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Aquatic Sciences

Editorial

The papers in this issue of Aquatic Sciences are the offspring of the 7th International GAP Workshop, held in Switzerland, from 9–17 September 1999.

The Group for Aquatic Primary Productivity (GAP) was established in 1980 at the Societas Internationalis Limnologiae's (SIL) 21st Congress in Kyoto, Japan. GAP is a working group of both SIL and INTECOL (the International Association of Ecology) and is run by an international committee composed of seven scientists from Australia, Canada, Chile, Denmark, Israel, Switzerland, and the United States. The purpose of GAP is to assess the state of knowledge on a wide range of topics related to marine and freshwater primary production, to perform joint field and laboratory experiments using different techniques to test their comparability and reliability, to define major knowledge gaps and urgent research needs, and to publish these results in international journals. To carry out this mandate, GAP holds workshops which address a specific theme. They are organized by volunteering scientists, a local organizing committee and their institutions. Past workshops have been held in several European countries, in Israel and in Canada. They offer an unique opportunity for established and young scientists to work together in short-lived, tightly focused teams, to effectively address key research questions and to exchange methodological expertise and technical knowhow.

In 1999, GAP VII was organized by the University of Zürich, EAWAG, and Zürich Water Supply. Plenary sessions were held at the Institute of Plant Biology in Zürich, while experimental work was done at the Limnological Research Centre of EAWAG at Lake Lucerne, at the Centre for Alpine Biology at Lake Cadagno, at the Limnological Station and the Institute of Plant Biology of the University of Zürich, and at Lengg Station of Zürich Water Supply, all of them situated at the border of Lake Zürich. The workshop was attended by app. 60 limnologists and oceanographers from all over the world.

The theme of GAP VII was "Dynamics of primary production in spatially and temporally heterogeneous aquatic environments". Experimental work was performed in four groups focussing on the following subtopics:

- Dynamics of primary production and biological diversity in different aquatic environments and at different time scales,
- Effects of UV radiation on primary productivity in different aquatic environments,
- Role of nutrients for the primary productivity and phytoplankton community structure, and
- Approaches and methods to estimate daily primary productivity.

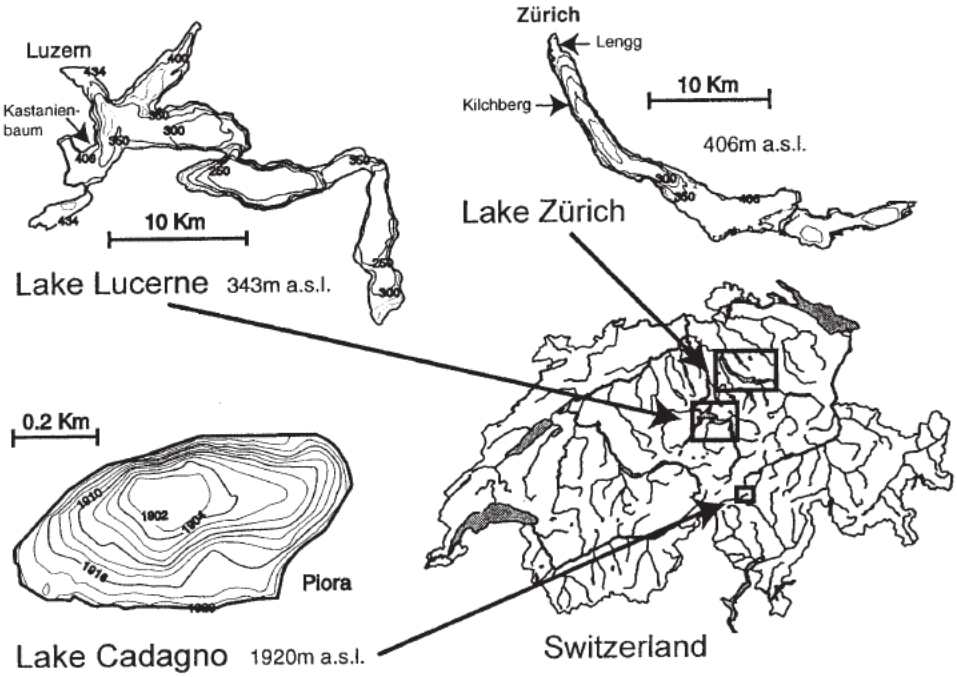

Figure 1. Map of Switzerland, with bathymetric maps of the Lakes Zürich, Lucerne and Cadagno, chosen as objects of investigation for the 7. International GAP Workshop. Lake Zürich, a deep (max. depth 136m), monomictic, mesotrophic lake in a densely populated region in the Swiss lowlands at 406 a.s.l. Lake Lucerne (Vierwaldstättersee), an oligotrophic deep (max depth. 214 m) prealpine monomictic lake of a complicated morphological structure consisting of a chain of different basins, at 434 a.s.l. Lake Cadagno, a small shallow (max. depth 20 m) alpine meromictic lake in the Piora Valley at 1921 m a.s.l. in the southern part of central Switzerland

Three keynote papers and eight papers containing data produced during GAP VII have been produced. Two to three referees reviewed each paper before being accepted for publication by the Guest Editorial Board*. We thank these referees for their time and interest in helping the authors prepare their final manuscripts.

This issue of Aquatic Sciences contains three keynotes lectures and two data papers. A following issue of Aquatic Sciences in 2001 will contain the remaining data papers and a limnological description of the three lakes (Lucerne, Zürich and Cadagno) investigated during the GAP Workshop.

Dubinsky examines in his keynote the fate of assimilated carbon not needed for phytoplankton cell doubling. He shows that on the ecosystem level, nutrient-limitation-induced uncoupling of photosynthesis from cell doubling leads

* Guest Editorial Board: Peter Bossard, EAWAG, Switzerland; Reinhard Bachofen, Univ. of Zürich, Switzerland; John Beardall, Monash Univ., Australia; Tom Berman, Kinneret Limnol. Lab., Israel; Zvy Dubinsky, Bar Ilan Univ., Israel; Vivian Montecino, Univ. of Chile; Patrick Neale, SERC, USA; Richard Robarts, NHRC, Canada.

to an increased excretion of dissolved organic carbon and the preferential enhancement of the microbial loop over the grazing pathway as a universal feature of most oligotrophic planktonic food webs.

Beardall reviews the merits and methodological limitations of approaches to identify factors limiting algal growth for the assessment of the nutrient status of algal populations. He discusses how an understanding of biochemical and metabolic changes induced by nutrient limitation can lead to the development of rapid and simple tools to monitor the nutrient status of aquatic plants.

Walsby presents an approach to reconcile measurements of growth rate, photosynthetic rate and the rate of biomass change using as an example a *Planktothrix rubescens* population that dominated the phytoplankton community in Lake Zürich. He also discusses the measurement methods and calculations for daily growth integrals based on growth / irradiance relationships.

DelDon et al. introduce the peculiar biogeochemical and microbiological characteristics of meromictic alpine Lake Cadagno that contains a sulfide-rich monimolimnion and an electrolyte-poor mixolimnion. They describe the lake's potential as an excellent model system for studies of the role of planktonic bacteria in the sulfur cycle.

Camacho et al. present an intensive short term study on the microstratification of several microbial assemblages, their production and fate in Lake Cadagno and show that chemolithotrophic carbon fixation can surpass carbon photoassimilation. They also provide evidence of a strong link between production in anoxic waters and the lake food web.

Beardall et al. report on the use of nutrient-induced fluorescence transients (NIFT) and FTIR spectroscopy to detect phosphate limitation in freshwater microalgae. They compare these to more conventional assays for P-limitation such as comparison of rates of P uptake and observation of P-induced perturbations in rates of O_2 evolution. They conclude that, since fluorescent measurements are non-destructive and highly sensitive, the NIFT approach is potentially very useful for exploring the nutrient status of algae and their response to environmental changes.

A following issue of Aquatic Sciences will publish various GAP datapapers about the photosynthetic response and size related adaptation strategies of phytoplankton to light und ultraviolet radiation in mixed and stratified water colums, about diel changes in photosynthetic properties of *Planktothrix rubescens* and about effects of solar radiation on biofilms.

Kastanienbaum and Saskatoon Peter Bossard and Richard Robarts

ACKNOWLEDGEMENTS

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