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Ship South Baikal. Photo by N. Rodenhouse

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Material for the **December 2019 issue** should be sent to the SILnews Editor, Giovanna Flaim, by 01 October 2019 at **flaim.giovanna@gmail.com**

SIL Behind the Scenes

WHAT HAPPENED OVER THE LAST 6 MONTHS?

By Tamar Zohary
SIL General Secretary-Treasurer

Changing of the Guard

SIL has recently seen some substantial changes of personnel. After 13 years of dedicated service to SIL – Ramesh Gulati, the editor of SILnews has stepped down. SIL is incredibly grateful to him. We welcome here Giovanna Flaim, from the Edmund Mach Foundation, San Michele all' Adige, Italy, who took over as the new editor for SILnews, starting with this current issue. We hope the readers like the new look of our newsletter that comes with the change of editor. Please send Giovanna your material for future issues.

The formal switch of SIL presidency from Yves Prairie to Thomas Mehner took place during a board meeting in Berlin on 17 May 2019, in which the strategic plan for SIL was addressed. You can find an interview with Thomas on page 4. Furthermore, following elections, Dr Marieke Frassl, joined the SIL board as a student/early career representative. She is already highly active, meet her on page 7. And lastly, after approximately 15 years, the business office of SIL moved from Denise Johnson in North Carolina, USA to Genevieve Leclerc, in Montreal, Canada. Consequently, SIL's running finances also moved to Canada, although its savings accounts remain in the USA.

SIL cares for its student members

SIL announced a third student competition, to be finalized before the 2020 Congress in Korea (see the call for applications on page 8). SIL is accepting applications by students from developing countries for the Tonolli Award. SIL now provides a 'Fast Track' option for manuscripts submitted to *Inland Waters* by PhD students. This is particularly valuable for those close to submitting their thesis and needing one more paper accepted for publication. We guarantee a 28-day turnaround from submission to a first decision letter.

SIL is involved with limnological politics worldwide

Lake Baikal, the world's oldest, deepest and largest (by volume) freshwater lake, was recently threatened by intentions of the Russian government to relax regulations regarding inflows and loading of contaminants. The SIL executive board responded with a strong letter (see page 6) urging the authorities to protect this precious iconic lake. As a truly international society, such actions are a main role of SIL.

We are planning our future Congresses

Plans for the 2020 Congress in Gwangju, Korea are in full blast. Its chair, Prof. Gea-Jae Joo met on-line with the SIL board during their meeting in Berlin in May to work out the details for this Congress. A major emphasis of the planning is to attract students and early career professionals. Plans for SIL's 100th Anniversary, to be celebrated at the 2022 Congress in Berlin, are also progressing well and were discussed in May in Berlin. Venues for the 2024 and 2026 Congresses are being considered as part of the strategic planning for the future of SIL.

SIL Berlin Meeting

Past president, Yves Prairie (right) and the new SIL president, Thomas Mehner in Berlin, during a ceremony in which the presidency was formally transferred.

SIL had a board meeting at IGB on May 17-18, 2019. The objectives of this meeting were to renew our value proposition and promises to you, our members. The Executive Board, SIL committees and a fresh group of engaged early-career researchers have embarked on a strategic planning process which is meant to modernize the way SIL has been serving the limnological community for close to 100 years. Collaboration between senior and younger scientists will grow stronger to make use of SIL's broad knowledge base.

In Berlin, the board focused on SIL's new main objectives:

1. Redefining our **MISSION** as a value creation Society
2. **ENGAGING** our members
3. **COMMUNICATING** better and to larger audiences
4. Targeting the interests and needs of **YOUNGER LIMNOLOGISTS**
5. Creating valuable **PARTNERSHIPS** and promoting interaction and collaboration with limnologists from developing countries

From left to right: Martin Kainz, Inés O'Farrell, Genevieve Leclerc, Thomas Mehner, Yves Prairie, Tamar Zohary, Jeremy Piggott, Marieke Frassl.

1. MISSION

The board meeting started by reshaping and modernizing the Society's mission. Our new mission is focused on **value creation** and **service delivery** for our members, which will concentrate on promoting excellence in limnology and its role in solving global issues through the transfer of knowledge and the fostering of a strong international community.

2. ENGAGE OUR MEMBERS

To enhance membership engagement, SIL:

- Has created an Education committee to develop several new projects to engage and inspire members such as an online series aiming to introduce the world's most interesting lakes and some of the limnologists who work on them.
  Be sure to keep an eye out for opportunities to participate in some of these new projects!
- Will align itself with the United Nations' Sustainable Development Goals to inspire every member to enter this global partnership for the people and the planet.
- Has started to claim a voice and lead more advocacy actions to protect freshwater, such as the Lake Baikal Letter (see page 6).
- Wants to have a clearer idea of our members' profiles to organize activities based on their interests.
  SIL will soon circulate a survey to know more about your interests. Be sure to answer our call!

3. BETTER COMMUNICATION

To improve our communication's content, SIL:

- Has created a Communication committee to assess better ways we can communicate with members.
- Will reshape the modalities surrounding our Awards and the reports and articles submitted to SIL so that the content presented is summarized and shared to a larger public, including non-SIL members.
- Will restructure the entire way we are communicating with our members with engaging fresh content and format such as this new SILnews design.
  Be sure to send SIL your thoughts and ideas on these new ways of communicating! You can tell us what you think at business@limnology.org.

4. YOUNGER LIMNOLOGISTS

To improve the opportunities of students and early career members, SIL:

- Has created an Early Career Researcher Committee to represent younger limnologists' interests that already has many projects, such as revamping the Working Groups' framework to involve student and early career members.
  We will soon ask via e-mail and social media what kind of workshops student and early careers would like to attend in Gwangju. Be sure to tell us what you would be interested in!
- Will restore the SIL mentorship program so that mentors can sponsor mentees to build relationships and improve opportunities for younger limnologists, as well as expanding international networks.

5. CREATE PARTNERSHIPS

To build a stronger international network, SIL will:

- Work on developing more partnerships with research centers from developing countries to offer education and knowledge transfer, to raise awareness and to support advocacy.
- Work on developing more partnerships with international organizations to work together on global issues and give new benefits to our members (access to conferences, journals, joint workshops, etc.)
- Work on developing project-based partnerships with the corporate branch to fund SIL activities.

With these five new goals, active participation of both younger and older scientists is greatly encouraged to increase possibilities for all SIL members as well as the entire international limnological community. Thereupon, cheers and be sure to stay tuned for exciting new projects and opportunities!

INTERVIEW WITH THE NEW

SIL President

Thomas Mehner, limnologist and fish ecologist at the Leibniz-Institute of Freshwater Ecology and Inland Fisheries (IGB) in Berlin (Germany), has been elected the new President of the International Society of Limnology (SIL). We talked with him about his goals and what fascinates him beyond science.

By Angelina Tittmann and Katharina Bunk
pr@igb-berlin.de

Dr. Mehner, congratulations on your new position! In May 2019, you will take office as the 14th President of the International Society of Limnology. Are you looking forward to assuming this new responsibility?

Thomas Mehner: By all means! After all, I would like to contribute to a fundamental renewal of the International Society of Limnology. For a long time, SIL, established in an analogue world, has been one of the most important platforms for scientific exchange in the field of limnology. And yet we entered the digital age some time ago, and the changes for SIL associated with this transition have to be taken into greater consideration in the future. We share these problems with many other scientific societies: our members are getting older, the number of members has fallen, and the original advantages of specialist societies and congresses – the ability to network, to exchange results and to gain access to articles and unpublished data – have more or less become a thing of the past, due to the internet. However, I want SIL to become more visible and relevant again in the future. Several steps have already been taken, and strategic and programmatic work has been started, centering on the question how value can be brought by SIL to all SIL members and non-members. I am eager to lead the further steps towards this transition, and I am happy that already many SIL members have dedicated their enthusiasm to support this process.

> "I would like us to work more programmatically, focusing on priorities and becoming more practice-oriented again."

SIL will celebrate the 100th anniversary in 2022. But you'd rather look ahead than back, right?

I have been a SIL member for 25 years now, and hence I would have good reasons to look back, on my own history in limnology, but in particular also on the 100 years of history of SIL. We can learn a lot about the power of science when it is done passionately, if we read for example the books by August Thienemann, one of the founders of SIL and its first president. Enthusiasm, passion, curiosity and intellectual exchange with colleagues – these have been features of the work of the early limnologists, and hopefully these features also characterize the work of limnologists today and in the future. Limnology is inherently interdisciplinary: limnologists come from the fields of biology, chemistry, physics, geology and mathematics. This may well be the reason for our desire to gain a holistic understanding of aquatic systems. Besides this, however, we have to consider whether the research we are doing is also relevant. It is essential to address basic research questions in limnology, but no less important to find answers to real-life environmental problems that are relevant to society. I could envisage that SIL involves our members in developing and emerging countries much more closely, to learn about pressing limnological issues, which limnologists throughout the world could help resolving.

Do you get the impression that young scientists are more likely to be inspired by such specific goals?

Absolutely! Ideally, SIL will soon re-establish as a center for scientific exchange in particular for young limnologists. Many young researchers are united in their desire to solve problems; they want to make a difference and not merely turn their hobby into a career. SIL might be an ideal platform for this – it is the society where more than a thousand members and even more interested people from related disciplines from over 60 countries could come together and discuss concepts, problems and solutions. I will put much effort into the preparation and organization of the next two SIL congresses, the 2020 meeting in South Korea, and the 2022 meeting in Germany on occasion of the 100th SIL anniversary. I hope we will see a re-juvenated audience there, with enthusiastic young limnologists contributing strongly to set standards in limnological research and international networking.

These are ambitious plans. Besides this, in your spare time you play bass in a blues band, experience nature while cycling, canoeing or flyfishing, and read many books. What else fascinates you?

I have become a grandfather recently, and my granddaughter attracts my attention now. Despite being a hard worker, I have never forgotten to take care of my family, and my life outside my job. I have always been convinced of, and have practiced it actively, what is called work-life balance now. Our life is as complex as nature, and in the same way as we have to understand the complexity of natural systems, we need to perceive the complex and manifold facets of our life. In this perspective, research is just one, albeit a very important one, component of my life.

Your first day as SIL president will be on 17 May 2019. What will you start with?

I will thank the then former SIL president, Prof. Yves Prairie, for his work for SIL in the previous period, for being courageous enough to identify the deep-rooting problems to move SIL into the future, and to initiate actions that will help addressing the necessary change.

INVITATION TO THE

35th SIL Congress

Gwangju City.
Photo by Ambir Tolang, pixabay.com

Experience an Innovative SIL 2020 in Gwangju, Korea!

KimDaeJung Convention Center,
Gwangju, South Korea
23 – 29 August, 2020

The Korean Society of Limnology and Korean SIL members cordially invite you to the 35th SIL Congress to be held in Gwangju (South Korea) in 2020. We anticipate a record number of participants for SIL2020. The conference site venue (KimDaeJung Convention Center, KCC) is conveniently located to access the city center of Gwangju (ca. 8 km).

We are challenging ourselves to develop and organize an innovative SIL Congress. The local organizing committee (LOC) members are discussing and cooperating with the SIL executive board to achieve this goal while maintaining the excellent SIL Congress tradition. The LOC will do its best to provide a comfortable forum for academic exchange and to enhance networking among SIL members. Specifically, there will be plenty of opportunities for early career limnologists to broaden their academic perspectives and experience state of the art developments in limnological knowledge.

For the lastest news and updates, please check

LIMNOLOGY.ORG/meetings
TWITTER.COM/silgwangju2020

Kimdaejung Convention Center

10 Reasons

for Young Limnologists to Attend SIL 2020

1. Very low registration fee for young limnologists (about 130 USD)
2. About 400 oral presentations (8 world class plenary talks)
3. About 300 poster presentations and 30-40 exhibition booths
4. Meeting with eminent scholars and editorial board members of the SIL Journal *Inland Waters*
5. 15 free short courses for young limnologists
6. A free technical study session on Korean national stream health programs
7. The chance to attend and contribute to one or more of 10 SIL working groups
8. Opportunity to publish your presentation in the journal *Inland Waters*
9. Numerous side events with free lunches (Job fair, auction, interaction with limnologists from emerging countries)
10. Opportunity to become a co-chair of special sessions

Russian and American scientists triumphantly displaying their plankton nets after completing a 2-week sampling expedition around L. Baikal in August, 2013. Their research is quantifying the genetic and functional diversity of L. Baikal's plankton with the goal of predicting whether the lake's cold-loving, endemic plankton will adapt and persist with climate change. Photo by Ted Ozersky.

Lake Baikal

After hearing about the proposed legislation that would allow increased nutrient loads to L. Baikal, SIL officers expressed their concerns to the Russian government with the following letter.

3 March 2019

Mr Kobylkin Dmitry Nikolaevich, Minister
Russian Federation Ministry of Natural Resources and Ecology

Minister Nikolaevich,

This letter expresses our deepest concern that recent proposals will weaken regulations on pollutant loads into Lake Baikal. We have been informed that these proposals will permit increased inputs of sulphates, chlorides, and detergents, as well as nitrates and phosphates. We, the Executive Board of the International Society of Limnology (SIL), form a widely international group of researchers experienced in the research and management of lakes and rivers. In particular, we are acutely aware of the consequences of phosphate and nitrate loads and other pollutants to lake ecosystems.

Lake Baikal is an iconic ecosystem of global importance, as recognized by its UNESCO World Heritage status. It is well known for its endemic flora and fauna, as well as its outstanding water quality. We fear that the recent proposals will contribute to an irreversible loss of the natural quality and health of this huge freshwater resource. We strongly urge the authorities and all those connected to the management and protection of Lake Baikal, to do their utmost to prevent these measures from being implemented.

Most sincerely,

Prof. Yves Prairie, Canada, SIL President
Dr. Thomas Mehner, Germany, SIL President Elect
Dr. Tamar Zohary, Israel, SIL General Secretary-Treasurer

On behalf of the rest of the SIL Executive Board members and other officers:

Prof. Inés O'Farrell, Argentina, SIL Vice President for Developing Countries
Dr. Jeremey Piggot, Ireland, Vice President
Dr. Martin Kainz, Austria, Vice President
Dr. Marieke Frassl, Australia, Student/Early Career representative
Dr. Iestyn Woolway, UK, Student/Early Career representative
Prof. David Hamilton, Australia, Society journal editor (Inland Waters)
Dr. Giovanna Flaim, Italy, SILnews Editor
Dr. Maciej Bartosiewicz, Switzerland, SIL Communications
Ms. Veronica Nava, Italy, website manager

cc: **Ms. Mechtild Rossler,** Director, UNESCO World Heritage Center (M.Rossler@unesco.org)
Peter Shadie, IUCN World Heritage Department (peter.shadie@iucn.org)

Our letter from SIL, together with several support letters from scientists and associations worldwide, indeed helped to convince the Russian Authorities to cancel their plan of relaxing the regulations for inflows into Lake Baikal. Read below the reply to our letter.

Dear colleagues, friends,

This letter of thanks acknowledges our deep gratitude to you for raising your voices in favour of Lake Baikal, the one for the Planet. Although it is a tiny piece of our Earth, no one would deny it being one of its pearls, and as a magnificent gift from the nature, it needs our care and protection. Global environmental problems are obviously piling up, but you do not step aside and stay involved. With your strong voices, we succeeded in suspending the draft regulations concerning emissions into Lake Baikal, which were not logical and technologically reasonable. At the moment, the government comes to the opinion that the construction of treatment facilities at Lake Baikal should be based on the best world technologies. Yours suggestions and examples have contributed to this opinion.

We greatly appreciate your concern, help and advice and hope that our mutual efforts, scientific experience and good will would contribute to the world's and Baikal's healthier future.

Dr. Andrey Fedotov
Director of Limnological Institute SB RAS

Lake Maroon - a manmade reservoir in Queensland, Australia. Photo by Marieke Frassl

OUR NEW
Student Representative

G'day everyone,

My name is Marieke Frassl and I am your new representative for students and early career researchers (ECR) on the SIL Executive Board. I am a modeller and a data analyst who also enjoys submerging technical equipment into lakes and reservoirs. Currently, I am working as a research fellow at the Australian Rivers Institute at Griffith University in Brisbane. My research down under centers on cyanobacteria, lakes and water supply reservoirs and how these are affected by climate change. I am passionate about collaboration and team science.

I am convinced that the involvement of students and early career researchers (PhD candidates and postdocs) and their active participation in the society are crucial for SIL. Let us increase the possibilities for all SIL members to make use of SIL's broad knowledge base, to interact with each other and especially for students and ECRs to enhance their career opportunities.

Together with the current representative Iestyn Woolway, I would like to give students and ECRs a strong voice within the society. Please do contact us, if you have questions or if you have thoughts and comments on how to provide students and ECRs with the best opportunities in our society. Also do contact us, if you would like to become active and engage.

Thank you very much to all who voted for me. Everyone, I am looking forward to exciting years with you within SIL.

Email: m.frassl@griffith.edu.au
Twitter: @m_frassl

International SIL student competition

The competition:
Best published paper in Limnology appearing as part of a PhD or MSc.
The prize:
Plenary talk at the 2020 SIL Congress in Gwangju, South Korea.

We announce the 3rd international competition, open to all SIL students and early-career members of the International Society of Limnology, for the best recently published paper in limnology emerging from a PhD or MSc study. The competition winner will present her/his study as a plenary lecture at the 2020 SIL Congress to be held at Gwangju, South Korea.

The competition will have two stages:

Stage 1 – National:

At this stage, each participating country will choose its best paper that will enter the international competition. The national representative of each participating country will organize this stage in his/her country. Only one paper can be nominated per country, except countries with more than 50 SIL members that can submit two papers. The National Representative of each country will set up a committee that will rank the papers and will choose 1 or 2 paper(s) for Stage 2.

Stage 2- International:

An international jury comprising at least 5 members from different countries will review the papers and choose the winning papers for the first 3 places.

Submission deadline for stage 1:

30 September 2019. By this deadline articles and accompanying documents should reach your National Representative (NR) or Judit Padisák in countries with no NR. Contact details: Prof. Judit Padisák Chair, Student Competition Committee - padisak@almos.uni-pannon.hu

All necessary information and details on the scoring system can be found at:

LIMNOLOGY.ORG/forms

Tonolli Award

The Tonolli Fund provides assistance to students from developing countries working toward post-graduate degrees (MS, MSc, PhD) in the field of limnology. **Application deadline is 30 May each year.** All necessary information can be found at:
LIMNOLOGY.ORG/tonolli-memorial-award

Here is a summary of work funded by a recent Tonolli recipient - Mark L.D. Lopez, the Philippines.

Insights into tropical groundwater ecology: Microcrustaceans from groundwater ecosystems in the Philippines

Mark Louie D. Lopez, Francis S. Magbanua, Augustus C. Mamaril & Rey Donne S. Papa

The ecology of microcrustaceans from tropical groundwaters and their dependent ecosystems remain poorly understood, yet knowledge about this group can elucidate patterns in groundwater biodiversity, necessary to develop sound conservation policies. In this study, microcrustaceans were collected from 102 groundwater-dependent ecosystems, including 51 artesian wells, 23 caves, 14 springs, and 14 piped groundwater pumps during the dry (Nov 2014 to Apr 2015) and wet (May–Oct 2015) seasons. We found 21 taxa of Cladocera and Copepoda, including 2 obligate stygobionts and 19 consistent with surface water and facultative stygobiotic taxa. Significant differences in microcrustacean assemblages were noted among types of groundwater-dependent ecosystems ($P<0.05$), where wells and caves harbored more abundant assemblages with higher total species richness; however, no significant variations were observed between seasons ($P>0.05$). Furthermore, principle component analysis revealed that sampling sites were highly characterized by altitude, specific conductivity, and total water hardness. Microcrustacean assemblages in sampled sites were highly dominated by the influence of temperature, dissolved oxygen, and altitude. Species rarefaction analysis revealed low species richness in sampled sites within the region, supporting the existing notion that temperate groundwater-dependent ecosystems were more diverse, and faunal composition in terms of ecological groups is extremely different in tropical and temperate settings. The results of this study were presented in the European Conference on Tropical Ecology and Annual Meeting of the Society of Tropical Ecology in Brussels, Belgium last February 6-10, 2017 and published in the official SIL journal, Inland Waters, last November 2017 (Lopez et al 2017).

Lopez MLD, Magbanua FS, Mamaril AC, Papa RD. 2017. Variations in microcrustacean (Crustacea: Cladocera, Copepoda) assemblages from selected groundwater-dependent ecosystems in the greater Luzon and Mindoro Island faunal regions (Philippines): insights to tropical groundwater ecology. Inland Waters 7:428-439, doi: 10.1080/20442041.2017.1368597

A monitoring project in Pampean shallow lakes (Argentina) reveals a joint effect of cultural eutrophication and hydrological variability on phytoplankton communities

Irina Izaguirre, Inés O'Farrell & María Laura Sánchez
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The Pampean Region, one of the most productive zones of Argentina, hosts more than 13,800 shallow lakes with a surface area larger than 10 ha (Geraldi et al. 2011); these are the more relevant aquatic systems in the region for fishing, water supply and recreation. They can exhibit different "regimes": clear with profuse submerged vegetation, turbid with high phytoplankton biomass or inorganic turbid (where turbidity is mainly due to a high amount of inorganic suspended material). Historically, a large part of the shallow lakes of the region were clear vegetated, and the increase in anthropogenic activities (agriculture, livestock, canalization, urbanization, etc.) would have been the main cause of the change to a turbid regime with higher algal biomass (Quirós et al. 2006). A study carried out using satellite images (Kosten et al., 2012) confirmed these changes, reporting that 68% of lakes that were clear in 1987 exhibited a turbid regime in 2005. Diovisalvi et al. (2015) analyzed a database of more than 2700 lakes around the world, and found that on average Pampean lakes were more eutrophic than any other grouping of lakes in the study: they tend to display higher nutrient contents (TP and TN) and chlorophyll a concentrations and lower transparency.

Since 2012 several Pampean shallow lakes are being monitored within the framework of a collaborative network project composed by an interdisciplinary team of researchers (Project PAMPA[2]), which is financed by the CONICET (Consejo Nacional de Investigaciones Científicas y Técnicas) of Argentina. The studied shallow lakes were selected across a pronounced climatic gradient within the Pampean plain, which encompassed from 400 to 1000 mm of mean annual precipitation, and from 14 to 20°C of mean temperature. The main objective of the project is to analyze the responses of Pampean shallow lakes to the stressors that take place in the region: climate change, land use and other anthropic impacts. Among the studied lakes, a few were equipped with automated buoys for the continuous monitoring of some limnological and weather variables, and all lakes were monthly sampled for limnological and plankton community analyses (Fig. 1).

The first results concerning phytoplankton showed that most lakes have high phytoplankton biomass in the warm season, except for a pair of lakes that are characterized by extreme conditions of salinity or inorganic turbidity (Izaguirre et al., 2015). A preliminary analysis of the phytoplankton structure encompassing a complete period of two years of monthly samplings (2012-2014) showed that in average cyanobacteria were more abundant in the shallow lakes located towards the wettest part of the gradient and in coincidence with the most impacted areas by human activities (mainly agriculture) (Fig. 2).

Anyhow, the composition and intensity of potentially toxic blooms (many exceeding WHO alert level of 1 µg L^{-1}) are more likely to be affected by the conditions of nutrients, light and macrophyte development than by the location of the lake in the geographical gradient. The composition and abundance varies annually in close relationship with the water regime. Accordingly, O'Farrell et al. (2019) found that in Argentina a high proportion of the blooms entailing a high risk of adverse effects (>100,000 cells mL^{-1}) were located in the shallow lakes of the intensively "agriculturized" Pampean Region.

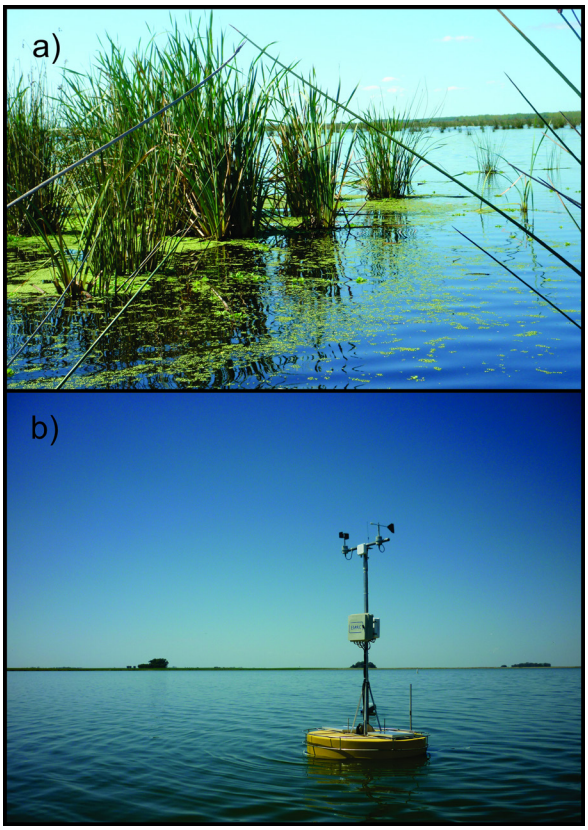

Fig. 1: *a) Vegetated shallow lake in the Natural Reserve Otamendi, Buenos Aires Province (Argentina) monitored within the framework of the PAMPA[2] project. b) Automated buoys for the continuous monitoring of one Pampean shallow lake.*

In general Pampean shallow lakes are strongly affected by hydrological changes that in turn depend on climatological changes. Particularly, water surpluses are marked during the El Niño phase of ENSO, having a deep influence on the lakes. Besides natural climatic oscillations, mean annual precipitation was found to increase in the region in the context of a climate change scenario (see Diovisalvi et al., 2015 and references therein). The effects of the hydrological changes on the limnological features and aquatic communities of the Pampean lakes were documented for some systems. In one lake that is being monitored within the PAMPA[2] project, the reduction in the hydrometric level seemed to be the main cause associated to the transition from a clear-vegetated

regime to a turbid one throughout a period of only seven years (Sánchez et al., 2015). The decline in submerged vegetation was followed by an increase in phytoplankton abundance and in Kd_{PAR}, and important changes in the phytoplankton composition were observed as well. Changes related to hydrological fluctuations are even more pronounced in those lakes strongly affected by the variability in the hydrometric levels of associated rivers. Such is the case of a shallow lake studied in the PAMPA[2] project, which is located in the wettest part of the gradient within a natural reserve in the Paraná River floodplain. In this lake we observed along a 15-year study period of regimes dominated by free-floating plants alternated by periods of high phytoplankton biomass and occurrence of cyanobacteria blooms (1998-2013) (O'Farrell et al. (2015), and more recently, periods dominated by submerged macrophytes and clearer waters (unpublished data). The continuous monitoring carried out within the PAMPA[2] project revealed that when water level remained quite high over several months, the submerged vegetation was abundant and the algal biomass (expressed as Chlorophyll a) remained relatively low.

The mentioned studies indicate that shallow lakes and their phytoplankton community may be considered as sentinels of cultural eutrophication, hydrological variability and global climate change in one of the more productive zones of Argentina, the Pampean region.

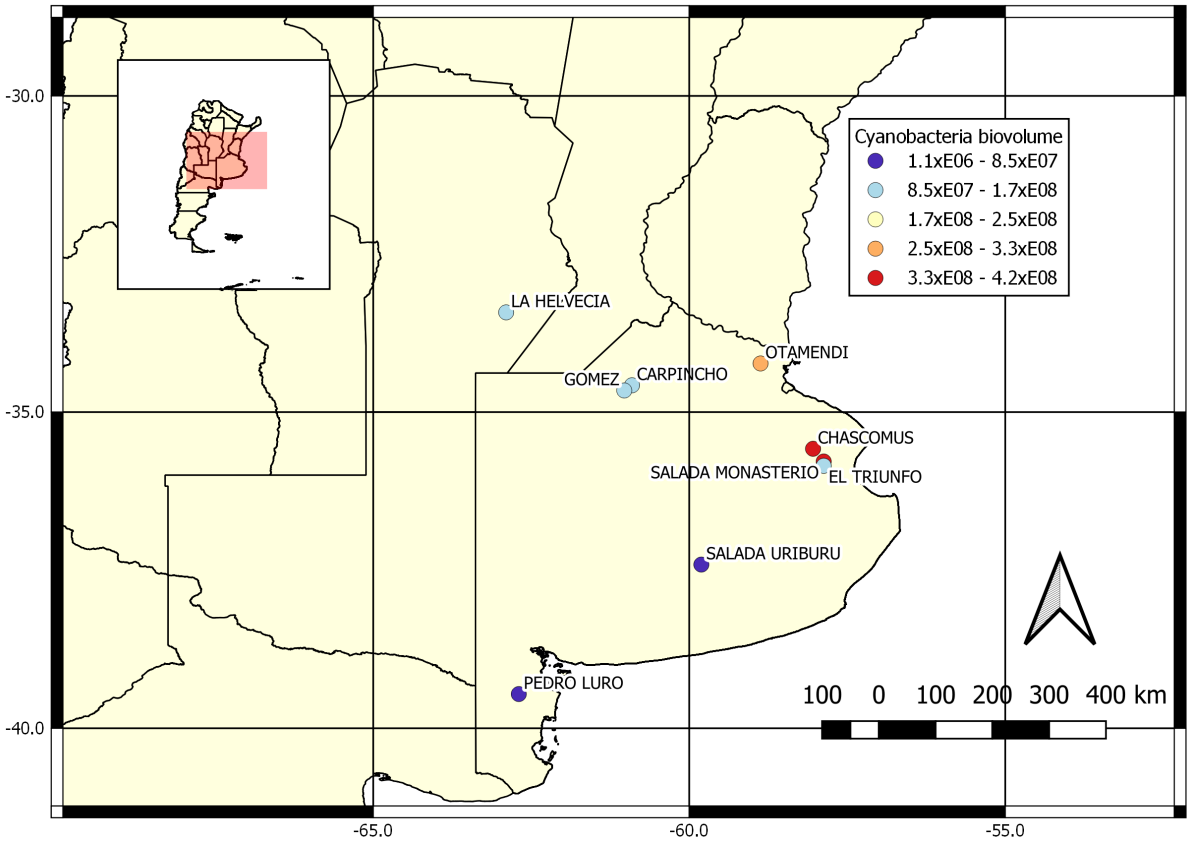

Fig. 2: *Location of the Pampean shallow lakes (Buenos Aires, Argentina) monitored within the framework of the PAMPA[2] project. The different colors indicate mean Cyanobacteria biomass ($\mu m^3 ml^{-1}$) in each lake (period 2012-2014, monthly samplings).*

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LIMNOLOGY AROUND THE WORLD: BOTSWANA

A Limnologist in Botswana

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My name is Hillary Masundire. I joined SIL as a student while studying for my PhD in Zimbabwe. I was then studying the zooplankton of Lake Kariba, a large reservoir on the Zambezi River between Zambia and Zimbabwe.

Apart from my PhD thesis titled 'Bionomics and Production of Zooplankton and its Relevance for the Pelagic Fishery in Lake Kariba', one other highlight was the international workshop we had at Kariba in July, 1991. Twenty-one research papers were later published in 1994 as a special volume of Hydrobiologia under the title 'Studies on the Ecology of Tropical Zooplankton' edited by Henri Dumont, James Green and Hillary Masundire (Hydrobiologia 272:1-295) A discussion followed during the workshop and this was captured in the book as The Kariba Discussion. A number of questions on Tropical Freshwater Zooplankton (TPZ) were raised in the discussion that were then said to need further investigation. There are:

- What are the quantitative interactions between food limitation and metabolic rate under tropical conditions?
- How is reproductive strategy (e.g. few large eggs vs many small eggs) influenced by these interactions?
- What are the relative importance of high metabolic rate and predation in the evolution of small-bodied zooplankters?
- Is the lunar trap a more general phenomenon, or is it only developed to a significant extent in the tropics?
- Are the frequency of occurrence and the rates of predation of medusae, rhabdocoels and hydracari high enough to have significant effects on zooplankton populations and community structure?
- Does the protective effect of suspended sediment compensate for the interference with filter-feeding mechanisms, and the reduction of photosynthesis by the phytoplankton?
- Is it justified to conclude that the overall selective pressures on freshwater tropical zooplankton are towards small species with small requirements and inconspicuousness to planktivorous fish? (Dumont, et al, 1994).

I would to challenge the SIL zooplankton research community if anyone has conclusive answers to any of these questions.

I left Zimbabwe to join the University of Botswana in January 1994. One of my main tasks was to initiate courses on freshwater ecology at undergraduate level as well as undertake research in Botswana. I soon realised that Botswana does not have many large limnetic habitats. Botswana is very similar to Zimbabwe in not having natural lakes. There were a few human-made reservoirs including two very close to the capital city: Gaborone and Bokaa Dams. Both these reservoirs are very poor in zooplankton species diversity and abundance. In Gaborone Dam, seven rotifer species, Cladocera and copepods made up 26%, 23% and 50% of zooplankton biomass, respectively.

In June 2000, I took part in the project 'A Rapid Biological Assessment of the Aquatic Ecosystems of the Okavango Delta, Botswana: High Water Survey (AquaRap). The study covered four sites: (i) Upper Panhandle (close to the border between Botswana and Namibia where the Okavango Rivers enters into Botswana before the Delta), (ii) Lower Panhandle (just before the river fans out into the delta), (iii) North-West of Moremi Island (north of the delta) and (iv) South-East of Chief's Island (southern delta, on the Boro River that flows out of the Delta (Alonso & Nordin, 2003). This was a fascinating study carried out by several teams covering geomorphology, water quality, aquatic and terrestrial vegetation, micro-invertebrates, macro-invertebrates, fishes and birds. The report is a useful quick guide to the limnology of the Okavango Delta.

I have been involved in policy issues in regard to wetlands ecology and management. In this regard, I co-authored a directory of wetlands of Botswana while advocating for a wetland policy for Botswana. This has been partially successful in that in 1997, Botswana acceded to the Ramsar Convention and designated the Okavango Delta as a Ramsar site. I took part in the work that culminated in the publishing of the Okavango Delta Management Plan (ODMP) – parties to the Ramsar Convention are obligated to develop management plans for wetland in general and for Ramsar sites in particular.

Recognising the scarcity of surface freshwater in Botswana, I am part of the research team that has been working on wastewater reuse in Botswana. My work has been focusing not only quantities of wastewater reused, but also on quality and the possible effects on vegetables irrigated using treated wastewater effluent. In this regard, we have been analysing the proliferation of toxin-producing blue-green algae and the potential of uptake of the microcystins by vegetables and fruits. This work in on-going.

I am a founder member of the IUCN Commission on Ecosystem Management for which I served as global Chair for 8 years. I took part in the Millennium Ecosystem Assessment (MA) Project as one of the coordinating lead authors on Trends in Biodiversity. I have just completed a 5-year climate adaptation research project – Adaptation at Scale in Semi-Arid Regions (ASSAR) in which I was the principal investigator in Botswana. My focus was on dynamics of ecosystem services and how this affect human livelihood in semi-arid regions of Botswana.

One major challenge has been to find students keen to study limnology in a country where water is generally scarce. There are now five major water supply reservoirs that would be quite interesting to study. The wetlands of the Okavango, Linyanti and Chobe Rivers also offer quite a diversity of micro-habitats that should be both interesting and challenging.

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LIMNOLOGY AROUND THE WORLD: UNITED STATES

Science for the management of the largest unfiltered water supply in the United States

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New York City's drinking water is world-renowned for its high quality and excellent taste. In fact, some say the water is what makes New York City bagels and pizza taste so good. New York City's (NYC) Department of Environmental Protection's (DEP) Bureau of Water Supply's mission is to reliably deliver a sufficient quantity of high quality drinking water to protect public health and quality of life in the City. Here we discuss some of the ways we use science to meet that mission and the future challenges that water supplies will face.

The water supply system provides over 3.8×10^6 m^3 of water to more than 9.6 million consumers in NYC and nearby communities. The water comes from a network of 19 reservoirs and 3 controlled lakes with a total volume of 2.12×10^9 m^3 and a combined watershed area of over 5,100 km^2 that extends more than 200 km from New York City. The water supply has two major components: the Croton watershed (970 km^2), east of the Hudson River and north of NYC, and the combined Catskill and Delaware watershed system (4140 km^2), west of the Hudson River. The Catskill/Delaware portion (Fig. 1) typically provides over 90% of the water delivered to NYC.

The water from the Croton watershed is filtered and

Fig. 1: *Catskill and Delaware Systems meet in Kensico Reservoir*

disinfected with chlorine and ultraviolet light. The Catskill/Delaware water is also disinfected with chlorine and ultraviolet light, but it is unfiltered. The Catskill/Delaware System is the largest unfiltered water supply in the United States with the largest UV plant in the world. NYC has received a waiver to avoid filtration, but in order to maintain this waiver, a number of conditions must be met and many watershed protection programs must be funded and supported. To date, DEP has spent over $1.7 billion USD in watershed protection programs and has committed to spend another $1 billion USD in the next decade. Another condition requires DEP to conduct extensive water quality monitoring throughout the watershed.

Water quality monitoring is tailored to: 1) meet regulatory compliance; 2) assist in guiding operations to provide the highest quality drinking water; 3) demonstrate the effectiveness of watershed protection measures; and 4) provide data for modeling applications.

DEP has a long history of water quality sampling stretching back over a century. The program has evolved as methods and water quality concerns have changed over time, although concerns about turbidity and algae have been a continuing challenge. The backbone of our current program is fixed-frequency grab samples at stream (Fig. 2), reservoir, and aqueduct sites, supplemented with storm-event sampling at select locations. High-frequency sensor readings have also become an increasingly important component of DEP's monitoring program.

In 2018 DEP performed approximately 240,000 analyses on 15,700 samples from about 475 locations throughout

Fig. 2: *Stream sampling in the Catskill Mountains*

the watersheds, and also took almost 1.3 million sensor measurements. With an evolving monitoring program DEP also continues to improve our data analyses and data visualization capabilities.

Algal Blooms

Algae have long been an issue in the NYC water supply, e.g. in a 1904 report it was noted that the "organisms which ordinarily give rise to the worst odors in the Croton Aqueduct are the blue-green algae. Several genera, such as Anabaena and Aphanizomenon, give the water a grassy, moldy odor." West of the Hudson, Synura and Uroglena were also offenders during the early days of trophic upsurge when the reservoirs were formed. More recently, we have begun surveillance of localized 'harmful algal blooms,' which have potential to produce toxins. DEP routinely collects phytoplankton samples from the reservoirs and selected aqueduct sites. Relevant analytes are also measured, including dissolved oxygen, pH, total phosphorus, chlorophyll a. and algal toxins (i.e. anatoxin-a, nodularin, cylindrospermopsin and six microcystin congeners). High frequency sensors for chlorophyll and phycocyanin (a blue-green algae pigment) are deployed to improve surveillance on selected reservoirs (Fig 3).

Organics and DBPs

DEP samples a wide range of constituents, including both regulated and unregulated contaminants. A national

Fig. 3: *Ashokan Reservoir dividing weir and a robotic buoy.*

regulatory authority, the U.S. Environmental Protection Agency, requires collection of data on unregulated contaminants under the Unregulated Contaminant Monitoring Rule (UCMR). These data recently included specific cyanotoxins, metals, pesticides, select haloacetic acid (HAA) disinfection byproducts (DBPs) and semivolatile organic chemicals and are used by the federal Environmental Protection Agency to guide future drinking water regulatory measures to protect public health. DEP has taken an additional initiative to screen for a range of volatile and semivolatile organic contaminants. DEP samples more than required by regulations to ensure that we meet the goal of protecting public health and the environment by providing clean drinking water to meet its core mission. Current and future challenges for water quality include maintaining compliance with drinking water regulations including the current Stage 2 Disinfectants and Disinfection Byproducts Rule. At present DEP is taking proactive steps to better understand how to monitor and predict DBP precursors through a study of two reservoirs that represent different trophic states and land uses. It is through special studies such as this that we develop an understanding of sources and predictive capability to improve management strategies.

Pathogens

While pathogens are controlled by chlorination and UV treatment, the first defenses against pathogens are system configuration and watershed management. Samples are collected throughout NYC's system of cascading reservoirs and analyzed for *Cryptosporidium* oocysts and *Giardia* cysts. Regarding system configuration, data indicate that the reservoirs act as sinks for cysts and oocysts, which demonstrate a reduction in concentrations as the water passes from one reservoir to the next. Samples collected upstream in the tributaries to the reservoir tend to have higher concentrations of pathogens than those collected at the respective reservoir outflows. Travel through several reservoirs in sequence promotes settling of these often particle-associated organisms, and also increases exposure to predation and UV from sunlight.

Regarding watershed management, the identification of the sources of pathogens is extremely beneficial. Microbial source tracking using molecular techniques has proven helpful in guiding watershed management practices. The use of polymerase chain reaction (PCR) for amplification of DNA and subsequent supplemental tests such as typing for Bacteroidales, or *Cryptosporidium* and *Giardia* genotyping and subtyping, has been essential in determining human versus non-human sources of contamination in reservoirs and streams. Once a source is identified, management practices can be applied for greatest effect.

Water Quality Modeling

Much of the data that DEP collects is brought together for the development, testing, and application of water quality models for the watersheds and reservoirs in our water supply. Since the early 1990's, models have been used to generally simulate reservoir inflow and outflow, including diversions for water supply, and measures of water quality that are important to our largely unfiltered water supply, including turbidity, nutrients, phytoplankton, organic carbon, and precursors of disinfection byproducts. DEP has developed and applied watershed models to simulate streamflow and water quality for streams entering our reservoirs, and models to simulate the fate and transport of pollutants through the water supply reservoirs.

The model development process has led to the identification of the sources and processes that significantly contribute to observed pollutant levels. Watershed models have been used to evaluate the impact of watershed protection efforts, and of predicted change in climate, on the streamflow and stream water quality. These modeling efforts identified stream channels and banks as the dominant sources of particles and found that agricultural runoff was the primary source of phosphorus, the limiting nutrient for phytoplankton growth. Models are essential to water management as they allow the prediction of the impact of reservoir operations, such as alternative intake elevations, on the quality of the water supply and evaluation of new infrastructure in advance of multi-million dollar expenditures.

Climate Change

Climate change is of importance to the NYC water supply because an abundant supply of high-quality water is essential for the health and economic well-being of 9.6 million people. Climate, specifically precipitation (Fig. 4), and temperature, are primary drivers of nearly all biogeochemical and ecological phenomena, many of which determine water quality in a surface water supply, such as NYC's. Temperature and precipitation govern characteristics such as water column stability, residence times, and biological growth; the interplay of these factors results in an ever-changing sequence of conditions. Consequently, there is an on-going need for continuous surveillance and active management to maintain high quality in the distribution system.

In order to understand the outcome of multiple processes and to optimize water quality, DEP employs a series of models (including GLM, SWAT, and CE-QUAL-W2) to address watershed management and planning questions. In addition, the Operational Support Tool (OST), specific for the NYC system, is a complex mathematical decision support tool that is not only used to guide current operations, but is being tested with future weather scenarios to evaluate future conditions. The next generation of scientists will need the mathematical and computing skills to face the challenges of incorporating model refinements such as improving downscaling resolution of climate models, to predict future climate scenarios with tools such as stochastic weather generators, and apply ecological models to understand potential future impacts on water quantity and quality. Ultimately, good science is essential in planning NYC adaptation strategies for climate change.

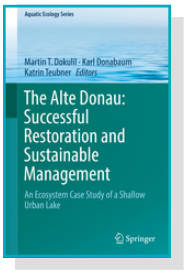
Fig. 4: *Ashokan Reservoir as seen from Slide Mountain, the highest summit in the Catskills. Snowmelt and spring rains account for 1.5 billion m^3 of runoff each year.*

In closing, water resources management should rest on the best science we can provide. The many scientists of SIL contribute to this essential body of knowledge. We applaud the SIL for its role in promoting and communicating the science we need for the protection, understanding, and management of the most precious resource on earth – WATER!

Book Reviews

The Alte Donau: Successful Restoration and Sustainable Management. An Ecosystem Case Study of a Shallow Urban Lake

Martin T. Dokulil, Karl Donabaum and Katrin Teubner (Eds).
Springer, Aquatic Ecology Series, Volume 10, pp. 407 (2019)



Limnologists are often drawn to lakes situated in scenic areas such as ancient forests or remote mountain valleys. Maintaining the ecological status of these waters presents many challenges but these are dwarfed by the problems encountered when managing urban lakes. In this volume, Martin Dokulil, Karl Donabaum and Katrin Teubner have assembled contributions from a number of authors to summarise the results of a restoration programme on an urban lake that took 25 years to complete. In the first chapter, Dokulil and Donabaum set the stage by describing the nature of the site and outlining some of the practical and theoretical problems encountered. The book is then divided into three sections: (1) An introductory section that describes the lake and the methods used for its restoration. (2) An analytical section that describes the changes observed at each stage of the process. (3) A planning and synthesis section that introduces some of the practical issues addressed in the closing years of the project.

In Chapter 2 Gerhard Nagel explains how the lake was created by the canalisation of the river in the 19th century and describes some of the ecological problems encountered in the 1980's. Chapter 3, by Kum and Dokulil details the physical characteristics of the lake and the weather patterns that influence its seasonal dynamics. These are explored in more detail in Chapter 4 where Raimund Taschke explains how a numerical model was used to calculate flows in this ground-water fed system. The methods used to rehabilitate the lake are described in some detail by Donabaum and Dokulil in Chapter 5. These included a reduction in the supply of nutrients, the treatment of the sediment with a chemical formulation (Riplox) and some final biomanipulation. The results of the interventions are then described by Donabaum and Riedler in Chapter 6 with diagrams that summarise the changes recorded from stage to stage. The ambition of the venture only becomes apparent when we note the time required to complete each phase of the project. Thus the eutrophication phase extended from 1987 to 1994, the restoration phase from 1995 to 1999, the recovery phase from 2000 to 2006 and the sustainability phase from 2007 to 2014. Chapter 7 by Riedler and Donabaum describes the role played by the sediment in the process and includes some information on the changes observed in the phytobenthos.

The first chapter in the analytical section is by Karin Pall on the wax and wane of the macrophytes. This includes an account of the plant groups found in the lake and the biomass changes recorded between 2005 and 2014. Chapter 9, by Teubner, Kabas and Teubner provides a detailed account of the changes observed in the phytoplankton between 1997 and 2014. A functional group approach is adopted to describe the changes and a Trophic State index used to demonstrate the shift from hypereutrophy to mesotrophy. In chapter 10 Dokulil and Kabas use productivity measurements to illustrate the magnitude of this shift. Their results demonstrate that phytoplankton production had halved by the end of the project but the carbon assimilated by the macrophytes had increased by an order of magnitude. Chapter 11, by Teubner, Großcharten and Teubner describes how the zooplankton of the Alte Donau responded to the restoration process. They document the change in the relative abundance of the Cladocera, Copepoda and Rotifera and provide some information on the size structure of the community. They conclude with an analysis of the impact of climate warming where they show that there has been a significant advance in the timing of the clear water phase. In Chapter 12, Gerald Pfister describes the ciliate assemblages of the Alte Donau where the main change observed was a gradual reduction in the population density. Chapter 13, by Velimirov, Fischer, Kirschner and Wieltschnig, describes the part played by the microbial loop' in the changing flux of carbon. They show that viruses play a key role in the dynamics of the Alte Donau and account for a high proportion of the bacterial mortality. The changes observed in the benthic invertebrate community are the subject of Chapter 14 by Janecek, Leitner, Moog and Teubner. In the early years, most of the invertebrates were associated with the sediment but the structure of the community changed once the macrophytes appeared. In Chapter 15 Waidbacher and Drexler describe the fish assemblages of the Alte Donau system. The chapter includes an analysis of changes in the stock and the catch and describes some of the biomanipulation experiments conducted. Since most of the fish now congregate in the macrophytes new plant harvesting techniques have had to be devised to minimise losses. In the last chapter of the section Raab and Goldschmid provide a general account of the water birds of the Vienna region. The chapter includes census data, notes on the spatial distribution of the birds and information on the development of a Grey Heron colony.

The first chapter in the planning and synthesis section is Wolfgang Zoufal's description of the procedures used to maintain the hygiene of popular swimming areas. Since most of these sites are in the care of the municipal authorities their public health record has been good but high coliform counts were reported in 1998. In recent years, there have been more reports of 'swimmers itch' in summer, a phenomenon known to be associated with high water temperatures. In Chapter 18 Pall and Goldschmid describe the planting schemes used to improve the littoral zone. Several reed beds were planted between 1989 and 1994 and some halophyte species added to increase biodiversity. The only chapter specifically devoted to urban planning is Chapter 19 where Brigitte Hozang explains the part played by this restoration in a regional conservation plan. This plan was developed in consultation with a wide range of end-users and was designed to improve public access to all the city's green spaces. In the final chapter, Dokulil, Donabaum, Pall, Janauer and Teubner outline how the experiences gained on the Alte Donau can be used to inform other lake restoration programmes. The book includes a subject and a taxonomic index and is illustrated with several colour photographs of the lake and its plants and animals.

This account of the restoration of the Alte Donau is unusual in that it was organized over quarter of a century and formed part of a much wider programme of urban conservation. The results demonstrate what can be achieved when a multi-disciplinary team can secure long-term funding for a carefully planned programme of rehabilitation. The municipal authorities in Vienna are to be congratulated on their vision and the editors for producing a book that explains what was achieved to a wider audience. The book will be of interest to many freshwater specialists as well as to those concerned with the management of lakes. It should prove of particular value to limnologists working in emerging economies where the pressures connected with urban development continue to grow.

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Obituaries

Constantine Herbert Fernando

1929-2018

Professor Constantine Herbert Fernando, Distinguished Emeritus Professor, University of Waterloo, Canada passed away on 18 September 2018. He was born on 04 April 1929 in Colombo, Sri Lanka. He went to the University of Ceylon in Colombo, obtained his B.Sc. degree in Zoology and achieved the highest ranking of any graduating student in the biological sciences. On that basis in 1953, he was awarded a scholarship to study at Oxford for his PhD. He attended Christ Church College at Oxford, and he did his PhD on aquatic insects at the Hope Department of Entomology, under the supervision of Professor G.C. Varley. In 1956, after returning home, he became an Assistant Lecturer in Zoology at the University of Ceylon. After a brief period at the University of Singapore, he started work at the Ceylon Fisheries Department as a Research Officer. In July 1965, he accepted a job in the University of Waterloo, Canada and became an Associate Professor in the Biology Department at the University of Waterloo and full professor in 1967. After his retirement in 1997, he was honoured as a Distinguished Emeritus Professor in the University of Waterloo. According to his wife, Prof. Aggie Fernando, Prof. Herbert, being an excellent cook, used to have weekly dinner parties with friends and hosting visitors and colleagues from all over the world. . I can remember that he cooked tasty food in his apartment and invited us for dinner. Until 2005, Prof. Fernando travelled extensively and visited over 50 countries. I first met him in 1976 as an undergraduate when he visited University of Kelaniya (then Vidyalankara Campus of University of Sri Lanka) to deliver a guest lecture.

In his scientific work, he ranged from his original study of aquatic insects, to fish, to parasites, to the study of zooplankton. One of his early research papers (Fernando 1956) was on rice field ecology. The book that he and his colleagues (Fernando et al. 2005) have more recently edited on aquatic ecology of rice fields perhaps reflects his long term interest in the ecology of rice fields. His publications on rice field ecology and fish culture (Fernando 1993; Fernando and Halwart 1999) provide many insights in importance of utilizing rice fields for fish production. Some of his seminal publications include freshwater zooplankton of Sri Lanka (Fernando 1980), zoogeographical distribution of freshwater calanoids in southeast Asia (Lai and Fernando 1980), cladocerans of Sri Lanka (Rajapakse and Fernando 1982), latitudinal distribution of caldocerans in India (Fernando and Kanduru 1984), a review on the ecology of tropical zooplankton (Dussart et al. 1984) and zooplankton, fish and fisheries in tropical freshwaters (Fernando 1994). Professor Fernando was one of the first to push for the introduction of tilapia, a staple fish for many now, because of its resilience and high yield. His much debatable opinion regarding introducing lacustrine-adapted fish such as tilapia, produce high yields in reservoirs because native fish fauna, which are generally riverine species, are incapable of successfully colonizing lacustrine habitats in reservoirs was highlighted in many publications (e.g., Fernando and Holčik 1982, 1991; Fernando 1991). Professor Herbert Fernando published over 250 papers and edited 6 books (e.g., Fernando, 1984, 2002). He was also a good singer and dancer. When we participated at the Third International Workshop on Reservoir Limnology and Water Quality, Czech Republic in August 1997, he sung a Russian song at the conference dinner, entertaining the entire audience. He kept up an enormous correspondence with colleagues, friends, and relatives from all over the world. He generously helped some early career fisheries scientists in Sri Lanka, realizing their financial difficulties. He has also helped many people from the developing countries to find financial support to carry out their postgraduate degrees. He was also an active member of Society of International Limnology.

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Colin Reynolds

1942-2018

Photo by Katrin Teubner

The name, Colin Reynolds, is familiar to most SIL members. His key experience was exploring phytoplankton patterns in different kinds of ecosystems in relation to a broad array of habitat characteristics including often neglected characteristics like light, turbulence and stratification patterns. His holistic approach not only allowed for a better understanding of ecosystem functioning but also for extending his knowledge to other disciplines and to applied aspects of environmental science and education. He was a dedicated member of the SIL since 1966 and Naumann-Thienemann Laureate in 2001.

Born in London and raised in Shropshire (England) he completed his formal education at the University of London (B.Sc. in 1965; Ph.D, in 1971, D.Sc. in 1981) Colin Reynolds started research at the Windermere Laboratory of the Freshwater Biological Association (seconded to Institute of Freshwater Ecology, 1989-2000 and to Centre of Ecology and Hydrology, 2000), where was employed until his retirement in 2002.

Colin Reynolds gained his early experiences were gained on naturally enriched meres of the English North-West Midlands including through experiments in large plastic enclosures (Lund Tubes) and studies of buoyancy regulation of cyanobacteria. He soon broadened his approach to many aspects of physiology, life history, indicator communities and process-based ecological models and to many different

Obituaries

kinds of aquatic ecosystems including high altitude lakes and biological oceanography. Generations of phytoplankton ecologists gained their basic knowledge from his more than 200 papers and three influential textbooks: "The ecology of freshwater phytoplankton" (1984), "Vegetation Processes in the Pelagic: A Model for Ecosystem Theory" (1997; as winner of the 1994 Excellence in Ecology Prize by the International Limnological Institute, Germany), and "The ecology of phytoplankton" (2006); edited or co-edited books, among them "The Lakes Handbook" (2003, 2006) as well as thematic journal issues (Developments in Hydrobiology/ Hydrobiologia 1993, 1994, 1998, 2000).

Colin Reynolds was a lifelong researcher. Though he acted as Elected Honorary Visiting Professor at the Universidad de Buenos Aires (1994) and as Invited Visiting Professor at the University of Reading (1995), his teaching activity extended far beyond these positions. He supervised six Ph.D. students and enthusiastically lectured at different conferences, symposia, workshops and wherever he was invited. He was a very thoughtful world leader in phytoplankton ecology and willingly gave time to encourage young researchers. As part of this activity, he was deeply involved in the foundation of the European Federation for Freshwater Sciences and was its convenor in the period 1999–2011. Inspired probably by his schoolteacher wife, Jane, his dedication to science and education led him to wrote about how to use lego bricks for teaching ecology (1994)

Apart of his immense contribution to aquatic ecology, Colin Reynolds was an active and dedicated member of his local community (see Tributes) in many different ways including his enjoyment of being mayor of Kendall in 1992-93.

While organizing the 8th Workshop of the International Association of Phytoplankton Taxonomy and Ecology (IAP) in Baja, Hungary 1991 a sudden idea came into my mind: how about inviting Prof. Reynolds – he might be interested in the topic (see Appendix in Sommer et al., 1993). I wrote a letter to him (also explaining that right after the changes in the East European countries) there was no financial support and I only hoped to get a response. What I got was his enthusiastic support with his 100% promise to come. An afternoon discussion of the general outcomes of the central topic of the workshop – i.e. the intermediate disturbance hypothesis to phytoplankton – proved unforgettable. He and my late professor Pál Juhász-Nagy, a theoretical ecologist, spent hours in front of a double blackboard (which was cleaned several times) and discussed, discussed and discussed the relationships between habitat properties, disturbances and community behavior. This event influenced Colin as he described in a short essay (2001). From that time on he never missed participating at the IAP Workhops sharing his knowledge with us.

On 5th December 2018 driving home from Budapest and I got stuck in a traffic jam on the highway. I started to read mails on my phone and found the sad message from Stephen Thackeray about Colin's death. During the rest of my drive my thoughts were full of nice memories, and recollections. I wrote a short message to the community of phytoplankton ecologists and a collection of the immediate responses tells us best how we all felt that day.

…" his 2 books were "the bible" for me! I remember puzzling over my phytoplankton data in the early 1980's, wondering what messages they contain, when his texts provided the eye-opener. He was a wonderful teacher! ... He will remain in that role in phytoplankton ecology, and ever so often I respond to submissions for Limnologia with: "please read Colin Reynolds and try to give some explanation of WHY your CCA data indicate what you propose they prove!"

– Ingrid Chorus (Germany)

"Colin has been one of the outstanding phytoplankton ecologists of the world, author of great publications including books,… which guided the and inspired the research of many of us. On top of that, he has been a wonderful person, a great colleague and friend. What a sad day!"

– Ulrich Sommer (Germany)

…"I remember him very much as the great teacher of all of us."

– Carmen Royo (Spain)

"How sad this news ..... sad for the enthusiastic and wonderful person that Colin was, and sad for the scientific community. His work is eternalized and we are very grateful for everything he has taught us. God bless you dear Colin."

– Vanessa Becker (Brazil)

"I am extremely grateful for having been able to meet and work with Colin who has done so much in the field of Limnology and who always was so enthusiastic and lively"…

– Martin Dokulil (Austria)

"I'm very sad ... Colin was a fantastic person, he left us a lot, not only for his great scientific legacy, but also in all the human aspects."

– Irina Izaguirre (Argentina)

"Colin Reynolds has been a great person, an inspiration for our generation around the world… I feel very sad."

– Maria Moustaka (Greece)

"I have so much to thank Colin for and I have used much of his ideas in interpretations of phytoplankton occurrences in Swedish lakes."

– Eva Willén (Sweden)

"Colin was an inspiration for more than one generation around the world…. I have no more words at this moment."

– Vera Huszar (Brazil)

"What a big loss !! So, so sad! I first met Colin as a PhD student when I visited the Ferry House, then he was one of the examiners of my PhD thesis. In the 1980s and 1990s I read every single paper he published. … his textbooks on the ecology of phytoplankton are the single major source I always go to first. … May he rest in peace."

– Tamar Zohary (Israel)

"Colin meant a lot to me, since the 1980s, where I got aquatinted with his writings, and met him for the first time at the SIL Congress in Copenhagen. … He was a unique and most helpful person, who managed to combine his understanding of phytoplankton traits with limnological knowledge, and with his political work as a Mayor in Kendal in order to save lakes from human impact. I am so sad he is no longer with us. Blessed be his memory."

– Kirsten Olrik (Denmark)

"I think that all those who had chance to benefit from Colin's friendship are finding themselves deprived from this sad event. It will take time to grieve."

– Luigi Naselli-Flores (Italy)

"…young 'phytoplankton scientists', who … never met him, have also and always been motivated and inspired by his work. This inspiration will last for very long time."

– András Abonyi (Hungary)

Yes, it has been difficult to find the words. Thank you, Colin!

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Dietrich Uhlmann

1930-2018

With sadness, we have to communicate that on 22 October 2018, Prof. Dr. Dietrich Uhlmann passed away in Dresden, Germany.

Prof. Uhlmann was born on 4 August 1930 in Chemnitz (Germany). He studied zoology and botany at the University of Leipzig, where he also got his PhD in 1957. During the early scientific career, his main research area was the self-purification of wastewater in ponds and the role of cladocerans in this process. Already in this phase of his scientific development, the combination of basic limnological research and application in water-related fields has become a major characteristic of Dr. Uhlmann's activities. Between 1959 and 1967, Dr. Uhlmann worked as Oberassistent (similar to an Associate Professorship) in Leipzig, where he got his habilitation (qualification for teaching) in 1964 on energetics of plankton-dominated highly eutrophic shallow aquatic ecosystems. This pioneering work was the foundation for the theories of biomanipulation and biostability of shallow lakes, topics which have enthusiastically been discussed decades later in the limnological community. In 1967, Dr. Uhlmann became full Professor for Hydrobiology at the University of Technology Dresden. During the next almost two decades until 1994, Prof. Uhlmann was the teacher of numerous students of hydrobiology, but also taught hydrobiology and limnology to many students of chemistry, hydrology and water engineering. His institute of hydrobiology became famous for this comprehensive approach to consider limnology as a truly holistic science, which links theoretical foundations with practical applications to solve real-world problems. Furthermore, Prof. Uhlmann was heavily engaged in teaching for the UNESO post-graduate course „Environmental Management of Developing Countries". He served as vice president of SIL between 1987 and 1992, and became editor in chief of the traditional limnological journal Internationale Revue der gesamten Hydrobiologie (now International Review of Hydrobiology). Prof. Uhlmann's work, his more than 150 scientific papers and a textbook on Technical Hydrobiology, were well received also outside the rather isolated scientific community in the Eastern European countries. Honoring his major contributions to limnology in the broadest sense, Prof. Uhlmann was awarded the Naumann-Thienemann medal of the SIL in 1987. After his retirement in 1994, Prof. Uhlmann remained active as researcher, and kept his office at the Institute of Hydrobiology until his death. During these years, he still contributed to several publications, for example about the limnology of reservoirs. He participated in conferences and as guest in many seminars at the Institute of Hydrobiology, and liked to discuss with the young generation.

Because of his friendly modest nature, his respectful interaction with other people, his selfless promotion of young scientists and because of his universal knowledge, he was enormously respected by students and colleagues. He was passionate about hydrobiology, and shared this passion with all of us. The German and international limnology has lost a great researcher and university teacher. We, his colleagues, students and friends, will keep him in memory.

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SvyatoiNos Peninsula and Small Ushkany iIslands. Photo by O. Timoshkin

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