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SIL news

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The International Association of Theoretical and Applied Limnology works worldwide, to understand lakes, rivers and wetlands and to use knowledge, gained from research, to manage and protect these diverse, inland aquatic ecosystems.

In this Issue

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Marley Waiser

Approaching Redberry Lake, Saskatchewan, Canada

REDBERRY LAKE – GLACIAL JEWEL

by
Marley Waiser

Between 17,000 and 12,000 years ago, receding Pleistocene glaciers carved out the hummocky terrain which typifies the North American prairie pothole region. When the ice melted and the depressions subsequently filled, millions of closed basin wetlands were created. Retreating glaciers also deposited huge chunks of ice onto this depressional landscape and when it melted, a number of glacial kettle lakes, including Redberry Lake, were formed. Redberry Lake, situated in the aspen parkland ecozone of south-central Saskatchewan (52º43'N, 107º09'W), is the largest of 15 such kettle lakes in this region (Z_{max} = 16 m, surface area 45 km^2; diameter ~10 km). It is saline (total dissolved solids, TDS, 20.9 g L^{-1}; Evans *et al*. 1996) and major cations are magnesium (68.1%), and sodium (29.2%) while anions are dominated by sulfate (93.7%) (Arts *et al*. 1993). Drainage basin soils are the major source of soluble salts - mainly sulfates of magnesium and sodium with smaller amounts of bicarbonate and chlorides (Rawson and Moore 1944). Magnesium in the soils was likely transported glacially from Paleozoic limestones north of the lake while sulfates probably originated from regional Cretaceous shales (Hammer and Haynes 1978).

continued on next page

Two major creeks, Marshy and Oscar, drain into the lake from the south-west and north-west corners, respectively. Because the lake has no major outflows, and no known groundwater input, it is considered endoreheic or hydrologically closed (Beak 1989; Waiser and Robarts 2000). Due to its location within a semi-arid climatic zone where evaporation exceeds precipitation, and endorehic nature, Redberry Lake volume has steadily decreased (~50-60% since 1918), with concomitant increases in salinity (11,520 mg L^{-1} TDS in 1925 to current values >20,000 mg L^{-1} - Van Stempvoort *et al*. 1993). Maximum water depth has also declined from ~27 m in 1941 (Rawson and Moore 1944), to ~16 m currently (Waiser and Robarts 2000). Mean lake water residence time is 20 years, which, in this endorheic basin, reflects loss by evaporation, not flushing (Van Stempvoort *et al*. 1993). Surrounding land is characterized by cultivated farmland, grasslands, fescue, oat grass, sedges, aspen and several shrubs. (Beak 1989).

Redberry Lake serves as a significant staging, nesting and feeding area for Canada Geese (*Branta canadensis*), Tundra Swans (*Cygna columbianus*), and about 30,000 ducks. Over 188 species of birds 'hang out' and nest here including the Piping Plover (*Charadrius melodus*), a small endangered shorebird. American White Pelicans (*Pelecanus erthrorhynchos)* are also summer inhabitants. Easily identified by its huge yellow bill and black wing tips, this truly spectacular bird, with wing span of about three meters, can often be seen in groups wheeling slowly on updrafts high above the lake.

In January 2000, Redberry Lake and watershed, were designated a World Biosphere Reserve by the United Nations Educational, Scientific and Cultural Organization (UNESCO) under its Man and Biosphere Reserve Program. This biosphere is the only such reserve in Saskatchewan and only one of 14 Canadian and 440 worldwide. Long term conservation goals and objectives for Redberry Lake include the development of plans for monitoring bird numbers, land use practices and ecosystem processes in order to determine changes and threats and to enable an adaptive response to them (Schmutz 1999).

Limnological studies of Redberry Lake

Redberry Lake was surveyed as early as 1884 by the Canadian Dominion Lands Survey (Van Stempvoort *et al*. 1993). Pioneering limnological work on the lake was conducted by Rawson and Moore (1944) as part of a larger, remarkable study of sixty saline lakes in central and southern Saskatchewan (1938-1944). Primarily an inventory of physical and biological features, this study also included information on geology, climate and vegetation. Rawson and Moore (1944) noted that the lake was dimictic, likely eutrophic and that magnesium and sulfate ions dominated. They also observed that lake salinity increased seasonally (on average by 1.7%) and over longer time scales (29% from 1921 to 1941) due to the semi-arid climate as well as basin wide land use changes. Phytoplankton were dominated by euryhaline cyanobacteria, while rotifer and entomostracan zooplankton were abundant. Amphipods present included *Hyallela azteca* and *Gammarus limnaeus*. Native fish species included ninespine stickleback (*Pungitius pungitius*), brook stickleback (*Culaea inconstans)* and fathead minnows (*Pimephales promelas)*. Whitefish (*Coregonus clupeaformis*) stocking occurred sporadically until 1953, and then in alternate years until salinities reached 17,000 ppm (~1985).

No further limnological work was carried out until that of Hammer and colleagues (Hammer 1975; 1978a, b, 1981, 1990; Hammer and Haynes 1978; Haynes and Hammer 1978). Results of this research indicated high phosphorus concentrations (P), exceptional water clarity (1% light level ~16.5 m), phytoplankton dominated by *Chaetoceros elmorei* Boyer, and average primary productivity (PP) (volumetric PP <0.05 g C m^{-3} d^{-1}; areal PP range = 124 - 628 mg C m^{-2} d^{-1}) indicating oligotrophy (Haynes and Hammer 1978).

Between 1989 and 2001, Redberry Lake was sampled by researchers from the National Hydrology Research Institute, Saskatoon. Based on this research, the lake was classified as either oligotrophic (mean summer chl*a* 0.7 µg L^{-1}; Waiser and Robarts 1995) or oligomesotrophic (annual areal PP 246 to 976 mg C m^{-2} d^{-1}; Robarts *et al*. 1992). Low algal production relative to total phosphorus reflected either the influence of high sulfate concentrations on nutrient utilization (Robarts *et al*. 1992) or zooplankton grazing pressure (Evans *et al*. 1996). Despite high soluble reactive P concentrations (mean 16 µg L^{-1}), little was available for microbial uptake. Strong signs of P-limitation including short ^{32}P turnover times (<10 minutes) and high alkaline phosphatase concentrations were noted (Waiser and Robarts 1995). P limitation was linked to the predominance of Mg and SO_4 ions, alkaline pH and high dissolved organic carbon (DOC) concentrations (Waiser and Robarts 1995). Bacterial production rates (26.1 mg C $m^{-2}d^{-1}$) placed Redberry Lake at the lower end of marine and freshwater values (Robarts *et al*. 1999). Correlation between bacterial and phytoplankton production was related to bacterial dependence on phytoplankton for labile DOC and co-limitation of both by inorganic nutrients (Robarts *et al*. 1999). A 1997 study investigating effects of triallate (herbicide) on the microbial community indicated no negative effects at expected environmental concentrations. With N and P additions, however, bacteria appeared to use triallate as a carbon source (Waiser and Robarts 1997). The short appearance of *Daphnia pulex* (mid-summer to fall) and low lipid content compared to freshwater counterparts, was associated with high lake salinity (Arts *et al*. 1993).

Crystal clear waters (see following photograph) in Redberry Lake (secchi disk 5.0 m) contrasted sharply with its high DOC concentrations (35 mg L^{-1}). Not surprisingly, on a carbon normalized basis, diffuse attenuation coefficients (K_d) for UV-B, UV-A and PAR indicated that DOC in Redberry Lake attenuated

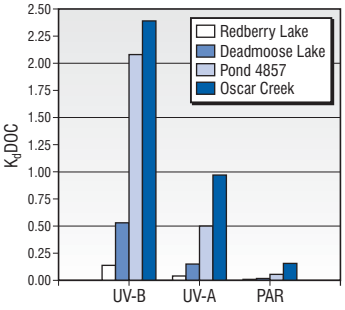

Fig. 1. *A comparison of K_d values from Saskatchewan waters: Redberry Lake (DOC 35 mg L^{-1} - saline), Deadmoose Lake (DOC 35.7 mg L^{-1} - saline), Pond 4857 (DOC 37.6 mg L^{-1} - fresh) and Oscar Creek (DOC 14.9 mg L^{-1} - fresh) normalized to ambient DOC concentration. (Waiser and Robarts 2000).*

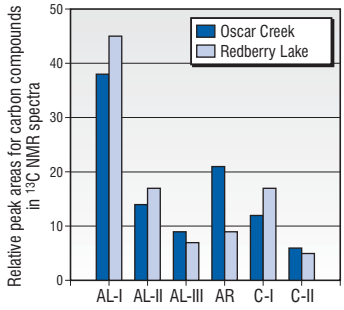

Fig. 2. *A comparison of relative peak areas for carbon compounds in ^{13}C NMR spectra from Oscar Creek and Redberry Lake hydrophobic organic acids (Waiser and Robarts 2000).*

UV-R to a far less extent than DOC in either Oscar Creek or other prairie systems having similar DOC concentration (Fig. 1; Waiser and Robarts 2000). Combining Redberry data with that from other saline systems, it was found that slopes of UV-A and UV-B versus DOC were significantly less than freshwater relationships (Arts *et al*. 2000). The fact that UV light penetrated much deeper into saline systems than freshwater counterparts was related to DOC composition. A Redberry Lake study which compared source DOC (from Oscar Creek) to lake DOC revealed that lake DOC had higher C:N ratios, was lower in molecular weight, chromphoric constitutuents and aromaticity and was older than source DOC (Fig. 2). DOC entering the lake was essentially 'trapped' in the endorheic basin. Over many years, coloured DOC, originating from Oscar Creek lost more than half of its aromaticity due to photodegradation. Low aromaticity and chromophoric constituents accounted for the high penetration of UV light in Redberry Lake (Waiser and Robarts 2000).

Photograph of coloured Oscar Creek water (left) and clear, non-coloured Redberry Lake water.

Research into UV radiation effects in Redberry Lake suggested that microbial community production was significantly affected by UV-B radiation (low P:R ratios were observed under UV-B enhanced conditions; Ferreyra *et al*. 1997). Kasai *et al*. 2000 later observed that smaller phytoplankton cells were more vulnerable to negative UV effects as were those from deeper mixing depths (5 m). Surface phytoplankton, however, appeared unaffected.

Lessons learned

The gravel road leading to Redberry Lake winds through rolling cropland dotted with wetlands and aspen. Gazing from the hilltop of the final approach, the lake shimmers below (cover photograph), islands eerily suspended as if in some Arthurian legend. Redberry Lake is a glacial jewel and one of the earth's special places – birds certainly think so and so do I. This lake has taught me to make no limnological assumptions. When I first studied P limitation here, an eminent ecologist asked me why, as P concentrations were so high. I showed, however, that bacteria and phytoplankton were strongly P-limited and in the process learned that lakes can and do defy limnological paradigms linking high algal biomass and productivity with high P concentrations. Redberry Lake also taught me that not all DOC is coloured – in fact many saline systems have incredibly high DOC concentrations yet the water is crystal clear. Consequently, limnological paradigms linking low UVR penetration to high DOC concentrations have little application here. In summary, studying Redberry Lake has taught me to keep an open mind, to expect the unexpected … and I do.

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Message from the President

This is a critical time for SIL and we all must apply our best thinking, talents and enthusiasm to invigorate and sustain our future as the international, professional society for limnology. The final report from the Futures Committee has been posted on our website *(http://www.limnology.org/)*. The Futures Committee has done an excellent job in evaluating our current situation, in posing important questions, and in making suggestions regarding the future of SIL. This hard-working Committee deserves our sincere thanks for their efforts.

I have set out the following schedule to bring our deliberations to a successful conclusion in a timely manner:

1. Members should respond to the Futures Committee report and proposed changes in the structure and function of SIL by **sending comments to Ms. Denise Johnson** *(denisej@email.unc.edu)* **by 1 April 2006.**
2. Based on the Report from the Futures Committee, the Executive Committee (Drs. Chris Gordon, Jack Jones, Winfried Lampert, Brian Moss, William Lewis and Gene Likens) will develop a proposed plan of action and send this plan to the National Representatives by late 2006 or early 2007.
3. Discuss the plan at the first meeting of the National Representatives at the 2007 SIL Congress (Montreal); Presidential report on this discussion at the First General Assembly; vote on plan at 2nd meeting of the National Representatives; and ratify the plan at the closing General Assembly of the Montreal Congress.

The Futures Committee has made 10 proposals to change and strengthen SIL. To help stimulate and guide your thinking and responses, I would point out a few key issues that must be resolved:

1. Is the current timing of Congresses at 3-year intervals appropriate? Should we regularly or occasionally join other limnological societies, such as the American Society of Limnology and Oceanography, for joint meetings between Congresses?
2. How can we use our website to attract and sustain younger members?
3. Should the Verhandlungen be done only electronically? What hardships would this cause to members in developing countries, and how could this adversely affect the SIL budget?
4. Should SIL establish a journal in paper and/or electronically, to publish submitted peer-reviewed articles on a regular basis?
5. Is there a continuing need for a governance structure that includes National Representatives?
6. Because the terms for President, two Executive Vice Presidents and the General Secretary and Treasurer all expire simultaneously in 2007, should the SIL statutes be changed to avoid this situation?
7. Should the position of an Executive Vice-President from a developing country be made permanent by a change in SIL statues?

I look forward to your comments on the Report from the Futures Committee, as we move forward to strengthen and sustain SIL into the future.

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Ceramic Forms based on the Architectural Design Patterns of Aquatic Microorganisms

The main sources of my inspiration, innovation, and principal of design are the tremendous number and varieties of macro- and nano-organisms, both living and fossilised. Millions of years of evolutionary natural processes have altered the shape and structure of microorganisms into an abundant variety of new forms. The rich wealth of design and three dimensional structures of micro-organisms inspire the style and design of my ceramic work.

As the forms and the architectural structures of these organisms can not be seen in detail with the naked eye, samples of organisms were prepared for photographic study of their fascinating and beautiful filigree features with a scanning electron-Microscope (SEM). Some photographs were selected for enlargement, depending on their characteristics, which inspired me to design my ceramic objects.

I taught myself ceramic art by reading books on contemporary ceramics and observing ceramic artists shaping their work at exhibits in different countries. I examine nature closely, with an imaginative, scientific and curious eye, seeking to duplicate that which I observe. My art is a reciprocal process, linking art to nature and nature to art. I see natural forms when examining micro-organisms and the underlining structural order that produces each individual form. The characteristics of my art are determined by my conception of what I see and by what I feel constitutes nature. My view of nature is an ordered and rational one; my forms are harmonious and rhythmic with an emphasis on the whole rather than on the parts. My work is neither manufactured nor natural; it is sculpture that achieves beauty by capturing the essential nature and design of the real microbial world.

Difflugia acuminata - *wall vase*

Euglypha acanthophora - *wall vase*

Difflugia bravicolla - *table vase*

Phacus sp. - *wall vase*

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Introducing Euro-limpacs - Integrated Project to evaluate the impacts of global change on European freshwater ecosystems

Introduction

Climate is changing rapidly, beyond the range of natural variability, and the changes are exerting considerable pressures on freshwater ecosystems. Predicting and managing the ecological consequences of global change on complex ecosystems is a task that requires great expertise, new methods and comprehensive, new approaches.

The European Union funded Euro-limpacs project (which began in 2004 and runs through to 2009) is concerned with the science required to understand and manage the ecological consequences of climate change on freshwater systems. The project brings together a consortium of leading scientists from 36 institutes and 19 countries aiming to integrate river, lake and wetland ecosystem science at the catchment scale. In particular, within a European context, the project considers the implications of future climate change for the operation of the EU Water Framework Directive.

Scientific focus

Euro-limpacs has the following objectives:

- Improve understanding of the past, present and future impacts of climate change on the structure and functioning of European freshwater ecosystems, both directly and through interaction with other drivers of change (e.g. land-use change, nutrient loading, acid deposition, toxic pollution).
- Develop an innovative toolkit for integrated catchment analysis and modelling for use in assessing the potential impact of global change under different climate and socio-economic scenarios.
- Identify key indicators of aquatic ecosystem health (e.g. specific taxa, structures or processes) that clearly indicate impending or realised climate change.
- Develop new methods for defining reference conditions and restoration strategies for freshwater ecosystems and habitats in the context of climate change.
- Provide guidance (in the form of useable models, decision support systems and other appropriate tools) to respond to the interactions between climate and other changes, in the best interests of conservation of the goods and services provided to the community by its freshwater systems.
- Communicate this information and understanding to users, stakeholders and the wider public.

Scale and approaches

Euro-limpacs focuses on episodic, seasonal and long-term time-scales, past, present and future. It combines experimental, observational, inferential and modelling methodologies in an integrated way, recognising that no single approach will solve all problems. Central to the project is a consideration of all freshwater ecosystem types (rivers, lakes and marginal wetlands) both as individual systems and as systems connected at the catchment scale. A process-based approach is used to assess the response of freshwater ecosystems to a range of drivers, which often occur in combination, and to assist in the development of effective management tools.

Long-term datasets have been collated and will be analysed to provide information on, for example:

- impacts of climate change on the hydrological cycle at key sites:
- effects of extremely high or low discharges on biota;
- long-term nutrient-climate change interactions within lakes;
- effects of climate change-acidification interactions;

A range of experimental approaches include:

- microcosms to examine marginal wetland response to climate change;
- experimental manipulations of snow-cover, freezing-thawing cycles, and soil wetness in mini-catchments;
- mesocosm experiments to examine climate-eutrophication interactions in lakes and wetlands.

Surveys provide data covering broad geographical and climate gradients including:

- data collation from lakes in Arctic and Alpine areas to examine biogeochemical and ecological responses to climate change in areas of climatic extremes;
- an intensive foodweb sampling campaign in the Pyrenees and Tatra mountains to assess pollutant transfer within lakes;
- sampling in Scotland to determine the impact of future climate change on the remobilisation of metals and persistent organic pollutants from peat soils to upland lakes.

Modelling techniques are being developed and applied, for example:

- the development of the Integrated Catchment Model of Carbon (INCA-C) and the Integrated Catchment Model of Sediment (INCA-Sed) to provide the ability to simulate carbon and sediment dynamics at a catchment-scale;
- the development of a new methodology to assess the impacts of climate change on soil and stream water acidification using the MAGIC (Model of Acidification of Groundwater In Catchments) model;
- the application of the process-based lake model, PROTECH, to lakes with long-term monitoring data in order to investigate the impacts of climate change and eutrophication on lake ecology.

A number of databases are being generated which include:

- a meta-database describing the hydrology, water quality and ecology of key sites which provides a project resource for inter-site comparisons, and current and future model applications;
- a pan-European database on sediment accumulation rates from 1850 to 2000, developed with data from almost 200 lake sediment cores;
- a meta-database on indicators of ecosystem health in relation to climate change, built on 'Cause-Effect-Chains', broadly categorising the known and potential effects of climate change on parameters, functions and communities in European freshwater ecosystems.

Palaeolimnological approaches are being applied to:

- examine long-term direct climate change impacts and natural variability at key sites,
- assess decadal-scale change in climate-nutrient interactions at large lakes across Europe,
- evaluate the role of climate in promoting soil erosion and trace metal pollution of upland lakes in Scotland,
- assess the impact of future climate change on restoration targets for lakes where these have been defined from palaeolimnological analysis.

Summary

Euro-limpacs is well placed to address the question of how freshwater ecosystems will respond to future climate change. The challenges for the project are:

- to produce excellent primary science at the task and sub-task level,
- to capitalise on the opportunities for new interactions provided by the project to generate new directions for freshwater science,
- to produce science that decision makers can use,
- to stimulate the next generation of freshwater scientists,
- to ensure knowledge is disseminated to the widest possible audience.

More information is available on the project web site: *http://www.eurolimpacs.ucl.ac.uk/*

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Conservation and Management of Running Waters

The Working Group was formed at the SIL Congress in Munich, 1989. The membership is rather fluid and fluctuates considerably at each of the triennial Congresses. At present, it stands at 107 representing 22 countries. The group produces an occasional newsletter, entitled *Meanders*, but as its production depends entirely on contributions from group members it has not been possible to circulate this to a fixed schedule.

The principal activity of the Working Group is to meet together for a short workshop at each of the SIL Congresses. The topics for discussion have included conserving freshwater biodiversity, opportunities and constraints in protecting rivers of conservation importance, international case studies of river management, and work on aquatic and riparian restoration. Each of these events usually takes place in the evening and is coupled with a short business meeting for the Working Group. One important output from these workshops has been the production of a manuscript for publication in the Proceedings written by a small group of the workshop organisers. So far, the following have been produced:

Campbell, I.C., P.J. Boon, B.L. Madsen, and K.W. Cummins, 1998. 'Objectives and approaches in lotic and riparian restoration projects'. *Verhandlungen der Internationalen Vereinigung für theoretische und angewandte Limnologie* **26:**1295-1302.

Boon, P.J., G.M. Gislason, P.S. Lake, B.K. Ellis, C. Frank, and A.J. Boulton, 2002. Competition for water: international case studies of river management and conflict resolution. *Verhandlungen der Internationalen Vereinigung für theoretische und angewandte Limnologie* **28:**1581-1587.

Madsen, B.L., P.J. Boon, P.S. Lake, S.E. Bunn, C.N. Dahm, T.E. Langford and M. Zalewski. Ecological principles and stream restoration. *Verhandlungen der Internationalen Vereinigung für theoretische und angewandte Limnologie* (submitted).

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Are you moving? Please send your change of address to:

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c/o Ms. Denise Johnson
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The Ecohydrology Working Group recently initiated the following activities:

1. From 16-21 April 2005 a Workshop on Ecohydrological Remote Sensing and Fractals was held in Goiania (Brazil) as part of the XII Brazilian Remote Sensing Symposium (SBSR) lead by Ivan B.T. Lima, Pierre Hubert and Maciej Zalewski. A proposal was developed to establish a new working group within UNESCO's IHP Ecohydrology Theme and to be led by Brazilian scientist Ivan Bergier Tavares de Lima. It will develop various scientific activities to promote research and disseminate these through cooperation with the IHP Ecohydrology scientific committee and other working groups. Major activities of this group will cover:

- development of good practice guidelines for the implementation of methane production mitigation and gas recovery facilities in aquatic ecosystems;
- development of an international network to disseminate and intensify use of remote sensing and applied mathematics for regulating aquatic ecosystems to increase ecosystem carrying capacity and ecosystem services, e.g., eutrophication control and methane production/recovery in the context of the effects of global warming and changing climate on hydroecosystems.

2. At the beginning of August 2005 the launching of the second M.Sc. course in Ecohydrology took place at the National University of La Plata, Argentina. Participants included 17 students in their second year and 16 new students that were beginning the 2005-2007 course. They were hydraulic engineers, biologists, geologists, forest engineers, and chemical engineers.

One week earlier, a one week course on Integrated Water Resources Management based on ecohydrology was also held at the University of Asunción (Paraguay) with 49 water managers participating. In the first week of September a one week course was also organized in Montevideo (Uruguay).

3. From 28 September - 2 October, 2005 under the framework of the UNESCO IHP/MAB (Man and the Biosphere) programme a joint Main Line of Action in Ecohydrology working group meeting was held in Split, Croatia with a theme of "Evaluation and development of ecohydrologic techniques to control water quality degradation in estuaries, lagoons and coastal areas". The main objectives of the meeting were:

- Exchange experiences in the use of modelling and different ecohydrologic techniques to control eutrophication, harmful algal blooms (HAB) and pollution in diverse areas.
- Determination of the key parameters that control eutrophication, HAB and invasive species in different regions and ecological conditions.
- Determination of measures to control and restore polluted and eutrophicated ecosystems.
- Test the applicability of ecohydrological models in different areas.

4. From 23-25 October 2005 an International Symposium on Ecohydrology devoted to the implementation of the European Water Framework Directive 2000/60/WE and biodiversity conservation was held in Vienna. The symposium was organized by the Polish Academy of Sciences, Austrian Academy of Sciences with cooperation of the UNESCO Venice Office, UNESCO MAB Programme, Vienna University and University of Lodz as a celebration of the 65th birthday of Friedrich Schiemer (University of Vienna). The goal of the Symposium was to integrate knowledge on ecology, hydrological processes and soil science and consider new aspects, such as pollutants and waste recycling. The proceedings from this Symposium will be published in the international journal "Ecohydrology & Hydrobiology".

5. The 3rd Asia Pacific Training Workshop on Ecohydrology on Bali Island (Indonesia): "Experiences and Best Practices of Ecohydrological Principles for Good Water Governance" was held from November 25-26, 2005. It was organized by the Indonesian National Committee for IHP, Indonesian Institute for Sciences, Ministry of Public Works of Indonesia, Research Centre for Limnology-LIPI, Asia Pacific Centre for Ecology with Support of the Indonesian National Committee for UNESCO and UNESCO Jakarta Office. The leading topic discussed during the workshop was focused on achieving sustainable water planning and water supply in Asia Pacific regions through the correct selection and practice of ecohydrological principles.

6. As part of UNESCO's IHP Ecohydrology programme for 2004 - 2005, 10 Demonstration Project Sites were established. The objectives of the activities at each demonstration site are:

- demonstrating the application of the ecohydrology approach to solve issues surrounding water, environment and people;
- contributing to the development of research on ecohydrology and to the increase in scientific knowledge to implement integrated watershed management and identify solutions to sustainable development in ecological and social systems in which water acts as a main driver;
- validation, both in qualitative and quantitative terms, of the effectiveness of the ecohydrology approach in practice, based on methodologies identified by members of the Scientific Advisory Committee of the Ecohydrology Project; and
- contributing to the dissemination of information and material through an internet website, accessible to all, which consolidates the results of the activities implemented at each site.

Research areas included in the project:

- Lacar Lake, Patagonia, Argentina: reduction of erosion using ecohydrology and phytotechnology. Project leader: M. Gavino;
- Guadiana River, Portugal: sustainable coastal zone management by effectively dealing with cyanobacterial blooms, invasive species and conserving biodiversity. Project leader: L. Chicharo;
- Pilica River, Poland: improving water resource management through effective ecohydrological coupling of a river and a reservoir. Project leader: I. Wagner-Lotkowska;
- Lobau floodplain, Danube River, Austria: optimization of river hydrological regimes to maintain biodiversity. Project leader: G. Janauer;
- Amazon River floodplain, Brazil: conserving biodiversity by using sustainable production of timber. Project leader: W.J. Junk.
- Parana floodplain, Brazil: creation of a biosphere reserve to protect the decline in the unique subtropical river floodplain biodiversity. Project leader: A. Agosinho;
- Marewa River and Lake Naivasha, Kenya: diversion of high-part hydrographs for fertilization of agricultural land by reducing nutrient fluxes into the ground. Project leader: D. Harper;
- Serengeti Plain, Kenya and Tanzania: study of the inter-basin transfer of water resources and water deficit for large mammals migrating to the Serengeti. Project leaders: E. Gereta/E. Wolanski;
- Lake Saguling, Indonesia: study of urban and industrial pollution and reduction of sedimentation by phytotechnology and by control of hydrological dynamics. Project leader: P. Hehanussa; and
- Polesie region, Poland, Belarus and Ukraine: conservation and sustainable use of a transboundary wetland. Project leader: N. Rybianets.

7. From 16-22 March 2006 UNESCO IHP will participate in the 4th World Water Forum in Mexico City where we are organizing a Session on "The Ecohydrology approach for water, ecosystem services and society".

Titles of local actions to be presented during the session:

- Application of ecohydrology and phytotechnologies for Integrated Water Resources Management and Sustainable Development in the Pilica River (Poland).
- Conserving biodiversity by using sustainable production of timber in Amazonas, Brazil.
- Inter-basin transfer of water resources and water deficit for large mammals migrating to the Serengeti (Kenya and Tanzania).

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Aquatic Primary Productivity (GAP)

The Group for Aquatic Primary Productivity (GAP) was established in 1989 at the XXI SIL Congress in Tokyo, Japan. It is a working group of both SIL and INTERCOL. Our group's activities are unique in that they centre on periodic workshops devoted to investigations of aspects of primary production in aquatic systems designed to:

- access the status of knowledge on aquatic primary production, in particular with respect to current and future methodology;
- perform joint field experiments using different techniques to test comparability and reliability; and
- define gaps and re-assess global research goals for the future.

These workshops involve between 40 and 60 scientists who get together for 7-10 days of intensive experimental studies covering a range of laboratory and field approaches supported by a host laboratory. Experimental results of the workshop are presented briefly at the end of the workshop and later re-analyzed and published in international peer-reviewed journals.

Recently the chair of the International Organising Committee for GAP, Richard Robarts, stepped down from the position after many years of valuable service to the group. We have since taken the opportunity to re-organize and reinvigorate the group by the introduction of a number of young, enthusiastic researchers. Thus, the International Organising Committee of GAP currently consists of John Beardall (Australia) and Vivian Montecino (Chile) [joint chairs], Tom Berman (Israel), Zvy Dubinsky (Israel), Katherine Richardson (Denmark), Katrin Teubner (Austria), Ruben Sommaruga (Austria), Jean-Pierre Gattuso (France), Pablo Serret (Spain), Peter Brossard (Switzerland) and Patrick Neale (USA).

We hope that our next workshop will be held in Eilat, Israel and Zvy Dubinsky is presently co-ordinating the planning effort for this. The Eilat location offers access to, inter alia, an oligotrophic sea, hypersaline algal mats and ponds, high-rate algal mass culture systems and diverse algal-coral symbioses. The lab facilities are

excellent. The local organisation will also involve colleagues from the Palestinian Authority and Jordan, with whom Zvy and colleagues have on-going scientific collaborations.

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Announcements

NEW Water Science Website from the U.S. National Academies

The U.S. National Academies is pleased to announce the launch of its Water Information Center, a portal of more than 100 peer-reviewed reports from the National Academies on water-related issues. The website (*http://water.nationalacademies.org <http://water.nationalacademies.org/index.shtml?wcat=O>*) aims to assist the work of water scientists, engineers, managers, policy-makers, and students throughout the world. These reports represent independent and objective consensus among experts from academia, industry, and other entities.

The website features the following major topics:

- Water Supply and Sanitation
- Water and Soil Remediation
- Hydrologic Hazards
- Water Quality in the Natural Environment
- River Basin Systems Management
- Environmental Assessment, Management, and Restoration
- Water Science and Research

All of the reports can be read for free on-line, and summaries are freely downloadable as PDFs. If you are from a developing country, the full reports can be downloaded for FREE (A list of countries eligible for free PDFs is available at *http://www.nap.edu/info/faq_dc_pdf.html*). A large number of reports are also available for free download for residents of other countries.

Please forward this to anyone who might be interested in this website.

If you have questions or comments, contact:

Ellen de Guzman
Email: water@nas.edu
202-334-3422
Water Science and Technology Board
The National Academies
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Book Reviews

Rivers of North America

Arthur C. Benke and Colbert E. Cushing (eds.)
1168 pp. 2005, hardbound
Academic Press, Burlington, MA, USA
ISBN 0-12-088253-1
USD $99.95

This book is a compilation by 69 authors to provide comprehensive information on 218 rivers throughout the North American continent with the goal to educate, synthesize and motivate readers to understand and protect rivers as a resource. The book is organized into 22 chapters, each highlighting a specific river basin or region. These include the Atlantic Coast Rivers of the Northeastern and Southeastern United States, Gulf Coast Rivers of the Southeastern and Southwestern United States, Lower Mississippi River and its tributaries, the Southern Plains Rivers, the Upper Mississippi River Basin, the Ohio River Basin, the Missouri River Basin, the Colorado River Basin, the Pacific Coast Rivers of the Coterminous United States, the Columbia River Basin, the Great Basin Rivers, the Fraser River Basin, the Pacific Coast Rivers of Canada and Alaska, the Yukon River Basin, the Mackenzie River Basin, the Nelson and Churchill River Basins, the Rivers of Arctic North America, the Atlantic Coast Rivers of Canada, the St. Laurence River Basin and the Rivers of Mexico. Each chapter provides in-depth detail for up to five rivers selected from each region or basin to represent differences in size, physical diversity, biological diversity, ecosystem function and degree of human influence. The target audiences are river scientists, conservationists, paddlers, river recreationists, sports fishermen, academics, government scientists and the general public who are looking for benchmark reference material on general aspects of geology, hydrology, ecology and human impacts for the major river basins of North America.

This book is a wonderful compilation by contributing authors who are well respected in their fields of research. The editors have done an excellent job integrating and ensuring consistency in the presentation of material among the different authors. One of the most interesting and unique features of this book are the concise one-page summaries following each chapter. These summaries highlight up to 12 rivers for each chapter and include abbreviated descriptions of physical and biological features; graphs of monthly temperature, precipitation, and runoff; and a color topographic map showing major tributaries, cities, dams, and boundaries of physiographic provinces. These summaries are very useful, accessible, and informative overviews.

In our review, we found that literature referenced in some of the chapters was outdated. However, with an effort of this magnitude it is likely that these omissions resulted due to time differences between when chapters were submitted and the book was published. As the goal of the book was to describe and characterize the rivers and identify those with major problems (Preface), incorporating a section on aquatic ecosystem health assessment (e.g. rate of land and water change) or comparative risk analysis among regions or basins would have provided a clearer picture of the rivers which have undergone the greatest change and are at highest risk. Overall however, true to its stated goal, this book is an excellent reference for those looking to gain a more holistic understanding of the characteristics of our North American rivers.

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Iconographia Diatomologica vol. 14: Diatoms of North America: The Freshwater Flora of Cape Cod, Massachusetts, U.S.A.

by P.A. Siver; P.B. Hamilton; K. Stachura-Suchoples & J.P. Kociolek
463 pp., 2005, hard cover
A.R.G. Gantner Verlag Kommanditgesellschaft, Ruggell
ISBN 3-906166-17-1
160.00 EURO (US$ 200.00)

The books of the series Iconographia Diatomologica need no recommendation to diatomists. The comprehensive floristic works of this series serve as valuable identification guides and provide distribution data for the diatoms of various kinds of water environments throughout the world. Ten years after the first volume was published, we have the pleasure of welcoming the 14th one. This volume is devoted to cataloguing and documenting diatoms recorded in cores retrieved in 1996-1998 from 56 small ponds and lakes of the Cape Cod Peninsula. The results of paleolimnological reconstruction and ecological investigations have been published earlier, but some of the conclusions were repeated in the Introduction to the volume.

The book comprises:

- an introduction to the Cape Cod Peninsula, its freshwater ponds and lakes describing the regional geography, geology, physical and chemical characteristics of 56 of Cape Cod's 343 waterbodies,
- general information on the diatom flora, with illustrated examples of the terminology used, to describe the major diatom frustule features,
- short but pithy descriptions of each illustrated taxon (taxonomic authority, basionym, synonyms, size ranges, literature, taxonomic notes, and ecological remarks including pH, total phosphorus tolerance and optima for any taxon found in at least five waterbodies),
- references (23 pages),
- 94 plates with 1,075 figures,
- five Appendices, which comprise a detailed list of localities, over 20 chemical and physical parameters of each lake/pond studied (for better recognition of the environmental background), the accession numbers of all samples deposited in the California Academy of Science and the Canadian Museum of Nature, and a Taxonomic Index.

Like previous volumes, it delivers a great deal of information from careful microscopic examinations, supported by very good pictorial documentation of 228 of the 315 diatom taxa identified. In contrast to previous volumes, and to the satisfaction of non-taxonomists, the 14th volume is rather conservative in its taxonomical innovations, and only two new combinations are proposed - Staurosirella pinnata var. lancettula and S. pinnata var. trigona. The genera most rich in taxa presented here were Pinnularia (23), Eunotia (24) and Neidium (14). Each of the taxa discussed is documented by between one (e.g., Craticula acidoclinata, Eucocconeis diluviana) and a dozen or so pictures (e.g., 12 micrographs of Kobayasiella pseudosubtilissima). In many cases the same specimen has been documented using a variety of optical methods (bright field, phase contrast, differential phase contrast, reflected interference contrast), that can be useful but does not always, reveal meaningful differences. On the other hand, the SEM photos of diatoms whose identification was difficult or uncertain are of an excellent quality. The reader might regret the lack of even approximate information about North American distribution of the discussed and documented diatom species.

These minor drawbacks detract little from the overall excellence of this book; the value of the presented data and documentation is incontrovertible. Certainly for American diatomists this book is indispensable. It might be said with equal justice that the book will be very useful to limnologists all over the world.

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SILnews Editor

SILnews, the SIL newsletter, was first published in 1987 and is distributed three times annually to all members. The present editor of the newsletter, Dr. Richard Robarts, has advised SIL of his resignation in early 2006. SIL expresses its great appreciation to Dr. Robarts for excellent service as editor of the newsletter and to Clara Fabbro as assistant editor.

SIL seeks a new editor for this newsletter. This is a job that requires dedication and persistence. Interested parties, or recommendations for individuals who might be contacted about this work, should be sent to the Acting General Secretary at:

lewis@spot.colorado.edu

William M. Lewis, Jr.
Acting General Secretary and Treasurer, SIL

Iconographia Diatomologica vol. 15: Taxonomy - Biogeography - Diversity Annotated Diatom Micrograph (Diatoms of Uruguay)

by Ditmar Metzeltin, Horst Lange-Bertalot and Felipe García-Rodríguez
Edited by Horst Lange-Bertalot
737 pp., 2005, hardcover
A. R. G. Gantner Verlag K.-G.
ISBN 3-906166-25-2
EURO 180.00

This large and lavishly illustrated book is the third volume concerning diatoms occurring in South America. It deals with the taxonomy and distribution of numerous diatom taxa found in different habitats of Uruguay, including large and small rivers, grottos, artificial dams, coastal lagoons and the Rio de la Plata estuary. This is the first monograph covering the diatom flora of the whole country, which complements previous incomplete knowledge of the floristic spectrum of many areas. In the recent and fossil material collected in 15 areas of the country ca. 1,000 (mostly cosmopolitan) diatom taxa were identified. Many of them have only been recorded exclusively from other regions of South America, i.e., the tropical part of this continent and the Andes. Moreover, 96 taxa and one genus are described as new in this volume.

The book consists of an English and a Spanish summary, followed by a description of the areas of study and a list of selected sampling localities. The following bilingual chapter contains some brief information on special results of the diatom studies. A "Quickfinder for plates" with new taxa or combinations is then presented. The most valuable contributions of this volume are the diagnoses (in Latin) of new taxa, with the "Typus" and the "Locus typicus", followed by an English/Spanish description, as well as their distribution and some other important remarks. The greatest strength of the book lies in the high quality SEM and LM micrographs illustrating the details of the morphological structures of all identified diatoms. Each of the 3,603 figures included in the 241 plates is provided with the sampling location and when available as well as short taxonomical comments. An index of all illustrated taxa is included at the end of the book.

In summary, the book can be highly recommended for anyone interested in diatom studies. It can be used not only as an important source of information about the diatom flora of Uruguay, but this monograph, presenting so many taxa known from other regions of the world will be a great help for taxonomical research, especially as it is so well-illustrated.

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Calendar of Events

2006

8th CILEF (International Conference of French-Speaking Limnologists).
17 - 21 March 2006
Hammamet, Tunisia
Contact: Habib AYADI, Sfax (Tunisia)
abib.ayadi@fss.rnu.tn
Web site: http://www.ait.org.tn/cilef

54th Annual Meeting of the North American Benthological Society.
4 - 9 June 2006
Anchorage, Alaska, USA
Additional information is posted on Society website: *www.benthos.org*

The 5th Conference of the Aquatic Birds Working Group of the International Association of Limnology "**Limnology and Waterbirds 2006**".
26 - 30 August 2006
Eger, Hungary
Conf. information: *http://aquabird.ektf.hu/*
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Speciation in Ancient Lakes - 4 (SIAL - 4).
4 - 8 September 2006
Berlin, Germany
Contact: Chairman and organizer -
Prof. Dr. Frank Riedel
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Phone: +49-30-838-70-283

The Tenth International Symposium on Aquatic Oligochaeta.
16 - 26 October 2006
The Institute of Hydrobiology
Chinese Academy of Sciences
Wuhan, China
Contact: Dr. Hongzhu Wang, D.Sc.
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Phone: +86 27 87647719
Fax: +86 27 87647664
Inquiries requesting additional symposium information should be sent to both of the following email addresses: *ISAO2006@ihb.ac.cn* and *ISAO2006@yahoo.com.cn*
Official symposium website:
http://www.ihb.ac.cn/isao2006/index.htm
Symposium information is also presented here:
http://www.inhs.uiuc.edu:80/~mjwetzel/ISAOBdir.html

2007

SIL2007 in Montréal.
Preparations for the next SIL Congress in Montreal are continuing. The local organizing committee is working towards an exciting scientific program with several special sessions as well as a series of excursions. Please visit the congress' website for more complete information and updates at *http://www.uqam.ca/SIL2007*

2008

Plant Litter Processing in Freshwaters-PLPF5 Meeting
July 23-26, 2008
University of Coimbra, Portugal
Contact: Cristina Canhoto
Department of Zoology
University of Coimbra
3004-517 Coimbra
Portugal
Phone: +351 239 828071/+351 239 834729
Fax: +351.239.826798
Email: *ccanhoto@ci.uc.pt* or *mgraca@ci.uc.pt*
(please indicate subject: PLPF5).
Congress website will be available soon.

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For Your Information

SILnews is now on the SIL web site in PDF format. The newsletter is created in Adobe Acrobat, Version 5. To open, use Adobe Acrobat Reader.

Attention:
Manufacturers of Limnological Equipment and Publishers

SILnews accepts *advertisements* for equipment and publications that will be of interest to SIL members.

SILnews is distributed three times a year to more than 3,000 members and libraries world-wide. If your company is interested in acquiring advertising space in SILnews, please contact the Editorial office for rates at *richard.robarts@ec.gc.ca* or use the mailing address indicated on the front page.

A complimentary copy of SILnews, in which your advertisement appears, will be sent to you once it has been published. SILnews is posted on the SIL web site at *www.limnology.org* after it has been published and your advertisement will appear there.

Limnology Job and Studentship Notices

Notices on the availability of limnologically-oriented jobs and graduate student opportunities are now accepted for publication in SILnews and displayed on the SIL web site at *www.limnology.org*. There is no charge for the service at this time, which is available to SIL members and non-members.

Persons submitting notices should note the four month lead-time for the print edition of SILnews; those advertisements with short deadlines should be directed to the web site only.

Submissions should include:

- a short title describing the position (job or studentship);
- location and duration of the position;
- closing date for applications;
- a short paragraph describing the position, including any citizenship, educational or employment prerequisites; and,
- information on where potential applicants may obtain further information, including names of contact persons, telephone numbers, fax numbers, e-mail addresses, and web site addresses, where appropriate.

Submissions may be edited for length and clarity. Those deemed inappropriate to the SIL mandate will be rejected at the discretion of the SILnews Editor or the Webmaster. Submissions for the print edition of SILnews should be sent to the editor at the address on the cover of this issue.

Submissions for the SIL web site should be sent by e-mail to *webmaster@limnology.org* or by fax to the attention of

Gordon Goldsborough at: +1 (204) 474-7618.