



# SIL news

Volume 34 September 2001

**The International Association of Theoretical and Applied Limnology** (Societas Internationalis Limnologiae Theoreticae et Applicatae, SIL) promotes and communicates new and emerging knowledge among limnologists to advance the understanding of inland aquatic ecosystems and their management.

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*The confluence of the Fraser River and its major tributary, the Thompson River located about 200 km upstream from the ocean. (Photo taken by Mark Sekela, summer of 1991)*

Material for the January 2002 issue should be sent to the Editor for **October 1, 2001:**

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Contributions on a PC formatted disk, in any standard word processor or DOS (ASCII) text, or as email attachments, will assist the Editor.

## Assessing Contaminant Impacts in the Fraser River

by  
*Colin Gray and Taina Tuominen*

*continued on next page*

The Fraser River is a major ecological asset in Canada which provides many economic and social benefits to the two and half million people who live in its basin. It still exhibits much of its original biological diversity because its main channel has not been controlled to any significant degree by dams and industrial, agricultural and urban development has not been extensive in its tributary basins. Even though the “foot print” of humanity is not large here, significant water quality degradation has been documented.



Figure 1 - The location of the Fraser River Basin in the province of British Columbia in Canada.

The river's basin is large (234,000 km<sup>2</sup>) and after flowing for 1,375 km from its headwaters in the Rocky Mountains to its delta at the Strait of Georgia near Vancouver, it attains a stream-order of eight (Figure 1). The river displays a pronounced late spring flood with maximum daily discharges as high as 15,000 m<sup>3</sup> s<sup>-1</sup>. The mean annual discharge is 3,600 m<sup>3</sup> s<sup>-1</sup>. The river upstream of the coastal lowland is frequently ice covered for several months of the winter when even lower flows are observed (< 400 m<sup>3</sup> s<sup>-1</sup>).

Since the last ice age, human settlement has been dependent on the river's fishery resources, particularly salmon, which return from the ocean in large numbers to spawn. During the 1900s, agricultural and urban development, along with the construction of dykes, in the lower flood plains altered the habitat and water quality of the river, especially in the estuary. In the 1960s six pulp mills built in three cities in the upper basin which, along with the resultant increased human

population, began to degrade the water quality. By the 1980s, the aquatic ecosystem was showing serious signs of pollution. For example, levels of dioxins and furans in whitefish, downstream from pulp mills, exceeded Canadian human consumption guidelines and levels in heron eggs, collected in the delta area many hundreds of kilometres downstream, were at levels which were causing measurable effects on heron chick health. It was also becoming obvious that projected urban and industrial development was likely to significantly increase these contaminant burdens which, in turn, could affect survival of juvenile salmon on their migration to the ocean and increase contaminant levels in resident fish and fish-eating birds. These observations led to new pollution abatement programs by federal and provincial agencies in the 1990s. In 1992, Environment Canada started a comprehensive assessment of contaminant stress and its effects on biota in the basin to evaluate the progress of these programs and the needs for further pollution control. This article provides a summary of its assessment completed in 2000.

To assess a basin of this size and diversity, developing a small number of basin-wide indicators for tracking contamination in components of the aquatic ecosystem appeared to be the most feasible approach. Similarly, biological impacts from selected significant pollution sources such as pulp mills and runoff from agricultural and urban areas were evaluated. The research entailed sampling water, suspended and bed sediments, fish, birds and mammals for analysis of contaminant burdens and assessing impacts on invertebrate community structure and on fish, amphibian, and wildlife health as indicated by various biochemical, histological or physiological observations. The research and surveys were undertaken by a multi-disciplinary team made up of scientists from three research components in Environment Canada National Water Research Institute (Burlington, Ontario & Saskatoon, Saskatchewan), Aquatic and Atmospheric Sciences Division (Vancouver, British Columbia) and Pacific Wildlife Research Centre (Delta, British Columbia), and the Institute of Resources and Environment at the University British Columbia. Additional expertise was supplied by others at the universities of British Columbia, Simon Fraser and Waterloo, the Federal Department of Fisheries and Oceans and environmental consultants.

The scientific results and their implications were synthesized into a two volume report entitled, “Health of the Fraser River

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aquatic ecosystem: a synthesis of research conducted under the Fraser River Action Plan” available at: [www.pyr.ec.gc.ca/ec/frap/fin.html](http://www.pyr.ec.gc.ca/ec/frap/fin.html) or from the Aquatic and Atmospheric Sciences Division, 700 - 1200 West 73rd Ave, Vancouver, BC, Canada V6P 6H9. The report contains 22 chapters summarizing the research of over 30 studies on contaminant transport via sediments, contaminant exposure and effects, indicator species, new guidelines, and contaminant fate modeling.

### **The major findings were the following:**

- On a basin-wide scale contaminant concentrations in water and sediments were low, usually below Canadian guideline levels for the protection of aquatic life. The levels of several persistent organic compounds such as dioxins/furans, chlorinated phenols and pesticides, PCBs, and PAHs have all declined in response to improved treatment technologies, especially at the pulp mills, or to new regulations which limit or ban their use. In particular, dioxins and furans in all media have declined by more than 90% (e.g., mountain whitefish liver levels of 2,3,7,8-TCCD in samples below the pulp mills have dropped from over 200 pg g<sup>-1</sup> wet weight in 1990 to under 15 pg g<sup>-1</sup> in 1994).
- Indicators of contaminant exposure, such as accumulation of persistent organic pollutants (POPs) in biota and the induction of Mixed Function Oxygenase enzymes, were still observed in both fish and aquatic-based birds near pulp mills and sewage treatment plants or in the estuary. However, the effects of these levels of exposure were found to be minor in the selected fish and wildlife populations evaluated with a fish health assessment index and the measurement of fledgling success in fish eating birds.
- Non-point sources of pollutants from urban and agricultural activities were identified as the major challenge to maintaining contaminant stress at present levels or lowering them in the longterm. The contaminant impacts from these sources were predicted to be more serious than point source discharges to the main river or tributaries because much of the expansion of urban land use and the intensification of agricultural production will occur in the small tributary basins in the lower Fraser Valley, which have small streams with little capacity to dilute pollutants in runoff. Loading of PAHs and several metals (e.g., Cu, Zn, Cd, Mn, Cr) from storm sewer discharges in the Vancouver area were also predicted

to rise as the population increases (present trends predict an increase of 50% in population by 2020).

- The headwaters of the basin have been contaminated with low levels of POPs transported in the atmosphere and subsequently deposited and stored in alpine snowfields and glaciers. While concentrations are low, the levels of toxaphene, DDT, and PCBs found in one fish species from a lake in the Rocky Mountains were high enough to potentially impair the health of wildlife or larger fish which prey upon these fish.

The scientific program also produced new methods and indicators for assessing contaminant or other stressor impacts and ecosystem health. These included a portable “mesocosm system” to assess complex effluent impacts with local ecologically relevant biotic communities and a benthic invertebrate community structure assessment model to quantify the divergence of community characteristics from those which would be expected from physical habitat attributes alone. Specific “indicator” species were identified and evaluated for their utility in tracking ecosystem contamination in a way which would be relevant to environmental managers and the concerned public. The major ones were three fish species (peamouth chub [*Mylocheilus caurinus*], mountain whitefish [*Prosopium williamsoni*], burbot [*Lota lota*]), three birds of prey (osprey [*Pandion haliaetus*], great blue heron [*Ardea herodias*], bald eagle [*Haliaeetus leucocephalus*]) and one mammal (river otter [*Lutra canadensis*]); each species providing an indicator of contamination levels in different parts of the basin. New guidelines were developed for several chemicals (e.g., chemicals used in wood preservation) through toxicity testing on selected local species, including white sturgeon [*Acipenser transmontanus*] and starry flounder [*Platichys stellatus*].

Recommendations were provided to regional monitoring and environmental management agencies on the application of these new assessment tools and the need for reducing pollution from non-point sources. Several research questions were also identified and these included: 1) What approaches can be used to assess cumulative contaminant stress generated by numerous chemicals, all below guideline concentrations, on populations of invertebrates, fish, amphibians, birds and mammals? 2) Are the proposed Canadian guidelines for dioxins in fish tissue for the protection of wildlife too low? 3) Do persistent organic pollutants

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which have accumulated since the middle of the last century in the alpine glaciers and snowfields represent a long term risk to the aquatic ecosystem health of the basin's lakes and rivers if significant climate warming occurs? 4) How can the stress of habitat alteration on a species be compared quantitatively with contaminant stress in large rivers when these stresses occur in different locations and at different times in a species' life cycle?

In conclusion, this assessment of the transport, fate and effects of contaminants in the Fraser River has added a significant body of knowledge on factors which influence these processes in large rivers, particularly those in the northern temperate zone. It has also developed a quantitative baseline of contaminant levels in indicator species which will be very valuable for agencies tasked with assessing the river's aquatic ecosystem contaminant levels and health in the future.

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## **Papers for the Proceedings of the Australian Congress**

As of June 14, 2001, as editor I have completed editing all manuscripts (350) received at the 28th Congress in Melbourne. Because of an electronic difficulty with the FTP site at Congress registration, a few papers may have been lost into cyberspace. If authors have not received some notice from me by e-mail or correspondence, and submitted a manuscript delivered at the Congress, please advise me immediately by e-mail (see below). Include as an attachment your manuscript, including figures and tables (MS Word format preferred).

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## **Permanent address change of General Secretary-Treasurer and Editor (Ad hoc):**

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## Message from the President

I am pleased and honored to be the eleventh President of SIL. This international, professional society has a major and unique role in organizing, initiating and promoting limnological interests and activities worldwide. These activities are important and worthy of our support and time.

The February Congress in Melbourne, Australia was exciting and also provided an excellent venue for many of us to learn more about that wonderful country “Down Under” (see *SILnews*, Volume 33). Many thanks to the organizers of the meeting for their efforts and dedication. Some 700 persons attended this meeting.

These triennial meetings provide:

- an update on aquatic research being done around the world;
- a forum for discussion of issues vital to the use and protection of aquatic resources;
- an opportunity to gain new perspectives and insights from limnological colleagues working on diverse aquatic systems, where different issues of environment, culture and politics can affect the research;
- a focus and rejuvenation for working groups dealing with international limnological issues;
- an opportunity to meet friends and acquaintances and renew discussions about aquatic science;
- an opportunity to visit inland aquatic ecosystems and discuss aquatic resource problems of the host country through scientific excursions.

SIL offers many and diverse opportunities to facilitate international research, discussions and friendships. ***But, we have needs:***

- There is a major need to recruit more members to SIL. More members speak with a louder voice and the critical issues associated with water use and availability worldwide demand nothing less than the loudest voice. Also, our current membership does not adequately represent both the applied and the theoretical areas and interests of our disciplines, and we urgently need the involvement of more young members.
- There also is a great need to build our general endowment fund for SIL. This endowment fund is currently used entirely to support membership in SIL for “needy” limnologists. With a larger endowment we could do much more to enhance limnology and limnologists throughout the world.

Robert Wetzel and I are working on a new Mission Statement and Objectives and Goals for SIL, and we will share this statement with you in a future issue of *SILnews*.

Sadly, the following members died during the past triennium: Andersen, Th. (Denmark); Besch, W.K. (Germany); Dahl, J. (Denmark); Denecker, E. (Austria); Dobolyi, Elemér (Hungary); Duncan, N. (Great Britain); Edmondson, W.T. (USA); Frost, T. (USA); Galazija, G.I. (Russia); Groschopf, P. (Germany); Heegaard, H. (Denmark); Jannasch, H. W. (USA); Klapwijk, S.P. (The Netherlands); Kohl, J.-G. (Germany); LaPerriere, J.D. (USA); Lysén, G. (Sweden); Nissinen, T. (Finland); Nümann, W. (Germany); Pejler, B. (Sweden); Perret, P. (Switzerland); Pignalberi de Hassan, C. (Argentina); Rixen, J.U. (Germany); Rodhe, W. (Sweden); Ryhänen, R. (Finland); Schimunek, K. (Austria); Sollberger, H. (Switzerland); Sprugel, Jr., G. (USA); Straskraba, M. (Czech Republic); Vásquez, E. (Venezuela).

### Report on the Proceedings:

**Dublin Congress:** Parts 1-3 issued; Part 4 in press; Parts 5 & 6 in galley stages, out late this summer.

**Melbourne Congress:** (thanks largely to the heroic efforts of Robert Wetzel) Parts 2/3 are edited now, and being set in galley; remainder by June, to be set in galley this summer and hopefully published late 2001 or early 2002, probably in three parts and/or on one CD disk.

I look forward to seeing all of you at the next meeting in Lahti, Finland, August 8-14, 2004.

*Gene E. Likens*

## For Your Information

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

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## Announcements

### **Arthur Hasler UW Limnology Pioneer (1908 - 2001)**

Arthur Hasler, one of the leading figures in 20th century freshwater ecology, whose research answered an intriguing mystery of nature - *how migrating salmon precisely identify their "home" waters* - died on Friday, March 23, 2001 after a long illness. He was 93.

Arthur, a professor emeritus of limnology who spent 41 years on the faculty at the University of Wisconsin-Madison, made a number of enduring contributions to the field of lake research. His most famous research came in the late 1940s, when he developed ways to demonstrate how "olfactory imprinting", a finely honed and ingrained sense of smell, enabled salmon to journey literally thousands of miles to spawn in the precise stream of their birth.

The idea for the study occurred to Arthur when he visited a mountain stream near his hometown in Utah, and was struck by how the smells of native plants seemed to rekindle childhood memories. His research formed the basis for better management practices on an international scale, and impacted salmon management programs in the Great Lakes, the Pacific Northwest and Europe.

"Many people who work on ecological problems today remain awed by the insightfulness of Arthur's research", says John Magnuson, retired director of the UW-Madison Laboratory of Limnology and longtime colleague. "He was a big thinker and had grand ideas, but he also believed you were not done with your research until you dealt with its applications in society".

Arthur, a 1969 inductee to the National Academy of Sciences, also pioneered a new way to study ecological problems by creating controlled experiments of entire lake ecosystems. Magnuson said Arthur recognized that lake ecosystems were too complex to be studied piecemeal in a laboratory setting. His most famous "whole lake manipulation" was at Michigan's Peter and Paul Lakes in the 1950s. Arthur constructed a barrier in the middle of the hourglass-shaped, connected lakes and used one side as a control, while using the other side to measure the effects of water chemistry on

aquatic life. Whole-ecosystem experiments are widely used today in lakes, streams, forests and oceans. Scientists who trained under Arthur have founded research centers that follow his model in the U.S. and Canada.

Arthur's research also helped define the importance of land-water interactions as a primary variable in the water quality and ecological health of lakes. His work on problems such as "cultural eutrophication", or the excessive loading of nutrients into lakes surrounded by urban and agricultural land, helped inform efforts to divert sewage and control fertilizer runoff and soil erosion in lakes, including Lake Mendota in Madison and the Yahara River chain of lakes.

Arthur served as an advisor to 52 doctoral students during his tenure at UW-Madison, and was author of more than 200 publications and seven books on the field of limnology. He was a past president of the American Society for Limnology and Oceanography, the American Society of Zoologists and the Ecological Society of America. Arthur was also a founder and first director of the Institute for Ecology. He was elected to the American Academy of Arts and Sciences in 1972, and held many lifetime service and achievement awards from limnology and ecology professional societies, both national and international.

At UW-Madison, Arthur played key roles in the development of the Laboratory of Limnology, built along Lake Mendota, and the Trout Lake Biological Station in northern Wisconsin. Both lakeside research labs have helped further UW-Madison's international prominence in the study of freshwater ecosystems.

UW-Madison had been known as the birthplace of lake research in North America by the time Arthur first came to Madison as an instructor in 1937. Two zoologists, E.A. Birge and Chancey Juday, essentially created this science in the early 1900s using Wisconsin lakes. Both leaders were aging when Arthur began, Magnuson says, and he rekindled the study in a second generation of scientists.

Magnuson says that Arthur made a profound impression on many of his students, both graduate and undergraduate, not only for his science, but also for the social responsibility he conveyed. He taught ecology of fishes and limnology to

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undergraduates for most of his Madison career. “He used to read German poetry in his classes about the beauty of lakes. He imparted a moral and ethical sense of the value and beauty of nature”, Magnuson said.

One project Hasler attempted to stimulate during his emeritus years was called “Salmon for Peace”. He hoped to bring the governments of Russia and China together around the shared goal of salmon management in the Amur River, which shares borders with both countries. The river’s salmon population is collapsing due to overfishing. He hoped his studies could be used to re-establish lost salmon runs, but the two countries never came together on the idea.

Arthur was born in 1908 in Lehi, Utah, and graduated from Brigham Young University with a bachelor’s degree in 1932. He earned his Ph.D. in zoology from UW-Madison in 1937. Arthur spoke fluent German, and in 1945, he served as a research analyst with the U.S. Air Force Strategic Bombing Survey in post-World War II Germany. He appreciated the opportunity to visit laboratories and meet with natural scientists that had survived the war, some of whom became longtime colleagues.

Arthur Hasler is survived by his wife, Hatheway, and his children, Sylvia (Thatcher), A. Frederick, Bruce, Mark, Galen and Karl.

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## **Water on the Web: The Global Water Information Network**

The Global Water Information Network, (GLOBEWINET) is an Associated Programme of the Global Water Partnership (GWP), implemented by the German Agency for Technical Cooperation (GTZ) with German Government funding. The Web site provides information on transboundary river basin organizations, national and international water law and legislation, national water administrations, and country-level water resources information. GLOBWINET incorporates two regional networks: SAWINET, the Southern African Water Information Network; and, GEWINET, the German Water Information Network. Please see [www.globwinet.org](http://www.globwinet.org) for more information.

## **2003: UN International Year of Freshwater**

The General Assembly of the United Nations has proclaimed that 2003 is to be the International Year of Freshwater.

Such initiatives are intended to further international cooperation and understanding and member states, national and international organisations, major groups and the private sector are called on to contribute. The declaration encourages all member states, the UN system and all other actors to take advantage of the year to increase awareness of the importance of freshwater and to promote action at the local, national, regional and international level.

The UN Administrative Committee on Coordination Subcommittee on Water Resources, which coordinates activity of the UN system in relation to water, has been asked to serve as the coordinating entity for the year and to develop preliminary proposals on possible activities, including possible sources of funding.

## **United Nations Commission on Sustainable Development Freshwater Issues**

The Sub-Committee on Water Resources of the UN Commission on Sustainable Development (CSD) maintains a web site on freshwater issues that includes official documents on freshwater management from the UN General Assembly and the CSD, reports on interagency activities, and links to national reports on freshwater. The web site is [www.un.org/esa/sustdev/water.htm](http://www.un.org/esa/sustdev/water.htm).

## **Third World Water Forum to be held in Japan**

Plans are now under way to hold the Third World Water Forum in Kyoto, Japan, in March 2003. This meeting will continue discussions of the World Water Vision and action plans to implement the vision begun at the Second World Water Forum at The Hague in March 2000. The Third Forum will concentrate on identifying examples of the implementation of integrated water resources management throughout the world and seeking commitments of governments and other organizations to pursue the goals of the Vision with specific actions. Please see [www.worldwaterforum.org](http://www.worldwaterforum.org) for further details.

### The Hydrobiological Station at Lake Glubokoe (Russia)

The Hydrobiological Station at Lake Glubokoe was established in 1891 and has been in operation continuously, and celebrates its 110th year of activities this year. As a result of this long history of research, Lake Glubokoe now belongs to the '*famous lakes of the world*'.

The lake and the station are situated about 90 km from Moscow, in a natural complex of mixed forest and swamps; one of the few surviving in close proximity to Moscow. The lake is 1,200 m long, 800 m wide and about 33 m deep, displaying typical stratification of physical and biological characteristics. For this reason, it is convenient, and a model site for studies of limnological processes.

The station belonged to the Russian Academy of Sciences since 1939, and presently is a unit of the Institute of Ecology and Evolution (Moscow) (Director, Academician D.S. Pavlov). The authorities have allocated the lake and the station's land to the Institute.

Summaries of work done at the station may be found in:

- ◆ Lake Glubokoe, Developments in Hydrobiology 36, 1987, Dr. W. Junk Publishers;
- ◆ Centenary of the First Lowering of a Plankton Net at Lake Glubokoe (and in Russia). SILnews, 1995, 16, p.7;
- ◆ Proceedings of the Hydrobiological Station at Lake Glubokoe, 1997, vol. 7, Argus; Moscow.

Some facts about Lake Glubokoe are cited in various handbooks, for example:

- ◆ A Treatise on Limnology by G.E. Hutchinson, vol. 1, New York: Wiley, 1957;
- ◆ The Functioning of Freshwater Ecosystems, E.D. Le Cren and R.H. Lowe-McConnell, eds., Cambridge University, 1980.

The Hydrobiological Station at Lake Glubokoe is a work site for several laboratories of the Institute of Ecology and Evolution, for scientists from other institutions, and for occasional field trips by university students. Periodically ichthyologists undertake special investigations of fish.

Scientists from the laboratory headed by Yu.B. Manteifel of the Institute of Ecology and Evolution are performing permanent studies on amphibian neurophysiology. The station actively supports international contacts.

The research program done at the Station consists of mainly zoological topics. Cladocera collected or obtained from different climatic zones (samples are always highly appreciated) are comparatively treated and the results of the species identification are forwarded to the originator.

During the past 10 years investigations concentrated in two main directions. The first direction dealt with long-term aspects of biological processes in the lake. Principally, zooplankton and littoral fauna were recorded, with occasional surveys of benthos. Monitoring of crustacean zooplankton by N.M. Korovchinsky revealed a regular trend in succession of *Daphnia* species, with a prominent role of the hybrids between *Daphnia cucullata* and *Daphnia galeata*. In 2000, the numbers of *Daphnia cucullata* increased for the first time in 15 years and the abundance of hybrids decreased. The second direction continued a permanent program of cladocera investigations, both locally and worldwide.

In 1987, Lake Glubokoe contained 671 known species or groups from fish to bacteria. In 1997, a list of 421 species of algae, recorded in Lake Glubokoe since the start of investigations, was published, including new unpublished data. A complete list of vascular plants of the lake and of its catchment was also published. Recent additions to the fauna include lists of Trichoptera, Nematoda, and Gastrotricha. Various groups of littoral insects are being studied, beginning with Coleoptera.

The station site remains essentially in its original condition. The natural complex is generally in good state, even though the immediate proximity of the lake is frequented by tourists and fishermen. There are about ten working benches, partly occupied by permanent staff. There is electricity, but no other conveniences. Basic scientific equipment and boats are available. A house was recently reconstructed where the manager and his family live year round. Scientists stay mainly from May till September. Efforts are being made to modernize the station.



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Visitors to the station are welcome to apply their methods to various components of the lacustrine ecosystem. There is no charge, but everyone is expected to support and serve themselves. Potential donations (i.e., equipment) would contribute to the improvement of the station. Sleeping facilities are provided. A wide range of aquatic issues are open for investigation while terrestrial and wetland systems await study.

Please contact me at [nik.smi@g23.relcom.ru](mailto:nik.smi@g23.relcom.ru) for further information.

*N.N. Smirnov*  
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My first SIL Congress was the 15th in Madison, Wisconsin and from then on I tried to attend every possible one and/or supported my students to do so. Over the years my wife and I have developed many long and rewarding friendships from SIL meetings, not only its Congresses, but also its wonderful pre- and post-Congress tours and other functions.

SIL has blossomed into a most dynamic and active international society around its Founders' aims of promoting both theoretical and applied limnology of the very highest quality, through its several formal publications, its working groups, its reviews of limnology in developing countries, its Circulars, its News, and so on.

However in my view there may be a gap in its expanse. This is in reaching out effectively to the general public, and particularly to the young, to help them realize what limnology is, what it does, and why it is so vitally important! Too few I find, even know that there is a science called limnology!! Most, by oceanography's name, understand something of its subject area at least, but not so for limnology. When I tell people that I am a limnologist, they very often say "Oh that sounds interesting - do you study tree limbs or human limbs?". Funny perhaps, but rather tragic. We as limnologists could do a better job in promoting general understanding of our science.

To be sure there are some outstanding exceptions - Jack Vallentyne with his "Algal Bowl" book and with the globe on his back has tried valiantly (see page 12). There have been efforts in limnological school education in Brazil, in Norway, and especially in Japan. There, around ancient Lake Biwa with its superb museum, Dr. Hiroya Kawanabe and others have most effectively promoted appreciation of that lake's remarkable resources by the general public and by the young.

In my small way I have for several decades been visiting schools from kindergarten to senior high under the B.C. "Scientists in Schools" program started by Peter Larkin, among others but we need much more such activity. Why not a SIL-LIS program; i.e., a SIL Limnologists in Schools program? The opportunity and challenge is there! Could not all SIL members devote a couple of days at least each year to being Limnologists in Schools? What better way, across the world, to further general understanding of our science by those who soon will be the next generation to apply that knowledge to appropriate use, preservation, and restoration of our inland waters!

*Tom Northcote*  
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## **What is a limnologist?**

### **Acceptance speech by Tom Northcote on being awarded the Naumann-Thienemann Medal**

I am very highly honoured to have been selected as a recipient of the Naumann - Thienemann Medal of the Societas Internationalis Limnologiae (SIL) at the 28th Congress.

I first learned something of SIL in 1952 when after working four long summers on a limnological survey of over 100 British Columbia (B.C.) lakes, my supervisor, Dr. Peter Larkin, told me that now I had better get busy and write up the results.

On starting to do so, I came across a relevant publication in German by Dr. Einar Naumann - his 1932 treatise of 176 pages in *Binnengewässer* 11, "Characteristic features of regional limnology" in my poor translation of its title. After struggling in translation of this work for several weeks, Peter Larkin came to my rescue with a German zoology exchange student and together we finished its translation. In doing so I came to appreciate the breadth and depth of Naumann, one of the Founders of SIL. It was Naumann's insight that helped me pull together in some meaningful manner the factors setting the amazingly diverse levels of productivity in British Columbia lakes.

I missed going to the 13th Congress of SIL, in 1956 in Finland, though Dr. Winifred Frost of the Freshwater Biological Association (FBA) had offered to support my travel from Cambridge to it. I was then too deeply into my research on movement and migratory behaviour of fish with Professor James Gray, but Dr. Larkin and I gave a paper at that Congress on typology of B.C. lakes.

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## Environmental Insights

### A Philosophic Prophecy is Coming True

I recently had to present the biennial Stander memorial lecture in Pretoria. This lecture series had been instituted to honour Dr. Gerrie Stander, the pioneer of South African water research and a previous four-term President of IAWQ (International Association of Water Quality) (1969-1977). I chose as my lecture theme “The changing face of water research”, emphasising how water research to an increasing extent has to align itself with the concept of integrated water resource management.

At the time I was working on my lecture, I also happened to do some reading on the life of Field Marshall Jan Christian Smuts, and learned he was the first to define the concept of holism as a universal process and to actually call it holism. I was thrilled to realise that his philosophic views, expressed more than 75 years ago, are being embodied exactly in the integrated approach to water management that is so universally being urged today.

Most readers - except South Africans - may never even have heard of Jan Smuts (1870 - 1950). Actually, he was one of the most remarkable men of the 19th Century, as admitted by Sir Winston Churchill in a letter to Mrs. Smuts when her husband passed away: “There must be comfort in the proofs of admiration and gratitude that have evoked all over the world for a warrior-statesman and philosopher who was probably more fitted to guide struggling and blundering humanity through its sufferings and perils towards a better day, than anyone who lived in any country during his epoch”.

What made him such a great man? Probably his versatility and broadness of vision: he was a lawyer by profession and a botanist of repute; a Boer General in the Anglo-Boer War, 1901-1902; fought in the South-West African and East-African campaigns during the First World War; served in the British War Cabinet, 1917-1918; South African Prime Minister 1919-1924 and 1939-1948; President of the British Association for the Advancement of Science, 1931; Chancellor, University of Cambridge; and was awarded 26 honorary doctoral degrees by universities all over the world.

At the same time he was a trail-blazing philosopher and expounded the concept of holism in his book *Holism and*

*Evolution* in 1924. Holism stresses the interdependence and dynamic nature of systems. It points to parallels, connections and underlying unities. In his book Smuts makes the prophetic statement: “It is my belief that Holism and the holistic point of view will prove important in their bearings on some of the main problems of science and philosophy, ethics, art and allied subjects”. This is indeed what is now coming to pass in a range of human endeavour and thinking.

We find that the concept of holism has become fairly entrenched in philosophic thinking, and is rapidly diffusing into politics, science, economics and into strategies relating to the sustainable use of natural resources. This latter context is specifically germane to the field of water management, where the holistic or integrative approach is becoming increasingly evident. Indeed, this has been clearly articulated with growing urgency over the last decade, particularly at the landmark conferences in Dublin (1992), Rio de Janeiro (1992) and The Hague (2000).

Smuts makes the statement: “Science has come around to the view that the world consists of patterns, and I construe that to be that the world consists of wholes... The wholes and parts formed and shaped each other. Yet the whole was greater than the sum of its parts”. In a communication I received some months ago from Dr. Bruce Beck, Chair of the IWA (International Water Association) Specialist Group on Systems Analysis and Computing, he stated that he had long argued in favour of integrated urban water management, simply from the classical “systems perspective”, that properly orchestrated management of the whole may be more than the sum of the separately managed parts. This echoes in modern practical scientific terms the philosophy expressed by Smuts. Add to this the precepts of chaos theory, and it becomes clear that in a sense Smuts was a modern day prophet.

A pinch of philosophy in our lives is not a bad thing!

*Piet Odendaal*  
IWA Co-President  
South Africa

*This article is reprinted with permission from Water21 (Magazine of the International Water Association), p.65, February 2001.*

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## Reports on Working Groups

### Aquatic Birds

Limnology and Aquatic Birds: Monitoring, Modelling and Management. 2000.

F.A. Comin, J.A. Herrera-Silveira, and J. Ramirez-Ramirez, Editors.

Universidad Autónoma de Yucatán, Mérida, Yucatán, México. (ISBN 968-7556-98-7)

The Working Group on Aquatic Birds of SIL meets periodically, usually triennially, to evaluate limnological aspects of aquatic birds. This book contains the proceedings of the Second International Symposium on Limnology and Aquatic Birds that was held in Mérida (Yucatán, México) in November 1997. Some 22 papers are grouped into three subject areas. (1) The limnological basis of aquatic bird habitats evaluated characteristics of aquatic environments in relation to the abundance, distribution, behavior, and ecophysiology of aquatic birds. Methods of monitoring aquatic birds and their habitats were discussed. (2) Modelling of energy and other links of aquatic ecosystems to aquatic birds are evaluated. Particular attention is directed toward sources of food and the impacts of birds on lower trophic levels, as well as how the birds can influence nutrient dynamics in these ecosystems. (3) Integration of management of aquatic ecosystems in relation to bird conservation.

*Robert G. Wetzel*

### Aquatic Invasive Species (WGAIS)

During calendar year 2000 a workshop, "Invasions of European and North American Ecosystems by Ponto-Caspian Species", was held under the sponsorship of the WGAIS in association with the American Society of Limnology and Oceanography (ASLO). The purpose of this workshop was to bring together scientists from Europe and North America to discuss the recent predominance of successful Ponto-Caspian aquatic species invasions in the Laurentian Great Lakes and Baltic Sea, and to examine the potential for future scientific collaborations on research studies and information exchange. Financial support for the workshop was provided by the U.S. Environmental Protection Agency (Great Lakes National Program Office), the National Oceanic and Atmospheric Administration, and the Canadian Natural Sciences and Engineering Research Council.

The workshop was held in association with the ASLO 2000 Conference in Copenhagen, Denmark and was convened on June 2-3, 2000 at the H.C. Ørsted Institute at the Science Faculty in Copenhagen. Thirty-four scientists, students, and program managers attended, representing the USA, Russia, Canada, Germany, Lithuania, Netherlands, Austria, Estonia, Finland, Norway, Poland, Romania/Canada (a doctoral student at the University of Guelph, Canada), and Ukraine/Canada (a post-doctoral fellow at the University of Windsor, Canada).

The first full day of the workshop was reserved for scientific presentations. The second day was used to identify and discuss international cooperation and future directions. It became clear that additional efforts and resources would be needed to identify and engage additional scientists, especially from Ponto-Caspian basin countries.

Please see the following web site:

<http://www.zin.ru/projects/invasions/gaas/silwg99.htm> for background information on the WGAIS and existing goals.

#### Changes in Working Group leadership effective April 1, 2001

Vadim Panov has assumed primary leadership as Chairperson of WGAIS. He is a Senior Research Scientist with the Laboratory of the Freshwater and Experimental Hydrobiology of the Zoological Institute of the Russian Academy of Sciences in St. Petersburg, Russia. Vadim can be contacted by e-mail at: [gaas@zin.ru](mailto:gaas@zin.ru).

I have assumed the role of Vice-Chairperson and North American liaison for the Working Group. I am a Senior Physical Scientist at the U.S. National Oceanic and Atmospheric Administration's Great Lakes Environmental Research Laboratory in Ann Arbor, Michigan, USA. I can be contacted by e-mail at: [reid@glertl.noaa.gov](mailto:reid@glertl.noaa.gov).

During the coming year, Vadim and I will work to expand international participation in WGAIS; review and revise goals for CY2001 and CY2002; and, plan an activity for the next SIL Congress (2004).

To participate in WGAIS, please contact Vadim at: [gaas@zin.ru](mailto:gaas@zin.ru) with your name, mailing address, telephone and fax numbers, e-mail address, and an indication of how you would like to be involved.

*David Reid* for WGAIS

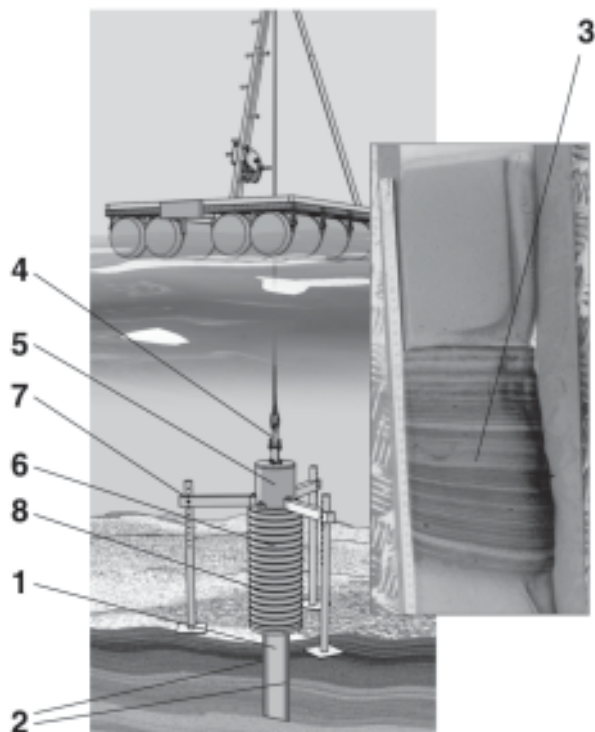
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## Letters to the Editor

### To DFO, Queens and SIL:

March 16, 2001

About a month ago, on February 12 to be exact, out of the blue I was presented with the Lifetime Achievement Award for the year 2001 by the American Society of Limnology and Oceanography (ASLO). My predecessors for this award, are a rather distinguished lot in the world of aquatic sciences, freshwater and marine. I was both surprised and delighted to be in such good company.

The Award was presented to me at the annual meeting of ASLO in Albuquerque, New Mexico, in the form of a plaque which reads: *For his exemplary research contributions in paleolimnology, biogeochemistry, and eutrophication; outstanding administrative accomplishments in forming and fostering the Experimental Lakes Area; and, passionate efforts in educating children in environmental, ecological and limnological issues.*

True to form, my alter ego, *Johnny Biosphere*, presented one of his "Know your Ecosystem" talks the next day at a middle school in Albuquerque.

My former employer, the Canadian Department of Fisheries and Oceans (DFO), Queen's University where I received my undergraduate degree and taught in the Department of Biology from 1952 to 1958, and the International Association of Limnology (SIL) of which I was president from 1974 to 1980, although unmentioned, deserve to share in this Award. So, I pass this information in appreciation of the help and encouragement that you gave me.

Sincerely,  
*Jack Vallentyne, a.k.a. Johnny Biosphere*  
Hamilton, Ontario, Canada

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## Book Reviews

### **Dragonflies: Behavior and Ecology of Odonata**

By Philip S. Corbet  
829 pp., 1999  
Comstock Publishing Associates of Cornell University Press,  
Ithaca, New York  
ISBN 0-8014-2592-1  
Cloth cover US \$95.00

Philip Corbet is a world authority on odonates. His book is a *tour de force* of perspectives and prospectuses on basic and applied research of these insects. In it, he shows how representatives from this diverse order have been used as models for tests of hypotheses in fields as disparate as behavioral ecology and aquatic biology. It is a compendium on the science of natural history applied to dragonflies, and a referential tome of modern ideas and information invaluable to students of other disciplines including: basic and applied entomology; biophysics; conservation; ecological parasitology; physiological ecology; and, the field of bionomics.

The four main chapters on larval odonates are perhaps most relevant to limnologists and aquatic biologists. These highlight where odonate larvae fit in terms of food web and energy dynamics, and as functional groups and illustrate nicely direct and indirect interactions with other aquatic organisms, habitat selection and ontogenetic niche shifts. These chapters also provide details of life history evolution, sensory abilities, development, growth and metamorphosis in relation to various physical (e.g., photoperiod and temperature) and biological factors (e.g., predation risk). Consideration is also given to appropriate sampling techniques throughout the text and detailed comparisons are made between tropical and temperate species with respect to voltinism: itself in relation to permanent versus ephemeral aquatic habitats.

With several other chapters devoted to behavior and ecology of adult odonates, this book is quite multifaceted. It is well written and well organized with 120 pages of references (from 1544-1998) cited for supporting information. This list alone is worth the money. The plates, micrographs and line drawings are stellar and easily interpreted. The tables are detailed and truly synthetic, summarizing everything from commensals of dragonflies to anthropogenic threats to

odonate diversity and to aquatic habitats. Corbet clears up terminological issues in the study of ecology and behavior of these insects and demonstrates considerable authority in drawing on parallel information from other taxa. He does justice to several viewpoints on controversial issues, particularly those concerning insect territoriality and mating systems. This book represents a lifetime of detailed and insightful work and follows John Ray's (1768) admonition cited by Corbet: "Good and quickly seldom meet". In short, the book is indispensable for anyone considering work on odonates on virtually any aspect, and it is an extremely useful reference for comparative work on other insects and invertebrates.

*Mark R. Forbes*  
Carleton University  
Canada

### **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](http://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 4 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: 1) a short title describing the position (job or studentship), 2) location and duration of the position, 3) closing date for applications, 4) a short paragraph describing the position, including any citizenship, educational or employment prerequisites; and, 5) 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](mailto:webmaster@limnology.org) or by fax to +1 (204) 474-7650, attention: *Gordon Goldsborough*.

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## **Limnology and Lake Management 2000+**

Edited by T. Berman, K.D. Hambright, J. Gat, S. Gafny,  
A. Sukenik, and M. Tilzer

593 pp., 2000

Archiv für Hydrobiologie Special Issues

Advances in Limnology 55

E. Schweizerbart'sche Verlagsbuchhandlung, Stuttgart

ISBN 3-510-47057-5

DM 198.00/US \$108.00

An international symposium on Limnology and Lake Management was held in Israel in September 1998 in commemoration of the 30th year of the Yigal Allon Kinneret Limnological Laboratory. Personnel of this research facility has conducted intensive limnological analyses on Lake Kinneret (Sea of Galilee). In three decades, they have gained considerable recognition for excellence of contributions not only about the operation of this primary lake ecosystem of Israel, but often results are generically applicable to the functioning of other lakes as well.

The diverse papers published from those presented at the Symposium were organized into five loose general categories:

Lakes and reservoirs as water supply sources. Seven papers address varied topics of the water storage capacities of Israel, effects of algae and cyanobacteria on water quality, particularly, in relation to drinking water supplies, and the regulation of salinity sources to the water quality of Lake Kinneret.

Operational limnology: New approaches. Studies presented in eleven papers address such varied topics as evaluating phytoplankton composition by delayed fluorescence excitation spectroscopy, spectral radiometer measurements for estimating phytoplankton pigment concentrations from direct in-lake spectral monitoring to close range and satellite imagery with potential for remote separation of different types of pigments, limitations of Secchi transparencies for estimating light attenuation, limited success of zooplankton regulation by manipulations of fish predation, sediment sampling, and correlational modeling of circulation patterns in small lakes with couplings to sediment quality and benthos distributions.

Management driven research: Case studies. Six papers evaluated results of various management and restoration efforts among specific lake ecosystems. Treatments vary from general analyses to specific problems, such as river transport of sediments, physiological aspects of buoyancy in cyanobacteria, and the effects of reservoir water level fluctuations on macrophyte development and fish refuges.

Nutrient cycling. A potpourri of nine papers addresses a diversity of subjects on nutrient fluxes, nutrient reservoirs, and regulation of nutrient turnover. In an adroit paper Hessen and Faafeng couple nutrient element ratios back to physiological limitations and carbon flux regulation. Other papers include dynamics of carbohydrates and combined amino acids, turnover rates of seston and carbon fluxes, regulation of sedimentation rates of phosphorus, bacterial chemoautotrophy, phosphorus-calcite interactions, and utilization of organic phosphorus and nitrogen compounds.

Control factors of aquatic population dynamics. The concluding seven studies analyze fluctuations in plankton, largely phytoplankton, and potential causes for observed spatial and temporal changes. It is apparent that resource competition and predator-prey relationships dominate conventional views of regulation of plankton dynamics. That conventional dogma is deeply entrenched, as evidenced in the detailed review of Tilzer. Yet it is clear that great voids exist in our understanding of the highly dynamic controlling factors, in part related to continued invoking of the same factors that are repeatedly shown to be quantitatively inadequate to cause the observed dynamics. Constant reversion to empirical hypotheses may be adequate for initial rudimentary management strategies, but are totally inadequate for understanding of the complexities of regulation of metabolic and population dynamics that are essential for truly effective management of water quality. Those messages emerge strongly from the frustratingly inadequate answers of control.

The analyses of this eclectic compendium are consistently good and often excellent. Most are thorough, informative contributions to the discipline. Some analyses provoke stimulating insights into contemporary research queries. For

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example, stoichiometric analyses of elemental ratios formulate hypotheses and direction for essential physiological experimentation on communities. Furthermore, many of the nutrient flux and turnover analyses point to the essential chemical interactions that regulate availability independently of absolute quantities of nutrients and energy. Other important reinforcing studies emphasized again the significance of wind-induced hydrodynamics in sediment distribution, diagenesis, and their coupled biotic effects at multiple levels.

In summary, this compendium contains a wealth of peer-reviewed information most contributory to contemporary limnology. Although many papers address specific problems and phenomena of Lake Kinneret, most of the processes analyzed and conclusions are more widely applicable. Even though these papers of this journal series are not abstracted as widely in information services as is the case of contents of many conventional scientific journals, they are important contributions that should be recognized. The work is highly recommended for ecological research libraries.

*Robert G. Wetzel*  
University of Alabama  
USA

## **New Approaches to River Management**

Edited by A.J.M. Smits, P.H. Nienhuis and R.S.E.W. Leuven  
356 pp., 2000 (paperbound)  
Backhuys Publishers, The Netherlands  
ISBN 90-5782-058-7  
Dutch Guilders 200.00/US \$100.00

This volume contains such a wealth of experience and practice that this reviewer felt compelled to read it not once, but twice. The main premise is that river management is moving from a “command and control” approach to one of “living with nature”. Certainly, the former approach has demonstrated that it can be effective only within a narrow context, but which sacrifices the ecological balance; and, in the end, creates more problems than it resolves. The chapters collectively demonstrate a wide range of scientific, technical, and social perspectives that are redrawing the map of river management from one of a narrow technical focus of hydrological control, to a larger ecological focus that is more in touch with contemporary societal views and which makes more economic sense. Rivers have a central place in nature and society and this volume amply demonstrates this new approach to “living with nature”.

This volume is comprised of papers from a 1998 international conference in The Netherlands with the same title as the book. Like any set of conference papers the content is inevitably a little uneven, with the major emphasis on European and North American experience; and, in particular, the Rhine River. Nevertheless, the only shortcoming perhaps is that, of the 20 substantive papers only three are from outside Europe and North America, so that the volume does not deal with the dilemma of managing rivers from a developing country perspective where these new approaches are not easily adapted to current societal priorities, economic realities and technical capacity, that typifies many developing countries. Nevertheless, this volume provides guidance and the promise of better things to come for river managers outside Europe and North America.

*Edwin Ongley*  
Emeritus Scientist  
National Water Research Institute  
Canada

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## **Guides to the Freshwater Invertebrates of Southern Africa. Crustacea I: Notostraca, Anostraca, Conchostraca and Cladocera**

Edited by J.A. Day, B.A. Stewart, I.J. de Moor & A.E. Louw

126 pages, 1999

Water Research Commission, Republic of South Africa  
(WRC Report No. TT 121/00)

(<http://www.wrc.org.za/>)

ISBN 1 86845 581 5

(Free in South Africa) R50 or US \$7.00 elsewhere

Although designated the second of ten identification guides to the freshwater invertebrates of southern Africa, this volume, devoted to the branchiopod Crustacea, is the first of the series to appear. Soft covered and ring bound, but printed on good quality paper, this series is obviously intended to find its place on the laboratory bench rather than the book shelf. Aimed at the non-specialist, particularly the field worker, whose needs for identification are more often than not frustrated by inaccessibility of the usually scattered taxonomic literature, the series seeks to guide the user to an identification based on the present, often limited, state of our knowledge of the taxa concerned. To this end each branchiopod order is dealt with in an individually authored chapter. This includes a brief synopsis of its biology, ecology, global distribution and recorded occurrence in southern Africa, as well as an illustrated description of the morphological characters on which identifications using the keys and descriptions provided are based.

Southern Africa is defined here as “South of (and including) the Cunene Catchment in the West and Zambezi catchment in the East”. It covers an area extending from approximately 11ES to 34ES and incorporating a range of climatic conditions from tropical to warm temperate, arid to mesic, and winter to summer rainfall. Taxonomic studies on the branchiopod Crustacea of this extensive region have, until recently, been sparse, with an almost complete hiatus between the publication of Barnard’s revision of the Branchiopoda of South Africa in 1929 and the work of the present contributing authors in the 1980/90s. During the intervening half century, there have been a mere seven publications dealing directly

with the taxonomy of the southern African branchiopod fauna, adding only a single new specie. This stands in sharp contrast to Hamer, Brendonck and co-workers adding 14 new species to the largely endemic anostracan fauna alone, during the last decade. There is, therefore, an urgent need for synthesis, presented in a user friendly form, not only to meet the requirements of freshwater ecologists but also to provide a platform and stimulus for further taxonomic research within the region. This volume meets that need admirably.

The editors, in their preface to this volume, and presumably the series, are at pains to stress that our knowledge is, at this stage, limited, and caution users against “attempting to make unusual specimens fit existing keys to species level”. The contributors, Nancy Rayner (Notostraca), Michelle Hamer (Anostraca), Luc Brendonck (Conchostraca) and Maitland Seaman, Dawie Kok and Marie Watson (Cladocera) all have first hand experience and expertise in the biology and systematics of the southern African branchiopod fauna, and are fully aware of the limitations imposed by inadequate collections, vague descriptions, mis-identifications and inaccurate locality records. They have produced an effective updating and synthesis of our knowledge based on their own experience and on reliable literature sources. All the keys follow a systematic progression to species level, enabling the user to pursue the identification of a species not included in the key down to the taxonomic level where uncertainty intrudes. The keys are supplemented by clear, concise descriptions of at least the included families, and in the case of the Notostraca and Anostraca, genera and species, and are augmented by illustrations detailing the characters important in identification. My only significant criticism of this publication is that some of the illustrations may have been subjected to over-reduction leading to some loss of detail, particularly of setation. How important this ultimately proves to be will only become apparent with actual use. Each chapter includes a useful guide to the important relevant literature, which goes beyond those publications cited in the text. A brief introduction to the branchiopod crustaceans by Jenny Day, aimed at the uninitiated user, and comprehensive glossaries of terminology and place names, further enhance the usefulness of this book.

*Jan Heeg*  
University of Natal  
South Africa



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## **Studies of the Zooplankton of two Western Uganda Crater Lakes, Nkuruba and Nyahirya, with Special Emphasis on the Bionomics and Productivity of the Cyclopoids**

by Yusuf S. Kizito

98 pp., 1998

Academie Royale des Sciences d'Outre-Mer.

Rue Defacqz 1 boîte 3, 1000 Bruxelles, Belgique

ISBN 90-75652-13-5

570 BEF/14,13 EURO

Effectively an abbreviated Ph.D. thesis, this slim 98 page volume was awarded the Jean-Jacques and Berthe Symoens Prize for Tropical Limnology in 1996. It provides a descriptive baseline account of the spatio-temporal distribution and abundance of zooplankton in two tropical meromictic crater lakes. This is based on field studies over 16 months, along with supporting experimental laboratory investigations into embryonic and putatively food-satiated post-embryonic development times of representative cyclopoid taxa across a commendably wide temperature range, and incorporates less extensive determinations of the cyclopoids' physiological tolerances of hypoxic/anoxic conditions. The study documents a range of data, but coverage is arguably over-ambitious. Penetration of subject matter is consequently rather superficial, and explanatory interpretations more conjectural than substantiated. Little in the way of new philosophical content or insight into the causality and control of plankton ecological dynamics of crater lakes is accordingly accomplished. And, as much of the data content appears to have been published concurrently with or ahead of submission of the doctoral thesis in 1995, this volume provides little new factual information. More unfortunately, it accomplishes little integrative synthetic analysis and interpretation of the comparative data. My review copy is extensively annotated with my queries regarding practical procedures, the author's intended meaning and/or interpretations, the factual basis of various suppositions and postulates, and inconsistencies. Typographical errors - including the non-italicization of taxonomic binomials in 27 of the 113 references listed - abound.

This evaluation may seem unduly harsh and uncompromising, but rather than renouncing (or mitigating) the volume, it can be taken as identifying two realities which underlie capacity development and improvement in tropical limnology. First, language proficiency. To reach an international audience, many native tropical biologists are effectively forced to communicate in a foreign tongue - English. Second, and for understandably compelling reasons, the development of a culture of science in many tropical countries has been, with obvious exceptions, relatively tardy compared with nations enjoying first-world status. Any society enduring a subsistence livelihood, plagued or punctuated by hunger, famine and disease, will inevitably prioritise food security and primary health care - issues of immediate survival - ahead of seemingly 'theoretical' tertiary training and associated academic pursuits. In this context (even if success is not inevitable), the vital role played in capacity development by various 'overseas' agencies or programmes - in the provision, particularly of postgraduate training courses and graduate supervision - is profoundly relevant, necessary, and laudable.

Indirectly, perhaps this volume offers a challenge to aspirant tropical ecologists: to accelerate, improve, and solidly advance the vital contribution which they, as resident professionals can make regarding the fundamental structure and functioning of tropical communities and ecosystems - heritages which are theirs, and which (all else being equal) they are best placed to investigate, understand, and thereby sustain. Viva Tropical Limnology!

*Rob C. Hart*

University of Natal

South Africa

## **Aquatic Microbial Ecology - A Textbook for Students in Environmental Sciences**

by Yuri I. Sorokin

252 pp., 1999

Backhuys Publishers, Leiden, The Netherlands

ISBN 90-5782-027-7

Dutch Guilders 128.00/US \$71.00

Sorokin brings together in this small volume a great amount of experience from a long career in aquatic microbial ecology. Limnologists will find much of interest although the majority of examples are drawn from marine microbial communities. Subtitled *A Textbook for Students in Environmental Sciences*, the style is conversational and anecdotal—almost as though it was transcribed from class lectures. The first four chapters are descriptive (with good line drawings) of four microbial communities: phytoplankton, bacterioplankton, microzooplankton, and benthic. Chapters 5 and 6 are functional treating trophic relations and biogeochemical physiology of bacteria. Chapter 7 provides examples of microbial communities in stressed and unstressed ecosystems with emphasis on microbial energy flows. The final chapter stands apart. It describes methodologies used in microbial ecology. Methods included obviously reflect the author's interests and are generally appropriate. If the book is for environmentalists, perhaps some are too advanced. One wonders why analysis for acid volatile sulphides in sediments is included while use of fluorescently labelled bacteria (or microspheres) for bacterial grazing studies is not. Subtitle notwithstanding, students of environmental sciences, which are often generalists (the term environmentalist is used in the text), will find it necessary to have a good science dictionary at hand to understand some technical terms and "jargon" used without explanation; e.g., vagility, coenobia, nauseic, oligocarbophyllic, marine snow, etc. A serious weakness is the absence of literature citations—there are none in either text or figures and tables. Further, there is no index.

Unfortunately, this is a poorly edited book – Backhuys Publishers should be embarrassed. The list of errors is too long to repeat but includes misspellings (cemical, dorming), faulty chemical formulae ( $\text{Ca CO}_3$ ), missing multipliers ( $3 \cdot 10^6$ ), missing characters (: from :  $\text{m}^3$ ), unintelligible phrases (if fake its concentration...), and inconsistency in the form of figures.

Its content is strong, its presentation is poor.

*Owen Lind*

Baylor University

USA

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## Calendar of Events

### 22nd Annual SETAC Meeting Changing Environmental Awareness: Societal Concerns and Scientific Responses.

11 - 15 November 2001  
Baltimore, Maryland, USA  
Contact: SETAC  
1010 North 12th Avenue  
Pensacola, FL 32501-3367  
www.setac.org  
Phone: (850) 469-1500  
Fax: (850) 469-9778

### 9th International Conference on the Conservation and Management of Lakes.

11 - 16 November 2001  
Shiga, Japan  
Contact: Shiga Prefectural Government  
Environmental Policy Division  
4-1-1 Kyomachi  
Shiga, 520-8577, Japan  
lake2001@nsl.pref.shiga.jp  
Phone: 81-77-528-3466  
Fax: 81-77-528-4849

### RMEL 2001

[An International Workshop on the Restoration  
and Management of Eutrophicated Lakes.](#)  
19 - 21 November 2001

Kuming, China  
Contact: X. Song, H. Guo and C. Jiao  
Workshop Secretariat of RMEL 2001  
c/o Yunnan Institute of Geological Sciences  
131 Baita Road  
Kuming, Yunnan 650011, China  
songtao.km@163.com  
Phone: +86-871-3188877  
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3 - 8 March 2002  
Cape Town, South Africa  
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mrashed@safat.kisr.edu.kw  
msherif@safat.kisr.edu.kw  
eawadi@safat.kisr.edu.kw  
Phone: (965) 4836100 ext. 4600 & 5197  
Fax: (965) 4818482

### 9th International Symposium on the Interactions between Sediments and Water (IASWS).

5 - 10 May 2002  
Banff Springs Hotel, Canada  
Contact: Dr. Ellen Petticrew  
University of Northern British Columbia  
3333 University Way  
Prince George, BC  
V2N 4Z9 Canada  
iasws@unbc.ca  
Phone: 1 (250) 960-6645  
Fax: 1 (250) 960-5538  
www.wsc.monash.edu.au/iasws/ninthconference.html

### First International Conference on Water and Health -ICWH 2002.

12 - 15 May 2002  
University of Ottawa Campus  
Ottawa, Ontario, Canada  
Contact: ICWH 2002 Conference Secretariat  
Centre for Water and the Environment  
Queen's University  
Kingston, Ontario, Canada  
K7L 3N6  
cwa@civil.queensu.ca  
Phone: (613) 533-6438  
Fax: (613) 533-2128

[Third International Conference on Water  
Resources and Environment Research \(ICWRER\)](#)  
Subtitle: Water Quantity & Quality Aspects in  
Modelling and Management of Ecosystems.

22 - 26 July 2002  
Dresden, Germany  
Contact: Conference Secretariat  
Cathleen Schimmek, Gisela Schöler  
Conference Secretariat ICWRER 2002  
Institute of Hydrology and Meteorology  
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Wuerzburger Str. 46  
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Tel: +49 - 351 - 463 3931  
Fax: +49 - 351 - 463 7162  
www.tu-dresden.de/fghhihm/hydrologie.html

[4th International Conference  
on Reservoir Limnology and Water Quality.](#)  
12 - 18 August 2002

„ eské Bud • jovice, Czech Republic  
Contact: Jakub Borovec, Conference Secretary  
Hydrobiological Institute  
Academy of Sciences of the Czech Republic  
Na sádkách 7  
CZ-370 05 „ eské Bud • jovice  
Czech Republic  
reslim@bu.cas.cz  
Phone: +420-38-777 5879  
Fax: +420-38-530 0248

### The Third International Symposium Speciation in Ancient Lakes (SIAL-2002).

2 - 7 September 2002  
Irkutsk, Russia  
Contact: Oleg A. Timoshkin  
Vice-Chair of the Organizing Committee  
Limnological Institute SD RAS  
Baikal International Centre for Ecological Research  
Ulan-Batorskaya, 3  
P.O. Box 4199  
664 033, Irkutsk, Russia  
tim@lin.irk.ru  
Phone: +3952-46-02-18  
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## 2003

[The 3rd International Limnogeology Congress  
\(ILIC\).](#)

29 March - 2 April, 2003  
Tucson, Arizona, USA  
Contacts: Theme session proposals:  
Andrew Cohen, General Chair of the Congress,  
Dept. of Geosciences, University of Arizona,  
Tucson, AZ 85721  
acohen@geo.arizona.edu  
Phone: 1-520-621-4691  
Fax: 1-520-621-2672  
Field trip proposals: David Dettman, Field Trip  
Coordinator for the Congress  
dettman@geo.arizona.edu  
Housing and Registration: Noah Lopez  
noahl@u.arizona.edu

[The 4th Conference of IIL Working Group on  
Aquatic Birds - Limnology and Waterbirds 2003.](#)

4 - 9 August 2003  
Sackville, New Brunswick, Canada  
Contact: Joseph Kerekes  
Environment Canada  
45 Aldemey Drive  
Dartmouth, Nova Scotia  
B2Y 2N6, Canada  
joe.kerekes@ec.gc.ca  
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