial simulation of environmental scenarios for biomass dispersion pattern and fishery management in a large shallow lake

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In our study, we wanted to examine the combined effects of climate change and human activities on fishery (fishing fleets and gear) based on the fish biomass dispersion in a large shallow eutrophic lake located in Estonia (northeastern Europe) using Ecospace model (Ecopath with Ecosim modelling suite). We simulated and analyzed the spatiotemporal model results for 37 years of data consisting in 19 functional group including 3 multi-stanza (larvae, juvenile & adult) for predator fishes (pike and pikeperch), also including two fishing fleets. The southern region of lake is marine protected from commercial fishing due to dense macrophyte and low water level. The results showed that the spatial distribution of fish biomass was very uneven in the lake, with the southern province exhibiting a greater fish concentration than all other regions combined. The density of macrophytes and inaccessibility to fishing fleet were the main cause for such discrepancies. We also introduced spatial scenarios based on one-meter lake water level rise or decrease for predicting changes in species population density, distribution and fishery pattern. The 1m decrease scenario caused a diminution in surface area as well as in biomass of several species including the phytoplankton and fishes. With respect to control, the fishing pattern clustered in a few specific areas and was reduced overall. In 1m increase scenario caused a weak decrease in all the species biomass whereas the fishing effort is similar to the control model. The simulation of these scenarios would be effective tools for future spatial management regulation where fishing resources ought to be protected.

Responses to local and global stressors in the large and deep lakes south of the Alps: Present status and challenges in research and management

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The largest (28-368 km2) and deepest (251-410 m) lakes south of the Alps (DSL: Garda, Maggiore, Como, Iseo and Lugano-N basin) represent one of the most important lake districts in Europe. In addition to being important tourist destinations, these lakes are intensively exploited for water supply in agriculture, industry and for drinking purposes, and for fishing. In the last decades, the DSL showed a tendency to oligotrophication or stabilization of the concentrations of total phosphorus (TP) in the water column. At the same time, these lakes were increasingly threatened by several pressures and changes (climate warming and meromixis, changes in phenology and community structure, increase of new emerging toxigenic cyanobacteria and cyanotoxins, introduction of invasive species and new micropollutants, degradation of littoral habitats) and their interactions. These changes will be critically described considering the results obtained in the framework of the investigations (including the Long-Term Ecological Research, LTER) carried out in the DSL. Special focus will be given to the opening of new perspectives in the LTER investigations fostered by the adoption of new technologies (e.g. Next Generation Sequencing) in the evaluation of biodiversity and community functions, and their contribution to the delineation of next generation monitoring approaches.

Shoreline quality of lake Geneva using environmental DNA of benthic diatoms.

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Lake ecosystems are exposed to strong anthropogenic pressures coming from their watersheds. These pressures are affecting firstly coastal areas, before affecting the pelagic ecosystem.A better understanding on those pressures and their impacts is necessary to bring environmental and social sustainable solutions. Biomonitoring of lakes is usually based on pelagic phytoplankton. However, this biotic indicator is not appropriate to identify coastal pressures, for which benthic indicators as diatoms would be more appropriate. Contrary to pelagic phytoplankton needing only a few samples from the water column, coastal biomonitoring requires several samplings along the shore to obtain a good characterization of the hot-spot pressures. This leads to the need of a quick methodology to handle those analyses. In order to increase the biomonitoring throughput and to adapt it to lake coastal areas, the SYNAQUA project proposes to use genetic tools based on the recognition of bioindicator organisms (diatoms and oligochaetes) present in the aquatic environment directly from their DNA. Indeed, the DNA-metabarcoding approach can be faster and less expensive than the usual microscopy approach. The program focuses on the French-Swiss lake, Lake Geneva, which is an alpine lake with a large watershed area (580km²) mainly urbanized (1,083,431 residents; 556,227 tourists per year) and agricultural (35%). Periphyton