XXV Congresso AIOL

On-line – 30 giugno-2 luglio 2021

Contributi innovativi dell'oceanologia e della limnologia alla conoscenza, al recupero e alla salvaguardia delle risorse acquatiche minacciate dai cambiamenti globali

Strumenti e approcci innovativi nelle scienze acquatiche in un mondo che cambia

Freshwater fish biomonitoring in the Alpine area using eDNA metabarcoding

Giulia Riccioni (1), Isabelle Domaizon (2), Andrea Gandolfi (1), Massimo Pindo (1), Adriano Boscaini (1), Marine Vautier (2), Rainer Kurmayer (3), Peter Hufnagl (4), Stefanie Dobrovolny (4), Valentin Vasselon (5), Hans Rund (3), Jonas Bylemans (1,6), Nico Salmaso (1), Josef Wanzenböck (3)

(1) Research and Innovation Centre, Fondazione Edmund Mach (FEM), Via E. Mach 1, 38010 S. Michele all'Adige, Italy
(2) INRAE, Université Savoie Mont Blanc, CARRTEL, 74200, Thonon-les-Bains, France Pole R&D ECLA, CARRTEL, 74200, Thonon-les-Bains, France
(3) University of Innsbruck, Research Department for Limnology, Mondseestrasse 9, 5310 Mondsee Austria
(4) AGES, Österreichische Agentur für Gesundheit und Ernährungssicherheit GmbH Währingerstrasse 25a, 1094 Wien
(5) OFB, Office français de la biodiversité, Pôle R&D ECLA, Évian-les-Bains, France
(6) University of Lausanne , Department of Ecology and Evolution, Biophore, Lausanne, Switzerland
Corresponding author: giulia.riccioni@fmach.it

Many freshwater fish are experiencing critical population declines with risk of local or global extinction because of intense anthropogenic pressure and this can have serious consequences on freshwater ecosystem functioning and diversity. Current fish monitoring techniques for large rivers and lakes, however, have known shortcomings. Within the Water Framework Directive (WFD, 2000/60/EC) environmental DNA (eDNA) based methods are proving to be a promising tool for freshwater fish biodiversity assessment. Within the EU project Eco-AlpsWater, advanced high throughput sequencing (HTS) techniques are used to improve the traditional WFD monitoring approaches by using environmental DNA (eDNA) collected in Alpine waterbodies. An eDNA metabarcoding approach has been evaluated by using mock samples within an intercalibration test, and has been used to study fish biodiversity of eight lakes and six rivers of the Alpine region including four EC countries (Austria, France, Italy, Slovenia) and Switzerland. This approach, based on HTS sequencing of a section of the mitochondrial 12S rRNA, allowed to assess freshwater fish biodiversity and their distribution in the different habitats. These data represent the first attempt to provide a comprehensive description of freshwater fish diversity confirming the applicability of eDNA metabarcoding analyses for fish biomonitoring in Alpine and perialpine lakes and rivers.

Nutrient trends in a deep oligomictic lake: the role of external loads versus internal processes

Michela Rogora (1)*, Claudia Dresti (1), Rossana Caroni (1), Aldo Marchetto (1), Lyudmila Kamburska (1), Martina Austoni (2), Paola Giacomotti (1), Arianna Orrù (1), Gabriele Tartari (1), Rosario Mosello (1)

(1) National Research Council of Italy, Water Research Institute (CNR-IRSA), L.go Tonolli 50, 28922 Verbania, Italy
(2) ECODICTYA S.rl. - Via Bernasc, 21020, Comabbio (VA)
* email corresponding author: michela.rogora@irsa.cnr.it

Lake Maggiore is a deep oligomictic lake belonging to the “Southern Alpine Lake” LTER site which has been studied for physical, chemical and biological aspects since the 1980s. The lake recovered from eutrophication thanks to the reduction of catchment loads and reached a stable oligotrophic status by the end of the 1990s. However, both reactive and total phosphorus have started to slightly increase since 2010, leading to a shift of the lake trophic state towards oligo-mesotrophy. This increase in phosphorus was limited to the hypolimnetic layers, concentrations being fairly stable or decreasing in the epilimnion. Reactive silica and nitrate also progressively increased in the hypolimnion, while nitrate and total nitrogen steadily decreased in surface layers, especially in the summer period. These changes were assessed in relation to catchment loads, atmospheric deposition and climate-related change in lake hydrodynamics. Long-term change in phytoplankton biomass and chlorophyll levels were also considered. Results clearly demonstrated how in the recent period nutrient dynamics became more controlled by in-lake processes, in particular stratification and mixing regime, in turn affected by climate change. Decrease of nitrogen atmospheric loads and change in phytoplankton phenology and community composition also played a role in the dynamics of nitrogen compounds.